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DEPARTMENT OF ECONOMICS

THE IMPACT OF AGRICULTURE ON ECONOMIC GROWTH IN SOUTHERN AFRICA DEVELOPMENT COMMUNITY

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DECLARATION

I CLEOPHAS MAWERE declare that the information in this dissertation prepared in partial fulfilment of the Bachelor of Science Honors Degree in Economics, Faculty of Commerce Bandura University of Science Education has never been presented, submitted or published in this nature or part. Previous work has been accredited and acknowledged properly.

DEDICATION

Dedicated to my late father Mr Mawere and my mother Mrs Mawere, my brothers and my lovely sisters for all the support they have given me through my journey of life. I love you all!

ABSTRACT

The source of economic growth has since been a subject of discussion in the global economy and most empirical results have yielded mixed results and sometimes conflicting evidence. This study seeks to re-examine the relationship between agricultural and economic growth for 14 African countries in Southern Africa Development Community in the period 2015-2018. The study applies panel data model in order to unravel the relationship between economic growth and agricultural production. Although the key relationship of interest is between real GDP growth and agriculture, one additional control variables was included in the estimated model. This research was carried out using secondary data. The regression analyses were performed using E-views statistical package. The Hausman test was carried out in order to select the appropriate computational model and the results were efficient under fixed effects. Moreover, the subjects included in the analysis are functionally identical. Results from the empirical analysis provide that there is a positive relationship between agricultural production and economic growth. This implies that improved agriculture expenditure in previous period in Southern Africa Development Community will generally increase economic growth in the current period. This confirms that agriculture in Southern Africa Development Community has positive impact on economic growth.

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I also extend my deepest appreciation to Dr Mutsvangwa for his forbearing character. “God will smile at you”. Above all l would like to thank the God, my Father for crowning my efforts with success, for keeping me on my feet even when it seemed practically impossible. If it wasn’t for you, l would have crumbled in the pressure. You Lord take all the GLORY for the GRACE you have shown me surpasses all understanding.

Thank You Lord Jesus Christ.

ACRONYMS

IFPRI……...International Food Policy Research Institute

SADC……...Southern Africa Development Community

GDP……Gross Domestic Product

FAO……Food and Agriculture Organisation

FE……Fixed Effects

RE……Random Effects

MPL…… …...Marginal Product of Labour

CHAPTER 1

INTRODUCTION

Agriculture is the basis and bedrock on which the economic growth of stable human societies, both rural and urban, has relied throughout the world (Anyanwu 2009). The Southern African Development Community (SADC) area contains large rich territory suited for agriculture, a pleasant temperature, and predictable rainfall patterns, making it the economy's backbone (Sithole 2006). Agriculture employs 50 to 70 percent of the people and provides six percent of the raw materials used in industrial production. It is also the primary source of income for the majority of the population. Agriculture's performance is a crucial predictor of rural livelihood resilience and poverty levels. This research seeks to build on this foundation to determine the effect of agriculture production on economic growth from 2015 to 2019.

1.1 BACKGROUND OF THE STUDY

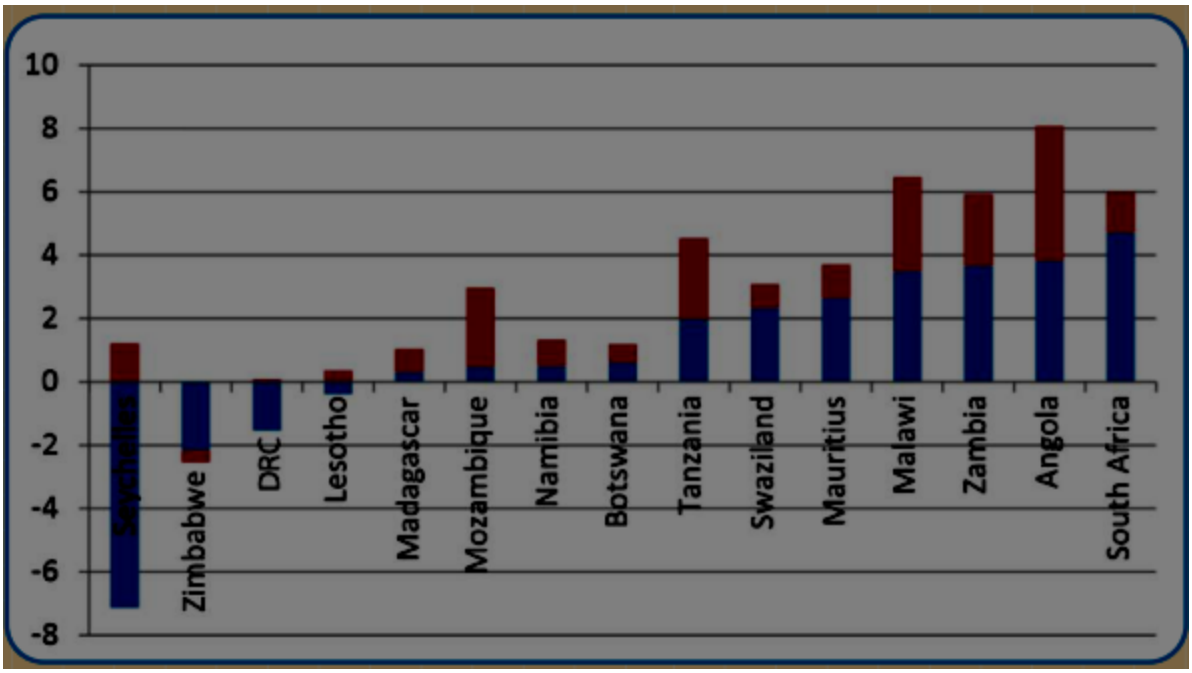
Agriculture is a significant contributor to the SADC regional economy, accounting for between 4% and 27% of GDP in various member nations. Agriculture provides food, income, and work for almost 70% of the people. Agriculture is also a key source of exports in various nations, accounting for around 14% of overall export earnings and 65% of intra-regional commerce on average. As a result, agriculture's success has a significant impact on growth, poverty reduction, and food security. Southern Africa is divided into four ecozone bands, with semi-arid and desert conditions in the south west and humid and tropical conditions in the north and east. Rainfall is the main source of cereal production. Rain fed cereal production occupies more than 50% of agricultural area in Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe (Vlek et al 2019). Only 6 million hectors of the 16 SADC member states' total land area are cultivated (Nhamo et.al.2019). Smallholder farming is the main source of income in rural areas, and it is primarily rainfed, relying on increasingly erratic rainfall patterns.

By a significant margin, the dry south of South Africa produces the majority of the region's food, including exports and irrigation. Water supplies are available farther north in Angola, Zambia, and northern Mozambique, but irrigated farming is significantly less developed and insufficient due to less intensive management of water resources (Vlek et. Al. 2014). SADC member states noted in

their 1999 productivity declaration that the region continued to experience low levels of economic growth, low levels of investment, high levels of unemployment and poverty, and a lack of regional competitiveness, all of which have harmed the region's development, integration, and competitiveness. In the SADC regional indicative strategic development plan published in 2003, the same patterns were seen (RISDP). The RISDP proposed a roadmap for the agriculture sector that emphasized improved food availability, access to food, and improved nutritional value of food while minimizing food losses, improving forecasting, prevention, mitigation, and recovery from natural disasters, and improving the institutional framework. RISDP recognizes agricultural research and technology creation as one of the primary drivers of agricultural development and economic progress.

