



**The impact of investment on economic growth and  
employment in South Africa: A sectoral approach**

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Campus North-West University

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## DECLARATION

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I, Tebogo Manete, hereby declare that the dissertation title “*The impact of investment on economic growth and employment in South Africa: A sectoral Approach*” is my own work and that where other researchers work was used it was acknowledged by means of complete reference and that I have not submitted it for obtaining any other qualification at any other institution.

**Signature**

**Date**

## ACKNOWLEDGEMENTS

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## SUMMARY

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The growing unemployment rate and slow economic growth rates has raised concerns for researchers into broadening research into factor that would increase economic growth and employment. The South Africa government has formulated strategies to stimulate growth and employment. This strategies are aimed at creating an inclusive growth independent of the foreign direct investment. The country is trying to create an economy that is labour absorptive and sustainable. As a result the use of economic sectors are crucial in achieving such objectives. The creation of employment in sectors require the increase in the sector productivity and be labour absorptive.

Studies have investigated the relationship of sectoral production on economic growth and not much have investigated the impact that investment in sectors has on economic growth and employment. Studies have reached a consensus that economic growth does not necessarily result to increase in employment, hence the study investigates the impact of sectoral investment on economic growth and employment. Furthermore, the study is grounded on the ideology of Says law, stipulating that investment in significant contributor to economic growth. Linking investment to sectors, the study aims to determine the relationship between investment in sectors and economic growth and determine if sectors are robust in creating employment and growth. This study seeks to fill the gap of investment in sectors impact on economic growth and employment and seeks to broaden the knowledge of sectoral investment impact on growth and employment in South Africa.

As a result, the study used quarterly data from 1994 to 2016 to analyse the impact of investment on economic growth and employment in South Africa. The study focused on theories of investment, growth and employment which all are significant in discussing the impact of sectoral investment on economic growth and employment. The investment theories confirmed that investment is crucial in influencing economic growth. The growth theories made use of labour, capital and technological advances as factors that will enhance economic growth. The employment theories explained the relationship between economic growth and employment. The study made of Autoregressive Distributed Lag (ARDL) and Vector Autoregressive (VAR) model to determine the impact of sectoral investment on economic growth and employment. Under the use of a VAR model a Granger causality and impulse responds were employed to determine the shocks between the variables.

The results showed that investment in sectors has a positive significant impact to economic growth and employment. The study established that there is no significant relationship between the variables in the short-run. The Granger causality test established that there is a bidirectional causality between investment in finance and mining to economic growth and further established that there is a unidirectional relationship between investment in finance and manufacturing to employment. As a result, the study concludes that sectoral investment has a significant impact on employment and economic growth. This means that an increase in sectoral investment will increase economic growth and employment. This calls for stricter measure in enhancing sectoral investment in South Africa.

**Keywords:** domestic investment, economic growth, investment spending, job creation

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## LIST OF ABBREVIATIONS

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AAR:	Average Abnormal Returns
ADF:	Augmented Dickey-Fuller
AIC:	Akaike Information Criterion
AR:	Abnormal Returns
ARDL:	Autoregressive Distributed Lag
ASGISA:	Accelerated and Shared Growth Initiative
BIC:	Bayesian Information Criterion
COSATU:	Congress of South African Trade Unions
CUSUM:	Cumulative sum of recursive residual
DTI:	Department of Trade and Industry
ECM:	Error Correction Model
EPWP:	Expanded Public Works Programme
FDI:	Foreign Direct Investment
FPE:	Final Prediction Error
GDP:	Gross Domestic Product
GEAR:	Growth Employment and Redistribution Strategy
$H_0$ :	Null hypothesis
$H_1$ :	Alternative hypothesis
HQC:	Hannan-Quinn Criterion
IDC:	Industrial Development Corporation
ILO:	International Labour Organisation
IPAP:	Industrial Policy Action Plan
KPSS:	Kwiatkowski–Phillips–Schmidt–Shin

LM:	Lagrange Multiplier
LR:	Likelihood Ratio
MTSF:	Medium-Term Strategic Framework
NDP:	New Development Plan
NGP:	New Growth Path
NPC:	National Plan Commission
OECD:	Organisation for Economic Co-operation and Development
PP:	Phillips-Perron
RDP:	Reconstruction and Development Programme
SARB:	South African Reserve Bank
SIC:	Schwarz Information Criterion
SMME:	Small, Medium and Micro Enterprises
STATS SA:	Statistics South Africa
TISA:	Trade and Investment South Africa
UK:	United Kingdom
UNDP:	United Nations Development Programme
VAR:	Vector Autoregressive
VEC:	Vector Error Correction
VECM:	Vector Error Correction Model
VECT:	Vector Error Correction Term

## CHAPTER 1

### INTRODUCTION AND BACKGROUND

---

#### 1.1 INTRODUCTION

Lack of employment is a predicament to global innovation and development (Fischer, 2014). Employment creation is every nation's top priority. South Africa is amongst the countries with the highest unemployment rate in the world, with more than 2 million unemployed people (IDC, 2016). Without work, it is difficult to survive and it exacerbates social, economic and poverty instability in the country (Rapoport & Wheary, 2013). It will be highly impossible for the South African government alone to help curb this high rate (27.7%) of unemployment. It is imperative that a country sustains its growth to achieve its macroeconomic objectives. It is through economic growth that inequality, unemployment and government dependency can be curbed (Vijayakumar, 2013).

The South African economy has faced with a number of challenges in recent years. The GDP growth rate has declined to around a percentage a year making it the lowest since 2009 and the unemployment rate remains remarkably high at more than 25 percent (World Bank, 2016). Commodity prices are lower, domestic confidence has declined, private sector investment has declined as well as exports revenue (Lings, 2016). Moreover, the weak South African economic performance has had a negative effect on the performance of economic sectors (IDC, 2016).

The performance of the economic sectors in South Africa has been sluggish and under a lot of pressure over the years. The mining sector contribution to GDP declined to 3 percent in 2015 due to long strikes experienced. The sector is still underperforming as a result of commodity markets (IDC, 2016:4). The agricultural sector was affected negatively by the worst drought ever in 2015, which resulted in a decline of 8.4 percent (IDC, 2016:5). Consequently, the manufacturing sector's performance declined. The financial sector's contribution to GDP grew in 2015, however, it started to deteriorate towards the end of 2015 (IDC, 2016:4). The performance of economic sectors is crucial, as they play an imperative role in the country's economic output.

Economic growth and investment are crucial for eradicating inequality, unemployment and poverty in South Africa (Akanbi, 2016). The South African government expenditure has increased extensively since 1999 in order to address high inequality and poverty. Investment,

on the other hand, has been diminishing and growth declining (Ashman, *et al.*, 2011). Countries that have a high growth rate are countries that devote a substantial fraction of their output to investment, as illustrated in Table 1.1. Over the period of 1975-2015 countries such as Singapore, Korea and China grew rapidly due to their high rate of investment. In contrast, countries such as Bangladesh, Burundi, Ethiopia and Malawi, had low investment rates to support their growth (Dornbusch *et al.*, 2014). Moreover, such countries with low investment remain the poorest. For that reason, it is important for countries to capitalise on capital investment to drive their growth prospects (Simone, 2016).

**Table 1.1: Ratio of investment to output**

Country	1975	1985	1995	2005	2015	Status
United states	18.3	20.7	18.2	19.9	15.2	Low and decreasing
Canada	24.1	19.4	17.6	20.5	22.6	Low and stagnant
Sweden	19.9	20.8	15.8	17.0	18.4	Low and stagnant
Japan	32.5	27.7	28.0	23.2	20.6	Low and decreasing
Korea	26.8	28.8	37.3	29.3	27.4	High and maintained
Singapore	35.1	42.2	33.4	21.8	23.4	High and stable
China	28.3	30.0	34.7	42.2	45.6	High and increasing
Bangladesh	5.5	10.3	19.1	24.4	25.2	High and increasing
Ethiopia	10.5	10.7	16.4	23.8	25.5	High and increasing
Burundi	12.8	14.2	9.4	15.5	21.7	Low and increasing
Malawi	24.9	13.3	14.	8.9	20.0	Low and increasing
South Africa	19.5	21	19	18	19	Low and stable

Source: Dornbusch *et al.* (2014)

The fundamental aspects of investment are a major concern in South Africa. Government attempts to normalise human development have resulted in the majority of the public spending

more on social expenditure and less on investment prospects. With high interest rates and fuel prices, increasing electricity costs and the high unemployment rate, growth in South Africa is difficult to achieve (Salih, 2012). According to Simone (2016), growth and investment are solutions to South Africa's state of the economy. Investment (as measured by gross fixed capital formation) has played an imperative role in the growth prospect of the South African economy, with trade inflow increasing extensively into the country over the past decades, contributing about 2.7 percent of the total gross domestic product (GDP) (StatsSA, 2016). Gross fixed capital formation increased by 1.4 percent in 2015 (IDC, 2016:7). An increase in such an investment resulted in an improved transfer of technology and information globally (Fedderke, 2006). Investment in manufacturing is important for the development of the country. Likewise, manufacturing enables the country to make use of its resources and be labour intensive. Investment is all the economic activities that make use of resources to produce goods and services. Fixed capital formation (investment) is the acquisition of plants, machinery and equipment (Chetty, 2007:7). Such investment will be used in manufacturing, finance and mining sector.

Investment is an important part of GDP and it can be categorised into two broad classes; namely domestic and foreign investment (Dornbusch *et al.*, 2011). The latter can be defined as all the spending occurring from non-foreign enterprises such as spending on machinery, equipment and necessary physical resources (Fitrianti, 2016). Whereas, foreign investment can be defined as the investment made to acquire short or long-term interest in businesses in a foreign economy to that of the investor (Buckley, 2010).

An investment approach has the means to increase jobs and create a more sustainable economic growth. According to Okuns law (1962), a 1 percent increase in the GDP will result in 0.3 percent decline in unemployment. That is, growth and unemployment have an inverse relationship. This law emphasises the need for economic growth in countries, as an increase in growth will result in the reduction of unemployment, which will result in improved living standards. Thus, poverty is reduced, inequality declines and households become active in the economy. Unemployment reduction is a priority focus for the South African government as stipulated in the New Growth Path (NGP) and New Development Plan (NDP) policies. This is due to unemployment's association with crime, poverty social division and instability (Geldenhuis & Marinkov, 2007:1).

Barro (1991) examined the relationship between human capital and investment growth to economic growth from a sample of 98 countries for the period of 1960-85, and established that the growth in GDP per capita has positive relation with human capital as well as investment growth. However, GDP per capita growth is related negatively to political instability and price distortions. Barro (1990) also contends that the fiscal policy and the rate of economic growth role has been part of the literature on endogenous growth. According to Barro (1990) government spending directly affects private production functions. Low investment inhibits the country's potential to attain a high level of growth rates. Ongo (2014) examined the effects of gross capital formation on the economic growth of Central African Economic and Monetary Community (CEMAC) sub region. Their study established that private investment enhances economic growth and development.

Among various theories and empirical studies on the effects of investment on economic growth, very few have addressed the important issue of the impact of sectoral investment on economic growth in South Africa. This study uses econometrics to analyse the impact of real sector investment on economic growth and employment in South Africa. Econometrics links empirical content to economic theory, enabling theories to be tested and used for evaluating policies and forecasting (Huynh *et al.*, 2015:5).

## **1.2 PROBLEM STATEMENT**

South Africa's current account deficit reached 5.1 percent of GDP in the fourth quarter of 2015, exports have deteriorated despite a weak rand and dividend receipts from abroad decreased (Vollgraaff, 2016). South Africa's economy grew by only 0.3 percent in 2016, 1.5 percent in 2015, down from 1.5 in 2014 and 2.2 percent in 2013 (StatsSA, 2016). A decline in the production of field crops, electricity, gas and water supply has decreased consumer spending in South Africa, which has resulted in an increase in inflation. GDP is widely used to measure the size of the economy and its performance over time (SARB, 2016). South Africa's economic environment prohibits it from attaining its Millennium Developmental Goals and achieving its NDP objectives (Zarenda, 2013).

Investment plays a major role as a key factor in economic growth. Due to capital's strategic role in raising productivity, capital formation occupies a central position in the process of economic development (Seth, 2014). Economic development is not possible without the invention and use of machinery, infrastructure, production of agriculture, tools and implements. Expansion of capital is imperative for development in South Africa. South Africa has a high

rate of unemployment, which exacerbates poverty and crime. Capital formation will thus reduce unemployment thereby improving the living standards of South Africans. Increase in investment results in an increase in economic growth (Museru *et al.*, 2014).

Without investment, an economy could experience a high level of consumption; however, this creates an unbalanced economy (Pettis, 2011). What can the government do to increase investment in South Africa? How will sectoral investment increase economic growth and create jobs? What measures can be taken to enhance growth? These questions have not been answered fully in the literature. Investment is a major contributory factor to economic growth, although the capital capacity of the nation is not peculiar to South Africa, it is a global phenomenon. Thus, there is a need to investigate the impact of sectoral investment on job creation and economic growth in South Africa.

