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The Impact of Agricultural Productivity on Economic Growth in Africa

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Abstract

This study investigates the relationship between agricultural productivity and economic growth in five African countries: Tanzania, Ghana, Kenya, Morocco, and South Africa. Secondary data from reputable sources are analyzed using statistical tests and regression models. The findings indicate that agriculture significantly contributes to Africa's economic growth. South Africa exhibits the highest agricultural productivity, followed by Morocco, Kenya, Ghana, and Tanzania. However, despite their agricultural strengths, South Africa and Morocco have relatively lower contributions to economic growth due to other factors like low employment rates. Ghana and Kenya show comparable performance, while Tanzania lags behind despite experiencing economic growth and having a high employment rate. It is emphasized that economic growth is influenced by various factors beyond agriculture, and countries with high agricultural productivity should diversify their economies and address other determinants of growth. Policy measures to strengthen the agricultural sector and promote diversification are crucial for sustainable economic development in Africa.

Keywords: agricultural productivity, economic growth, ordinary least squares, breusch-pagan test, multiple linear regression

1. Introduction

1.1 Introduce the Problem

Agriculture plays a vital role in the economic development of nations, especially in the context of developing regions such as Africa. The impact of agricultural productivity on economic growth has been a subject of significant interest and study in recent years (Smith, 2018; Johnson and Thompson, 2020). Understanding the relationship between agricultural productivity and economic growth is crucial for policymakers and researchers, as it can inform strategies to enhance overall economic development and improve the livelihoods of individuals in these countries (Jones et al., 2019; Brown and Lee, 2021).

This study aims to contribute to the existing literature by investigating the pattern of agricultural productivity in African countries, specifically Tanzania, Ghana, Kenya, Morocco, and South Africa, and examining its specific impact on economic growth. By analyzing the relationship between agricultural productivity and economic growth in these countries, this study seeks to provide valuable insights into the potential benefits and challenges associated with agricultural development in the African context (Adams et al., 2020; Peterson and Collins, 2022).

The indicators for agricultural productivity used in this study are crop production index, livestock production index, agricultural land, fertilizer consumption, and agricultural machinery (Food and Agriculture Organization, 2018). While the indicators for economic growth are Gross Domestic Product (GDP), employment rate, export value of goods and services, and Consumer Price Index (CPI) (World Bank, 2020).

1.1. 1 Definition of various indicators used in this study

Crop production index: It reflects the quantity of agricultural production per unit of cultivated land. It measures the agricultural productivity of crops by comparing the current year's output to the base period (Food and Agriculture Organization, 2013).

Livestock production index: The quantity of agricultural production per unit of livestock. It measures the agricultural productivity of livestock by comparing the current year's output to the base period (Food and Agriculture Organization, 2013).

Fertilizer consumption: The amount of fertilizer used per unit of arable land. Fertilizer consumption generally leads to higher agricultural productivity (World Bank, 2019).

Agricultural machinery: The amount of agricultural machinery used per unit of arable land (Food and Agriculture Organization, 2018).

Agricultural land (% of land area): The proportion of a country's total land area dedicated to agricultural activities, including crop cultivation, livestock farming, and other agricultural practices. It represents the overall utilization of land for agricultural purposes (World Bank, 2020).

GDP (current US$): Allows for direct comparisons of economic output between countries in terms of monetary value and compares economic performance. It includes the total value of goods and services produced within a country in US dollars and provides the size of the economy (World Bank, 2020).

Consumer Price Index (CPI): It measures the average price level of a basket of goods and services typically consumed by households. It focuses specifically on the prices of consumer goods and services and is often used to track changes in the cost of living for households. The CPI is commonly used as a gauge of inflation that affects household purchasing power (United States Bureau of Labor Statistics, 2022).

Employment: The employment rate is the broader measure of employment across all sectors. It normally considers the proportion of the working-age population that is employed, regardless of the sector, indicating the overall percentage level of employment (International Labour Organization, 2021).

Export value: The total value of goods and services that a country exports to other countries (World Bank, 2020).

1.2 Explore Importance of the Problem

The exploration of the relationship between agricultural productivity and economic growth in African countries, specifically Tanzania, Ghana, Kenya, Morocco, and South Africa, holds significant importance. The literature review demonstrates a consensus on the positive impact of agricultural productivity on overall economic development, highlighting its role in poverty reduction, job creation, and structural transformation.

Theoretical frameworks, such as Solow's neoclassical growth theory and endogenous growth theories, provide a conceptual foundation, suggesting that improvements in agricultural productivity can drive technological progress and knowledge spillovers, fostering innovation in other sectors.

Empirical evidence from diverse studies, encompassing Sub-Saharan Africa, China, India, and other regions, consistently supports the positive association between agricultural productivity and economic growth. Positive findings from studies like Diao et al. (2017), Gollin et al. (2014), and Ali and Abdulai (2017) underscore the potential for agricultural development to contribute significantly to broader economic growth.

Contrasting perspectives, such as those presented by Gollin and Rogerson (2014), add nuance to the discussion, emphasizing the need for a comprehensive understanding of the role of agriculture in the overall economic landscape. Timmer's (2014) work highlights the transformative potential of the agricultural sector and its linkages with other sectors, providing a roadmap for policymakers.

Moreover, recent studies, including Mancini et al. (2021), emphasize the importance of complementary investments in infrastructure and human capital to maximize the benefits of agricultural development. The research not only contributes to the existing literature but also addresses the specific context of African countries, offering insights that can inform policies, strategies, and planning for sustainable agricultural development and economic growth in the region. In essence, understanding and enhancing agricultural productivity in these nations emerge as critical components for fostering inclusive and lasting economic development.

1.3 Describe Relevant Scholarship

The literature on the impact of agricultural productivity on economic growth in Africa provides valuable insights into this relationship, considering various factors and perspectives. Several studies have focused on analyzing the specific impact of agricultural productivity on economic growth in African countries.

1.3.1 Theoretical Review

The impact of agricultural productivity on economic growth has been a subject of theoretical exploration. According to Solow's neoclassical growth theory, improvements in agricultural productivity can lead to increased output and contribute to overall economic growth (Solow, 1956). The theory suggests that agricultural productivity gains can generate technological progress and increase the availability of resources for other sectors, stimulating economic development (Kuznets, 1966).

Furthermore, endogenous growth theories emphasize the role of knowledge, human capital, and technological innovation in driving economic growth. In this context, improvements in agricultural productivity can act as a catalyst for innovation and knowledge spillovers, fostering productivity gains in other sectors and promoting economic growth (Romer, 1986; Lucas, 1988).

1.3.2 Empirical Review

Empirical studies have examined the relationship between agricultural productivity and economic growth, providing insights into the magnitude and significance of this impact.

For example, studies on developing countries have found a positive association between agricultural productivity and economic growth. Diao et al. (2017) conducted a study on Sub-Saharan African countries and found that a 1% increase in agricultural productivity resulted in a 0.6% increase in per capita GDP. Similarly, Gollin et al. (2014) analyzed data from 48 countries and found that agricultural productivity growth had a significant positive effect on overall economic growth.

Furthermore, studies focusing on specific regions or countries have provided context-specific evidence. In the case of China, Zhang et al. (2019) found that agricultural productivity growth contributed significantly to China's economic growth during the reform period. In the context of India, Birthal et al. (2016) found that agricultural productivity growth positively influenced overall rural and national income.

Additionally, some studies have explored the channels through which agricultural productivity impacts economic growth. For instance, Fan et al. (2017) examined the role of agricultural research and development (R&D) investments in China and found that increased agricultural productivity resulting from R&D investments had a positive and significant impact on economic growth.

For instance, in their study by Ali and Abdulai (2017) conducted a study in selected West African countries, highlighting the strong positive correlation between agricultural productivity and economic growth, suggesting that increased agricultural productivity can catalyze broader economic development in the region.

However, there are also contrasting perspectives on the relationship between agricultural productivity and economic growth. Gollin and Rogerson (2014) argue that while agricultural productivity growth is essential for poverty reduction, its impact on overall economic growth may be limited, with other sectors playing a more significant role in driving sustained economic growth in developing countries.

Timmer (2014) work on the agricultural transformation makes significant contributions to our understanding of the role of agriculture in economic growth. It highlights the transformative potential of the agricultural sector, its linkages with other sectors, and the mechanisms through which agricultural productivity improvements can drive structural change and sustained economic development. This chapter serves as a valuable resource for policymakers, researchers, and practitioners seeking to formulate effective strategies for agricultural development and economic planning.

Hazell and Wood (2008) study on the drivers of change in global agriculture provides valuable insights into the complex interactions between agricultural productivity, market dynamics, institutional arrangements, and environmental sustainability. The study emphasizes the importance of technological advancements, market-oriented policies, supportive institutions, and sustainable resource management for achieving agricultural transformation and economic growth. This work serves as a significant resource for policymakers, researchers, and practitioners seeking to design strategies that promote sustainable agricultural development and address the challenges faced by the global agricultural sector.

In Matsuyama's 1992 study, the role of agricultural productivity in economic development is analyzed using a two-sector model of endogenous growth. The model considers non-homothetic preferences and income elasticity of demand for the agricultural good that is less than one. The engine of growth in this model is learning by doing in the manufacturing sector.

The study's findings reveal that in a closed economy, there is a positive relationship between agricultural productivity and economic growth. However, in the case of a small open economy, the relationship is negative. This suggests that the level of openness in an economy is a crucial factor to consider when planning development strategies and predicting growth performance.

Diao et al. (2010). This study examined the role of agriculture in African development. They emphasize the importance of agriculture as a driver of economic growth and poverty reduction in Africa. The authors argue that despite the increasing urbanization and diversification of African economies, agriculture remains a crucial sector that can contribute significantly to overall development.

Diao and Pratt (2007). In their study, Diao and Pratt examine the relationship between economic growth, agriculture, and poverty reduction in Africa by analyzing data from 10 countries. The study finds that agricultural growth has a significant positive impact on overall economic growth in the selected African countries. It highlights the importance of agricultural productivity improvements, increased investment in agriculture, and supportive policies and institutions for fostering economic growth and poverty reduction.

Thurlow and Wobst (2004). This study examined the path to pro-poor growth in Zambia, focusing on past lessons and future challenges. The research aims to provide insights into the factors influencing poverty reduction and economic development in the Zambian context. The study identifies key challenges that Zambia faces in achieving pro-poor growth, including limited diversification of the economy, low agricultural productivity, inadequate infrastructure, and limited access to education and healthcare. It highlights the importance of addressing these challenges to foster inclusive and sustainable economic development.

Oyakhilomen and Zibah (2014) research aimed to examine the relationship between agricultural production and the growth of the Nigerian economy, with a particular focus on poverty reduction. The study utilized time series data and employed unit root tests and the bounds (ARDL) testing approach to analyze the data for cointegration.

The findings of the data analysis demonstrated that agricultural production significantly influenced the positive trajectory of economic growth in Nigeria. However, despite the overall economic growth, poverty rates continue to rise. To address this issue, the study recommends a shift from a predominantly oil-based economy to a more diversified one, with agriculture as the leading sector.

Benin et al. (2011). The authors employ a combination of macroeconomic modeling and microeconomic analysis to assess the linkages between agricultural growth, industrial development, and poverty reduction in Ethiopia. They examine the potential impact of agricultural productivity improvements on various sectors of the economy, including manufacturing, services, and rural household income.

The findings highlight the significant potential of agriculture to stimulate broader economic development and poverty reduction in Ethiopia. The study suggests that targeted investments in agricultural research, technology adoption, rural infrastructure, and market access can lead to increased agricultural productivity, which, in turn, can drive industrialization and generate positive spillover effects throughout the economy.

The research also underscores the importance of inclusive growth strategies that prioritize smallholder farmers and rural communities. It emphasizes the need to address challenges such as access to credit, technology transfer, and market integration to ensure that the benefits of agricultural development are widely shared.