In most African countries, agriculture is regarded as the most important industry in terms of its contribution to the GDP and employment. Agriculture is the primary source of income for the majority of people in SADC. According to Fan and Saurkar (2006) government farm expenditure is one of the most effective tools for fostering economic development and poverty reduction in developing countries. According to the FAO and the World Bank (2003), agriculture accounts for 20% of total GDP and 60% of total employment in the region. More-so the manufacturing industry, in particular, is strongly reliant on agricultural inputs. Despite all of these facts, according to the International Food Policy Research Institute (2003), growth in agricultural investments in Africa has remained static over the last two decades. Agriculture growth rates in the region have been low and very volatile, averaging only 2.6 percent per year over the previous few decades and dropping in per capita terms. Food security, poverty reduction, natural resource conservation goals, and economic growth for the majority of SADC nations cannot be realized without greater agricultural productivity.

Despite having a diverse natural resource base, agricultural growth and productivity in the SADC area have remained low during the last 20 years. The population weighted average for both land and labor productivity for all 14 SADC member nations is shown in Figure 1.1.



Source: Chilondra et al. 2013

Despite its progress, the region has not kept pace with population growth, as seen by the relatively flat trend in agriculture value added per worker. As a result, agricultural revenues have plummeted, and food insecurity has risen dramatically across the region. With a vast range of agricultural and livelihood systems, South Africa covers a broad spectrum of the region's agro-ecology and climates. In Tanzania, agriculture accounts for about half of GDP, whereas in Botswana, agriculture's contribution of GDP has dropped dramatically from 35 percent in 2002 to 3 percent now. While the amount of arable land in the various SADC nations is a factor in this difference, resource endowments may also assist to explain the broad disparities in agriculture's contribution to GDP. However, nations like Angola, Madagascar, and Zambia saw negative GDP growth between 1990 and 2002, whilst Botswana, Mauritius, and Mozambique experienced excellent development.

Limited agricultural productivity, low cash crop diversification, and ecological degradation are the key obstacles to economic growth, food security, and poverty alleviation in the region. Much of the region is plagued by pestilence and sickness, as well as very erratic rainfall. According to Hazell (2005), interest in agriculture began to wane in many African nations about 1990, resulting in economic stagnation, recurring food crises, and enduring poverty. This contradicts a number of findings that show agriculture has a favorable impact on economic growth. It is clear that

agriculture has lost its credibility in the majority of African countries. As a consequence of the findings of this study, SADC's trust may be restored, and agriculture's role in accomplishing the region's economic growth goals can be acknowledged as critical.

Recognizing the need to iron out the various farm expenditure patterns, most nations, particularly those in the SADC area, have been stepping up their efforts to raise and re-direct resources to agriculture by lobbying for the Maputo Declaration to enhance agriculture spending by 10% in order to attain GDP growth of nearly 6% per year and halve starvation in the region, as stated by the International Food Policy Research Institute (IFPRI) (2003). According to Todaro and Smith (2009), with rising debt levels, poor export performance, and a lack of foreign direct investment, agriculture is the only means to bridge the savings and funding gaps. Other economists, on the other hand, disagree with Sadoulet's assertion that agricultural output has a considerable influence on economic growth and development. As a result, it's increasingly vital to look at the influence of agricultural production on SADC's economic growth.

1.2 PROBLEM STATEMENT

Southern Africa Development Community region has been facing a problem of reducing poverty which is associated with deteriorating gross domestic product. Some member states in the region are finding it difficult to achieve minimum yield to feed its population growth thus, food insecurity in the region. A typical example is of Zimbabwe during 1980s, it was named the breadbasket of the Southern Africa Development Community (SADC), however Zimbabwe's economic crises since 1990 have resulted in rising poverty, massive unemployment, economic contraction, and a fall in agriculture. As a result, some academics have debated the origins of Africa's economic success. While some scholars believe that agriculture is the foundation of many African economies, others disagree. Recent empirical research have shown varied results and even contradictory findings, and there is still a lack of clarity on the relationship between economic growth and agriculture.

Agriculture sector is a pillar of economic growth of SADC region as at least 75 percent of the population survive and rely on agriculture, which provides the majority of the economy's raw materials. A number of fundamental concerns about the relationship between agricultural and economic growth have been raised by policymakers in emerging countries. The researcher wants

to look into, describe, analyse, and bring to light the influence of agriculture on economic growth based on this breakdown.

1.3 OBJECTIVES

The study's goal is to see how agriculture production affects SADC's economic growth. The study will achieve the following objectives:

- To figure out how agriculture affects economic growth.
- To determine the link between economic growth and the manufacturing industry.
- To assess how agriculture affects the cost living.

1.4 RESEARCH QUESTIONS

- What is agriculture's contribution to economic growth?
- What is the link between manufacturing and economic growth?

What is the impact of agriculture on the cost of living?

1.5 HYPOTHESIS STATEMENT

H_0: Agriculture and economic growth have a beneficial link.

1.6 IMPORTANCE OF THE RESEARCH

This study aims to fill a gap in the existing empirical research on the link between agricultural production and economic growth. The primary goal of this study is to reevaluate the relationship between economic growth and agricultural productivity. According to Timmer (1988), the linkage between agriculture and economic growth implies that the elements that impact agricultural performance may also be related to the entire economy, implying that the paramaters that affect agricultural performance also affect economic growth. As a result, this research informs policymakers on the relevance of agricultural production as a remedy to today's economic hardships. This research will provide insight to the SADC regimes on how to attain significant macroeconomic goals such as industrialization and poverty reduction. Furthermore, as a trading block, SADC would gain from this research since it will provide proof of the influence of

agriculture on economic growth and development, allowing policymakers to formulate better policies.

It also broadens economic knowledge in terms of study into long-term growth and development. The research also aims to find ways to boost agricultural output for domestic consumption and export, resulting in a more favorable balance of payments (BOP) for the region and, as a result, higher economic growth. The study will also assist policymakers in determining how to strengthen agricultural policies in order to promote the region's transition to a higher-income status.

1.7 ASSUMPTIONS OF THE STUDY

1. All of the data concerning the variables in question is accurate and trustworthy. As a result, statistics from the World Bank and other sources may be trusted.
2. There is no fictitious connection.
3. The econometric model that was applied is accurate and dependable.
4. There is no knowledge of the link between variables.

1.8 SCOPE OF THE RESEARCH

The influence of agriculture on SADC's economic growth is the topic of this research. The study will run from 2015 to 2018, and the values utilized will be on an annual basis.

1.9 LIMITATIONS

There are several limits or variables that are preventing me from completing the goals of my project, including a lack of funds, a lack of time, and environmental constraints such as free mobility during the corona virus epidemic.

Data confidentiality—the majority of the data was not accessible to everyone, making it difficult for the research to collect it.

Some SADC member nations continue to present incomplete data, which might result in the loss of some critical interpretations. The researcher, on the other hand, took this into consideration while selecting data sources and chose the best relevant data source for each variable.

1.10 Definition of terms

Gross Domestic Product- It refers to the total financial or market worth of all completed products and services generated inside a country's borders during a given period of time.

Agriculture - is the science of using land to grow livestock and plants. It also refers to the activity of raising and farming livestock, food, and other living things in order to maintain life.