### **1.3 OBJECTIVES OF THE STUDY**

The following objectives have been formulated for the study:

#### **1.3.1 Primary objective**

The objective of this study is to evaluate the general impact of manufacturing, finance and mining sector investment on employment and economic growth and to examine whether a sectoral investment is a robust determinant of South Africa's economic growth and employment.

#### **1.3.2 Theoretical objectives**

The study formulated the following theoretical objectives in order to achieve the primary objective:

- To provide theoretical explanations of sectoral investment and employment
- To review the theoretical concepts explaining the various investment and growth regimes in South Africa;

#### **1.3.3 Empirical objectives**

In accordance with the primary objective of the study, the following empirical objectives are formulated:

- To analyse the relationship between sectoral investment, economic growth and employment in South Africa with specific reference to the years 1995 to 2016

- To examine the impact of sectoral investment on South Africa's economy and employment
- To investigate the problems affecting investment decisions and make suggestions on how to resolve them
- To improve investment strategies through empirical research to create growth in South Africa.

## **1.4 RESEARCH DESIGN AND METHODOLOGY**

This section outlines the methodology and design used to conduct this research. This section will discuss the literature around quantitative research, followed by a review of the research design and research instrument to be used. Data collection and analysis in relation to the study will be discussed.

### **1.4.1 Literature review**

The theoretical background entailed reading of the literature on the subject and other related concerns and consultation of other sources of information that were relevant to the subject under discussion. The referral of other sources of information was performed in an attempt to have a thorough understanding of previous writings on the impact of sectoral investment on employment and economic growth.

The study made use of different sources such as books, journals and any documentation that are available at national level. Information was sourced from platforms such as NWU Library, such as Research in Economics, World Bank, World Economic Forum, Statistics South Africa, Newspapers and South African Reserve Bank

### **1.4.2 Empirical study**

This section explains the manner in which data were collected and analysed.

#### **1.4.2.1 Data collection and sources**

Determining the impact of sectoral investment requires the availability of investment and data of a specific period. This study focused on the quarterly time series data over the period 1995 to 2016. The sample date begins from 1995 in order to omit the effects of economic sanctions imposed against South Africa before 1995. Data were collected from the South African Reserve Bank (SARB).

### 1.4.2.2 Data analysis

The descriptive analysis of the data made use of tables and graphs to analyse data collected. This simplified analysing information. The analysis was done in line with the research problem and the empirical objectives. The empirical objectives of the study were achieved by using various econometrics models through Eviews 9, which made it possible to determine the impact of sectoral investment on employment and economic growth. To examine the impact of investment in economic sectors on economic growth and employment, the components of the gross fixed capital formation are expressed as follows:

$$GDP_t = f(InvMin, InvManu, InvFin) \quad (1.1)$$

$$Employment_t = f(InvMin, InvManu, InvFin) \quad (1.2)$$

Where GDP is economic growth, InvMin is the investment in mining, InvManu is the investment in manufacturing and InvFin is the investment in the financial sector. These three sectors were chosen because of their potential to growth and eradication of unemployment. Furthermore, an autoregressive distributed lag (ARDL) and Vector auto-regression (VAR) model was used to capture the linear interdependencies among the variables.

Granger causality test was used to test the impact of investment on economic growth and employment. This test has been utilised widely to determine the direction of causality between two time-series variables (Chipaumire *et al.*, 2014). However, the time series properties of the variables have to be checked before using the Granger causality test. In the case where the variables are not stationary, the usual asymptotic distribution of the test statistic in the Granger test may not be valid. Therefore, it is important to ensure that the variables are stationary before proceeding. In order to check if the variables are stationary, unit root test will be used.

## 1.5 SIGNIFICANCE OF THE STUDY

In a developing country such as South Africa, where the country is facing a budget deficit and future economic growth prospects are low, it is vital to focus on investment. However, the type of investment that South Africa has to focus on should be to enhance inclusive growth. Domestic investment will exacerbate job creation and living standards in the country. Bhutan is amongst the countries with the lowest economic development in the world; however, it is one of the fastest growing countries in the world (World Bank, 2016). This is caused by the high gross capital formation of 58 percent in 2014, which makes it the highest in the world.

Mozambique in one of Africa's strongest performers at an average annual growth rate of 6 percent to 8 percent in the decade up to 2015 (World Fact Book, 2016). It has the second largest gross capital formation in Africa and the second in the world (World Bank, 2016).

The fundamental aspects of this research are to advance the study of the importance of the contribution of domestic investment in South Africa and its contribution to the economy. The research will provide a good understanding of the domestic investment environment to South Africa's future economic growth prospects. The results will help the policy makers as well as other parastatals make informed decisions concerning policy drafting and achieving the NGP and well as NDP goals. It will further reinstate the importance of investment in South Africa and highlight the significance of internal growth.

## **1.6 CHAPTER CLASSIFICATION**

This study comprises of the following chapters:

### **Chapter 1: Introduction and background to the study**

This chapter introduced the study by putting forward the problem statement, research questions and the objectives of the study.

### **Chapter 2: Literature review**

This chapter addresses the key theoretical aspects of the impact of sectoral investment on employment and economic growth.

### **Chapter 3: Trend and policy analysis**

This chapter provides and explain the historical and current trends of investment in sectors and employment. It further discussed the introduction of policies and their implications on the country's objectives.

### **Chapter 4: Research design and methodology**

This chapter explains the sample period, the econometric model used and how data were collected to achieve the empirical objectives set by the study.

### **Chapter 5: Results and discussions**

This chapter uses econometric models to determine the impact of sectoral investment on economic growth and employment in South Africa. The chapter presents the finding of the

econometric models (ARDL and VAR) and discusses the findings by linking them with the theory and previous studies.

### **Chapter 6: Summary, Conclusions and recommendations**

This chapter aims at linking some of the major findings obtained in this study. This chapter relate the findings of the econometric study with the literature review, discuss any variances, show the relevance of the study and formulates some recommendations for future studies and for policy formulation in South Africa. Moreover, it make recommendations and suggestions for future research.

## CHAPTER 2

# THEORETICAL ASPECTS OF ECONOMIC GROWTH, INVESTMENT AND EMPLOYMENT

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### 2.1 INTRODUCTION

Uplifting and developing economic sectors remains a key priority in promoting and stimulating growth and employment for prolonged and sustained economic success (Patel, 2010). Domestic investment in general and gross fixed capital formation in particular have been recognised as key factors in accelerating growth and employment within the various economic sectors (Faulkner *et al.*, 2013). The importance of investment as a driver of economic growth has also been emphasised by both neoclassical and Marxist economists (Anwer & Sampath, 1999). Following the establishment of research into the relationship between investment and growth, Barro (1990) found a positive correlation between investment and growth. Similar findings were reported by Fedderke (2006), Dornbusch *et al.* (2014), Ongo (2014), and Ncanywa and Makhenyane (2016).

Factors that enhance economic growth have been given much attention by both the empirical and theoretical literature due to the effect that economic growth has on the wellbeing of a country. There is consensus on the importance of investment on economic growth among countries (De Long & Summers, 1990; Amusa, 2014). This chapter discusses the theoretical background of investment, economic growth and employment.

### 2.2 THEORETICAL BACKGROUND

#### 2.2.1 Definition of investment

The theory of investment dates back to academics such as Irving Fisher, Arthur Cecil Pigou, Alfred Marshall and John Maynard Keynes who all made contributions to the ideology of investment (Kothe, 2013). Investment is a commitment of money and other resources in the expectation of attaining future benefits (Bodie *et al.*, 2009). Investment involves the use of resources in economic activities to increase productivity. Hence, investment can be referred to as the production of capital goods (Heim, 2008). Capital goods in this case are goods used to produce other goods such as machinery.

According to De Long and Olney (2009), investments that enhance capital intensity have an imperative role in creating growth. Capital formation is the process of accumulating assets of value, increasing or creating wealth. This means that capital is accumulated in different forms of investments such as financial assets, human capital and real assets (Adekunle & Aderemi, 2012). Capital formation constitutes what society does not consume immediately but rather directs to capital goods to increase the efficiency of productivity (Saleh, 1997). The Organisations for Economic Cooperation and Development (OECD, 2017) defines investment as the attainment and creation of assets by producers for their own use, less the disposals of produced fixed goods. According to OECD (2017), assets that are the result of the production process are included in the national accounts and are referred to as produced assets. Fixed assets are intangible or tangible assets such as buildings, machinery, equipment and other assets that are used in the production process (Saleh, 1997:3).

## **2.2.2 Economic sectors in South Africa**

South Africa's economy consists of various economic sectors. These economic sectors contribute differently to the country's growth prospects. Economic sectors can be referred to as activities that perform certain economic functions and share the same characteristics of producing products or services (Fisher, 1939). Economic sectors comprise of three large sectors, namely the primary sector, secondary sector and tertiary sector, which then are subdivided into various sectors.

### **2.2.2.1 Primary sector**

The primary sector is an early stage of economic development that is responsible for extracting and harnessing natural resources from land. This sector involves the extraction of minerals and harvesting of food such as mining, fishing and agriculture (Mohr & Fourie, 2008). The primary sector is considered to be one of the most important sectors. Economic theory supports the importance of the primary sector towards growth in the country. The primary sector is responsible for food security, employment creation and enables the productivity of the secondary sector as well as tertiary sector (Gylfason & Zoega, 2006; Vagdevi & Kiranbabu, 2015).

### **2.2.2.2 Secondary sector**

The secondary sector involves the process of converting raw material to final output. The latter includes the manufacturing and constructions sectors that are responsible for transforming raw

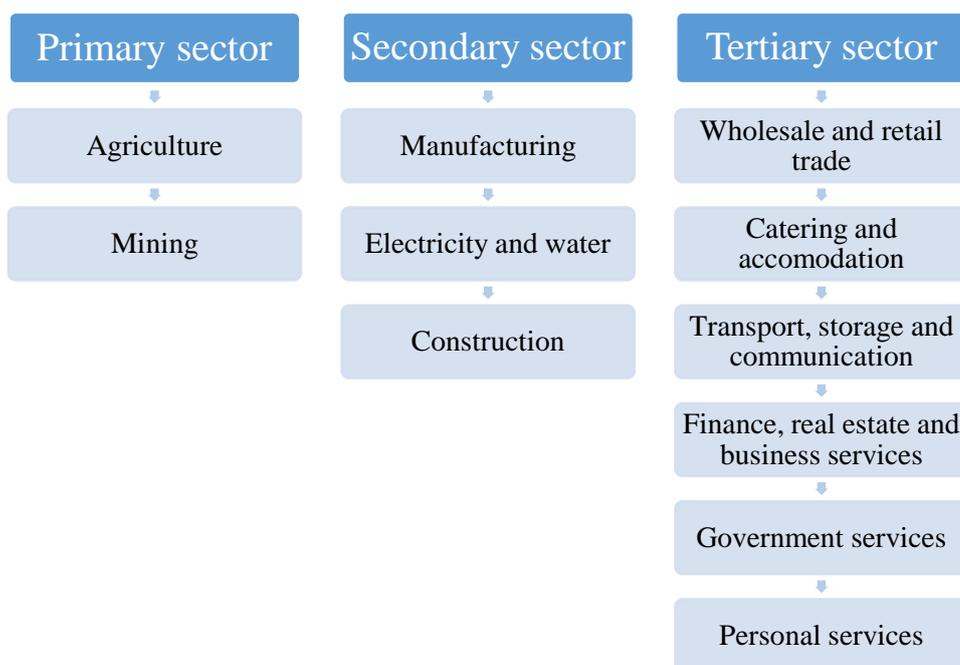
materials into final outputs (Mohr & Fourie, 2008). In other words, the secondary sector is the processing sector that gets inputs ready for tertiary sector. It involves the use of human activities in collaboration with capital equipment to produce final or intermediate goods. South Africa’s manufacturing sector has three subsectors, namely food and beverages, petroleum and chemical products and metal and machinery StatsSA (2015).

### 2.2.2.3 Tertiary sector

Tertiary sector involves the purchase of final goods and services from the secondary sector for households; hence, it is referred to as the service sector. This sector is the final phase in which products are made ready for consumption. According to Grubel (1987), a service is an economic transaction between two parties, which results in change in the condition of goods or a person. Activities associated with the tertiary sector include transportation, trade, communication, education and financial services (Mohr & Fourie, 2008). The world is advancing to technological productive methods enabling the growth of the tertiary sector (Dunning, 2013). This means that the tertiary sector is growing faster than the other sectors.

The aforementioned sectors have subsectors, as previously indicated and they contribute differently towards the economy. Figure 1 shows the three main economic sectors with their subsectors.

**Figure 2.1: Economic sectors**



Source: Authors own compilation from Fisher (1939)

Subsequently, this study focuses on all the economic sectors, specifically mining, manufacturing and the financial sector.