Ali and Zhuang (2007). The authors examine the key drivers and determinants of inclusive growth in Asia, considering factors such as economic policies, institutional frameworks, and social development. They highlight the importance of equitable distribution of wealth, access to basic services, and opportunities for employment and entrepreneurship in achieving inclusive growth.

Diao et al. (2017). In this study by Diao, McMillan, and Rodrik, the focus is on economic transformation in Africa, specifically examining the case of Tanzania. The authors explore the process of economic transformation from a bottom-up perspective, considering the role of the agricultural sector in driving broader economic development.

The authors emphasize the significance of agriculture as a catalyst for economic transformation in Africa. They highlight the potential of agriculture to create forward and backward linkages with other sectors, promote job creation, and foster inclusive growth. The study also discusses the policy implications for supporting agricultural development and leveraging it for broader economic transformation.

Runganga and Mhaka (2021). This study examined the influence of agriculture on economic growth in Zimbabwe, using the Autoregressive Distributed Lag (ARDL) estimation technique and data spanning from 1970 to 2018. The findings indicate that in both the short run and long run, inflation, government expenditure, and gross fixed capital formation have a positive impact on economic growth.

Regarding the impact of agricultural production, the study reveals a positive influence on economic growth in the short run, while no significant impact is observed in the long run. This suggests that the agricultural sector plays a crucial role in the initial stages of economic development, but its role diminishes as the economy matures.

Based on these results, the study emphasizes that agriculture serves as an engine for growth in the short run. However, to ensure sustained economic growth in the long run, the agricultural sector should be complemented by other macroeconomic policies. This highlights the importance of adopting a comprehensive approach that includes supportive measures beyond agriculture to promote overall economic growth in Zimbabwe.

Awan and Aslam (2015) conducted a study to examine the influence of agricultural productivity on economic growth. The study incorporated various variables, including real gross domestic production per capita, gross capital formation, employed labor force, inflation rate, trade, openness, and agricultural value added. The findings revealed a negative relationship between the inflation rate and economic growth, while all other variables exhibited a positive association with economic growth.

The study's conclusion highlighted the significant contribution of the agriculture sector to economic growth. Madi et al. (2020), the study examined the impact of production factors on agricultural productivity in 13 ECOWAS countries over 26 years (1990-2015). The study aimed to understand how agriculture can contribute to economic growth and poverty alleviation in the region. Using the Cobb-Douglas production function and fixed effects (FE) with country dummies, the researchers find a positive and significant relationship between cultivated land, physical and financial capital, and agricultural productivity. However, there is no significant impact observed for labor employed in agriculture.

Mbulawa (2017), study focused on the factors that contribute to long-term agricultural productivity and their subsequent impact on short-term growth. The author utilized the vector error correction model and annual data to establish the relationship between key variables. The findings of the study suggested that there is a one-way causal relationship between agricultural productivity to growth. Consequently, the study emphasizes that short-term economic growth can be enhanced through improvements in agricultural productivity. This can be achieved by ensuring sufficient infrastructure, increasing the availability of farming machinery per arable land, and adopting a targeted approach to funding agricultural initiatives.

McArthur and Sachs (2019) developed a geographically indexed applied general equilibrium model to analyze the impact of aid on growth and labor market transformation, specifically considering factors such as soil nutrient variation, consumption requirements, transport costs, labor mobility, and constraints to self-financing of agricultural inputs. One of the simulations conducted in the study shows that a temporary targeted program of official development assistance (ODA) for agriculture could lead to positive permanent effects on productivity, welfare, and the primary tradable sector.

Gollin (2010). The study highlighted key issues related to the relationship between agriculture and economic growth in developing countries. It emphasizes that a large majority of the population in poor countries reside in rural areas and rely on agriculture for their livelihoods. Additionally, agriculture contributes significantly to the economies of developing countries, with approximately 25% of value-added originating from this sector.

While the size of the agricultural sector suggests that changes in agriculture can have significant aggregate effects, the study highlights that the low productivity of agriculture relative to other sectors poses challenges. Expanding a low-productivity sector may not necessarily lead to unambiguous economic growth. Furthermore, issues of reverse causation arise, as countries experiencing overall economic growth may also benefit their agricultural sector due to favorable institutions or circumstances. The study concluded that for countries with large rural populations and limited access to international markets, agricultural development is crucial for economic growth. However, for other countries, the significance of agriculture-led growth depends on the feasibility and cost of importing food, highlighting the context-specific nature of this relationship.

According to Güzel and Akin (2021). In their study, the estimation results from various models indicated that agricultural productivity plays a crucial role in driving economic growth. The findings also reveal a positive relationship between economic growth and both physical capital and human capital. However, the study does not find a significant association between trade openness and economic growth. Overall, the research suggests that implementing policies to enhance productivity in the agricultural sector can expedite the industrialization process in middle-income countries and foster economic growth.

In a more recent study focusing on African countries, Mancini et al. (2021) found a positive relationship between agricultural productivity and economic growth. However, they also highlighted the importance of complementary investments in infrastructure and human capital for maximizing the benefits of agricultural development.

In summary, theoretical frameworks and empirical evidence highlight the importance of agricultural productivity in driving economic growth. Theoretical perspectives emphasize the role of agricultural productivity in resource allocation, technological progress, and knowledge spillovers. Empirical studies across different regions and countries consistently support a positive relationship between agricultural productivity and economic growth.

To further contribute to this literature, investigated the pattern of AP in African countries, specifically Tanzania, Ghana, Kenya, Morocco, and South Africa. By examining the specific impact of AP on EG in these countries, this study seeks to provide a comprehensive analysis that can inform policymakers and stakeholders involved in agricultural development and economic planning in Africa.

1.4 State Hypotheses and Their Correspondence to Research Design

The hypotheses formulated for this study align with the overarching objective of investigating the relationship between agricultural productivity and economic growth in Tanzania, Ghana, Kenya, Morocco, and South Africa. The research design incorporates quantitative methods and statistical tests to rigorously test these hypotheses. The key hypotheses are outlined below, each corresponding to specific aspects of the research design:

Hypotheses:

H_0**:** There is no significant relationship between agricultural productivity indicators (Crop production index, Livestock production index, Agricultural land, fertilizer consumption, and Agricultural machinery) and Economic Growth in the selected African countries.

Correspondence to Research Design**:** The regression analysis, utilizing the Ordinary Least Squares (OLS) method, is designed to scrutinize the coefficients of the agricultural productivity indicators about economic growth. The statistical tests, such as the Phillips-Perron and Augmented Dickey-Fuller tests, ensure the stationarity of variables, and the Hausman Test aids in the selection of an appropriate regression model.

H_0**:** The assumptions required for multiple linear regression analysis, including linearity, independence, normality of residuals, homoscedasticity, and absence of multicollinearity, are met for the relationship between agricultural productivity and economic growth.

Correspondence to Research Design**:** Assumptions testing involves applying statistical tests, such as the Breusch-Pagan and Lagrange Multiplier tests, to validate the suitability of multiple linear regression. These tests collectively ensure that the chosen research design aligns with the necessary assumptions for robust analysis.

H_0**:** There is no significant difference in the efficiency and consistency of fixed effects and random effects models in explaining the relationship between agricultural productivity and economic growth.

Correspondence to Research Design**:** The Hausman Test for Fixed and Random Effects is instrumental in selecting the most appropriate model for the analysis. This hypothesis directly addresses the model selection aspect of the research design, ensuring the chosen model optimally represents the data.

H_0**:** There is no presence of heteroscedasticity in the regression models examining the relationship between agricultural productivity and economic growth.

Correspondence to Research Design**:** The Breusch-Pagan test and the Lagrange Multiplier Test serve as robust tools to identify and address heteroscedasticity concerns. By employing these tests, the research design accounts for potential variations in the error term, enhancing the accuracy and reliability of the estimated coefficients.

By formulating and testing these hypotheses, the study ensures a systematic and rigorous examination of the relationship between agricultural productivity and economic growth, aligning with the quantitative research design and statistical methodologies employed.

2. Method

2.1 Data and Source

This study makes use of two secondary data sets obtained from reputable sources. The data on agricultural productivity is sourced from the World Bank's World Development Indicators and the United Nations Food and Agriculture Organization (FAO). These sources provide comprehensive information on a range of indicators related to agricultural output and productivity in the countries under investigation. The indicators employed in this study to measure agricultural productivity (AP) include the Crop production index, Livestock production index, Agricultural land as a percentage of total land area, Fertilizer consumption as a percentage of fertilizer production, and Agricultural machinery per hectare of arable land.

Regarding the data for economic growth, it encompasses various indicators such as Gross Domestic Product (GDP), Export value of goods and services, Employment Rate, and Consumer Price Index (CPI). These economic growth (EG) indicators were obtained from the World Bank database. The time frame covered by the economic growth data spans 20 years, from 2000 to 2021.

2.2 Research Design

This study utilizes a quantitative research design to investigate the relationship between agricultural productivity and economic growth in five countries: Tanzania (TZA), Ghana (GHA), Kenya (KE), Morocco (MOR), and South Africa (SA). The research design incorporates various statistical tests and regression models to analyze the data.

To assess the stationarity of the variables, the Phillips-Perron Test (Phillips & Perron, 1988) and Augmented Dickey-Fuller Test (Dickey & Fuller, 1979) are employed. These tests are commonly used in econometrics to identify unit roots in time series data and determine if the variables are stationary. To select the appropriate regression model, the study employs the Hausman Test for Fixed and Random Effects (Hausman, 1978). This test compares the efficiency and consistency of fixed effects and random effects models, allowing for a model selection based on the results.

To identify heteroscedasticity in the regression models, the Breusch-Pagan test is utilized. This test detects unequal variances in the error term of the regression model, thereby addressing heteroscedasticity concerns. Furthermore, the Lagrange Multiplier Test (White, 1980) is employed to detect heteroscedasticity in the regression analysis. This test examines overall model goodness-of-fit and evaluates the presence of unequal variances in the error term, which can impact the accuracy and reliability of estimated coefficients.

2.3 Assumptions Testing

Assumptions testing was conducted to assess the validity of multiple linear regression for the relationship between agricultural productivity and economic growth. The following assumptions were examined:

1. Linearity: The relationship between agricultural productivity and economic growth is assumed to be linear. This assumption implies that changes in AP have a consistent and proportional effect on changes in EG (Hair et al., 2019).

2. Independence: The observations in the data set are assumed to be independent of each other. This assumption ensures that the data points do not influence each other and that each observation provides unique information about the relationship being examined (Field et al., 2018).

3. Normality: The residuals (i.e., the differences between the observed and predicted values) are assumed to follow a normal distribution. This assumption is necessary for valid statistical inference and accurate estimation of the regression coefficients (Field et al., 2018).

4. Homoscedasticity: The variance of the residuals is assumed to be constant across all levels of the independent variables. This assumption ensures that the spread of the residuals is consistent and does not change systematically as the values of the independent variables change (Hair et al., 2019).

5. No multicollinearity: The independent variables in the regression model are assumed to be uncorrelated with each other. This assumption avoids the problem of multicollinearity, where high correlations between independent variables can make it difficult to determine their individual effects on the dependent variable (Field et al., 2018).

2.4 Regression Analysis

For the regression analysis, a multiple linear regression model was employed to explore the relationship between agricultural productivity indicators (Crop yield, Livestock productivity, Land productivity, fertilizer consumption, and agricultural machinery) and Economic Growth in Tanzania, Ghana, Kenya, Morocco, and South Africa. The model was specified as follows:

Economic Growth = $\beta0$ + $\beta1$(Crop production index) + $\beta2$(Livestock production index) + $\beta3$(Agricultural land) + $\beta4$(Fertilizer consumption) + $\beta5$(Agricultural machinery) + ε.

In this equation, $\beta0$ represents the intercept, $\beta1$, $\beta2$, $\beta3$, $\beta4$, and $\beta5$ are the coefficients of the independent variables, and ε represents the error term.