Economic growth - is defined as a rise in the production of economic commodities and services from one period to the next. It's also the gradual rise of the economy's productive capacity through time, resulting in higher levels of income and national production (Todaro 2008).

1.11 Organization of the research

This chapter provided an overview of the entire study and exposed the reader to the research topic in order to put it into context. It also included research objectives, a statement of problem, research questions, a hypothesis, limits, assumptions, and the study's importance, as well as definitions of words. The empirical and theoretical literature is covered in chapter two, and the methods and processes for data collection are covered in chapter three. The fourth chapter covers data visualization and interpretation. Chapter five concludes with findings, policy implications, and suggestions.

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter discusses the theories related with the basic study and prior research on the influence of agriculture on economic growth through empirical and theoretical literature. The purpose of this research is to look at agricultural production and its influence on economic growth.

2.1 THEORETICAL LITERATURE REVIEW

Agriculture's contribution to general economic growth, development, and industrialization has been the focus of development economists. Economic progress has frequently been connected to industrialization, necessitating attention to agriculture as a subordinate of the industrial sector rather as a major stimulator of development. According to Todaro (2003), the undeveloped economy is divided into two sectors, based on Lewis' theory of development. The traditional agricultural sector, which has zero marginal labor productivity, and the contemporary industrial sector are the two sectors in question.

2.1.1W. ROSTOW AND THE ECONOMIC GROWTH STAGES

Traditional society, pre-condition for takeoff, takeoff, drive to maturity, and era of high mass-consumption are the 5 phases of economic growth identified by Rostow (1960) in his historical perspective to the process of economic growth. Rostow alluded that the take off stage is the big watershed in the life of a civilization when economic expansion becomes regular. Modernization forces are at odds with traditional customs and institutions. The traditional society's worth and desire make a dramatic breakthrough, and a compound interest is established into the organization of society. Based on this historical method, agriculture plays a significant part in the first three phases. The agriculture sector has the ability to serve as an industrial and economic foundation for a country's growth. Indeed, agriculture operations are mainly focused in less developed regions where rural transformation, redistribution, poverty alleviation, and socioeconomic development are vital needed (Stewart 2001).

2.1.2 THE DUAL ECONOMY MODEL FOR STRUCTURAL TRANSFORMATION BY LEWIS

The research built on Lewis Arthur's structural change hypothesis, which he coined "development with an endless supply of labor" in 1954. (Ogen 2007). According to Lewis' theory, if there is surplus labor in agriculture, and surplus labor means lower labor productivity in agriculture than in industry, the more productive and higher-wage industry sector can lure labor from rural areas to urban areas by paying wages slightly higher than rural wages. Lewis noticed that LEDCS with two sectors, agriculture and industry, such as Zimbabwe, are dualistic. A traditional low-productivity, low-technology agriculture sector existed where the vast majority of the people lived, worked, and produced the majority of what they consumed.

According to the notion, the expansion of the two sectors is necessary for an economy to develop.

$$Y = f(AGRIC, IND)$$

Where: Y = Economic Growth,

$AGRIC$ =Agricultural Sector, and

IND = Industrial Sector

The agriculture and industrial sectors are inextricably linked. The agricultural sector uses capital inputs, labor skills, and is a final consumer of industrial sector output, whereas the industrial sector uses labor and agricultural sector output (Ogen 2007). This theory focuses on the tool that undeveloped economies may use to shift their domestic economic structures away from a heavy reliance on traditional subsistence agriculture and toward a more modern and advanced approach. According to Lewis, pay rates in the urban sector should be at least 30% more than in the rural sector in order to automatically move workers from the rural to the urban sector. Lewis believed that the modern labor market is totally competitive, with a fixed pay rate and a horizontal labor supply curve. In the traditional sector, the wage rate is determined by worker productivity:

$$W = APL = TP/L$$

The theory was expanded to include the idea that the full advantages of agricultural growth would not be achieved until government support structures that provide the essential incentives are put in place. Other initiatives or methods are likely to be unsuccessful, if not downright destructive, unless fundamental adjustments are made to limit productivity (Todaro and Smith 2009). Bank loans, fertilizer distribution, technical and educational extension services, public credit agencies, funding from diverse sources, rural transportation, and feeder roads are examples of such programs.

2.1.3 Classical economists' perspectives on agriculture and economic growth

Early classical thought saw economic growth as a process in which forces of production are reallocated from a primary sector with low productivity, old technology, and declining returns to a modern industrial sector with better productivity and growing returns (Adelman 2001). Agriculture was seen as a low-productivity, traditional industry that could only support to development by providing food and jobs. According to Lewis' theories, agriculture's importance to economic growth and development is expected to diminish as the economy improves. Agriculture is still regarded as essential for growth and the transition of a country from a traditional to a modern economy. Agriculture's perceived significance in growth and development has shifted over time as the amount of industrialization has varied. Classical economists also predicted that if agriculture remained stationary, rising employment in other sectors would result in food shortages, boosting food costs and hence the expense of living, especially for low-income households with large consumption shares, or importing food. This is also in line with Thomas Malthus' population increase and food security hypothesis. Classical economists claimed that most emerging nations had dual economies, with worker productivity in agriculture often lower than in other sectors, and that labor and savings from the agriculture sector should be reallocated to other sectors to fulfill financial and labor demand. This supports Lewis's idea.

2.1.4 FEI-RAINS’ ECONOMIC DEVELOPMENT THEORY

In 1960, John Fei and Gustav Ranis, introduced their dual economy concept. Lewis' model had a weakness in that it undervalued the role of agriculture in driving industrial progress. However, the Fei-Ranis (FR) dual economy model demonstrates how increasing agricultural output may assist

the industrial sector grow. It depicts three phases in which an undeveloped country (UDC) progresses from stagnant to self-sustaining economic growth in this regard (Todaro and Smith 2009). As a result, this model is seen as a step forward from Lewis's concept of infinite labor supply.

This idea is about a bad economy with these characteristics:

(i) In such a UDC, there is a surplus of labor but a scarcity of natural resources.

(ii)The population growth rate is extremely high, resulting in widespread economic unemployment.

iii) Agriculture employs the vast majority of the people. The agricultural industry, on the other hand, is in a state of stagnation. As a result, in the agricultural sector, worker productivity is both zero and negative.

(iv) The usage of capital is reduced in several non-agrarian areas of the economy.

(v) In the economy, there is a vibrant industrial sector.

As a result, the model implies that transferring agricultural people to the industrial sector, where their productivity will increase, will result in economic progress. It has a bifurcated economy, as we have stated, with a sluggish farm sector and a thriving industrial sector. When MPL is zero, labor may be shifted to the industrial sector without causing a reduction in agricultural production (Jhingan 2002). In the industrial sector, real wages remain constant and are equal to the beginning level of real income in the agricultural sector. Institutional wages are the label given to such payments.

2.1.5 CHENERY'S MODEL OF STRUCTUAL CHANGES & PATTERNS OF DEVELOPMENT

Chenery and Scourt proposed this hypothesis in the 1960s. Several characteristics of economic development have been identified in empirical studies, including the transformation from agriculture to industrial production, the steady accumulation of physical and human capital, changes in consumer demands, increased urbanization, shrinking family sizes, and demographic change (Todaro and Smith 2009). Domestic and international restraints are blamed for the

disparities in progress across the countries. The model also recognizes the significance of investment in achieving economic development, as well as the role of savings in obtaining adequate levels of investment (Anyanwu 2009). According to the idea, specific amounts of savings and investment must be accessible in order to achieve the appropriate degree of economic growth, and hence development.If the current level of saving-investment is not maintained, gaps will form, and the necessary degree of economic growth and development will not be accomplished. To recap, structural-change experts think that the "right combination" of economic policies will result in self-sustaining development patterns.