The mining sector involves the extraction of mineral and metal resources that are used to produce other goods or for commercial purposes (Sebehela, 2011). The manufacturing sector converts what was extracted in the primary sector to usable goods or services (Enderwick, 2013). The financial sector is also referred to as the service sector; it includes banks, insurance companies, investment funds, and real estates (MacKenzie, 2008). These services are not consumable and can either be durable and non-durable as they are influenced mostly by returns. All these sectors contribute substantially to the country's growth, thereby positively influencing economic development.

### **2.2.3 Economic growth and economic development**

Economic growth is an imperative goal that many countries strive to attain. A country's economic health can be measured by looking at its economic growth and development (Hess, 2013). According to Todaro and Smith (2011), economic growth is a sustained increase in real GDP. The achievement of high economic growth is certainly one of the most accepted goals in the economic world. The consensus is that economic growth should result in an overall improvement in the standard of living of the population (Fourie & Burger, 2010:12). According to Van den Bogaerde (1972:397), economic growth in European and North American countries required technological advancement and restructuring of their economies. This emphasises the neoclassical ideology of economic growth. Economic growth is measured through change in GDP, which is defined as the monetary value of all the final goods and services produced within the boundaries of a country in a specific period of time (Mohr & Fourie, 2008). GDP can either be in real or nominal terms. The former is the production of goods and services adjusted for inflation and the latter is not adjusted for inflation (Bjork, 1999).

Factors of production are believed to have an impact on economic growth due to their contribution to output. Improvements in the productivity of the factors of production lead to increases in the production of goods and services. Consequently, development is realised as more job opportunities are created and unemployment is reduced (Haller, 2012).

The concepts of economic growth and development often are confused, although they are closely related. Economic development is one of the most crucial factors leading to economic progress. Unlike economic growth, economic development entails the reallocation of resources, infrastructure and the structure of the economy and social and technological progress

(Adelman, 2000). It involves the way in which human economic conditions change gradually and how these circumstances can be changed (Hogendorn, 1996:1). According to Todaro and Smith (2011), economic development is a holistic dimension, which does not only entail the economic aspects but restructures the entire economy and social structure. In particular, development is often coined with human development, a process that not only involves an expansion of peoples' choices in a way that enables them to lead a longer, healthier and fuller life, as per the United Nations Development Programme (UNDP, 1990:9), but one that goes beyond these dimensions to encompass a much broader range of capabilities (UNDP, 2010:2). Thus, it entails escalating the variety of choices that individuals have, liberating them from misery, oppression and narrow beliefs and improving their standard of living so that they overcome hardships stemming from poverty and as a result are able to meet basic human needs (Fourie & Burger, 2009; World Bank as cited by Meyer, 2014).

This means that with development, there should be an increase in the per capita income, education, health and environmental protection (Sekhampu, 2010). This is possible through increase in income, however, sustainability is crucial as a result enhancement of skills, education, improved nutrition, conducive environments, reduction in inequality, individual freedom, and improved lifestyle and reduced poverty. Will create a conducive environment for development.

Economic development is regarded as the process of improving the quality of the lives of all people and their capabilities through the enhancement of their standards of living, self-esteem and freedom (Todaro and Smith, 2011:5). Haller (2012:66) defines economic development as a process resulting in the generation of economic social, quantitative and qualitative moderations, which results in an increase in the country's economic product.

According to Feldman *et al.* (2014:1), the focus for economic development is placed on quality improvements, introducing new goods and services, minimising risk and promoting the area of innovation and entrepreneurship. He further states that economic development entails substantial, constant cooperation amid the public and private sectors; it is a result of long-term investments put in place to generate new ideas, establishment of infrastructure and the transfer of knowledge. Economic growth and employment are crucial for the development of our nation.

#### 2.2.4 Employment

Employment is a substantial indicator of a country's development. One of the reasons why some countries are richer and more productive than others is due to the presence of labour efficiency (De Long & Olney, 2009). Labour efficiency in this regard refers to the ability of the labour force to use the production resources with which the market functions (Stuebs & Sun, 2010:3). From a broad perspective, unemployment is regarded as a state in which people have no jobs. According to Posel *et al.* (2012:2), unemployment can be understood as a situation in which people are able, willing and actively looking for work but cannot find jobs. Employed people are those that receive a pay cheque for services provided; these are people who work at least an hour or 15 hours in their either business or profession (Dornbusch *et al.*, 2014). Employment can either be due to production being capital intensive or labour intensive. Capital intensive is when the firm uses machinery and technology to produce or provide a service, whereas labour intensive is when the production activities are effected by the labour force.

Production occurs differently depending on the demand for the product being produced. As a result, when the demand for consumption of a product is high, it is assumed that the employer will increase his or her production capacity in an attempt to meet the increased demand. This often results in the creation of more employment. Likewise, more labour will be generated through a surplus labour market as a result of a high economic growth rate; hence, this will see employment increase. In addition, investments and savings have substantial multiplier effects since as more capital is used in the production, more jobs will be created (Nitzan & Bichler, 2000).

On the other hand, Cooley (1963) argues that employment is not only being involved in paid activities or operating one's own business, it also signifies being involved in what you want to do. Cooley also explains employment reward as not only money but also satisfaction or pleasure. Although economists tend to ignore the psychological reward due to its immeasurability, yet psychological rewards in the community plays an imperative role in the economic development of a nation at large (Cooley, 1963). Therefore, employment is an important factor in securing growth and reducing poverty (Karnani, 2011).

## **2.3 THEORETICAL VIEWS ON ECONOMIC GROWTH, INVESTMENT AND EMPLOYMENT**

### **2.3.1 Theories of investment**

The theories of investments were accentuated by Irving Fisher and John Maynard Keynes, who argue that investments are made until future expected returns are achieved, taking opportunity cost into account (Eklund, 2013). Keynes (1936) and Hayek *et al.* (2011) further postulate the significance of capital investment within production. Investment theory attempts to explain the manner in which investors classify and measure risk and returns in the evaluation process (Mpfung *et al.*, 2013:33). The study made use of the Keynes theory, accelerator theory, Tobin Q theory and McKinnon and Shaw theories on investment to reinforce the investment behaviour on economic growth.

#### **2.3.1.1 Keynes theory**

The General Theory of Employment, Interest and Money by Keynes is one of the most famous books, which had a significant contribution toward the theory of investment and growth. According to Keynes, (1936) investment is reliant on the future marginal efficiency of capital, relative to the interest rate, which is reflective on opportunity cost of the invested funds. Consequently, higher investments will only be realised when the returns are greater than the opportunity cost (Serven & Solimano, 1992:12).

Keynes' theory postulates that as long as the marginal efficiency of capital is greater than the real rate of interest, investment will be realised (Serven & Solimano, 1992:13). Keynes defined marginal rate of return (also known as internal rate of return (IRR)) as the rate of discount, which would make a present value. The expected return on investment is not certain hence private investment is volatile (Serven & Solimano, 1992:13). As a result, the focus is on the demand expectations of the firm relative to its current capacity and its ability to realise investment through internal cash flow and external borrowing (Fazzari & Mott, 1986:171).

#### **2.3.1.2 Accelerator theory**

The accelerator theory contends that an increase in the production of a firm requires an increase in its capital accumulation. The narrative further stipulates that capital accumulation involve the acquisition of assets to increase the production process (Tsiang, 1951). The accelerator theory assumes that fixed capital output is constant. Fixed capital assumptions imply prices,

wages, taxes and interest rates have only an indirect impact on capital spending (Du Toit & Moolman, 2004:650). According to Serven and Solimano (1992:13), the accelerator theory makes investment a percentage change in production output, thus focusing on the efficiency of investment. The more efficient the production process is the better the output will be. Thus, more investment is required for more production to occur. According to this theory, there is a direct link between consumption and investment as indicated by Equation 2.1.

$$I \leftrightarrow C \quad (2.1)$$

According to Equation 2.1, increase in production capacity, that is investment in inputs, results in increases in the demand for outputs. Consequently, the higher the consumption the higher the investment will be. The increase in output results in an increase in income for firms. As a result, firms spend income received on materials, which will increase production outputs; this concept is referred to as multiplier effect. The multiplier effect elucidates how changes in one variable results in a proportional change in output (Van den Bogaerde, 1972:90). Multiplier effect also explains how changes in one industry can affect other industries. According to Van den Bogaerde (1972:89), changes in investment induce greater changes in income. However, it should be noted that this increase in investment is determined by the rate of change in consumption. The higher the proportion of consumption, the greater the rate of investment will be (Samuelson, 1939). Overall, the accelerator theory explains the relationship between capital investment and the rate of changes in GDP, with the relationship between the two positive, *inter alia* the higher the rate of GDP the greater the investment and vice versa.

Contrary to the underlying foundations of the accelerator theory, Pilat and Lee (2001) suggest that improvements in technology are in fact the main driver of productivity and not consumption. They go on to argue that the accelerator theory does not take into account all the factors determining the increase in the production capacity or output. Firms, among other things, can measure increase in their production capacity by effectively utilising their equipment, ensuring that their employees are capacitated fully to perform tasks and are satisfied.

### **2.3.1.3 Neoclassical theory of investment**

The limiting assumptions by the accelerator theory resulted in the formulation of the neoclassical view of investment by Hall and Jorgenson (1971). Accordingly, the neoclassical theory of investment contends that a firm will employ investment up to a point in which its user cost of capital is equal to its expected rate of return (Serven & Solimano, 1992:13). In

essence, the firm determines its desired capital stock to rent or own by equating it to user cost capital (Chirinko 1993:1878). The desired stock of capital is the expected return the firm would like to receive from investment. The neoclassical model foundation is based on the assumption that *ceteris paribus* firms maximise profits in a perfectly competitive market (Chirinko 1993:1878). According to these assumptions a firm does not have to invest much of its time in predicting the future, in other words, the firm can achieve any desired capital stock instantaneously (Chirinko 1993:1878).

#### **2.3.1.4 Tobin Q theory of investment**

James Tobin proposed a Q theory of investment in which the firm's investment decisions depend upon the volatility in the stock market (Tobin, 1969). According to Q theory, firms should invest in capital as it matures and increases their share value (Yoshikawa, 1980:739). This implies that the firm places value on what the stock market weights their assets or capital relative to the cost of replacing them. Tobin's theory of investment is centred on the return on investment and the belief that for a firm to have high returns on investment the investment should be assessed and its costs should be less than its return in an attempt to benefit the shareholders. Consequently, the rate of investment should be equivalent to the value of capital relative to its replacement costs. In the process of accumulating capital, the firm does not only incur the cost of purchasing the capital but also adjustment cost, which includes costs of utilising the regained capital (Yoshikawa, 1980). The stock market has a significant impact on the investment decision of any firm. Hence, Tobin put forward the innate of volatility in the stock market and investment, which is stated as:

$Q = \text{the market value of the firm} / \text{replacement cost of capital}$

According to Tobin, the higher the market value of the firm (Q) the higher the price of shares will be. Tobin argues that investment depends on whether Q is greater than or less than one. If Q is greater than one, firms will purchase more capital that is physical. This is because firms find it convenient to purchase as the cost of capital exceeds the cost of acquiring it (Yoshikawa, 1980). Thus, when Q is greater than one, more investment occurs. In contrast, firms find it difficult to invest when Q is less than one, this is because the cost of acquiring capital is greater than the costs of purchasing it (Hayek, 1941). Thus, when Q is less than one, firms are discouraged to replace their capital stock, that is, investment is discouraged.

The Tobin Q theory is related closely with the neoclassical investment model (Yoshikawa, 1980:739). The neoclassical theory of investment suggests that firms make profits on their

installed capital when their marginal product of capital is greater than the cost of capital (Hayek, 1941). Consequently, these profits increase the value of the share. As a result, the market value of the share will increase, inducing more investment for the firm.

As stipulated above, Tobin's Q investment theory reflects both the current and future profitability of the firm's capital assets. For that reason, increase in capital assets will result in increase in investment and the manner in which investment will increase depends upon the decrease in real interest rates, increase in expected output and increase in tax credits.