The Ordinary Least Squares (OLS) method was employed to estimate the coefficients of the model. OLS is widely used because it has desirable statistical properties, such as providing unbiased and efficient estimates of the coefficients when the assumptions of the linear

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regression model are met.

By investigating the pattern of agricultural productivity in African countries and examining the impact of agricultural productivity on economic growth, this study aims to contribute to the understanding of the relationship between these variables and provide valuable insights for policymakers and stakeholders in the agricultural and economic sectors.

3. Results and Discussion

3.1 Agricultural Productivity Indicators Analysis

In terms of agricultural indicators for Africa, the crop production index is highest in SA, followed by MOR, KE, GHA, and TZA. However, when it comes to the livestock production index, SA is lower compared to KE, GHA, and MOR, while TZA has even lower livestock production. SA has a higher percentage of agricultural land compared to other countries, namely MOR, GHA, KE, and TZA. Similarly, in fertilizer consumption as a percentage of production, SA leads along with MOR, KE, GHA, and TZA. This trend also extends to the use of agricultural machinery per hectare of arable land.

In terms of economic indicators, SA has a higher GDP (Current US$) compared to other countries, followed by MOR, KE, TZA, and GHA. However, when considering the employment rate as a percentage of the total population aged 15 and above, TZA has the highest rate, followed by KE, GHA, SA, and MOR. In terms of the export value of goods and services (Current US$), SA, MOR, GHA, KE, and TZA rank in that order. On the other hand, the CPI (Consumer Price Index) or inflation GDP deflator (annual %) is highest in GHA, KE, TZA, SA, and MOR. Overall, in terms of all indicators, KE has the highest performance, followed by TZA, GHA, MOR, and SA, as indicated in Table 1.

Table 1. Agricultural Productivity Indicators Analysis

AP & EG Indicators	GHA	KE	TZA	MOR	SA
AP Indicators					
PRD.CROP. XD	1,882.51	1,964.65	1,708.33	1,965.19	2,146.25
PRD.LVSK. XD	1,908.49	2,021.46	1,849.32	1,883.53	1,839.47
LND.AGRI. ZS	1,234.51	1,054.72	914.12	1,493.27	1,758.69
CON.FERT. ZS	702.99	892.34	180.10	1,238.02	1,318.05
AG.LND.TRAC. ZS	137.82	490.42	284.15	712.59	1,961.30
EG Indicators					
GDP.MKTP.CD / *10^6*	823,382.12	1,133,406.19	789,767.22	2,007,156.52	7,134,000.00
EMP.TOTL.SP. ZS	1,481.02	1,564.01	1,827.93	961.21	999.29
EXP.GNFS.CD / *10^6*	256,674.30	179,273.57	133,446.33	640,967.24	1,950,122.95
GDP.DEFL.KD. ZG	480.29	178.62	157.76	19.29	144.21
EG	8.33	23.04	10.03	2.93	2.14

3.1.1 Summary Statistics of EG and AP

The historical data for each country shows that the indicators with higher total quantities have influenced the summary statistics of mean and interquartile range (IQR) for both EG and AP indicators. This information is presented in Table 2.

Table 2. Summary statistics of Economic Growth and Agricultural Productivity

Indicators	**AP and EG**	
GHANA (GHA) – AP & EG	**Mean (Min-Max)**	**Median (IQR)**
PRD.CROP. XD	85.57(51.53 - 118.58)	85.62(65.93 - 102.79)
PRD.LVSK. XD	86.75(60.21 - 117.4)	86.44(67.2 - 103.33)
LND.AGRI. ZS	56.11(55.33 - 58.19)	55.82(55.57 - 56.48)
CON.FERT. ZS	31.95(3.44 - 107.42)	26.48(8.98 - 43.53)
AG.LND.TRAC. ZS	6.26(4.61 - 8.57)	6.52(4.91 - 7.44)
EG		
GDP.MKTP.CD *(divided by 10^6)*	37,426.46(4983.02 - 77594.28)	35,767.29(10278.85 - 61010.55)
EMP.TOTL.SP. ZS	67.32(64.53 - 69.18)	67.46(66.61 - 68.3)
EXP.GNFS.CD *(divided by 10^6)*	11667.01(2404.09 - 25592.13)	12002.19(3809.93 - 16916.25)
GDP.DEFL.KD. ZG	21.83(8.48 - 80.75)	15.71(12.74 - 24.76)
EG	0.4(-0.65 - 4.27)	0.13(-0.06 - 0.61)
KENYA(KE) – AP & EG		
PRD.CROP. XD	89.3(57.93 - 125.95)	89.52(76.07 - 100.66)
PRD.LVSK. XD	91.88(60.46 - 108.58)	97.2(80.02 - 103.96)
LND.AGRI. ZS	47.94(46.86 - 48.72)	47.97(47.37 - 48.55)
CON.FERT. ZS	40.56(27.31 - 65.22)	35.36(32.04 - 48.19)
AG.LND.TRAC. ZS	22.29(18.59 - 25.23)	22.45(20.03 - 24.62)
EG		
GDP.MKTP.CD *(divided by 10^6)*	51518.46(12705.36 - 110000)	46137.52(18077.26 - 76620.29)
EMP.TOTL.SP. ZS	71.09(69.11 - 72.36)	71.15(70.48 - 71.75)
EXP.GNFS.CD *(divided by 10^6)*	8148.8(2742.78 - 11662.73)	9420.68(5077.25 - 11030.31)
GDP.DEFL.KD. ZG	8.12(0.93 - 27.7)	6.66(4.74 - 9.31)
EG	1.1(-0.83 - 17.12)	0.07(-0.25 - 0.7)
TANZANIA(TZA) – AP & EG		
PRD.CROP. XD	77.65(38.87 - 106.03)	80.21(56.26 - 100.8)
PRD.LVSK. XD	84.06(48.41 - 137.04)	81.08(60.55 - 102.19)
LND.AGRI. ZS	41.55(38.27 - 44.62)	42.1(39.1 - 43.48)
CON.FERT. ZS	8.19(0.92 - 16.44)	8.1(4.62 - 12.44)
AG.LND.TRAC. ZS	12.92(8.07 - 24.66)	9.16(8.3 - 18.95)

EG		
GDP.MKTP.CD *(divided by 10^6)*	35898.51(13375.98 - 67841.05)	33335.69(17968.27 - 50803.78)
EMP.TOTL.SP. ZS	83.09(78.16 - 85.43)	83.25(82.1 - 84.72)
EXP.GNFS.CD *(divided by 10^6)*	6065.74(1445.82 - 9786.71)	6887.51(3012.29 - 8731.32)
GDP.DEFL.KD. ZG	7.17(0.34 - 16.38)	7.35(4.71 - 9.18)
EG	0.48(-0.92 - 6.32)	0.18(-0.2 - 0.53)
MOROCCO (MOR) – AP & EG		
PRD.CROP. XD	89.33(50.97 - 117.12)	91.91(75.98 - 103.33)
PRD.LVSK. XD	85.62(57.52 - 115.98)	86.88(65.43 - 105.08)
LND.AGRI. ZS	67.88(66.35 - 69.56)	67.65(67.19 - 68.57)
CON.FERT. ZS	56.27(38.99 - 71.35)	58.51(47.33 - 63.64)
AG.LND.TRAC. ZS	44.54(39.95 - 49.02)	45.02(41.4 - 46.77)
EG		
GDP.MKTP.CD *(divided by 10^6)*	91,234.39(38857.25 - 143000)	95,741.53(61,663.77 - 119000)
EMP.TOTL.SP. ZS	43.69(38.63 - 45.77)	44.54(41.99 - 45.12)
EXP.GNFS.CD *(divided by 10^6)*	29134.87(10408.86 - 47048.23)	33092(18646.81 - 36265.87)
GDP.DEFL.KD. ZG	0.88(-6.31 - 4.53)	0.97(0.15 - 1.37)
EG	0.14(-17.92 - 29.97)	-0.5(-1.69 - 0.12)
SOUTH AFRICA (SA) – AP & EG		
PRD.CROP. XD	97.56(80.38 - 125.47)	94.26(88.29 - 107.16)
PRD.LVSK. XD	83.61(56.85 - 104.39)	86.11(67.64 - 98.81)
LND.AGRI. ZS	79.94(79.42 - 80.89)	79.87(79.42 - 80.53)
CON.FERT. ZS	59.91(47.33 - 72.83)	60.68(55.74 - 63.49)
AG.LND.TRAC. ZS	89.15(49.45 - 137.6)	91.86(52.35 - 119.34)
EG		
GDP.MKTP.CD *(divided by 10^6)*	32,4272.73(129000 - 458000)	33,5500(280750 - 401750)
EMP.TOTL.SP. ZS	45.42(39.72 - 48.67)	44.59(43.68 - 48.17)
EXP.GNFS.CD *(divided by 10^6)*	88641.95(35694.72 - 131000)	94634.98(65683.02 - 111000)
GDP.DEFL.KD. ZG	6.55(3.75 - 12.54)	6.05(5.52 - 7.81)
EG	0.1(-1 - 1.99)	0.02(-0.23 - 0.26)

3.1.2 Agricultural Productivity Violin Indicators

3.1.2.1 AP and EG Indicators by Country Violin Plot Visualization

A violin plot visualization reveals that in terms of agricultural production (AP), South Africa (SA) outperforms all other countries in four indicators, except the livestock production index. Meanwhile, Morocco (MOR) also demonstrates significant progress in AP, followed by Ghana (GHA), Kenya (KE), and Tanzania (TZA). As a result, the distribution of AP for SA and MOR exhibits similar trends, as does KE and GHA, with TZA following closely behind. When considering economic growth (EG) indicators, SA and MOR exhibit a higher distribution compared to the other three countries. However, in terms of employment rates, TZA has a higher distribution, followed by KE, GHA, SA, and MOR. Additionally, KE, TZA, GHA, MOR, and SA have high EG indicators. The results are visually presented in Figure 1 through Figure 10.

Crop production index.

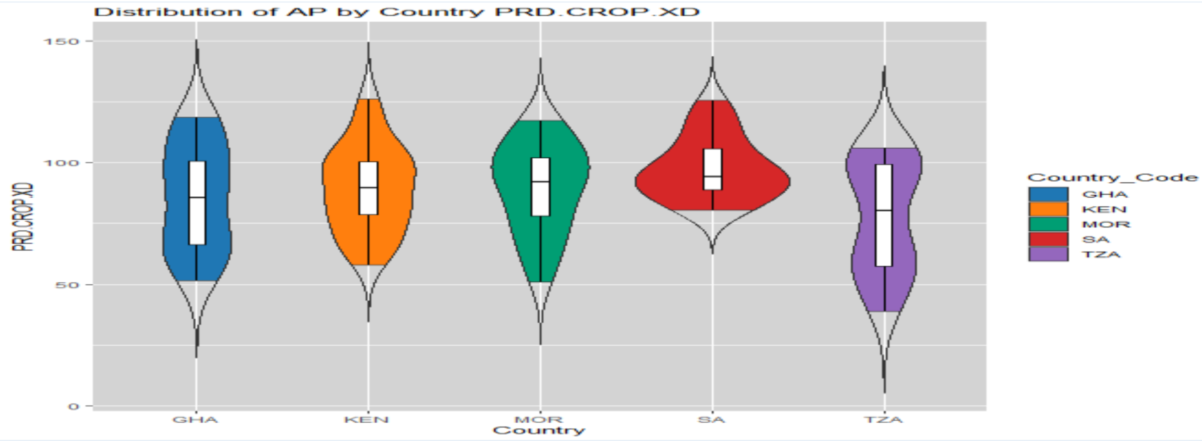

Figure 1. Violin Plot by Country AP: Crop production index

Livestock production index

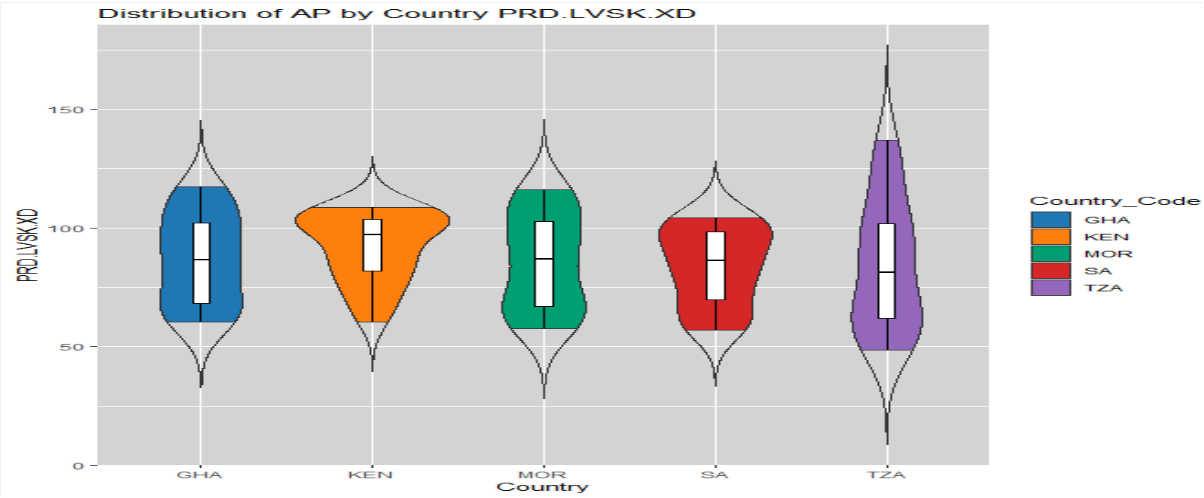

Figure 2. Violin Plot by Country AP: Livestock production index

Agricultural land (% of land area)