2.2 REVIEW OF EMPIRICAL LITERATURE

A lot of useful studies on the link between agricultural and economic growth and development in SADC have been published. A number of empirical studies have also weighed in on the significance of agriculture in the quest for economic growth. Schultz (1964), for example, emphasizes the role of the agricultural sector in providing food. According to Schultz, agriculture is essential for economic progress since it ensures society's subsistence, without which growth is impossible. This early perspective of agriculture's function in economics corresponded to Kuznets' (1966) empirical finding that the agricultural sector's significance reduces with economic progress. Agriculture's function in economic growth, according to this viewpoint, is to give cheap food and low-wage labor to the modern sector. Aside than that, there are little linkages between the two industries. Growth and increased productivity in the agriculture sector can help boost overall economic growth by freeing up labor and money for other industries. Industrialization, on the other hand, is considered as the primary driver of a country's development and economic progress, whereas agriculture is seen as a traditional low-productivity industry.

Bresciani and Valdes (2007) in Rome proposed their research in terms of three important channels, namely the jobs market, agricultural growth, and food prices, which they believe are linked to agricultural expansion and poverty. They lay forth a theoretical framework for examining the quantitative relevance of those distinct channels, and then provide the findings of six nation case studies. They conclude that when both the direct and indirect sound impacts of agricultural expansion are considered, agricultural growth reduces scarcity more than growth in non-agricultural industries.

Agriculture has played a crucial role in creating economic development in South Pacific island countries, including the four Melanesian countries under evaluation, as alluded by Diao et el (2007) in their essay on reassessment of the importance of agriculture in economic growth in Melanesian Countries. In many nations, agriculture continues to be the primary form of employment and food, as well as a substantial driver to export money. Exports of sugar and coconut products in Fiji; coffee, cocoa, coconut products, palm oil, and palm kernel oil in Papua New Guinea; coconut products, cocoa, palm oil, and palm kernel oil in Solomon Islands; and coconut products and cocoa in Vanuatu were traditionally the main source of foreign exchange. Agricultural commodity exports continued to be a substantial source of export revenue, although their proportional contribution to foreign exchange profits in all nations has decreased.

Meijerink Gerdien et al. (2007) investigated the role of agriculture in economic growth, with a focus on food insecurity. They also looked at the link between economic or agricultural growth and development that benefits the poor. Agricultural development is critical for economic growth. They stated that while most observers now believe that agriculture contributes to economic growth, agriculture's significance in GDP is diminishing as a result of economic expansion. They recognized its significance and interconnection with other industries, emphasizing the necessity to eradicate poverty through a variety of initiatives aimed at the impoverished in rural regions. The agriculture sector's immediate function is to provide food, jobs, foreign currency through exports, and raw materials for industry. Indirectly, the agriculture industry plays a significant role, for example, in environmental services.

As shown in a study conducted by the Food and Agriculture Organization's research institute on Latin American nations that experienced significant industrialization during the 1950s and 1970s. Due to rapid population expansion and urbanization, agricultural growth struggled to keep up with increased food demand. Between 1965 and 1973, industrial growth accelerated to 8% per year, while agricultural production per capita remained or decreased in five nations. As a result, food imports surged from 3.1 percent per year in the 1950s to more than twelve percent per year in the early 1970s. Food imports caused significant stresses on the balance of trade and the currency rate, as well as inflationary pressures, as international grain prices rose (de Janvry 1981).

In Rome, Cervantes-Godoy and Dewbre (2010) looked for commonalities across twenty-five developing nations that have achieved significant progress in eliminating severe poverty in the

previous twenty to twenty-five years. The macroeconomic and agricultural economic aspects of these nations were compared utilizing indices. According to Oji-Okoro, the group contains some of the world's poorest and wealthiest emerging countries, representing nearly all geographic areas (2011). While economic development is generally a key contributor to poverty reduction, their conclusions from time-series, cross-section, and regression analysis reveal that it is not always the case.

Agricultural expansion is a significant tool for reducing poverty in emerging nations since traditional and contemporary industries are intertwined. Increases in agricultural output promote job creation in upstream and downstream non-farm industries in response to increasing domestic demand, which directly contributes to poverty alleviation. Food costs that are potentially lower will boost impoverished customers' purchasing power. The degree of these poverty-reduction impacts is determined on the economy's unique characteristics. Farm employment may not necessarily rise if technical improvement in the agriculture industry saves labor (Irz et al., 2001).

Vogal (1994) investigated the strength of agriculture as a growth driver for 27 nations using social accounting matrices. He discovered that agriculture's linkages lead to positive integration of the sector with the broader economy, and that agriculture was a major source of economic growth in all 27 countries in the early stages of development, but that its importance began to wane as the countries progressed industrially.

Adelman's general equilibrium idea of agricultural demand led industrialization, which states that, due to production and consumption linkages, a country's growth strategy should be agriculture influenced rather than export driven, and agricultural production productivity would be the pioneer of industrialization, was further emphasized by Singer (1979). Agriculture development contributed to industrialization because when agriculture grew owing to links, the industrial sector grew as well, and this may be referred to as agriculture-induced industrial growth. Furthermore, small and medium-sized farmers should be prioritized since they are more likely to employ locally produced intermediate products than large scale industries, who may import equipment and other resources, weakening the ties connecting agriculture and industry and other sectors (Adelman, 1984).

In Zimbabwe, Nkamleu (2007) looked at the causes and consequences of agricultural expansion during the past three decades. The study looks for important factors of growth in African

agriculture using a larger framework of empirical growth literature and new breakthroughs in total factor productivity (TFP) assessment. The quantification of the role of productivity increase and the participation of various inputs such as land, labor, tractor, and fertilizer in agricultural growth is one of the primary responsibilities. The fact that factor accumulation, rather than TFP, accounts for a major percentage of agricultural production increase, and that fertilizer has been the most statistical significant physical-input source to agricultural development, is highlighted by growth accountancy. The report also emphasizes how agricultural growth contributions fluctuate depending on nation environment.

Kuznets, Chenery, and others concentrated their early contributions on sector changes that accompanied economic expansion. Kuznets (1966) found that as economies improve, agriculture's share of production and employment decreases, which has been verified by empirical evidence. Timmer (2002) shows a favorable association between agricultural GDP growth and its lagged values and non-agricultural GDP growth using a panel of 65 developing nations from 1960 to 1985. He claims that this link may be described by both direct and indirect benefits of agricultural expansion, such as decreased food costs, labor migration, and flows of capital from agriculture, as well as spillover impacts such as higher nutritional intake, which boosts workers ' productivity.Self and Grabowski (2007) found a positive relationship between several indicators of agricultural production and average increase in real GDP per capita for a cross-section of nations from 1960 to 1995. Gardner (2005), based on panel data from 52 developing nations from 1980 to 2001, concludes that agriculture does appear to be a significant driver of national GDP per capital development.