### 2.3.1.5 McKinnon and Shaw theory

McKinnon (1973) and Shaw (1973) developed a complementary hypothesis where high real returns on money enhances the accumulation of real money balance, which further finances the expensive, amalgamated fixed capital (Moore, 2009:3). McKinnon (1973) and Shaw (1973) analysed the benefits of the elimination of financial repression's impact on domestic financial systems within developing countries. According to their analysis, curbing financial restrictions on developing countries, particularly by allowing market forces to determine real interest rates, could have a positive effect on growth rates as interest rates increase towards their competitive market equilibrium (Audu & Temidayo, 2017:10). Consequently, there will be an increase in savings, capital accumulation and efficient allocation of resources thus investment (Fourie, & Burger, 2009:52). Furthermore, McKinnon (1973) asserts that financial repression could result to dualism. That being true, firms that are liable to subsidised funding prefer capital-intensive technologies, whereas those not in favour resort to high-yield projects with short maturity (Gemech & Struthers, 2003:2). Shaw was proving that the financial sector is crucial to the economic development of a country. As a result, McKinnon and Shaw's hypothesis can be represented by equations 2.2 and 2.3 below:

$$\frac{M}{P} = f\left(Y, \frac{I}{Y}, (d - \pi^\alpha)\right) \quad (2.2)$$

Where Equation 2.1 is the long run real money demand function, where Y is defined as real investment,  $\frac{I}{Y}$  = investment rate, d= nominal interest rate,  $\pi^\alpha$  = anticipated inflation rate and  $d - \pi^\alpha$  = real interest rate. According to Rehman and Gill (2005:22), an increase in capital accumulation results in an increase in the average ratio of M/P to income. That is, an increase in return on capital results in an increase in the need of a real cash balance holding for accumulation purposes.

$$\frac{I}{Y} = f\left(r, (d - \pi^\alpha)\right) \quad (2.3)$$

Where Equation 3 is the private investment function, where  $r$  is the physical capital,  $(d - \pi^\alpha)$  denotes the real interest rate. The supply of money has a direct impact on determining investment. The investment rate  $I/Y$  should have a direct impact on the rate of return on money balances. This is because an increase in real return on bank deposits enhances the demand for money and the real money balances are complementary to investment (Pentecost & Moore, 2006:6), which will lead to an increase in investment. However, an increase in the real interest rate has a negative impact on investment and lessens the opportunity cost of holding reserves by financial intermediaries (Pourshahabi & Elyasi, 2013:70). In other words, with low interest rates it becomes motivating for financial intermediaries to have productive investments (Fourie, & Burger, 2009:52). In contrast, Savanhu (2011:17) suggests that increases in interest rates result in increases in the efficiency of investments, which enhances economic growth. Likewise, the study of Savanhu was based on the work of McKinnon (1973) and Shaw (1973), who suggested that high interest rates lead to high savings rates, which fuels investment as stipulated by Harrod Domar model.

The theories analysed above stipulate that there is consensus that a nexus between economic growth/output and investment exists (McKinnon 1973; Shaw 1973; Jorgenson 1963; Keynes, 1936 and Tobin Q). Thus, it is important that policies should be investment-based to enhance the economy of the country.

### **2.3.2 Theories of economic growth**

South Africa has had challenges in maintaining a sustainable economic growth. Since 2002, economic growth rates below 3 percent have become common rates, essentially implying that the economy has been failing to grow to assist the economy is attaining some of its macroeconomic and developmental goals (Department of Treasury, 2017a:1). Economic growth refers to an increase in the production of goods and services by an economy over a period of time (Todaro & Smith, 2011:78). It is measured as a percentage increase in real GDP, that is, GDP adjusted to inflation. Growth theories seek to explain the behaviour of economic growth, how economies growth and why they growth (Dornbusch *et al.*, 2014). This section focuses on the neoclassical and endogenous growth theories. The neoclassical growth theory emphasises growth opportunities in technological progress whereas the endogenous growth theory stresses the need for physical capital attributes (Dornbusch *et al.*, 2014).

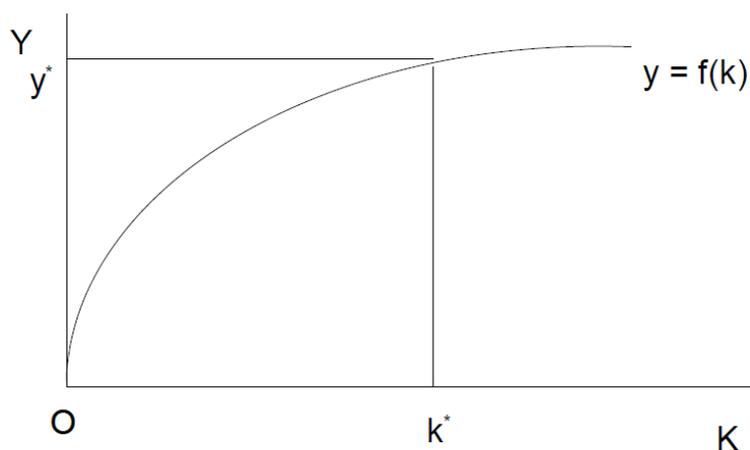
### 2.3.2.1 Neoclassical theory

Swan (1956) and Solow (1956) made important contributions to the theory of economic growth by developing a theory referred to as the Solow-Swan growth model. This model focuses on the use of labour, capital and technological advances as factors that enhance growth. The Swan and Solow (1956) growth model asserts that output per worker increases with the output per capita but at a decreasing rate (diminishing marginal returns to scale). As a result, capital and labour will reach equilibrium (Nattrass, 2002:17).

The neoclassical growth model describes how the economy expands when savings and investment, labour force growth and advancing technology increase employee's performance (Acemoglu, 2008). Saving and investment results in capital intensity whereas technological advancement results in labour efficiency (De Long & Olney, 2009). The theory begins at a point where the economy reaches long run output and capital is referred to as steady state of equilibrium, where per capita income and capital are constant in an economy (Mellet, 2012). The relationship between per capita income and capital is described best by the production function as postulated by Robert Solow. Figure 2.2 illustrates the production function in terms of GDP per capita against capital labour ratio and the equation is written as:

$$y = f(k) \tag{2.4}$$

**Figure 2.2: Production function**



Source: Dornbusch *et al.* 1998:49

Where  $y$  denotes output and  $k$  capital. This implies that there is a positive relationship between output and capital; an increase in capital will result in an increase in output and vice versa.

However, the increase in output is less at high levels of capital than at low levels, this implies that there is a diminishing marginal product of capital (Dornbusch *et al.*, 2014). An additional capital to the production process will increase the production but at a lower rate relative to the initial capital. The steady state of per capita income and capital is denoted by  $k^*$  and  $y^*$  and are values in which the required investment to employ new workers and new machinery is equivalent to savings generated by the economy (Domar, 1946). Therefore, the steady state depicted by  $y^*$  and  $k^*$  are the level of output in which saving and required investment are at par.

The required rate of investment is influenced by the population rate and the time it takes machinery to depreciate. The neoclassical theory assumes that the economy grows at a constant rate, implying that more investment is required for labour productivity. This implies that the growth rate of output in the steady state is exogenous and independent of the saving rate (Dornbusch *et al.*, 2014). Additionally, the neoclassical theory asserts that technological progress enhances the productivity of labour. The final prediction of the theory is that of convergence, which means that if countries have the same population growth, saving rate and production function they will attain the same level of output. This means that countries are poor due to lack of capital; however, should they save like richer countries and have technological access they will be on par (Domar, 1946). The neoclassical theory postulates that growth is influenced by investment, population, land growth as well as an increase in productivity as a whole.

### **2.3.2.2 Adam Smith and wealth of nation**

The 'Wealth of Nation' reflects that growth and development were important concepts to Adam Smith. In his publication, Smith elucidates how growth can be achieved in a country when capital accumulation, labour productivity and population growth are taken into consideration (Adams, 1936). Adam Smith advocates faire free markets; he argues that specialisation and division of labour would result in high growth rates (Eltis, 2000:68). Romer (1987:57) further asserts the idea of specialisation as a key factor in enhancing. Specialisation results in division of labour as work is transformed from a complex process into a simple process enabling the employee to be more attentive and careful (Sabel, 1982:57). According to Smith (1776), the division of labour increases efficiency and productivity. This is because time is saved and employees learn to be more efficient at performing their tasks.

The labour force is regarded as the factor that results in growth in the wealth of nations. Smith alludes to the fact that agriculture and manufacturing are the two viable sectors towards growth with the use of efficient labour force (as cited by Lanza, 2012:18). He argues that ineffective spending by government results in disturbance in the market. Smith further alludes to the fact that government regulations inhibit growth and explains the association between capital accumulation and economic growth, which intensified interest in that sphere (Smith, 1976). Smith contends that capital accumulation leads to increased population and employment.

Subsequently, if the market is widened, there will be an increase in division of labour, thus, more productivity (Eltis, 2000:69). Increases in population increases the demand and enables the markets to expand. It follows that an increase in capital accumulation will result in an increase in employment and efficiency, as a result, growth and living standards will increase (Eltis, 2000:70). Smith asserts the importance of directing investment to projects that are productive.

According to Smith (1776) the economic production is of the results of labour, capital accumulation and land and can be written as:

$$Y = f(L, N, K, ) \quad (2.5)$$

Where, L, is labour force, N and K capital and Y is national output. Smith's production function is the result of increasing return to scale (Sims, 2012). Increasing return to scale is when an increase in the output increases at a larger proportion than input (Mohr & Fourie, 2008). Smith asserts that production increase is a result of collaboration of labour, which is the population, capital and land.

### **2.3.2.3 Endogenous growth theory**

In contrast to the neoclassical view, the endogenous growth theory identified knowledge and capital as the two new factors that could result in sustainable economic growth (Dornbusch, *et al.*, 2014). According to neoclassical growth theory, technological advancement will result in growth in the long run, however, the theory does not explain the economic determinants of technological advancement (Dornbusch, *et al.*, 2014). As a result, the endogenous growth theory highlights the technological attributes that enhance economic growth.

The endogenous growth theory is the modified neoclassical growth theory. The notion that physical capital will precipitate long run economic growth has diminishing marginal return

(Mellet, 2012). The notion that knowledge has positive effects on growth in the long term is the main link to increased saving rates and higher equilibrium growth rates (Romer, 1994). Accordingly, endogenous growth theory is centred on the constant return to scale for accumulation of factors of production (D' Agata & Freni, 2003). This implies that a firm with more capital will produce far better than one without. The more the factors of production a firm has, the more the output will be. This theory suggests that larger firms perform better and more efficiently (D' Agata & Freni, 2003). Furthermore, the endogenous theory asserts the importance of investment as it considers human capital, research and development as the drivers for long run economic growth (Mellet, 2012:27). Table 2.1 is a summary of growth theories based on the main components of growth from the study.

**Table 2.1: Summary of growth theories**

Components of growth	Growth theories		
	Neoclassical	Wealth of Nations	Endogenous growth
<b>Capital accumulation</b>	Saving rate is imperative for increasing capital labour ratio	Emphasises the importance of specialisation, division of labour and saving	Emphasises the importance of physical and human capital
<b>Population growth rate</b>	Growth can be increased by increasing the quality and quantity of labour	Growth is achieved through Labour force and increase in population results to growth	Knowledge and human capital are endogenous to the model
<b>Technological progress</b>	Viewed as an exogenous factor	Viewed as an exogenous factor achieved through capital accumulation	Technology is viewed as endogenous and imperative for knowledge and labour intensive industries

Source: Authors own compilation from Lewis (2013)

### 2.3.3 Theories of employment

The major challenge facing South Africa to date is the absence of sustained job creation and declining growth. Unemployment remains a key issue for policy makers in the country (Faulkner *et al.*, 2013). In the first quarter of 2017, the official unemployment rate reached 27.7

percent, which is the highest since 2003. The expanded unemployment rate is believed to be higher, peaking at more than 35 percent, with youth being the most affected (StatsSA, 2014a; Mncayi, 2016: 43). The lack of sustainable jobs exacerbates inequality and poverty; pervasive challenges since the apartheid times (Triegaardt, 2006; Leibbrandt *et al.*, 2010). With these low rates of employment, it becomes challenging for South Africa to achieve macroeconomic goals. Although, Statistics South Africa has reported a high number of employed people (69.2%), the number of unemployed people remains the highest at about 27.1 percent, with the majority (73.3 percent) being the youth (StatsSA, 2014a:31).

To confront these challenges, South Africa has to achieve and sustain higher economic growth (Faulkner *et al.*, 2013). It is likely that employment emanates from an increase in GDP. This notion is asserted further by Okun's law, which posits a negative relation between unemployment and growth (Okun, 1962). The discourse of employment definition can be clarified further when the issue of unemployment is raised. This section focuses on the classical theory of employment and the Keynesian theory of employment. The former focuses on the notion of full employment in the economy whereas the latter was a critic to the classical economists. It further explains Okun's law and its relevance in explaining employment's relation to growth.

### **2.3.3.1 Classical theory of employment**

Classical economists believed that labour and other resources always are fully employed in the economy (Schumacher, 2012:58). Full employment refers to a situation in which all those who are willing and able to work at the going wage rate are able to get employed (Patinkin, 1948). It is a situation in which the demand for labour is equal the supply for labour, that is, there is no unemployment or people are involuntary unemployed (Tobin, 1995:33). According to classical economists, the interference of government and/or private organisation creates unemployment (Pritchard, 1985:48). This notion is referred to as the *laissez-faire* theory, which asserts that government should not interfere with the market as it causes disequilibrium (Knight, 1967:782).