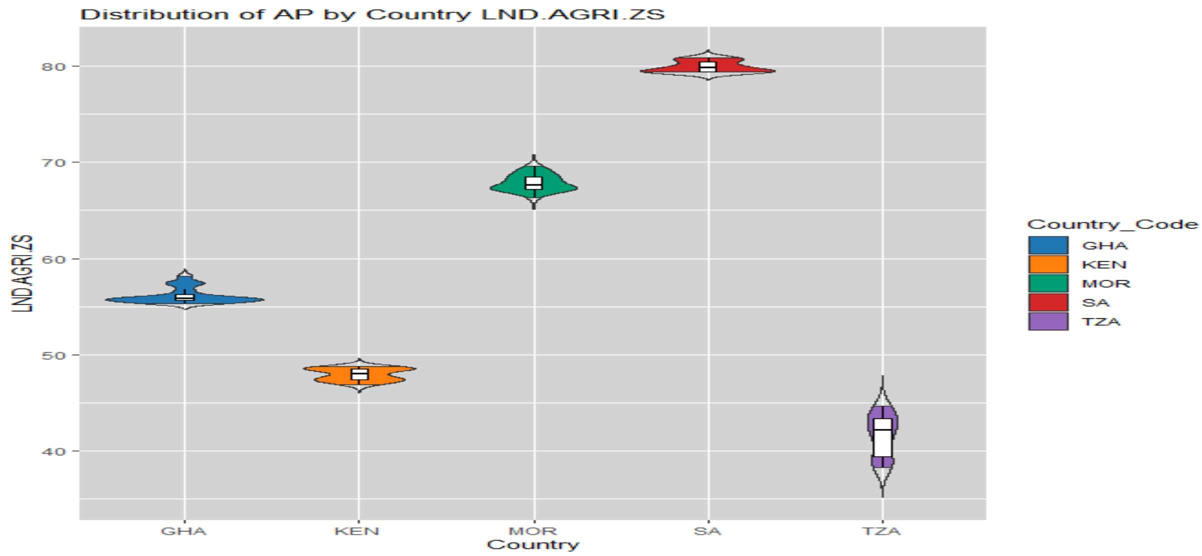

Figure 3. Violin Plot by Country AP: Agricultural land (% of land area)

Fertilizer consumption (kilograms per hectare of arable land)

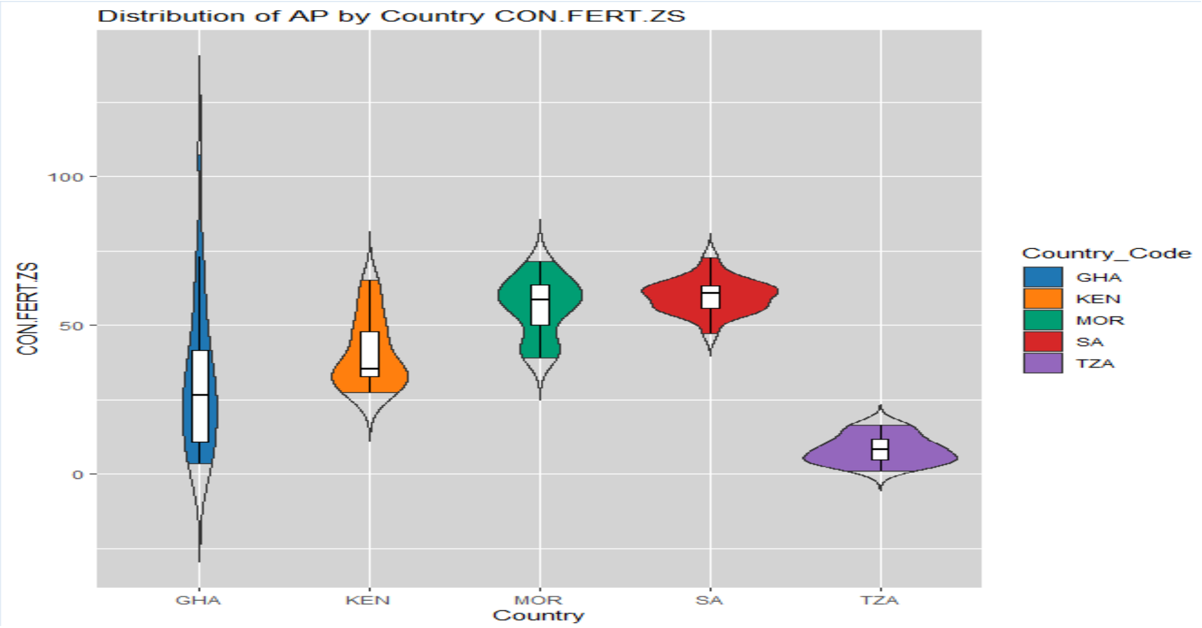

Figure 4. Violin Plot by Country AP: Fertilizer consumption

Agricultural machinery, tractors per 100 sq. km of arable land

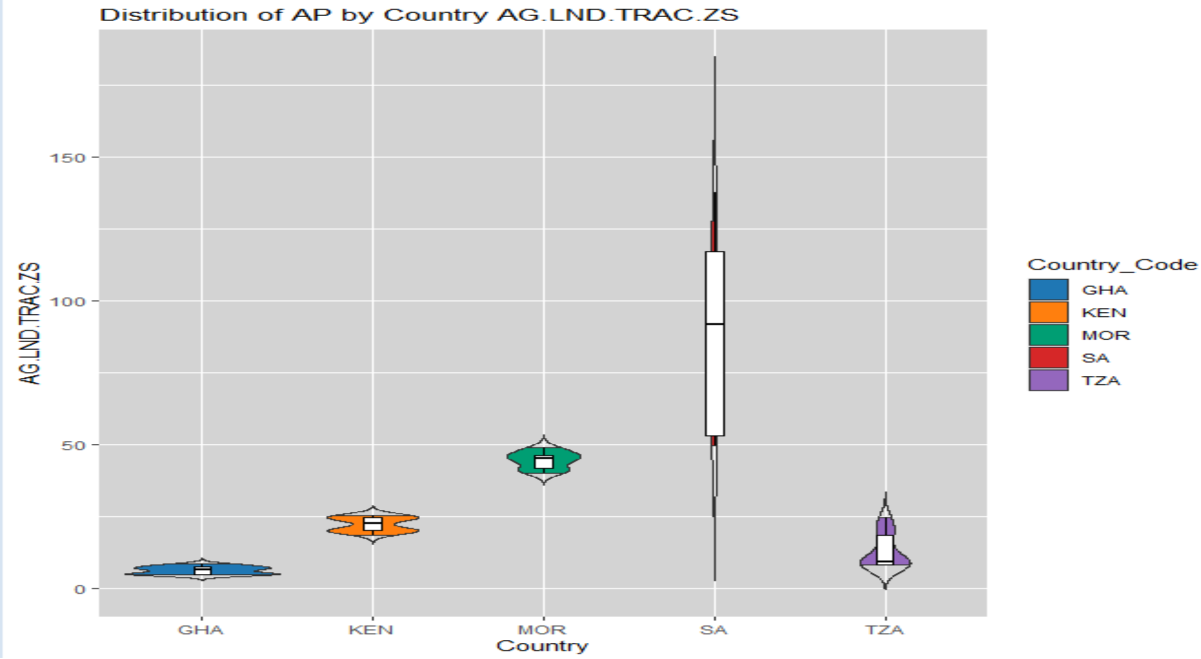

Figure 5. Violin Plot for Country AP: Agricultural machinery, tractors per 100 sq. km

3.2 Economic Growth Violin Indicators

GDP (current US$)

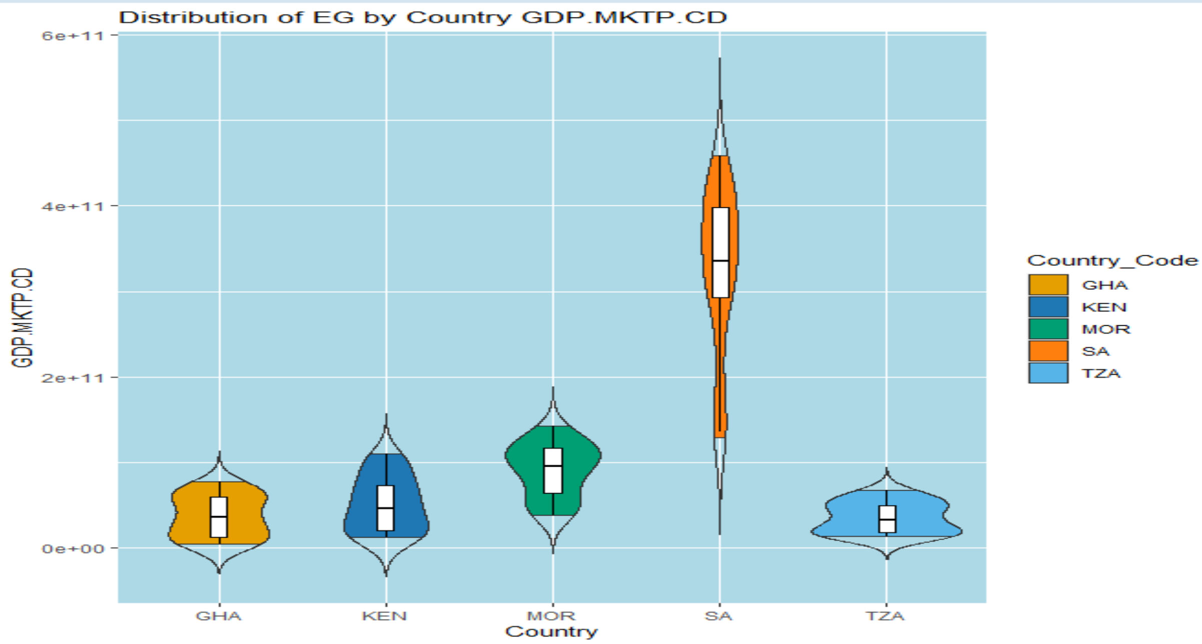

Figure 6. Violin Plot for Country EG: GDP (current US$)

Employment to population ratio, 15+, total (%) (modeled ILO estimate)