Agriculture's relevance in the early phases of development was demonstrated by Collin et al (2002) and Femi et al (2013). The authors discovered that agricultural productivity increase was mathematically essential in interpreting growth in GDP per worker when they looked at data from 62 countries from 1960 to 1990. Countries with higher agricultural production were able to shift workers from agriculture to other sectors of the economy, according to both cross-section and panel data analysis.

According to the conclusions of a study conducted by Izuchukwu (2011), there is a positive association in Nigeria between GDP, domestic saving, government expenditure on agricultural,

and foreign direct investment in agriculture. This demonstrated that agriculture expenditure and investment in the agricultural sector are a function of Nigeria's economic growth and development.

Eboh et al. (2012) investigated the driving forces behind Nigeria's agricultural development. Using the Cobb Douglas model, they calculated a worldwide agricultural production function for Nigeria. They also developed a delayed residual econometric model of total factor productivity (TFP). According to the findings, the Nigerian agriculture sector has growing returns to scale. This indicates that farmers are at the bottom of the production function. Rainfall, technology, fertilizer use, and land area are among the substantially more significant aspects that have been discovered to modify Nigeria's agricultural value. Agriculture capital expenditure, agricultural commodity prices, per capita income and agricultural investment rate, human capital, and finance availability are all activist factors on total factor productivity.

2.5 GAP ANALYSIS

The economy of SADC as a whole has not been functioning well in recent decades, necessitating the completion of this research, owing to the fact that several SADC member states are unable to maintain stable economies. Given that the majority of the aforementioned studies were conducted outside of Africa, with some in affluent countries, and only a handful in SADC, the researcher chooses to fill in that gap. In certain cases, policy difference, the period the studies were conducted, the technique used, and the places where the research were conducted all have an impact on the study. As a result, a gap has been established, necessitating the conduct of this investigation.

SUMMARY

There is a substantial amount of research on the impact of agriculture on economic growth. The empirical and theoretical literature examined in this chapter yielded varied results, leaving room for more research on agriculture's true influence on economic growth.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter will describe the research model as well as the instruments utilized to arrive at the research's conclusions. The techniques discussed here will allow the researcher to assess the influence of agriculture on economic growth. It includes an explanation model as well as information on how the data will be processed and presented. This chapter also includes a summary, as well as a description of the model specification, data sources used, and variable rationale.

3.1.1 RESEARCH DESING

It's a proposal for documentation, inquiry, and identification that specifies the project's approaches, expected results, goal methods, and expected outcomes for other planned activities (Sana and Massey 2006). Cooper (2006) defines research design as "a framework and structure for obtaining research outcomes." According to Creswell (2004), the sort of research design used in a study has a significant impact on the results' accuracy.

3.1.2 DESCRIPTIVE RESEARCH

According to Creswell (2003), a quantitative research design tries to define and explain circumstances for the current study by employing individuals and describing a phenomena. In general, descriptive research summarizes raw data in a comprehensible format. As a result, descriptive research is suited for this study since it entails the transformation of raw data into a

more accessible format for the purposes of forecasting without affecting the operational environment.

3.2 HYPOTHESIS

Agriculture output will lead to economic growth, according to the research premise. Agriculture's influence on economic growth is examined in this study project.

3.3 THEORETICAL MODEL

The researcher used Lewis Arthur's structural change theory of development, published in 1954, to identify the link between economic expansion and agriculture (Smith and Todaro 2009). Agriculture and industry are the two areas on which it is reliant. Because of the zero marginal product of labor, the conventional sector is overcrowded, and marginal labor productivity is zero. Because labor has a zero marginal product, it is easy to remove workers from the conventional sector without hurting production. This is why Lewis classed this industry as a sector with excess labor.

According to Bresciani and Valdes (2007), productivity in the contemporary sector is high, and labor is gradually shifting from the traditional industry to this sector. According to Eboh et al. (2012), shifting labor from the agrarian to the modern sector increases output and employment. The rate of this expansion is determined by the rate of industrial investment and capital acquisition, which are in turn determined by profit levels. Lewis assumes that all earnings are re-invested in the business. As an example, consider the following:

$$Y = f(AGRIC, IND) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.1)$$

Where Yeconomic growth (GDP) is, $AGRIC$ is agriculture produce and IND is industrial produce

3.4 EMPERICAL MODEL

The researcher used the model proposed by Ben and Abula (2016), who investigated the influence of agricultural output on Nigerian economic growth from 1985 to 2015. The functional form of the model that they utilized was as follows.

$EPC_t = f\ (AGP_{t,}\ GSA_t)$ …… (3.2)

They rephrased the model for estimating purposes as follows:

$EPC_t = \beta_0 + \beta_1 AGP_{t,} + \beta_2 GSA_t + u_t$…… (3.3)

Where: = Earnings per capita

= Agriculture produce

= Government spending on agriculture

= Stochastic term

The researcher will make use of the agriculture production and will also add manufacturing sector for the research to be more interesting. This study will adopt the panel data model which can be represented as $Y_{it} = \propto_i + X_{it} + \mu_{it}$ It's critical to emphasize the importance of difference between fixed effects and random effects models. We assume $\propto_i$ in the FE model that has a relationship with the regressors X_{it} whereas X_{it} is believed to be unrelated with error μ_{it}. In the RE model, $\propto_i$ is assumed to be purely random meaning that it is uncorrelated with X_{it} . The following is an implied description of the model used for this research:

$GDP_{it} = \propto + AGRIC_{it}\beta + MANU_{it}\beta + \mu_{it}$

where: GDP is the Gross domestic product which is the dependent variable indicating the rate of economic expansion.

$AGRIC$ is the agricultural sector production

$MANU$ is the manufacturing sector production

$\propto$ is the constant of regression or the intercept

β is the explanatory variable's vector coefficient.

μ is the stochastic term

3.5 JUSTIFICATION OF MODEL VARIABLES

3.5.1 Gross domestic product (GDP)

GDP is the total production of all products and services generated in a country by residents and nonresidents, regardless of whether the output is distributed among domestic or foreign enterprises. GDP growth is the universal and normal indicator of economic success in all countries. As GDP rises, so does the demand for products made in the economy, resulting in more efficiency and productivity, and hence economic expansion.

3.5.2 Agriculture (AGRIC)

According to Cypher and Dietz (2010), the size of the people living and working in agriculture has a strong inverse relationship with the country's national level of per capita income. Increased agricultural production leads to increased expenditure, which leads to higher livelihoods and economic growth. Agriculture output is predicted to have a positive association with economic growth, that is the greater the level of agricultural output, the greater the proportion of economic growth and development.

3.5.3 Manufacturing (MANU)

Johnson and Mellor (1961) emphazed the existence of production and consumption links inside and outside of agriculture (1961). A rise in industrial output would suggest an increase in residents' quality of living as well as an improvement in the economy's consumption level, which would lead to an increase in production and employment. Agriculture production creates forward linkages, allowing agricultural products to be sold into non-agricultural industries, such as the manufacturing and agro-processing sectors. As a result, the manufacturing sector is projected to have a positive association with economic growth, meaning that the larger the manufacturing production, the higher the level of economic growth.

3.6 TECHNIQUES FOR ANALYZING DATA

3.6.1 POOLABILITY TEST

Only time series and cross section data are combined in panel data. In this model, time and individual dimensions are taken into account, and it is expected that the behavior of corporate data

remains consistent through time. Panel data estimation is a simple OLS extension. Pooling time series data allows you to expand your data set and acquire more accurate and dependable estimations of the model's parameters. The OLS model has the null hypothesis for the simplest poolability test Y_{it} =a +bX_{it} + $\propto_{it}$ and the alternative the FE model Y_{it} = $X_{i,t}$ +β($\propto_i$ + $\mu_{i,t}$) We will be testing for the presence of individual effects.