The classical theory of employment is based on Say's law of markets, which enunciates that supply creates its own demand (Keynes, 1936:18). That is, more income is spent when firms supply goods and services and reward households with income for their factors of production. Income received by households is then spent on purchasing those goods and services (Baumol, 1977:146). Subsequently, for every product produced in the economy, demand equivalent to

its value in the market is created (Foley, 1985:183). According to Say's law, the pursuit of investment is significant as opposed to saving, due to its potential to enhance economic growth (Baumol, 1999:196).

The classical theory of employment can be expressed with the production function:

$$Y = f(K, T, L) \quad (2.6)$$

Where Y is the total output, K capital, T technological knowledge and L is labour. In other words, when a firm increases its production capacity; its output will also increase, resulting in an increase in the number of workers.

However, Keynes contends that not all income generated from production will be spent, as some of that income will be saved (Mastrianna, 2013:198). As a result, the demand for produced goods and services will be less than the supply, as income saved is not used to purchase consumption goods. Subsequently, the supplier will reduce his production and the amount of resources used to produce goods and services. When employment of the economy's resources is below the full employment level, the equilibrium level of output will decline below its natural rate (Mastrianna, 2013:198). Furthermore, Patinkin (1948) elucidates that inability of firms to sell the quantity of output given by their supply causes them to demand less labour (Barro & Grossman, 1971:83). This results in disequilibrium thereby creating cyclical unemployment. Cyclical unemployment is involuntary unemployment resulting from lack of demand for goods and services in the market (Mohr & Fourie, 2008).

### **2.3.3.2 Keynes theory of employment**

Keynes theory of employment challenges the view of self-correcting economy by the classical economists. Keynes's argument was that employment levels were determined by aggregate demand rather than the price of labour; as a result, the economy would not be in equilibrium (Keynes, 1936). He believed that government intervention is important to enhance the level of employment; it creates a virtuous economic cycle that stimulates employment. According to Keynes, employment depends on the country's level of output, given the available technology (Galí, 2013:3). Keynes propounded that employment depends on the level of demand of goods and services (Wood, 1994:524). That is to say, an increase in the demand of goods and services will lead to an increase in the level of employment. Aggregate employment in a country can be viewed through the total demand in that country (Robertson, 1936:170).

The consumption of goods and services signifies the effective demand on saving, resulting in investment. The aggregate expenditure is equivalent to national income and its output (Keynes, 1936). Keynes theory of employment is based on the effective demand. The general theory begins by explaining that demand for money is apprehended depending upon the rate of interest (Hicks, 1973:152). To put it differently, the quantity of money is now determined by the rate of interest rather than income as the classicalists believed. According to Keynes, the level of employment is determined by the investment value and income that is spent through consumption (Hicks, 1973:155). Furthermore, Keynes asserts that consumers do not spend all their income on consumption, the more income they receive the less they spend on consumption goods (Keynes, 1936). That is because some of their income will be saved.

### **2.3.3.3 Okun's law**

Various economists have tested the relationship between unemployment and economic growth since it was introduced by Arthur Melvin Okun (De Jager, & Smal, 1984; Cuaresma, 2003:439; Geldenhuys & Marinkov, 2007; Kabanova & Tregub, 2012; Fatai & Bankole, 2013). According to Okun's law, there is an inverse relationship between economic growth and unemployment (Geldenhuys & Marinkov, 2007:1). In particular, Okun's law (1962) posits that a 1 percent change in unemployment will result in a substantial 3 percent change in economic growth (Lee, 2000:331). Okun's law explains how much GDP could be lost due to a high unemployment rate. According to this law, labour employed in the production process determines the economic growth of the country. That is, the more the firm increases its production capacity the greater the chances that economic growth will accelerate. Okun based his hypothesis on the concept of full employment and held other determinants of growth constant.

However, economists argue that Okun's law is based on a statistical approach, which is bound to change due to changes in macroeconomic variables (Knotek, 2007; Ajakaiye, *et al.*, 2015:6). According to Ajakaiye *et al.* (2015:6), Okun's law will depend on the time used to estimate the Okun's coefficient, due to differences in countries. Subsequently, factors such as the size of the market, production costs and the number of employees entering and exiting the labour market will result in a difference in Okun's coefficient (Ball *et al.*, 2013:1; Akeju & Olanipekun, 2014:141). As a result, a different coefficient will be established. Nevertheless, empirical studies have reached a concord regarding the rationality of Okun's law (Weber, 1995; Moosa, 1997; Lee, 2000; Cuaresma, 2003:440; Geldenhuys & Marinkov, 2007). According to

Okun's law, it is correct to say employment and economic growth are directly proportional to each other.

## **2.4 EMPIRICAL STUDIES OF THE IMPACT OF SECTORAL INVESTMENT ON ECONOMIC GROWTH AND EMPLOYMENT**

The relationship between investment and growth has imbued scholar's interests and resulted in various establishments and identification of problems and solutions to growth challenges of countries. The emphasis of the first section of this chapter was to show the importance of investment on a country's economic health and reveal how classical and Keynesian schools of thoughts viewed growth in a country. Keynes identified investment as the key driver to economic growth due to its multiplier effects. It is imperative that a country reduces its unemployment rate in an attempt to curb poverty and thereby reduce inequality, therefore, creating an environment conducive to achieving its macroeconomic objectives as indicated in its policies.

The fundamental aim of every country is to attain high growth rates, eradicate unemployment, poverty and inequality, particularly developing countries (Fine, 2012). The emancipation in such enables the country to attract more investors, thereby sustainable growth. The aim of this section is to discuss and contrast various studies in support of investment and growth. This section will discuss studies on the impact of investment and growth, nexus between growth and employment as well as the importance of investment in sectors in a broader scope.

### **2.4.1 The relationship between investment and economic growth**

As previously mentioned, the relationship between investment and economic growth is grounded on traditional theories such as those of Keynes (1936), McKinnon (1973), Shaw (1973), Barro (1990), Romer (1986) and Lucas (1988) Domar-Harrod among others, which stressed the significance of investment on economic growth. Romer (1986) and Lucas (1988) emphasised the role of investment in generating high growth rates. Odhiambo (2009) and Amusa (2014) emphasised the need for savings in South Africa as a stimuli for higher investment rates in the country. This is further asserted by McKinnon (1973) and Shaw (1973) who argue that saving promotes investment.

Moreover, McKinnon (1973) and Shaw (1973) highlight that investment is the key driver to increasing output and that interest and savings are just the investment determinants. Empirical studies show that countries that have high growth rates have significantly high investment rates

to support their growing economies (Romm, 2005; Dornbusch, *et al.*, 2014). Investment growth in South Africa is hindered by low growth rates and low savings rates and the country has put in place policies aimed at enhancing investment in the country (Department of Treasury 2017a:169).

Most and De Berg (1996) investigated the nexus between economic growth and foreign aid, foreign direct investment and domestic investment in sub-Saharan African countries. Their study established that there is a positive correlation between economic growth and domestic investment and that domestic investment played a more significant role to the economic growth of African countries than foreign aid or foreign direct investment.

Levine and Renelt (1992) examined the robustness of association between per capita growth rates and broader assortment of economic indicators in previous studies. The aim of the study was to examine whether the conclusion drawn from previous studies are robust or fragile to changes in information. The results showed that the majority of the studies were fragile to small changes in information. However, their study established that there is a positive outcome from their results. The results showed that there exist a positive relationship between growth and ratio of investment in GDP and ration of investment and share of international trade to GDP

Yu (1998) established that fixed capital investment and merchandise exports are significant drivers of China's economy. The results revealed that changes in fixed capital investment cause growth in industrial outputs unidirectionally. As a result, the study propounded that China follows an investment-driven approach to enhance its growth rates.

Odhiambo (2010:217) examined the casual relationship between financial developments, investment and economic growth in South Africa. The study made use of the ARDL test model, arguing that most papers used Engle and Granger or maximum likelihood test rooted on Johansen, which are not adequate when the sample is small. The aim of the study was to establish a causal relationship between financial development, investment and economic growth in South Africa. The results showed that economic growth causes investment and investment results in financial development in South Africa. Hussin *et al.* (2013) examined the determinants of economic growth in Malaysia. The study established that gross fixed capital formation is one of the determinants of Malaysia's economic growth in the long run.

Tawiri (2010) examined the impact of domestic investment as a determinant of growth in Libya. The results revealed that investment has a positive effect on the economy of Libya in

both the long- and short run. The results showed that investment causes growth and economic growth results in employment growth. As a result, the study concludes that the government of Libya has to create policies that will enhance investment to stimulate economic growth and employment.

De Long and Summers (1990) examined the impact of capital investment on economic growth and found that there is a high association between economic growth and capital investment, implying that capital investment enhances economic growth. Hendricks (2000) recommend an adoption of technological theory that accounts quantitatively for the nexus between equipment prices, capital investment and long-run growth rates in data. Theory suggests that growth is not determined through investment in new physical capital but in upgrading the existing capital. Hendricks (2000) theory agrees with empirical research that capital investment causes growth.

Onsare (2013) examined the nexus between investment and economic growth in Kenya. The results depicted that there lies a weak positive relationship between investment and economic growth in Kenya. This implies that growth in Kenya was not fully determined by investment but by other factors. Investment had an impact on the economy of Kenya, but the effect was minimal.

In contrast to De Long and Summers (1990), Blomstrom, Lipsey and Zejan (1993) found that investment does not induce economic growth but economic growth induces investment. Their study examined the casualty between investment and economic growth. Increase in economic growth capacitates the country to have the means to increase its production methods thus leaving room for investment and saving.

In contrast to endogenous and classical economists that investment is the driver for economic growth, Verma (2007) established that there is no causal relationship between investment and economic growth. Kuznet (1973:123) also established that it is not always the case where investment results in acceleration of economic growth, it can happen that increases in economic growth will result in high investment. Moreover, Denison (1967) could not find any casualty between investment and economic growth. His study confirmed that it is not always the case where investment will result in increase in economic growth.

The non-causality between investment and growth may be due to other factors that affect the investment and growth prospects of a country. Like many other scholars Akanbi (2012) established that cost of capital and the extent of financial development are significant

determinants of domestic investment in Nigeria. Factors such as the country's law regulations (political climate and institutional sphere) are robust determinants of economic performance. It is thus of great importance that South Africa achieve a sound political environment to have high investment rates and economic growth. Most of socioeconomic problems in South Africa are of the result of the country's political climate (Corrigan, 2009).

#### **2.4.1.1 The impact of investment in financial sector on economic growth**

The financial sector enables households to have access to basic services such as health care and education, thus assisting in eradication of unemployment and poverty (Department for International Development, 2004). According to Schumpeter (1912) the financial sector is important for the development of the country due to its immense contribution to economic growth. In fuelling employment creation, the financial sector offer credits, enabling individuals and businesses to spend beyond what they have at hand, offer liquidity and risk management services prohibiting unnecessary loss of money thus providing security (Baily & Elliot, 2013).

Earlier studies of Schumpeter (1912), McKinnon (1973), Shaw (1973) and Goldsmith (1969) made use of endogenous and exogenous growth theories to stress the relationship between financial sector and economic growth. McKinnon (1973) and Shaw (1973) accentuated the robustness of financial liberalisation in enhancing domestic saving and investment. Goldsmith (1969) established that investing in the financial sector imbues savings thereby promoting economic growth. These studies all confirm the significance of financial sector to economic growth and assert that financial sector investment is crucial for enhancement of the economy.

Most studies examine the nexus between financial development and economic growth instead of investment in finance and economic growth. Nonetheless, financial development and investment in finance will be used interchangeably in this section. This is because development of financial sector involves the uplifting and enhancing of the financial sector, whereas investment in such a sector aims at achieving the same results, improving the sector, enhancing its productivity and thus upgrading it. As a result, the research will focus on the impact of financial development on economic growth.

Most empirical studies established a positive relationship between financial development and economic growth (Ahmed & Ansari, 1998; Arestis *et al.*, 2001; Odhiambo, 2004; Godwin, 2010; Hassan *et al.*, 2011; Ageli & Zaidan, 2012; Fethi & Katircioglu, 2015). Ahmed and Ansari (1998) examined the nexus between financial development and economic growth in the

large South Asian economies (India, Sri Lanka and Pakistan). The results reveal that financial sector development results in economic growth. Hassan *et al.* (2011) established that financial development is crucial to the development of the country through economic growth. The study postulated that increase in saving and investment will result in growth. Likewise, Ageli and Zaidan (2012) established positive nexus in Saudi Arabia and posited that Saudi Arabia should invest in the financial sector to achieve higher rates of economic growth.

Fethi and Katircioglu (2015) examined the role of financial sector in the United Kingdom economy and established that financial sector has a significant impact on its economy. Their results depicted that United Kingdom is highly dependent on the financial sector and it affects domestic economy significantly. Concurrently, Godwin (2010) examined the nexus between financial development and economic growth for Nigeria and established a positive relationship between them. The results indicated that financial development in Nigeria has a positive impact on the country's growth rate. That is, financial development is crucial for the growth of the economy in Nigeria.