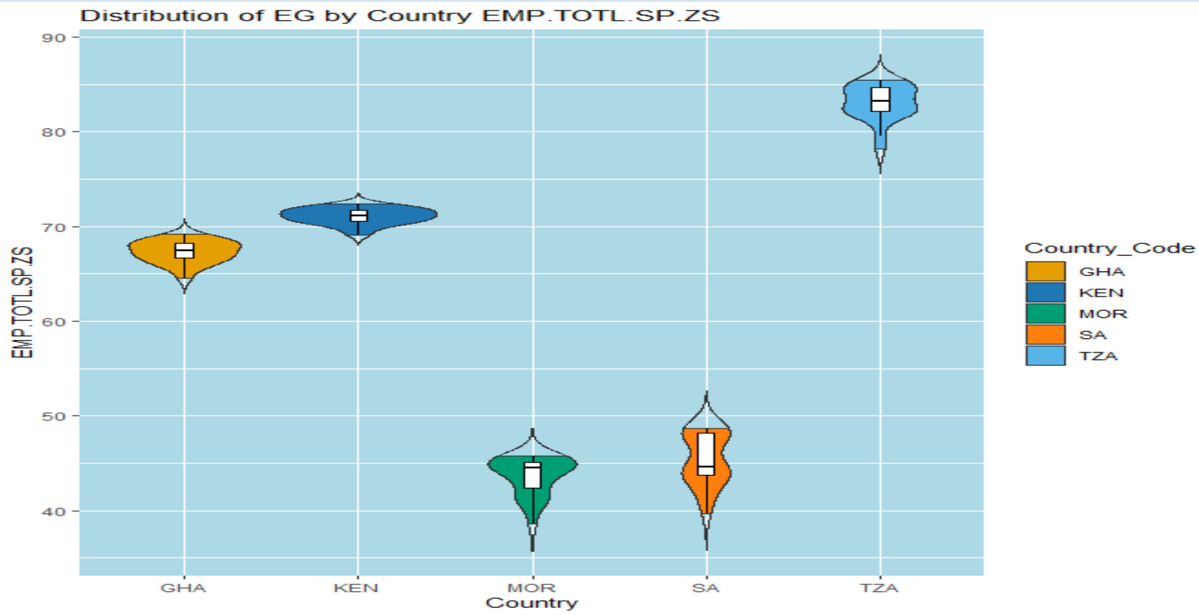

Figure 7. Violin Plot for Country EG: Employment to population ratio, 15+, total (%)

Exports of goods and services (current US$)

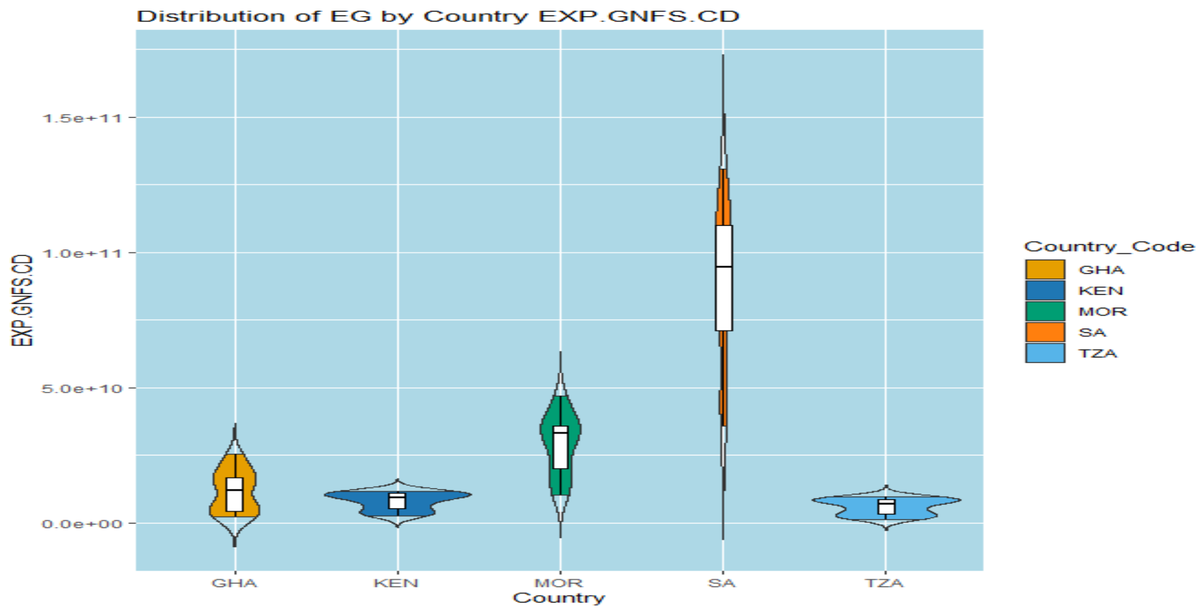

Figure 8. Violin Plot for Country EG: Inflation, GDP deflator (annual %) Inflation, GDP deflator(annual%)

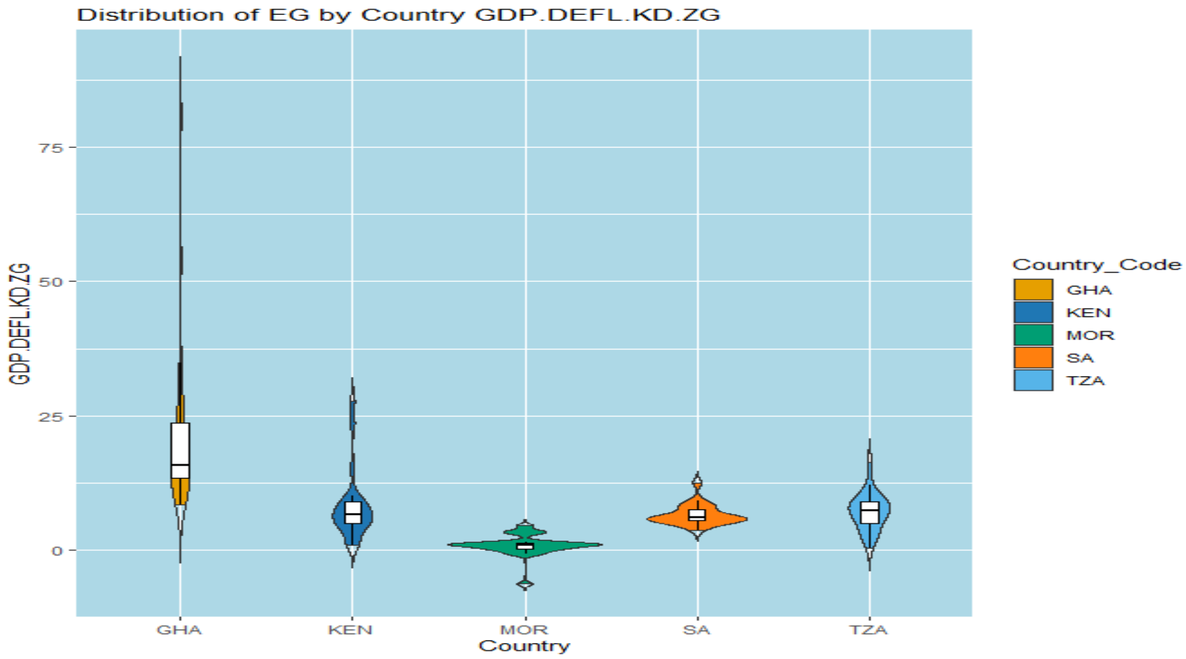

Figure 9. Violin Plot for Country EG: Inflation, GDP deflator (annual %)

Economic growth

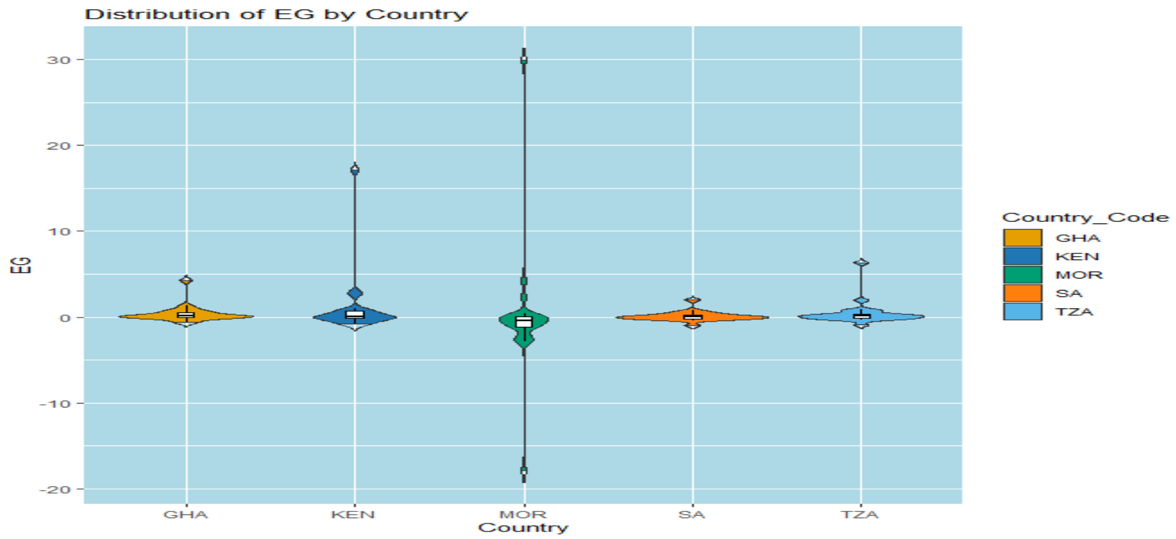

Figure 10. Violin Plot for Country EG: Economic growth

3.2.1 AP Coplots Indicators

3.2.1.1 AP and EG Indicators by Country Violin Plot Visualization

The trend of the crop production index shows a higher fluctuation in South Africa (SA) and Morocco (MOR) with noticeable peaks and declines over the years. However, Ghana (GHA), Kenya (KE), and Tanzania (TZA) exhibit a gradual and smaller change in this indicator. In contrast, the livestock production index displays a different pattern, with varying trends across all countries.

In terms of agricultural land size, SA has the largest area, followed by MOR, GHA, KE, and TZA, all of which have land sizes over 80. Furthermore, TZA shows lower levels of fertilizer consumption, agricultural machinery usage, and tractor ownership compared to the other countries.

Similarly, the violin plot of economic growth (EG) indicators confirms the same patterns observed in the crop production index, indicating that SA has a higher GDP but a lower employment rate, while TZA has a higher employment rate compared to the other four countries. Additionally, SA demonstrates higher export values, while TZA has the lowest export values in terms of EG indicators. These results are illustrated in Figure 11 through Figure 20.