3.6.2 Estimators of model with fixed effects

The model presupposes that individual differences may be accommodated. from different intercept. The FE model is represented as

Y_{it} = $X_{i,t}$ +β($\propto_i$ + $\mu_{i,t}$)…… (2)

Where parameter $\propto_i (i = 1 \ldots . . n)$ detects fixed factors that differ between individuals however, this is constant across time, hence there is no t subscript, resulting in an error $\propto_i$. Thus $\propto_i$ and $u_{i,t}$ are enclosed in square brackets in the equation indicating that they are undetected, and if we forecast the model using a non-panel approach, the condition BLUE will not be satisfied; Y_{it} is the dependent variable where i = entity and t = time series, represent a single independent variable, β is the explanatory variable's coefficient vector, $\mu_{i,t}$ is the stochastic term.

Suppose $\propto_i$ is correlated with $X_{i,t}$, a problem called omitted variable will be created if $\propto_i$ goes into error term. Our estimator becomes inconsistent if we use non panel regression model, unless we use the FE, which implies that the covariance of ($\propto_i$ $\mu_{i,t}$) is zero. Hence the fixed effects model is represented as;

Y_{it} = $X_{i,t}$ +β($\propto_i$ + $\mu_{i,t}$)…… (3)

Where t=1, 2…T and =1,2……N given that T= 4years and N= 14 countries in the model. It is expected that while employing the FE model, $\propto_i$ is inextricably linked to $X_{i,t}$ and E($\propto_i$ $\mu_{i,ts}$) = 0 where s=1, 2…T (strict exogeneity). Therefore, this is written as;

ÿ$_{it}$ =$x_{i,t}$ β+ ü$_{i,t}$ ……..... (4)

Where y_{it} is time demeaned data, which is analogous to the situation for $x_{i,t}$ and $u_{i,t}$. The inside modification, which is a transformation of the original equation, has removed $\propto_i$from the equation. As a result, β casn be estimated consistently and this is known as the fixed effect estimator.

3.6.3 Estimators of random effects model

This model will predict panel data with linked interference factors across time and between people. The discrepancy in intercepts is handled by each company's error terms in the random effect model. The RE model has the advantage of eliminating heteroscedasticity. Random effect residuals can be linked over time, persons, or cross sections. As a result, RE believes that each individual has a distinct intercept and that the intercept is a random variable. There are two residual elements in the RE model. The first is the residual as a whole, which is a cross section and time series combination. The second residual is an individual residual, which is the random characteristic of the i-th unit observation and does not change over time. The panel data of RE model has the following regression equation:

$Y_{it} = \propto + \beta' X_{it} + \mu_i + \varepsilon_{it}$ …….. (5)

For i = 1, 2……N and t =1,2……; T where N= number of individuals, T= periods of time, ε_{it}= the residual as a whole, where residual is a cross section and time series combination, μ_i= Individual residual is a random property of unit measurement i-thand that exists at all times.

3.6.4 Hausman Test

The Hausman test is used to determine which of the FE and RE models is the most suitable, therefore it is conducted after we have estimated our data using the models. The basic goal of the Hausman test is to figure out where is correlated with the regressors, and hence hypothesis is used when there are two distinct estimators. The FE estimator is known to be consistent regardless of whether or not it is associated with, whereas R Effects requires a zero correlation. If the Hausman test accepts or p value > 0.05, we use the random effect technique; if the test accepts H_1 or p value < 0.05, we use the fixed effect approach.

3.6.5 Lagrange Multiplier Test (LM)

After running Hausman test and if Hausman test accept we use the LM test to see if we should stick with Random effect or Common effect.

3.6.6 Unit root test

The LL test, developed by Levin and Lin (1992, 1993), treats panel data as if it were made up of homogeneous cross sections, allowing it to be used to a pooled data set. Based on the following model, the LL test for unit in panel data is computed:

$Y_{it}= \rho_i y_{i,t-1}+ z_{it}y + \mu_{it}$ …… (6)

Where i =1...……N and t=1……. T, z_{it} is the component that is deterministic and μ_{it} is a stationary process. z_{it} may be 0, one, fixed effects- μ_{it} and a temporal trend and fixed effects. The LL test assumes that for all cases, the homogeneity assumption holds $\rho_i = \rho.$ and $\mu_{it} \sim iid\ (0, \sigma_\mu^2)$. In this case, the LL test is defined as $H_0: \rho = 1$ against the alternative that H_1:IρI < 1 .The testing technique is then designed to compare the null hypothesis of each individual in the panel having unit root properties to the alternative hypothesis of all cross section series in the panel being stationary. The unit root test is implemented in three steps using a pooling approach, with Augmented Dickey-Fulley (ADF) regressions estimated on each cross section in the panel and residuals computed.

3.7 SOURCE OF DATA

The World Bank, IMF, and RBZ provided data on economic growth, agriculture, and manufacturing for this study. These sources provide up-to-date estimates of variables. World Development Indicators provided GDP values and agricultural and manufacturing sector contributions

3.8 ADVANTAGES OF PANEL DATA

Panel data can answer issues about casuals ordering that non-panel data cannot. The fundamental purpose of empirical social inferences is to discover the relationship between social variables. The likelihood of an unobserved variable, endogeneity bias, and ambiguity about the causal mechanism's sequencing all limit the desire to derive a causation link from a non-panel variable (Hausman 1978).

Panel data controls for individual variability because it allows one to adjust for characteristics that are impossible to see or quantify, such as culture, factors, or distinct corporate practices among enterprises, or variables that change over time but not between organizations.

Panel data are larger data sets with more variability and less co-linearity across variables than non-panel data. With more informative data, one may obtain more trustworthy estimates and test more complicated behavioral models with fewer constraints.

Panel data sets may also be used to regulate individual homogeneity. Panel data also improves the ability to find and evaluate impacts that would otherwise be undetectable in non-panel data. Panel data also improves the research of complicated situations involving dynamic behavior.

3.9 CONCLUSION

This chapter concentrated on the technique employed in this research, the rationale of the variables used, the tests to be performed, and the data source. The chapter will lay the groundwork for data display and analysis. The next chapter (4) does data analysis and table display. For regression analysis, Econometric E-views version 7 will be utilized.

CHAPTER 4

PRESENTATION OF DATA, ANALYSIS, AND RESULT

4.0 Introduction

The study findings and findings are summarized in this chapter. The influence of agricultural production on economic growth in the Southern African Development Community was calculated using E-views. The outcomes will be analyzed from an economic and statistical standpoint. Data descriptions, regression findings, diagnostic tests, and the model's relevance are all included in this chapter. Finally, a summary of the study's outcomes and observed correlations between the explanatory and determinant factors is provided.

The World Development Indicators statics section provided data for the variables utilized in this research. On a constant LCU basis, both GDP and agriculture are calculated in millions of dollars. Despite the fact that agriculture is the most important relationship of interest, the model includes one other variable.