Odhiambo (2004:59) examined if there is a unidirectional or bidirectional relationship between financial development and economic growth in South Africa. The results revealed that there is unidirectional causality between economic growth and financial development in South Africa. The causality is from economic growth to financial development implying that economic growth in South Africa enhances the development of financial sector. As a result, measures that enhance growth in South Africa should be taken in an attempt to increase the development of the financial sector.

Nyamongo *et al.* (2012) examined the impact of remittance and financial development on African countries. The results reveal that remittance is the main source of economic growth for most African countries. However, instability in remittance has a negative impact on the growth of African countries. The study further established that the impact of financial development on economic growth is weak. Furthermore, the study examined the impact of private investment in enhancing economic growth of African countries and established that private investment is crucial for the growth of countries as it enhances their GDP. As a result, the study concludes that private investment as well as financial development should be of high priority for African countries.

In contrast to the notion of direct casualty between investment in finance and economic growth, Berthelemy and Varoudakis (1996) argue that although the financial sector is crucial for the economy, its expansion could be due to increase in economic growth. Their study argues that economic growth could result in increased demand for financial and banking services, which will increase the economy. King and Levine (1993) assert that financial sector improves the chances of innovation and accelerates economic growth.

Subsequently, a distortion in the financial sector hinders the success of economic growth. Their study articulates that for the financial sector to perform better it needs to have an improved system. They showed that a well-functioning financial sector has great potential to increase productivity. King and Levine (1993) decry the notion of the neoclassical growth model, which believed that financial sector had insignificant impact on the rate of investment in physical capital and that variations in investment had little impact on economic growth as Solow (1956) stipulated. Similarly, Iheanacho (2016:6) examines the impact of financial development on economic growth in Nigeria. The results indicate that there is a negative relationship between economic growth in the long- and short run.

#### **2.4.1.2 The impact of investment in manufacturing sector on economic growth**

The manufacturing sector has an immense potential in creating jobs and stimulating growth in South Africa. Despite the negative growth manufacturing is facing, it has potential to compete in the global market (Ngulube, 2014). Manufacturing sector is the catalyst for growth of service sector and creation of employment and has been identified by the South Africa government as one of the sectors that has potential in stimulating job creation due to its labour intensity (Department of Treasury, 2017b).

Tregenna (2009:429) examined the significance of manufacturing output or employment to economic growth. The study argues that the manufacturing sector could contribute towards economic growth through the notion of economies of scale, technological advancement and through balance of payment constraints, which will ensure sustainable economic growth. Tregenna's (2009:459) analysis established that dwindling labour intensity does not always result in decline in economic growth as evidenced from Finland, Sweden, Switzerland, Ireland and Korea. The impact of decline in economic growth will depend upon other factors such as the root of the decline in the productivity of labour. Contrary to the results established in Finland, Sweden, Switzerland, Ireland and Korea, Tregenna (2009:459) established that in Colombia, Latvia, Hong Kong and Norway, labour intensity had an impact on the

manufacturing sector GDP contribution. He argues that this poses a detrimental effect on the economy as it means that the countries are too reliant on the manufacturing sector.

According to Tsoku *et al.* (2017), manufacturing has a positive relationship with economic growth that is, manufacturing results in growth in the economy, confirming Kaldor's first law of growth. Kaldor's first law was grounded on the ideology of understanding how some countries grow faster than others do. Kaldor established a correlation between the level of industrial activity and economic growth (Thirlwall, 1983:345). The study advises that South Africa should invest in manufacturing sector in order to enhance economic growth.

Zalk (2014) argues that manufacturing is still the main driver of economic growth and job creation in South Africa. According to Zalk (2014), manufacturing sector directly increases employment whereas other sectors such as the financial sector indirectly create employment. Zalk agrees with Kaldor's law and Verdoon's law that the growth of the economy is directly related to that of the manufacturing sector and that the growth of labour productivity in manufacturing sector is directly proportional to output in manufacturing growth due to increasing returns to scale (Wells & Thirlwall, 2003). Building upon the studies of Kaldor, Wells and Thirlwall (2003) examined the impact of manufacturing on economic growth in developing countries. The results indicated that there is a positive correlation between manufacturing sector and economic growth in Africa. As a result, manufacturing sector should be given more attention to develop it.

Jeon (2006) tested the hypothesis of Kaldor in China and established that secondary sector played a significant role in the economy of China and has increasing returns to scale. The study argues that the increasing return to scale might be due to the surplus of labour in the sector, which results in increase in the productivity of the secondary sector, which results in a high rate of economic growth. Similarly, Guo *et al.* (2013) observes the same output as Jeon (2006), in which the economic growth of China is correlated positively with the growth in manufacturing sector and employment. Guo *et al.* (2013) further validates Verdoon's law and concludes that manufacturing sector results in economic growth in China.

Nigeria is classified amidst countries with the highest poverty level, as a result, Ehinomen and Adeleke (2012) confer the impact that investment in manufacturing has on poverty alleviation. Thus, the study evaluated the effects of increased investment in manufacturing sector on the economy of Nigeria. The study established that increase in investment increases the

manufacturing's gross domestic output. Moreover, the latter results in improved production inputs, reduces production costs, time, enhances production methods and quality of the labour force.

The environment in which the manufacturing industry is grounded is imperative for attracting investment. To attract private investment there should be tranquility in the macroeconomic and political scope of the country (Bigsten *et al.*, 1999; Bayai & Nyangara, 2013; Bonga & Nyoni, 2017). Private investment is crucial for development of the manufacturing sector. Most studies have conferred the positive impact that investment has on the profitability of the manufacturing sector (Hoshi *et al.*, 1991; Athey & Laumas, 1994; Harris *et al.*, 1994).

Theoretically, it is expected that increase in profit of the sector will enable it to require more employees or increase production capacity as a result of increased economic growth. However, Bigsten *et al.* (1999) established that investment rates in Zimbabwe, Kenya, Ghana and Cameroon are approximately zero and linked with high profit rates and low rates of value added growth. Subsequently, Ghura (2000) established that economic growth in Asia and Latin America imbue private investment, however, it was not significant to sub-Saharan Africa.

Investment in the manufacturing sector is empirically significant to growth in the economy. It is important that countries skew their focus on factors that may enhance the investment prospects in the manufacturing sector. The manufacturing sector is responsible for majority of employment as it enables people with semi-skills and low skills to work. The majority of South African citizens lack the necessary skills to be absorbed by the market; however, manufacturing allows people of all calibres to get jobs. It is of fundamental importance that countries invest in measures that will enhance the employment absorption capacity of the sector.

#### **2.4.1.3 The impact of investment in mining sector on economic growth**

South Africa is largely endowed with mineral resources and its economy is built on the mining sector, which has created two large economic cities in the country, Johannesburg the city of gold and Kimberly the city of diamonds. Historically, mining has always been viewed as a locomotive industry, which contributes to economic growth, employment creation, tax revenue and foreign exchange earnings for South Africa's economy (Fedderke, & Pirouz, 2002).

Even so, mining sector has experienced and is experiencing formidable challenges such as performance deterioration, labour unrest and the land reform saga (Antin, 2013; Baxter,

2016:25). Aryee (2001) examined the contribution of mining sector on economic growth in Ghana and established that mining sector has significant effects on the economic growth of Ghana. The study concludes that more fiscal measures should be put in place to support the sector thereby achieving sustainable growth.

Akabzaa (2009:25) argues that although the mining sector has potential to increase the economy of Ghana, creating employment and enhancing the living standard of the population, the technological improvement in the sector constrains employment opportunities. According to Akabzaa (2009:26), the contribution of the mining sector to the economy of Ghana was small because of high taxes levied on the sector and the technological and environmental regulations imposed on the sector.

Like Akabzaa (2009:25), Walser (2000) asserts the importance of the mining sector regardless of its detrimental effects on environmental sustainability; it is without a doubt that the mining sector plays a significant role in the economy of the country. Among others, in countries such as Ghana, Mozambique, Venezuela and Madagascar, the mining sector is responsible for approximately 13 million jobs, which has a multiplier effect. As a result, the mining sector investment is crucial for all countries that are richly endowed with mineral resources. Despite the negative impact it has on the environment, the sector is able to create sustainable growth and thus development through employment and social responsibility.

#### **2.4.2 The relationship between investment and employment**

It is important that the nexus between investment and employment be understood. Both empirical and theoretical literatures have examined this relationship and are in consensus that there is a relationship. Nonetheless, it is not clear that investment will enhance employment or be detrimental to it. It is clear that sustained investment will lead to employment growth. However, employment growth will depend on the intensity of the labour. In other words, investment will depend on whether the new establishment is capital-intensive or labour-intensive (Kar & Datta, 2015:32). Investment is a chief determinant of economic growth and is an employment creation stimulator (Kim & Won-Kyu, 2009). Athamneh and Al-Zu'bi (2010) examined the nexus between investment and employment in Jordan and the level it takes investment activities to boost the level of employment. The study establishes that it takes a minimum of two years for investment to accelerate employment.

#### **2.4.2.1 The impact of sectoral investment on employment**

The literature has proved that investment has an impact on the level of employment growth. However, due to structural changes in the industrial sphere it has become unclear which sectors play a significant role in the economy. Checchi and Galeotti (1993:14) contend that it would be absurd to say that sectors contribute immensely to the growth rate of the country without taking into consideration other factors that influence or fuel growth. Furthermore, the study contends that the type of investment is imperative for each type of economic sector. As a result, Checchi and Galeotti (1993:22) investigated the nexus between employment and investment in Italy over 16 years. The outcomes of the investigations show that investment is significant in determining the equilibrium level of employment.

However, the effectiveness of investment varies with regards to the nature of the sector or the region in which the sector is based. Furthermore, the results showed that investment is a significant determinant of employment in industries in the long run. The research thus concludes that it is crucial to take note of the type of investment to enhance employment growth. Capital investment reduces growth in employment whereas investment flows enhance growth of employment (Checchi & Galeotti, 1993:23). Söderholm and Svahn (2015:89) also attest to the findings of the study as they propound that investment funds are more effective in ensuring long term economic growth and development and distributional impact. In contrast, Larson *et al.* (2000) established that fixed investment is imperative to agricultural and manufacturing sector.

As Checchi and Galeotti (1993) have alluded, it is imperative to take into account other factors that may influence the prospect of sectoral growth before focusing on what increases the sectors growth. The importance of agricultural and manufacturing sector established by Larson *et al.*, (2000) proves that the country's location and growth or development is crucial in comparing the growth prospects of countries sectoral growth.

In the South African context, by creating an inclusive growth the government has skewed its focus on investing in sectors. Various studies (e.g. Edwards 2001; Jenkins, 2004; Tregenna, 2007; Tregenna, 2008 and Hodge, 2009) have evaluated the link between sectoral growth and employment. That is, the impact of growth in economic sector to changes in the employment rate. However, very few have addressed such issues in South Africa. The studies that addressed the impact of growth on economic sectors to employment are mostly on the agricultural sector,

which is beyond the scope of the research. With the world always changing, most economies are reliant on the tertiary sector, which is grounded mostly by the secondary sector. Although the agricultural sector is of significant importance to the economy of the country and welfare via food security, the study focuses on manufacturing, mining and the financial sector. The three sectors have a forward and backward linkage; each sector's outputs are the inputs of economic activities of the other sectors and each sector is the buyer of the inputs from other sectors in the economy (Fisher, 1939).

In South Africa, manufacturing has been identified as one of the sectors that has immense potential to creating employment. However, with its low growth rate, employment creation will be difficult. Muzindutsi and Maepa (2014) examined the relationship between manufacturing production and employment rates in South Africa. The results reveal that a short- and long-term relationship exists between manufacturing and the employment rate. These results further revealed that there is a causal link from manufacturing to employment rate. As a result, much attention has to be given to the manufacturing sector in an attempt to enhance employment creation and growth of the country.

Hajkowicz *et al.* (2011) established that mining activities have a significant impact on employment and income of Australia. The study argues that investment should be directed towards sectors that are capable of enhancing growth and creating employment. Moreover, the study contended that investment is not sufficient to curb unemployment in the country.

Moritz *et al.* (2017) examined the impact of employment on mining sector and established that there is a positive relationship between the increase in the number of employees in the mining sector relative to employee changes in other sectors; a percent increase of employment in the mining sector results in more jobs in other sectors. The study contends that the mining sector contributed 82 percent of employment in Norrbotten, Sweden. However, the study established that employment contribution of the mining sector would differ between countries/regions.

#### **2.4.3 The relationship between economic growth and employment**

Employment creation is crucial for the development of every county. The unemployment rate in South Africa has been on the rise, forsaking government attempts to curb it. The low growth rates and increasing disputes in the labour markets are among other factors that exacerbate employment growth in South Africa. Economic growth and employment are two terms said to have cause and effect, that is, the higher the economic growth the higher the employment rate

as the growth rate of the economy allows an increase in production and innovation (Islam, 2004).