Crop production index

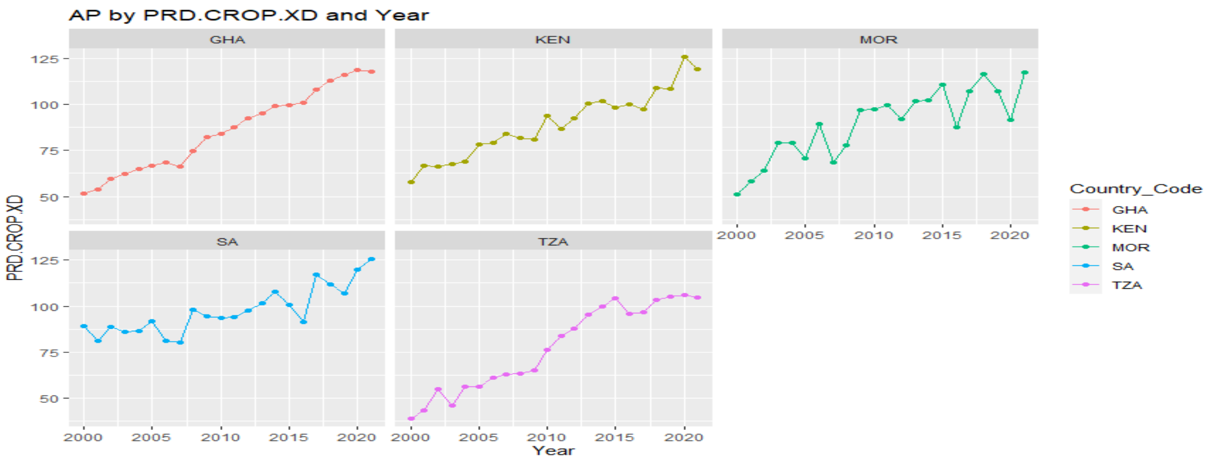

Figure 11. Coplot Plot by Country AP: Crop production index

Livestock production index

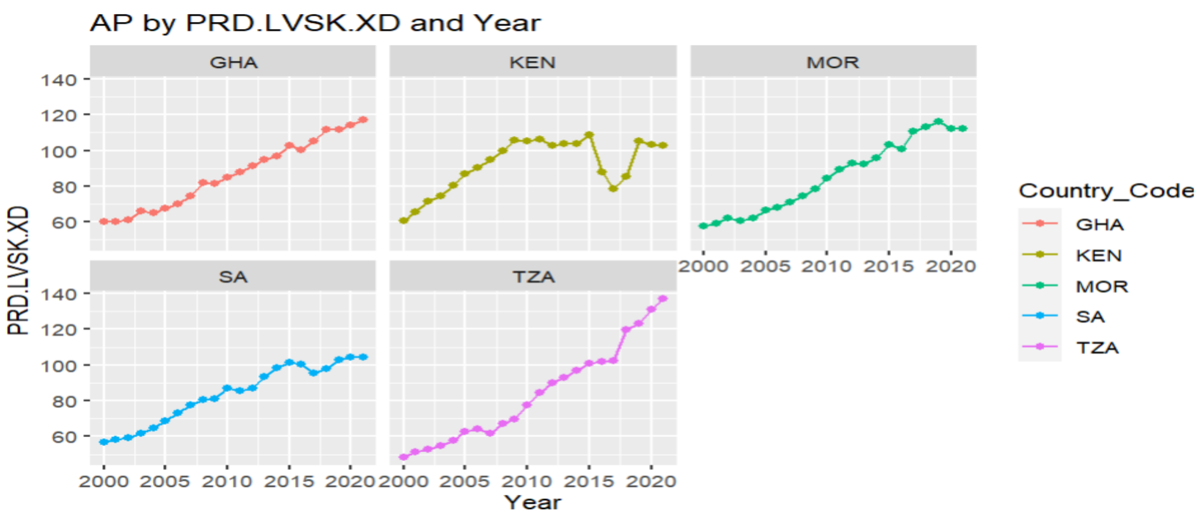

Figure 12. Coplot Plot by Country AP: Livestock production index

Agricultural land (% of land area)

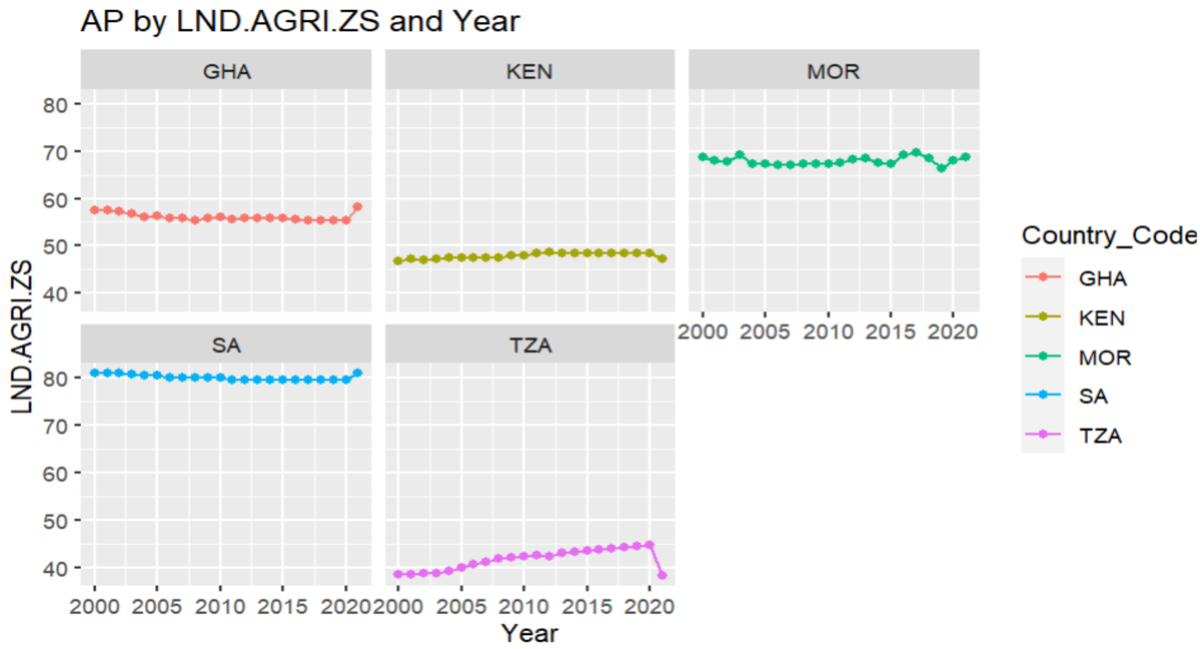

Figure 13. Coplot Plot by Country AP: Agricultural land (% of land area)

Fertilizer consumption (kilograms per hectare of arable land)

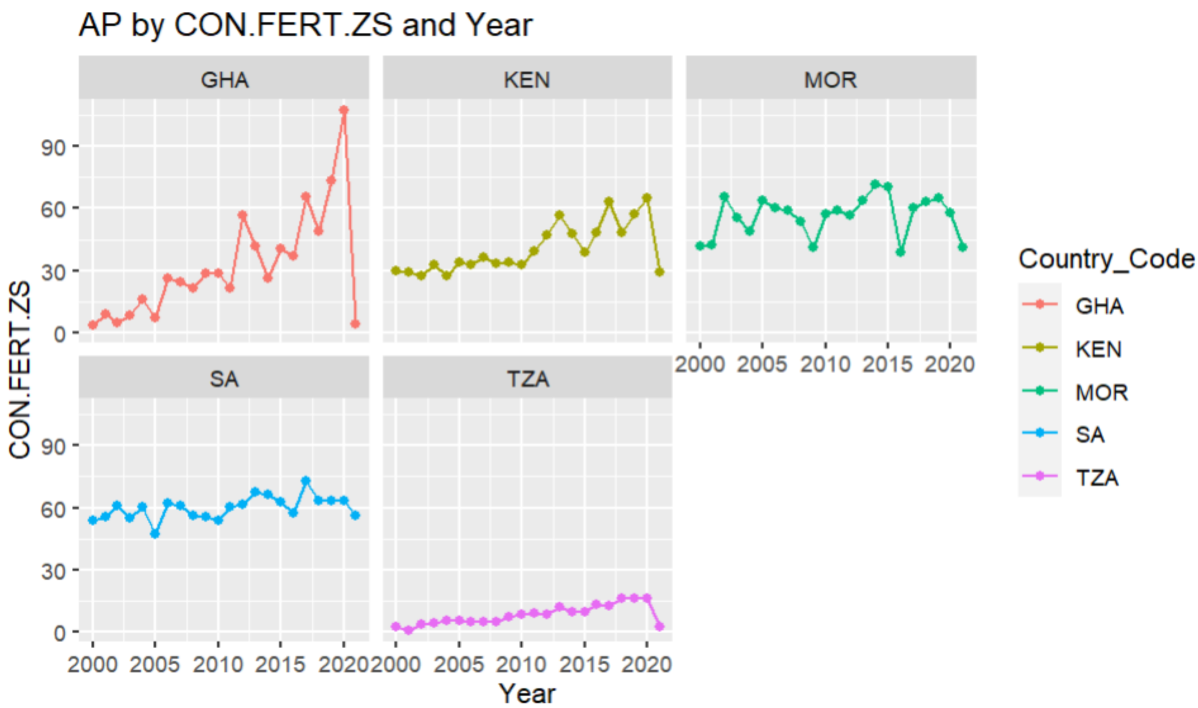

Figure 14. Coplot Plot by Country Agricultural Productivity: Fertilizer consumption

Agricultural machinery, tractors per 100 sq. km of arable land

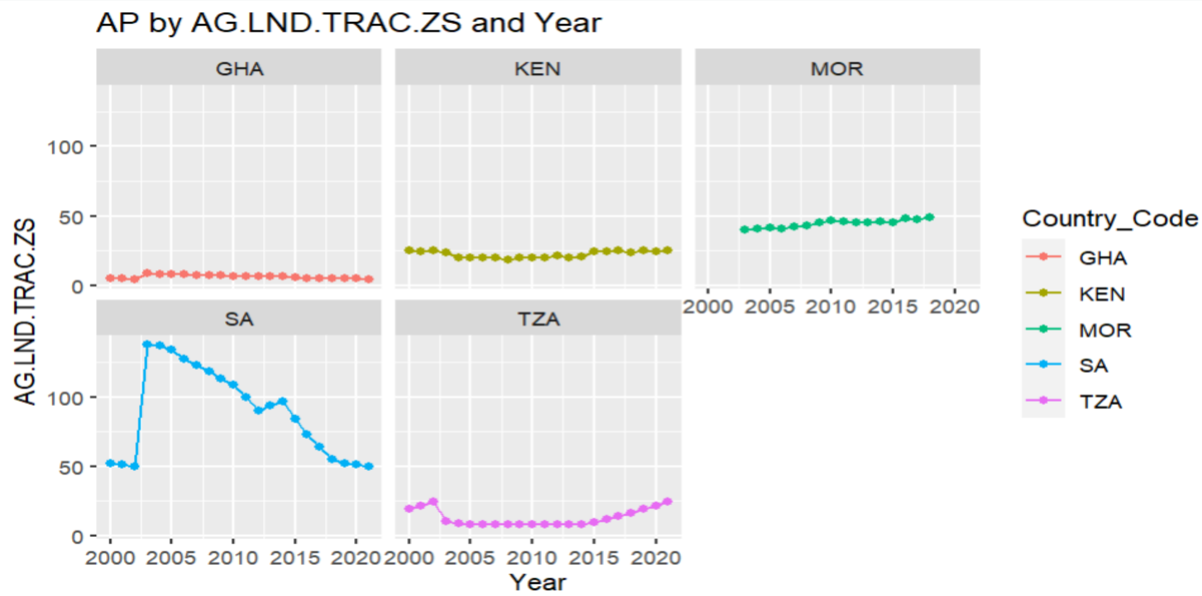

Figure 15. Coplot Plot for Country AP: Agricultural machinery, tractors per 100 sq. km

3.2.3 Economic Growth Coplots Indicators

GDP (current US$)