4.1 DESCRIPTIVE STATISTICS

	AGRIC	GDP	MANU
Mean	2330	9730	8740
Median	1190	2490	3050
Maximum	2.900	1.140	9620
Minimum	1.590	8.070	5100
Std. Dev.	2700	7070	2220
Skewness	3.90	3.168	3.100
Kurtosis	11.53	11.492	11.333
Jarque-Bera	264.761	261.980	251.731
Probability	0.000000	0.000000	0.000000

Sum	13014	5454	4891
Sum Sq.Dev	2757	4003	2726
Observations	56	56	56

Source: E-views7

For 56 observations, the table above gives descriptive statistics for the variables used in the model. The mean, maximum, and standard deviation, among other known dispersion factors, are included in the descriptive statistics. AGRIC has a low standard deviation of 2700, indicating that there is little fluctuation in the data and that it is quite reliable in explaining GDP growth changes. MANU also has a low standard deviation of 2220, showing a high level of confidence in its capacity to explain GDP changes.

The Jarque-Bera coefficients reveal that all variables are normal, such as AGRIC, which is 264.761 and therefore more than 0.1, the minimal coefficient required to fulfill the normality criteria. Because their coefficients are both bigger than 0.1, GDP and MANU are also normal.

4.2 Diagnostic test

4.2.1 Unit root test

Augmented Dickey Fuller is used to test for stationarity. Table 1 in the appendix shows that all ADF test statistics for all variables were greater than those of Levin, Lin & Chun t statistics which indicates that the variables are stable.

4.2.2 Correlation Analysis

The coefficient of determination illustrates the link between dependent and independent variables. The correlation matrix in the appendix depicts the link between economic growth and the study's independent variables. The matrix reveals that both farm production and the manufacturing sector are beneficial contributors to economic growth. We reject the null hypothesis that the estimated model is suffering from multicollinearity since the coefficients between the explanatory variables are less than 0.8. (Gujarati 2004).

4.3 Regression Results

4.3.1 Panel Least Squares

VARIABLE	COEFFICIENT	Std ERROR	t-Statistic	Prob
C	3250	1180	2.750	0.0081
AGRIC	2.742	0.094	29.161	0.0000
MANU	3.455	0.300	11.518	0.0000

4.3.2 Random Effects Model

Dependent Variable: GDP

Method Panel EGLS (Cross-section random effects)

VARIABLE	COEFFICIENT	Std ERROR	t-STATISTIC	Prob
C	15910	22801	0.700	0.4870
AGRIC	2.470	0.100	24.811	0.0000
MANU	4.372	0.276	15.814	0.0000

Specification of Effects

	S.D.	Rho
Cross section random	8030	0.9286
Idiosyncratic	2230	0.0714

4.3.3 Fixed Effects Model

Dependent variable: GDP

VARIABLE	COEFFICIENT	Std ERROR	t-Statistic	Prob
C	-3340	4790	-0.697	0.4899
AGRIC	2.950	0.562	5.252	0.0000
MANU	3.657	0.977	3.745	0.0000

4.3.4 Hausman test
Correlated random effects

Test Cross section random effects

Test Summary	Chi-Sq Statistic	Chi-Sq. df	Prob
Cross section random	4.009	2	0.135

Cross section random effects comparison

Variable	Fixed	Random	Var diff	Prob
AGRIC	2.950	2.450	0.305	0.385
MANU	3.657	4.372	0.877	0.445

Since the p-value >0.05 that is 0.135 is greater than 0.05, the method we choose to present the results is the random effect model.

4.4 Presentation of results

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	3250	1.180	2750	0.0081
AGRIC	2.742	0.094	29.161	0.0000
MANU	3.455	0.300	11.518	0.0000

SUBSTITUTING COEFFICIENTS
GDP=3250+2.742AGRIC+3.455MANU+ $\mu_{i,t}$

4.5 INTERPRETATION OF RESULTS
Agriculture output has a positive association with GDP with a coefficient of 2.742 and a P-value of 0.0000, which is significant at 1%. This means that in the current term, agriculture production in the Southern Africa Development Community will normally grow by one unit compared to the previous period. This demonstrates that farm output in the Southern Africa Development

Community has a positive impact on economic growth, which is statistically significant at 5%, implying that a 1% increase in agriculture production boosts economic growth by 1%. Furthermore, the manufacturing sector has a favorable impact on economic growth, with a 3.456 percent gain in economic growth for every 1% increase in manufacturing production. The value of Prob (F) is 0.0000 less than the crucial threshold of 0.05, implying that the entire model is correct.

4.6 Summary

The findings of the study were presented, evaluated, and discussed in this chapter, which was based on several sources. The findings of this study showed that agricultural production and economic growth had a beneficial link. For a period of four years, the positive association was discovered in a sample of 14 Southern African Development Community nations.

CHAPTER IV

RECOMMENDATIONS, CONCLUSIONS, AND SUMMARY

5.0 INTRODUCTION

This chapter summarizes the primary findings of the research and provides a concise review of the findings, followed by conclusions. It also contains suggestions for improving the efficiency of agriculture output in the Southern Africa Development Community. Its goal is to link the study's findings to the study's goals.

5.1 SUMMARY

The study's goal was to see how agriculture output affected the Southern African Development Community's economic growth. Panel data from 2015 to 2018 was used to calculate the contribution of agriculture to SADC's economic development. The findings support the hypothesis that agriculture output has a favorable impact on SADC's economic growth. The manufacturing sector is very important in influencing the amount of economic growth in the SADC region.

Agriculture is a vital source of inputs for the rest of the economy. Other industries consume at least 70% of primary agricultural output, accounting for about three-quarters of agricultural inputs needed in other industries. The food and agriculture industries pay well for both skilled and unskilled labor. It is also a vital producer of value added in rural regions, as well as a source of foreign exchange. In reality, farm output has a multiplier effect on the rest of the economy.

Key findings in summary are:

- Agriculture and industry output are important factors to consider when measuring regional economic progress.
- Agriculture encourages and supports both economic growth and development in rural regions, as well as the improvement of living conditions. Through consumption and production links, Johnson (1961) suggested that farm output plays an active role in economic growth. Higher productivity can boost rural and urban residents' incomes, resulting in increased demand for locally produced industrial goods.

- Agriculture is a necessary component of economic development and prosperity (Rostow 1960). As an economy diversifies and develops, the main agricultural sector loses importance in terms of GDP, but it develops strong ties to the rest of the economy.

5.2 CONCLUSION

The influence of agriculture on economic growth in SADC was examined in this study, and significant evidence was established indicating agriculture is a key instrument for economic growth in SADC. Agriculture's importance in terms of production has been shown to be lower than that of the manufacturing sector, which contributes more, but this does not imply that manufacturing is more significant. Agriculture and industry, in reality, are both vital, and they operate hand in hand in the form of consumption and production links.

5.3 SUGGESTIONS

It is recommended that governments of SADC member states provide funds to purchase sophisticated farm equipment, increase investments in agriculture, and increase their budgetary allocation to agriculture in a consistent manner because agriculture is critical to the regional economy, with the hope that effective monitoring and supervision of funds will contribute more significantly to the region's economy. As a result, efficient use of agricultural finances is encouraged, and all waste bottlenecks are avoided.

The SADC member states' governments must help set up a trust fund for the agriculture business. Agriculture ministries must be accountable for policy execution and openness is required, since policy failure has been linked to insufficient policy implementation in the agriculture sector, hurting the industry's contributions to economic growth.