According to classical economists, increase in employment rate is of the consequence of economic growth. However, it is not always the case where growth results in increase in employment as there are other factors that might have contributed to the increase in growth other than labour capacity. That is, the economy might be capital-intensive and the increase in growth might result in firms finding easier methods of production and cut down on labour in an attempt to reduce production costs.

Empirical and theoretical studies have long asserted the relationship between employment and economic growth (Rawski, 1979; Fields, 1988; Pini, 1995; Islam, 2004; Demeke, *et al.*, 2003; Mahadea and Simson, 2010; Seyfried, 2011; Vermeulen, 2015). However, consensus has not been reached to say that growth in employment is a result of economic growth (Ahsan *et al.*, 2010; Hassan, 2015; Mkhize, 2015). Factors such as the state of the economy, employment niche, population, education level and the demographics of the country, have an impact on determining the nexus between economic growth and employment rate (Furuoka, 2010:82; Ajakaiye, *et al.*, 2015).

Mahadea and Simson (2010) used a regression analysis to determine the impact of economic growth on employment rate, grounded by the Harrod Dogma model. Their study established that the growth elasticity of employment is lower in the short run and its impact in the long run is weak. The study thus confirms a relationship between employment and growth; however, the impact is not as great. Additionally, Ahsan *et al.* (2010) established that there is a negative relationship between employment and growth in India. The aim of the study was to determine whether the productivity growth of labour, employment, demographics and the sectoral trend of growth could influence changes in growth and decline in poverty. The results further established that increase in labour productivity correlates with decline in poverty and the role of labour productivity in sector is insignificant.

Seyfried (2011) examined the relationship between economic growth and employment. The results indicated that there is a relationship between economic growth and employment. However, Seyfried's (2011) results indicated that the impact is only for a short period. As a result, economic growth has to occur for a successive period before its impact can be seen on the labour markets. The nexus between employment growth and economic growth can depend

on the state of the economy of a country. Developing countries are largely characterised by low standards of living, poor growth rates and low employment rates. Whereas developed nations are better off, as they tend to have high growth rates relative to developing, high literacy and development rate. Due to the availability of skilled labour in developing sector, employment is widely available as the members of the community are innovative and informed as a result the market is able to absorb them (ILO, 2010).

Rawski (1979) examined the nexus between economic growth and employment in China. The study insinuates that China has chiefly achieved the growth towards full employment. Subsequently, China has experienced growth in the labour force. The agricultural sector was able to absorb the majority of the labour force. This indicated that the sector contribution to employment is important, as a result, contributes to increased productivity within the sectors.

In support of the results contended by Rawski (1979), Fields (1988) also examined the relationship between economic growth and employment in Costa Rica and established that it is important to support the sector that contributes the most to productive job opportunities. The study alluded to the fact that growth in employment had a direct relationship with labour force growth, diversity in job opportunities, increased real wages and dwindling inequality (Fields, 1988).

Islam (2004) examined the nexus of economic growth, employment and poverty reduction based on cross-country data. The results indicated that there is a significant relationship between changes in GDP, employment and poverty reduction. This implies that changes in GDP resulted in changes in employment rate and poverty levels. The results were different in accordance to countries, stipulating that the state in which a country belongs, demographically and economically has an impact on the results of the study. The results also indicated that countries that are highly dependent on primary sector and secondary sector tend to be highly elastic to changes in GDP than those in the service sector.

According to Demeke *et al.* (2003), employment growth results in increase in productivity thus poverty reduction. In other words, it is of great importance that the employment creation in countries be made of high priority. Demeke *et al.* (2003) study indicated that investment in sector was crucial for high growth rates as sectors contributed immensely to changes in employment rate. The study also confirmed a positive relation of sectoral growth and economic

growth. In Ethiopia, manufacturing and financial sector contributed immensely to changes in employment and growth rates.

Vermeulen (2015) established that there is a long-run relationship between employment and economic growth. Thus, all factors that are related to economic growth such as impetus in inflation rate will dwindle job creation. The study concludes that low levels of inflation are actually conducive for job creation in South Africa. Vermeulen's (2015) study investigated the nexus between inflation, employment and economic growth in South Africa. However, according to Mkhize (2016) there is no significant relationship between employment and economic growth in South Africa. This is because South Africa has become more capital intensive than labour intensive and that the labour market cannot absorb the labour demand due to skills mismatch and lack of required skills.

In contrast, Hassan established a negative relationship between employment and economic growth. This implies that the GDP rate in Nigeria was growing with the unemployment rate. The results showed that GDP growth has not impacted positively on the poor through employment creation.

#### **2.4.3.1 The relationship between sectoral growth and employment**

It is of great importance that employment growth rates increases in South Africa. The South Africa government is working towards curbing unemployment and creating inclusive growth. This is evident in the country's policies such as the NDP, the NGP and IPAPs. For employment creation to occur there has to be economic growth, however, growth should be in sectors that are highly elastic to employment changes. Leshoro (2014) established a positive growth elasticity of sectoral employment. However, it revealed that there is a negative correlation between employment and growth (jobless growth). The study focused on mining, financial and agricultural sector and posits that the mining sector in Botswana had a colossal contribution towards economic growth, followed by the agricultural sector and service sectors, which contributed the lowest.

Employment growth responds more to labour intensive sector than to capital-intensive sector. Arias-Vazquez *et al.* (2012) used a cross-country analysis to investigate the nexus between sectoral growth and changes in employment. The study posits the importance of growth in sectors that are more labour intensive. That is because the study established that employment in the middle-income countries is more vulnerable to growth in the manufacturing sector.

Mkhize (2015) also established a positive correlation between sectoral growth and employment. The aim of the study was to determine how sectoral employment in non-agricultural sectors of South Africa has changed in an attempt to determine the key employment-intensive sectors. The study revealed that the financial, manufacturing, transport and utility sectors are highly elastic to changes in economic growth.

Slimane (2015) investigated the macroeconomic determinants of employment growth elasticity in developing nations. The study established that there is a long run relationship between employment and changes in economic growth. The elasticity of countries that are more service inclined is higher relative to those that are not. This is consistent with the studies by Mazumdar, (2003); Melamed *et al.* (2011); McMillan and Rodrik (2011); Crivelli *et al.* (2013), which contend that sectoral growth in manufacturing and service has an impact on employment.

Martins (2013) examined a country comparison of economic growth for Africa's fastest growing economies, Ethiopia, Ghana, Mozambique and Tanzania. The study evaluated the economic performance, policies and strategies to detect what they were doing and how are they achieving rapid growth rates. The study established that labour-intensive sector were the main reason for their performance. Growth that was capital intensive contributed less towards eradicating poverty. The study thus posits that agricultural, manufacturing as well as service sector are crucial for achieving sustainable economic growth and thus creating employment and should be supported.

Bbaale (2013) examined the nexus between economic growth and employment in Uganda. The study revealed that there is a link between economic growth and employment in Uganda and the link is spread across the performance of the sectors. Subsequently, the manufacturing sector contributed positively to economic growth rate but negative to employment growth rate. However, the service sector contributed positively to changes in employment rate as well as to economic growth rate. Similar to the establishment of Bbaale (2013), Ajilore (2011) established that Botswana has a low labour absorption capacity at the sectoral level and that economic growth does not result in increased employment rate.

Similarly to the findings of Ajilore (2011), Akinkugbe (2015) established negative relation between economic growth and employment in the mining, finance, insurance and business services sectors in Zambia. However, the manufacturing sector was responsible to 17.1 percent

of changes in GDP to employment rate. That is, manufacturing sector was responsible for employment creation in Zambia.

Labour-intensive sectors are elastic to changes in economic growth relative to capital-intensive sectors. However, structural changes in countries have an impact on the sensitivity of employment creation to growth (McMillan & Rodrik, 2014). Nonetheless, structural changes have contributed positively to growth rates of African countries and Latin America. Moving from agricultural-based productive methods to more service-inclined creates a platform for new skills, thus methods of production and demands for more people in the labour market. Subsequently, the size of the economy is not the only significant thing towards achieving employment creation but the composition of growth (Loayza & Raddatz, 2010).

Moreover, policies towards employment creation and poverty alleviation play an important role in the overall economy of the country. Creating an efficient economy is imperative for sustainable economic growth. South Africa has to create employment for the labour force it has rather than for the labour force it desires. Black and Hasson (2012) contend that South Africa's conundrum of not having a labour-absorbing economic growth can be resolved by creating policies that are in favour of creating employment for both unskilled and skilled workforce.

## **2.5 SUMMARY AND CONCLUSION**

This chapter presented the literature review on the impact of sectoral investment on economic growth and employment in South Africa. The chapter was divided into three subsections, the definition of concepts, theoretical background and the review of empirical studies. The definition of concepts introduced the concept of investment, employment, economic growth and economic sectors. The subsection briefly discussed how economic growth is defined in South African context and how economists view growth. There are three different types of sectors, namely primary, secondary and tertiary sectors. These sectors were explained and defined with their subsectors. The concept of employment was defined according to South Africa and the world at large. Investment, which forms the main basis of the study, was also introduced with a brief definition of how it will be used in the study.

Furthermore, the chapter discussed the theoretical background in which various theories of investment, economic growth and employment were discussed. The chapter discussed various forms of investment theories such as the Keynes theory, accelerator, Tobin Q and McKinnon

and Shaw theories. Sustainable economic growth is essential for the development of every country and its competitiveness in the global market. As a result, three essential theories of employment namely, the neoclassical, Adam Smith and the endogenous growth theories were discussed. The central theme of the growth theories is based on how countries can utilise resources and generate income. The last theory discussed was that of employment, the classical, Keynes theory of employment and the Okun's law hypothesis. The three theories were mostly about how the labour force generates growth and other factors that contribute towards the efficiency of labour force such as income and human capital.

The last part of the chapter reviewed the empirical studies on the subject of investment in economic sector, growth and employment. The chapter was divided as follows, first, it reviewed the relationship between investment and growth, where it discovered that there is a relationship; however, it moves from investment to growth and growth to investment in different countries. Secondly, it reviewed studies on the relationship between investment in manufacturing, mining and financial sectors. The study established that different countries yield different results, countries that are developed have higher investment prospect relative to developing countries. Moreover, there is a relationship between economic sector and economic growth. However, for most countries the relationship moves from growth to investment in economic sectors. Due to the literature gap, the study was not able to find studies on the subject matter, however, investment on individual sectors was found. As a result, the study established that more studies on the impact of investment in sectors on economic growth and employment in South Africa have to be conducted. However, from the obtained studies the literature established that there is a nexus between investment and growth and employment and growth.

## CHAPTER 3

### OVERVIEW OF SOUTH AFRICA'S INVESTMENT, ECONOMIC GROWTH AND POLICY IMPLICATIONS

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#### 3.1 INTRODUCTION

In the context of creating an inclusive growth with the focus on domestic investment and employment creation, the South African government adopted the NDP as a framework that will assist in attaining its inclusive growth objective. The increasing unemployment rate concurrently hinders the sustainability of the economy within the country and leads to low opportunities and growth. Nonetheless, the government is increasingly putting measures in place to curb unemployment and create a labour-absorptive economy. This is seen through increasing launches of different frameworks such as the NGP (2011) NDP 2013, the IPAP 2014 and the Medium Term Strategic Framework 2014-2019 (Toyin *et al.*, 2017).

The latter is the government strategic framework that is aimed at elevating the implementation of the NDP. The MTSF seeks to ensure policy consistency, alignment and coordination across government plans (The Presidency. 2013). MTSF is a long-term plan that is designed to make sure that the vision and goals of the country's long-term plans are achieved. The NGP is grounded solely on the restructuring of the South African economy to create a labour-absorptive economy and high growth rates (Hendriks, 2013). The IPAP is aimed at enhancing industrial growth and reducing unemployment; it postulates that sectors are essential in enhancing economic growth in South Africa and have the potential of increasing employment through investment (Nel & Rogerson, 2013).

This section gives an overview of the economic composition and contribution of sectors in the economy concerning employment creation and economic performance through investment. Gross fixed capital formation is the domestic investment used in the study and the study will refer to investment as a representative of gross fixed capital formation. The economic overview through employment and investment in sectors will assist in identifying the key elements of growth in South Africa and give a historical view of the economic performance; determine the sectors that have comparative advantages. The historical data will assist in determining the economic trends, allowing the analysis of sectoral performance, which will help in identifying the elite and inferior sectoral performance in the economy. Furthermore, the sectoral analysis

will enable the study to determine the skewness of the economy. The government formulates policies that work towards enabling its desired goals of increasing development and growth within the country. The section concludes by discussing the policies formulated in South Africa and their implication on growth and development in South Africa.