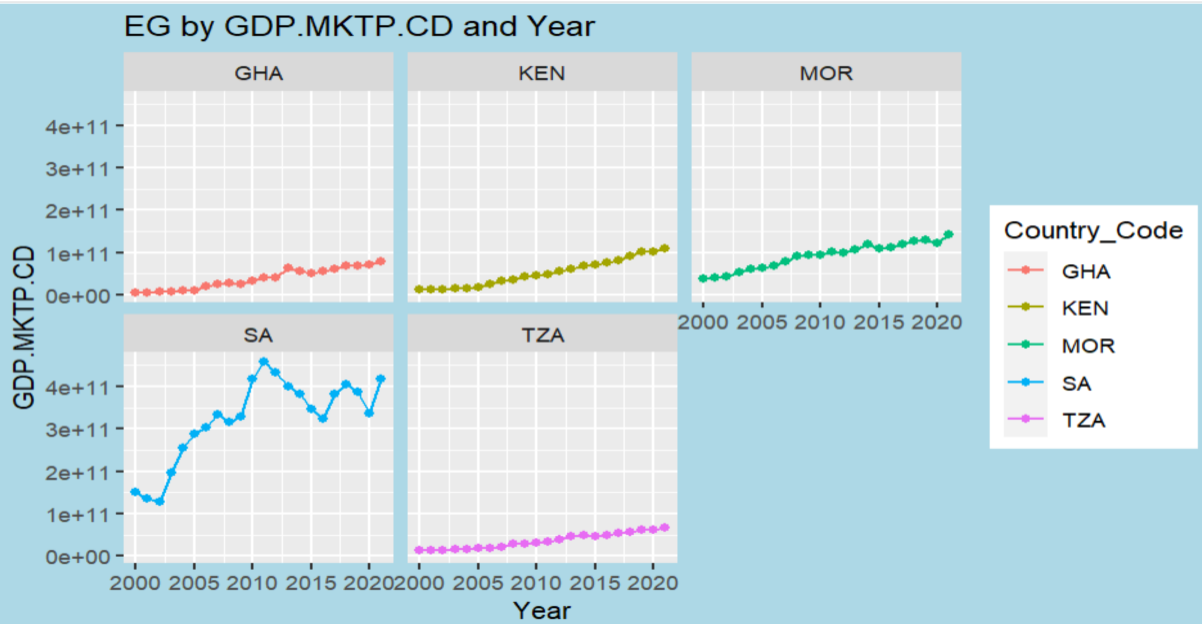

Figure 16. Coplot Plot for Country EG: GDP (current US$)

Employment to population ratio, 15+, total (%) (modeled ILO estimate)

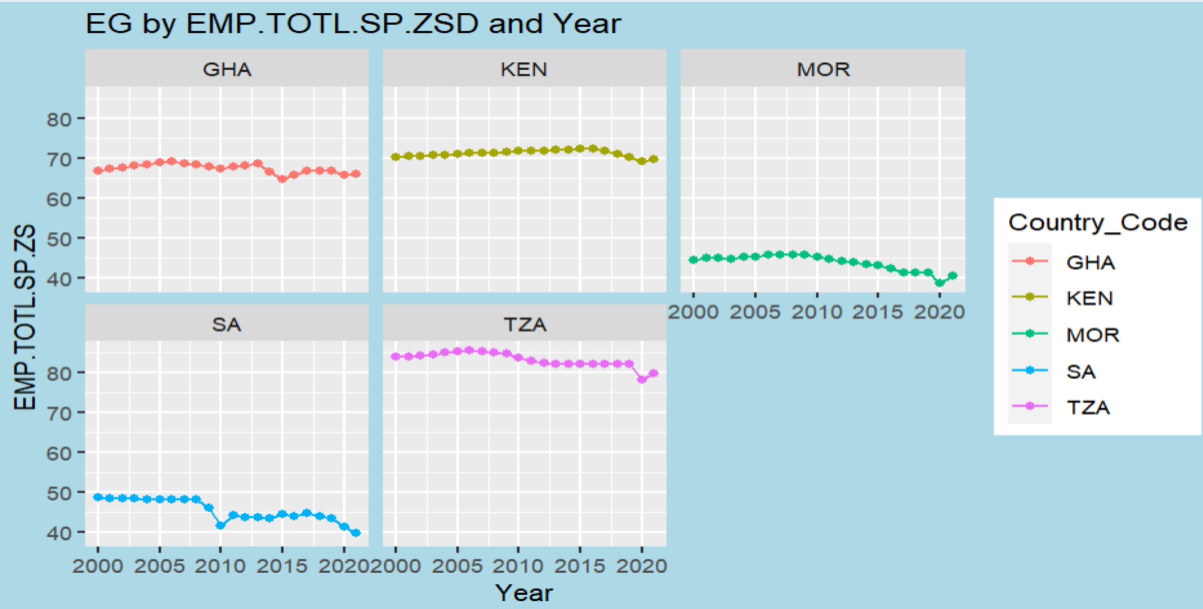

Figure 17. Coplot Plot for Country EG: Employment to population ratio, 15+, total (%)

Exports of goods and services (current US$)

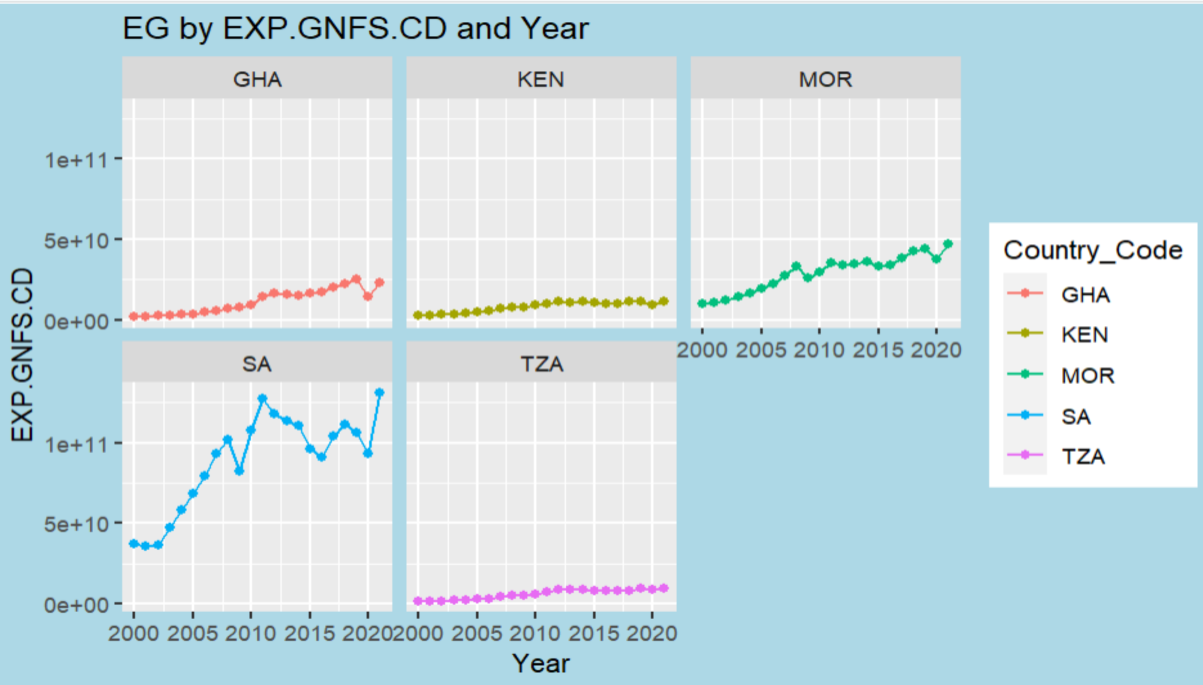

Figure 18. Coplot Plot for Country EG: Inflation, GDP deflator (annual %)

Inflation, GDP deflator (annual %)

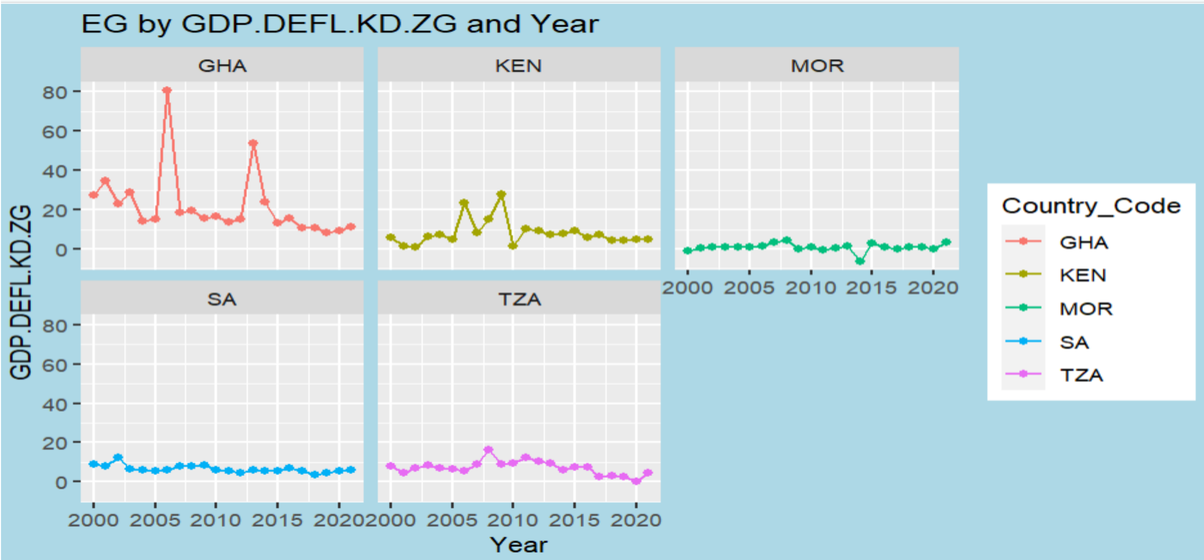

Figure 19. Coplot Plot for Country EG: Inflation, GDP deflator (annual %)

Economic growth

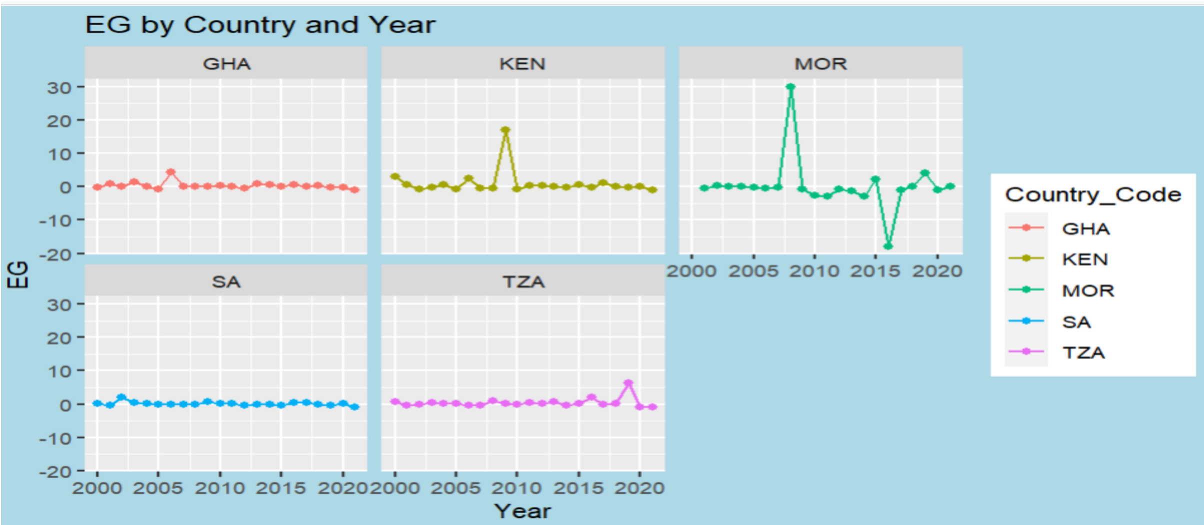

Figure 20. Coplot Plot for Country EG: Economic growth

3.3 Regression Analysis

3.3.1 Investigating the Impact of AP on the EG of the Country

To investigate the influence of AP on EG at the country level, the study progressed through descriptive analysis of AP and EG to the analytical stage. Initially, multiple regression was applied while considering the assumptions of the regression model. However, since some important assumptions were not met, the data were transformed to fulfill the assumption criteria for a more accurate assessment of AP's contribution to EG.

Afterward, the analysis shifted focus to examining the specific impact of AP on EG for each country, providing a comprehensive understanding of the relationship between these variables.