There is need of thorough investigations on how institutions process and utilize funds allocated to agriculture sector according to budget allocated and presented.

To promote allocation efficiency and production efficiency, governments of member states should implement efficient rules, regulations, and law enforcement that allow for visibility in service delivery and spending management in the agriculture sector.

5.4 FURTHER AREAS OF RESEARCH

The findings of this study should not be seen as definitive, but rather as a catalyst for more research into the influence of agriculture on economic growth in SADC. Further research on the influence of agriculture on various economic sectors, such as manufacturing, is recommended. There is also a need to include other factors such as climate, regional spillovers and location that affect agriculture development, hence assist to come out with a detailed understanding of these relationships. Additional research may be done to uncover other elements that influence SADC economic growth that are not covered in this study.

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APPENDICES

APPENDIX A

ID	Country	Year	GDP	AGRIC	MANU
1	Zimbabwe	2015	1.82E+10	1.56E+09	2.27E+09
1		2016	1.83E+10	1.5E+09	2.28E+09
1		2017	1.92E+10	1.65E+09	2.31E+09
1		2018	2.01E+10	1.96E+09	2.34E+09
2	Zambia	2015	1.25E+11	9.15E+09	1.02E+10
2		2016	1.3E+11	9.49E+09	1.04E+10
2		2017	1.34E+11	1.04E+10	1.08E+10

2		2018	1.4E+11	8.21E+09	1.13E+10
3	South Africa	2015	4.42E+12	9.88E+10	5.53E+11
3		2016	4.45E+12	9.37E+10	5.56E+11
3		2017	4.5E+12	1.12E+11	5.55E+11
3		2018	4.57E+12	1.12E+11	5.66E+11
4	Botswana	2015	1.54E+11	2.81E+09	1.02E+10
4		a2016	1.64E+11	3.25E+09	1.07E+10
4		2017	1.71E+11	2.96E+09	1.05E+10
4		2018	1.78E+11	3.27E+09	1.03E+10
5	Mozambique	2015	5.93E+11	1.37ES+11	4.8E+10
5		2016	6.15E+11	1.43E+11	4.97E+10
5		2017	6.38E+11	1.48E+11	5.1E+10
5		2018	6.6E+11	1.53E+11	5.19E+10
6	DRC	2015	5.3E+12	2.93E+11	1.24E+12
6		2016	4.73E+12	2.93E+11	1.34E+12
6		2017	4.52E+12	3.19E+11	1.38E+12
6		2018	4.3E+12	3.15E+11	1.37E+12
7	Angola	2015	1.62E+12	1.11E+11	5.56E+10
7		2016	1.58E+12	1.15E+11	6.2E+10
7		2017	1.58E+12	1.16E+11	6.28E+10
7		2018	1.55E+12	1.07E+11	6.58E+10
8	Tanzania	2015	9.43E+13	2.52E+13	7.41E+12
8		2016	1.01E+14	2.64E+13	8.21E+12
8		2017	1.08E+14	2.8E+13	8.89E+12
8		2018	1.14E+14	2.9E+13	9.62E+12
9	Namibia	2015	1.46E+11	9.71E+09	1.67E+10
9		2016	1.46E+11	9.92E+09	1.83E+10
9		2017	1.45E+11	1.02E+10	1.8E+10
9		2018	1.46E+11	1.06E+10	1.8E+10
10	Eswatini	2015	3.95E+10	3.93E+09	1.24E+10
10		2016	4E+10	3.6E+09	1.26E+10
10		2017	4.08E+10	3.44E+09	1.3E+10
10		2018	4.17E+10	3.65E+09	1.29E+10
11	Mauritius	2015	3.2E+11	1.32E+10	4.27E+10
11		2016	3.33E+11	1.37E+10	4.28E+10
11		2017	3.45E+11	1.36E+10	4.34E+10
11		2018	3.58E+11	1.34E+10	4.37E+10
12	Seychelles	2015	8.07E+09	1.59E+08	5.1E+08
12		2016	8.44E+09	1.61E+08	5.19E+08
12		2017	8.84E+09	1.66E+08	5.43E+08
12		2018	8.99E+09	1.9E+08	5.81E+08

13	Lesotho	2015	2.17E+10	9.42E+08	2.28E+09
13		2016	2.25E+10	1.44E+09	2.68E+09
13		2017	2.18E+10	1.15E+09	2.43E+09
13		2018	2.15E+10	9.98E+08	2.77E+09
14	Madagascar	2015	1.88E+13	4.67E+12	1.48E+12
14		2016	1.95E+13	4.73E+12	1.56E+12
14		2017	2.03E+13	4.79E+12	1.63E+12
14		2018	2.1E+13	4.81E+12	1.71E+12

APPENDIX B

Diagnostic tests

Unit root test

Table 1

Variables	ADF test statistic Fisher Chi-square	Levin, Lin & Chu t statistic	Decision
GDP	30.2898	18.5838	Stationary
AGRIC	17.1719	9.07811	Stationary
MANU	52.2678	-10.8603	Stationary

Source: E views

APPENDIX C

Correlation Matrix

Table 2

	GDP	AGRIC	MANU
GDP	1.000000	0.698606	0.693199
AGRIC	0.698606	1.000000	0.787559
MANU	0.693199	0.787559	1.000000

APPENDIX D

Hausman test

Correlated Random Effects - Hausman Test

Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.008930	2	0.1347

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
AGRIC	2.949608	2.469594	0.305487	0.3851
MANU	3.656849	4.372315	0.877145	0.4449

Source: E-view

APPENDIX E

Method: Panel Least Squares
Date: 03/09/22 Time: 20:06
Sample: 2015 2018
Periods included: 4
Cross-sections included: 14
Total panel (balanced) observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.25E+11	1.18E+11	2.750158	0.0081
AGRIC	2.742304	0.094041	29.16087	0.0000
MANU	3.455053	0.299957	11.51849	0.0000

R-squared	0.999205	Mean dependent var	9.73E+12
Adjusted R-squared	0.999175	S.D. dependent var	2.70E+13
S.E. of regression	7.75E+11	Akaike info criterion	57.64198
Sum squared resid	3.18E+25	Schwarz criterion	57.75048
Log likelihood	-1610.975	Hannan-Quinn criter.	57.68404
F-statistic	33291.40	Durbin-Watson stat	0.087383
Prob(F-statistic)	0.000000		

APPENDIX F

REM

Dependent Variable: GDP
Method: Panel EGLS (Cross-section random effects)
Date: 03/09/22 Time: 20:15
Sample: 2015 2018
Periods included: 4
Cross-sections included: 14
Total panel (balanced) observations: 56
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.59E+11	2.28E+11	0.700126	0.4869
AGRIC	2.469594	0.099537	24.81086	0.0000
MANU	4.372315	0.276490	15.81363	0.0000

	Effects Specification	
	S.D.	Rho
Cross-section random	8.03E+11	0.9286
Idiosyncratic random	2.23E+11	0.0714

Weighted Statistics

R-squared	0.997164	Mean dependent var	1.34E+12
Adjusted R-squared	0.997057	S.D. dependent var	4.18E+12
S.E. of regression	2.27E+11	Sum squared resid	2.73E+24
F-statistic	9319.275	Durbin-Watson stat	0.769733
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.999056	Mean dependent var	9.73E+12
Sum squared resid	3.78E+25	Durbin-Watson stat	0.055518

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