3.3.2 Agricultural Productivity on Economic Growth of the Overall

The overall findings indicate a positive relationship between AP indicators and EG in countries, albeit with a small variation (R^2 =0.1354). The increase in the efficiency of AP is accompanied by an increase in EG, and the R^2 value suggests that 14% of the variation in countries' EG can be attributed to AP collectively. The remaining percentage is likely influenced by other factors, as countries engage in diverse activities. Therefore, the individual findings for each country will shed light on the unique contribution of AP to EG. Although not statistically significant, the positive coefficients associated with AP variables imply a positive association with EG, as opposed to a negative one. This observation is significant in explaining EG within the population, considering the sign of the coefficients for positive indicators. Please refer to Table 3 for more details.

Table 3. Agricultural Productivity on Economic Growth of the Overall

Source	SS	df	MS			
				Number of obs	=	53
				F(5, 47)	=	1.47
Model	14.7996995	5	2.9599399	Prob > F	=	0.2169
Residual	94.5006476	47	2.01065208	R-squared	=	0.1354
				Adj R-squared	=	0.0434
Total	109.300347	52	2.10192975	Root MSE	=	1.418

lnEG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	-.0606378	.0238282	-2.54	0.014	-.108574	-.0127016
prdlvskxd	.0458429	.0204112	2.25	0.029	.0047808	.086905
lndagrizs	.0067881	.0286811	0.24	0.814	-.0509109	.064487
confertzs	.0166975	.0177223	0.94	0.351	-.0189552	.0523502
aglndtraczs	-.0022572	.0096693	-0.23	0.816	-.0217092	.0171949
_cons	-.419662	1.655319	-0.25	0.801	-3.749735	2.91041

Overall Economic Growth Model *= -0.4197 + -0.0606(Crop production index) + 0.0458(Livestock production index) + 0.0067(Agricultural land) + 0.0667(Fertilizer consumption) + -0.0023(Aagricultural machinery) + ε.*

3.3.3 Agricultural Productivity on Economic Growth for GHA

The findings for GHA indicate a modest variation between the AP variables and economic growth (EG) (R^2 =0.0903). An increase in AP leads to minor changes in EG, suggesting that only 9% of the variation in GHA's EG can be explained by AP. The remaining percentage is likely influenced by other activities within the country. For more detailed information, please refer to Table 4.

Table 4. Agricultural Productivity on Economic Growth for GHA

Source	SS	df	MS			
Model	1.8279987	5	.36559974	Number of obs	=	22
Residual	18.4102354	16	1.15063971	F(5, 16)	=	0.32
				Prob > F	=	0.8950
				R-squared	=	0.0903
				Adj R-squared	=	-0.1939
Total	20.2382341	21	.963725432	Root MSE	=	1.0727

eg	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	.0155416	.0896015	0.17	0.864	-.1744051	.2054884
prdlvskxd	-.0241959	.1003068	-0.24	0.812	-.2368368	.188445
lndagrizs	.0403232	.5233143	0.08	0.940	-1.069054	1.1497
confertzs	.0024358	.0181803	0.13	0.895	-.0361048	.0409764
aglndtraczs	.1777186	.2670309	0.67	0.515	-.3883617	.7437989
_cons	-2.306227	31.32071	-0.07	0.942	-68.70318	64.09072

GHA Economic Growth Model *= -2.3062 + 0.0155(Crop production index) - 0.0242(Livestock production index) + 0.0403(Agricultural land) + 0.0024(Fertilizer consumption) + 0.1777(Aagricultural machinery) + ε.*

3.3.4 Agricultural Productivity on Economic Growth for KE

The findings for KE demonstrate a positive relationship between AP and EG. With over 50% of the variation explained (R^2 =0.5963), an increase in AP's efficiency corresponds to a significant magnitude of change in EG. The value of 59.6% indicates that AP accounts for a substantial portion of the variation in KE's EG. This finding further justifies the importance of agriculture as a significant economic activity in KE as it ranks second in terms of employment rate after TZA. For detailed information, please refer to Table 5.

Table 5. Agricultural Productivity on Economic Growth for KE

Source	SS	df	MS			
Model	18.1495332	5	3.62990665	Number of obs	=	12
Residual	12.285593	6	2.04759884	F(5, 6)	=	1.77
				Prob > F	=	0.2525
				R-squared	=	0.5963
				Adj R-squared	=	0.2599
Total	30.4351263	11	2.76682966	Root MSE	=	1.4309

lnEG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	-.1009423	.0638564	-1.58	0.165	-.2571933	.0553088
prdlvskxd	.0930511	.0612708	1.52	0.180	-.0568732	.2429754
lndagrizs	-1.281605	1.69299	-0.76	0.478	-5.424203	2.860993
confertzs	.043712	.0791257	0.55	0.601	-.1499016	.2373255
aglndtraczs	.2926559	.2778024	1.05	0.333	-.3871019	.9724138
_cons	53.17497	75.82986	0.70	0.509	-132.374	238.7239

KE Economic Growth Model *= 53.1750 – 0.1009(Crop production index) + 0.0931(Livestock production index) – 1.2816(Agricultural land) + 0.0437(Fertilizer consumption) + 0.2927(Aagricultural machinery) + ε.*

3.3.5 Agricultural Productivity on Economic Growth for TZA

The findings for TZA indicate that AP contributes to approximately 38.3% of the variation in EG (R^2 =0.3833). Despite this modest contribution, TZA stands out as the leading country in terms of employment rate and EG. This suggests that other factors may play a role in driving TZA's EG. Additionally, TZA has a relatively small proportion of land dedicated to agriculture, lower utilization of technology in machinery, and limited use of fertilizers in AP. For more detailed information, please refer to Table 6.

Table 6. Agricultural Productivity on Economic Growth for TZA

Source	SS	df	MS		
Model	7.74692943	5	1.54938589	Number of obs =	13
Residual	12.4638115	7	1.7805445	F(5, 7) =	0.87
Total	20.2107409	12	1.68422841	Prob > F =	0.5452
				R-squared =	0.3833
				Adj R-squared =	-0.0572
				Root MSE =	1.3344

lnEG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	-.018796	.1046673	-0.18	0.863	-.2662949	.2287029
prdlvskxd	-.0210967	.14543	-0.15	0.889	-.364984	.3227907
lndagrizs	.2936605	.7047055	0.42	0.689	-1.372703	1.960024
confertzs	.1446013	.3355363	0.43	0.679	-.6488159	.9380186
aglndtraczs	.1594219	.1740116	0.92	0.390	-.2520502	.570894
_cons	-13.06807	25.19182	-0.52	0.620	-72.63726	46.50112

TZA Economic Growth Model *= -13.0681 – 0.0188(Crop production index) - 0.0211(Livestock production index) + 0.2937(Agricultural land) + 0.1446(Fertilizer consumption) + 0.1594(Aagricultural machinery) + ε.*

3.3.6 Agricultural Productivity on Economic Growth for MOR

The findings for MOR reveal that AP contributes approximately 18% to the country's EG with a relatively small variation (R^2 =0.1805). This suggests that the increase in efficiency of AP only accounts for 18% of the overall variation in EG across all activities. Despite investing in agriculture, other significant industries or sectors are likely driving the country's economic growth. For more detailed information, please refer to Table 7.

Table 7. Agricultural Productivity on Economic Growth for MOR

Source	SS	df	MS		
Model	225.779462	5	45.1558924	Number of obs =	16
Residual	1025.26209	10	102.526209	F(5, 10) =	0.44
Total	1251.04156	15	83.4027704	Prob > F =	0.8109
				R-squared =	0.1805
				Adj R-squared =	-0.2293
				Root MSE =	10.126

lnEG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	-.0636524	.3439748	-0.19	0.857	-.8300759	.7027711
prdlvskxd	.0419313	.6211862	0.07	0.948	-1.342158	1.42602
lndagrizs	-3.017114	3.964377	-0.76	0.464	-11.8503	5.816069
confertzs	.1456541	.4405481	0.33	0.748	-.8359483	1.127257
aglndtraczs	-.5884066	3.162663	-0.19	0.856	-7.63526	6.458447
_cons	224.9019	327.8954	0.69	0.508	-505.6946	955.4984

MOR Economic Growth Model *= 224.9019 – 0.0637(Crop production index) - 0.0419(Livestock production index) – 3.0171(Agricultural land) + 0.1457(Fertilizer consumption) – 0.5884(Aagricultural machinery) + ε.*

3.3.7 Agricultural Productivity on Economic Growth for SA

The study revealed a small variation in EG in South SA (R^2 =0.1439), where an increase in AP contributes to a 14% increase in EG. Among the five countries analyzed, SA stands out with a large crop production index, extensive agricultural land, and high utilization of fertilizer consumption. However, the low livestock production index in SA limits its contribution to EG. These findings indicate that the agricultural sector in the country is productive and successful, likely due to factors such as a favorable climate, fertile soil, efficient farming techniques, and effective use of technology. However, the overall contribution of the agricultural sector to EG is relatively small, possibly influenced by other confounding activities within the country. For more details, please refer to Table 8.

Table 8. Agricultural Productivity on Economic Growth for SA

Source	SS	df	MS		
				Number of obs	= 11
				F(5, 5)	= 0.17
Model	2.04196784	5	.408393568	Prob > F	= 0.9637
Residual	12.1452207	5	2.42904414	R-squared	= 0.1439
				Adj R-squared	= -0.7121
Total	14.1871885	10	1.41871885	Root MSE	= 1.5585

lnEG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
prdcropxd	-.0569199	.0990616	-0.57	0.590	-.3115657	.197726
prdlvskxd	.1079479	.1494473	0.72	0.502	-.2762186	.4921145
lndagrizs	3.057299	3.873672	0.79	0.466	-6.900291	13.01489
confertzs	.0933669	.1475963	0.63	0.555	-.2860415	.4727754
aglndtraczs	.0004561	.0179825	0.03	0.981	-.0457695	.0466816
_cons	-254.8071	322.7871	-0.79	0.466	-1084.558	574.9436

SA Economic Growth Model *= -254.8071 – 0.0569(Crop production index) + 0.1079(Livestock production index) + 3.0573(Agricultural land) + 0.0934(Fertilizer consumption) + 0.0005(Aagricultural machinery) + ε.*

4. Conclusion and Recommendations

4.1 Conclusion

Agriculture contributes to the EG of Africa, although there are overlapping indicators of this contribution, stemming from the different levels of technology adoption across countries. SA stands out as having a strong agricultural sector compared to other countries, followed by MOR, KE, GHA, and TZA. However, SA is unique in having a low employment rate, potentially due to higher utilization of machines and advanced technology compared to other countries. This can result in a smaller economy for the lower-income population, as food purchases and taxes increase, ultimately leading to lower EG. MOR follows SA with higher scores in various indicators, while GHA and KE exhibit similar levels of agricultural contribution. TZA lags in most indicators, despite experiencing economic growth and having a high employment rate.

In conclusion, agriculture plays a role in EG, but the contribution of the agricultural sector to overall EG is relatively low in certain countries like SA and MOR. It is important to note that EG encompasses various sectors, and while agriculture plays a role, it may not be the sole driver of a country's overall EG. Other sectors, such as manufacturing industries and international trade, could be contributing more to the EG of these countries.

4.2 Recommendations

It is crucial to acknowledge that economic growth is influenced by a multitude of factors beyond agriculture. Government policies, infrastructure development, education, investment climate, and global economic conditions all play significant roles. Therefore, a country that exhibits high agricultural productivity and extensive land utilization must also prioritize diversification of its economy, fostering value-added activities, and addressing other factors that contribute to overall economic growth.

Despite this, agriculture still holds tremendous potential for Africa. Given that income levels for many people in the region are relatively low and heavily reliant on agricultural production for food, relevant ministries, institutions, and the government as a whole need to continue developing robust strategies that position agriculture as the backbone of the economy.

By focusing on enhancing agricultural productivity, implementing innovative practices, investing in infrastructure, and providing support to farmers, African nations can not only improve food security but also stimulate economic growth and uplift the livelihoods of their populations. It is crucial to recognize the pivotal role that agriculture plays and to continue nurturing this sector through strategic planning and effective policies.

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