### 3.2 THE SOUTH AFRICAN ECONOMIC PERFORMANCE

South Africa is regarded as one of the most prosperous countries in terms of growth and development. Botswana is the second most competitive country after Mauritius, in Africa (Legatum Institute. 2016; WEF, 2017). South Africa experienced an upward trend in economic growth after apartheid because of the removal of economic sanctions imposed on South Africa prior 1994. South Africa achieved an average of 3.3 percent of economic growth over a period of 18 years (1994-2012), influenced by an increase in household consumption spending, which has contributed to about 75 percent to the GDP and fixed investment activities, which have contributed about 29 percent (IDC, 2013:1-2).

**Table 3.1: Annual average percentage growth rates 1994-2012**

	1994-2000	2001-07	2008-12
<b>Gross domestic product</b>	2.94	4.3	2.2
<b>Gross fixed capital formation</b>	4.4	9.5	3.4

Source: IDC (2012)

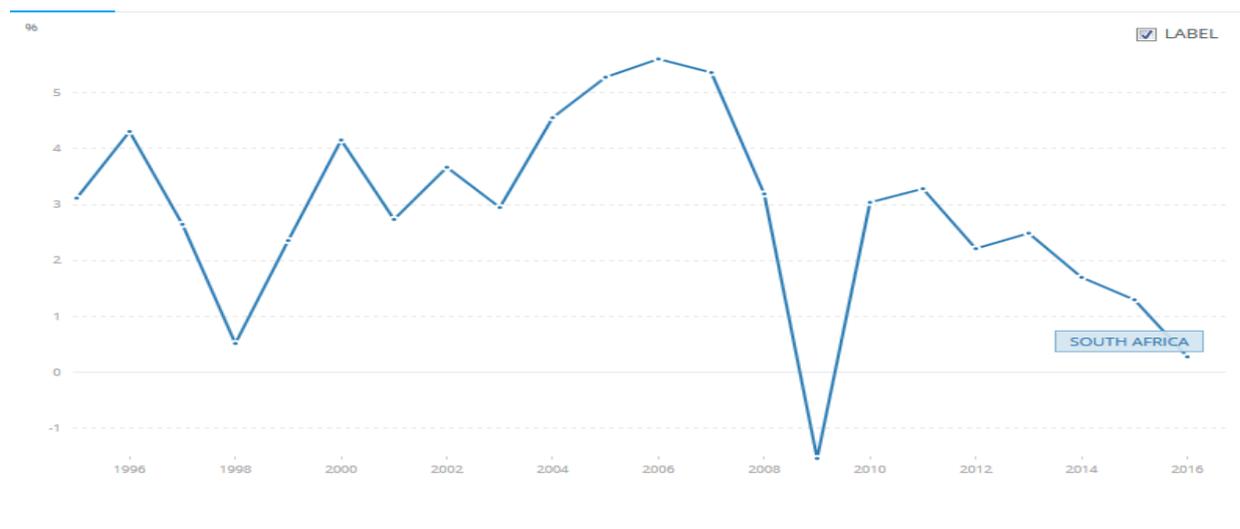
Table 3.1 shows the GDP and investment performance over the period of 22 years from 1994 to 2016 in South Africa. The table shows that investment increased from 4.4 percent to 9.5 percent during 2001-2007 but declined in 2008-2012. This huge decline was due to the global financial crisis (later referred to as the great recession) as well as the changes in South Africa's political stance, in particular changes in the leadership of the country. On the other hand, the increase in growth was exacerbated by the prolonged developments in the tertiary sector, which accounted for approximately 69 percent of the GDP in 2012 (IDC, 2016). The growth tertiary sector was attributed to the strong financial sector, which accounted for approximately 22 percent of the GDP in 2012. The secondary sector performed averagely well considering the labour unrests and steel dumping by China. Manufacturing was the best performing sector under the secondary sector with an estimated contribution of 19 percent. In contrast, the primary sector, which is dominated by the mining industry and the agricultural sector, experienced a decline in performance, resulting in loss of employment in the industry (IDC,

2013). The low performance in the agricultural sector is attributed to the decline in research and development in the sector, land redistribution and the acceding to the World Trade Organisation, which exposed it to the global market.

Since 2013, the economic sector's contribution towards economic growth has deteriorated. In 2015, the primary sector contributed the lowest (10%) towards GDP, followed by the secondary sector at 21 percent and lastly, the tertiary sector contributing 69 percent (StatsSA, 2016). In an attempt to grow the economy, the government introduced a number of policies that will see the economy to new heights. One policy in particular, IPAP, identified key subsectors within the main sector, which will drive growth. In addition to the IPAP, the government introduced NGP, which is aimed at introducing change in the economy by focusing on enhancing the value of production sectors.

Despite the government’s attempt to support the sector in the effort to enhancing growth, economic growth in South Africa has been deteriorating since 1994. South Africa welcomed technical recession after the 2008/9 global financial crisis. At the time of writing, two of the most advanced sectors in South Africa, namely the tertiary and secondary sectors were experiencing negative growth rates, with manufacturing having declined by 3.7 percent (Pali, 2017). In contrast, the primary sector has proven to have a great potential for growth as it experienced a positive growth exacerbated by both the mining and agricultural subsectors.

**Figure 3.1: GDP growth (annual %)**



Source: World Bank (2017)

Figure 3.1 shows that the GDP growth in South Africa has been deteriorating from 1995 onwards. However, South Africa experienced a sharp increase in GDP from 1998 to 2008 and a strong decline during the financial crisis in 2008. Despite being one of the largest economies in Africa, South African economic growth has been sluggish. In 2015, South Africa moved from being the largest economy in Africa to being the second largest surpassed by Nigeria. However, in 2016 the country regained its title for being the largest economy in Africa after Nigeria's currency devaluation. One of the Reserve Bank's objectives is to maintain financial stability in an attempt to create an atmosphere that will result in sustainable economic growth. The Reserve Bank currently (2017) reduced the interest rate for the first time in five years by 25 points to 6.75 percent in an attempt to avoid further recession (Graham, 2017), which is one of the measures South Africa is taking to enhance its growth.

### **3.3 INVESTMENT CLIMATE IN SOUTH AFRICA**

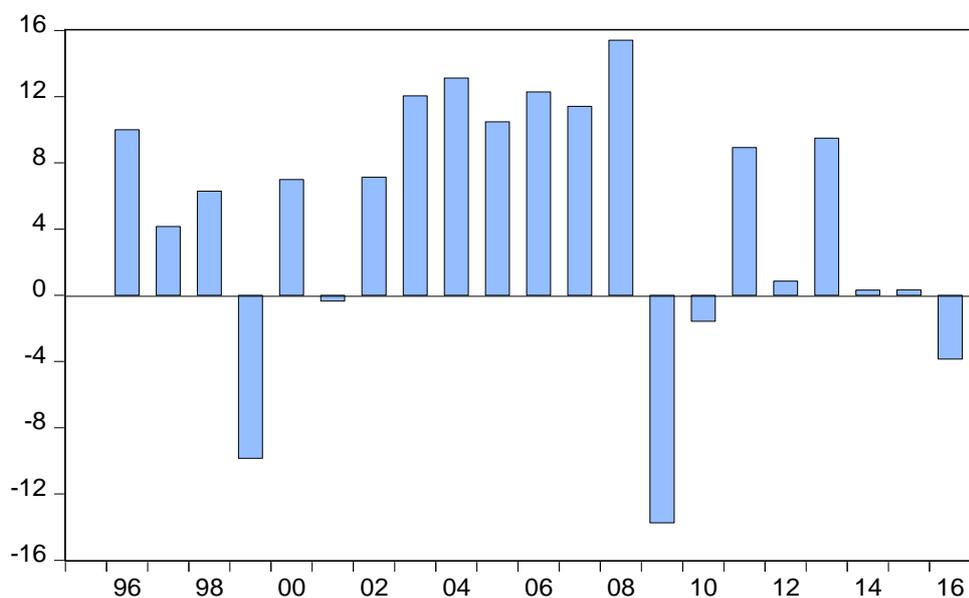
The investment forms part of the major South African objective in achieving sustainable economic growth (NPC, 2012). Investment enhances the growth and employment of the country (Kim & Won-Kyu, 2009). China's economic growth is one of the highest in the world and this according to Eckart (2016) is due to the country's investment activities towards GDP growth, which is amongst one of the highest in the world. China was able to withstand the global economic crisis better than most other countries through investment stimulus, which exacerbated or contributed mostly to growth (Lee *et al.*, 2012). It is through investment that introduction of industries is possible and the attraction and upliftment of other industries is realised. It takes development in certain areas for the potential of other areas to be realised. For instance, investment in infrastructure attracts more industries and new opportunities and consequently employment is formed (Estache & Garsous, 2012).

The South African investment environment, however, has not been performing well over the years. Investment has been sluggish and deteriorated significantly in the year 2002. Internationally, countries were still recovering from the repercussions of the 1998 Asian financial crisis in the year 2000 (Laubscher, 2013). Nonetheless, investment increased significantly post 2002 until 2008/09 where the global financial crisis hard began and negatively impacted by the decline in commodity prices and increasing interest rates (Essers, 2013).

Despite the fall during the 2008/09 global financial crisis, investment growth in South Africa increased (NPC. 2012). This increase in investment is supported by the NDP document

instigating that investment in important for economic growth. This highlights the importance and relevance of the document. The NDPs objective was thus achieved as investment increased from -6.7 to 7.6 percent annual growth rate after its establishment. Conversely to the sluggish growth in investment rates, investment continued to grow but dropped between 2014 and 2015 (see Figure 3.1), reflecting the electricity constraints and the decline in business confidence (SARB, 2017). The prolonged economic uncertainty could be the reason for slow growth in investment that is holding back employment creation and thus the achievement of the NDP.

**Figure 3.2: South Africa’s gross fixed capital formation 1995-2016**



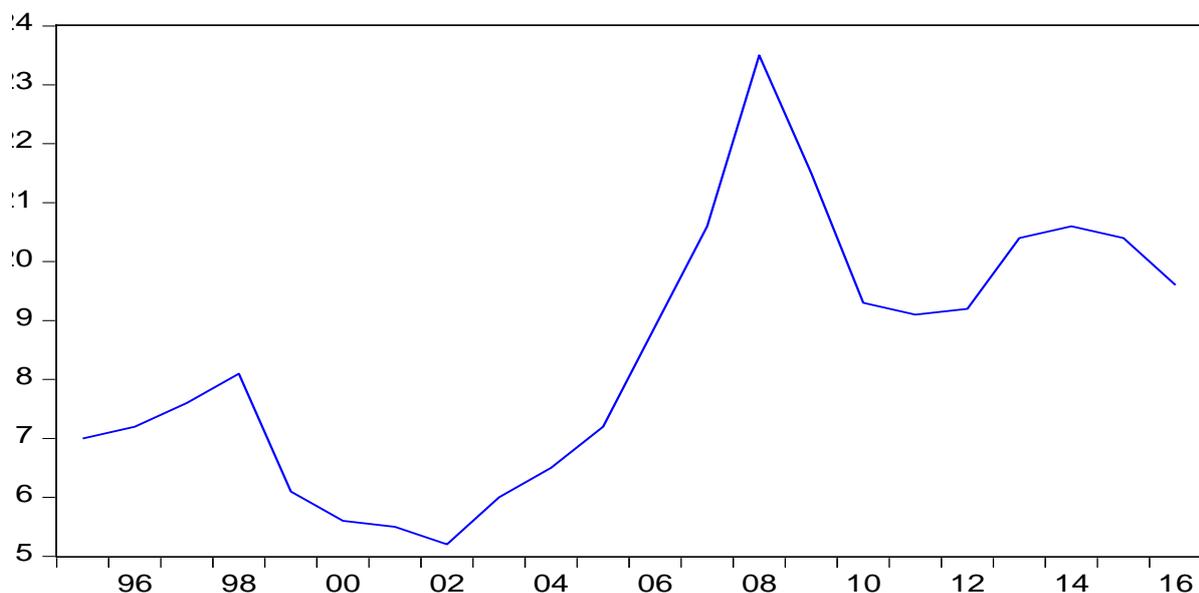
Source: Author’s own compilation data extracted from SARB

Figure 3.2 shows that the percentage change of investment in South Africa was mostly affected by the financial constraints in the global market. In 2000, 2002 and 2008 investment was negative exacerbated by the great recession during those years. The figure suggests that for investment to be successful in a country the global market has to be sound. The ratio of investment to GDP in South Africa as depicted in Figure 3.2 sharply declined during the financial crises and sharply rose right after the financial crises where it reached a peak in 2008 and continued to decrease. During the global economic turmoil, the ratio of investment towards GDP continued to increase highlighting that the South Africa policies of improving investment were effective.

There has been a positive trend of percentage change of investment in South Africa over the period of 1995-2016. This implies that South Africa has taken high priority on investment as

an enhancer for growth. Investment post 2000 has accelerated to R613 858 million in the first quarter of 2017 from R287 048 million in the fourth quarter of 2000 (SARB, 2017:12). However, in 2015 and 2017 South Africa experienced negative growth in investment, whereas in 2016 it experienced a growth rate of 1.7 percent. The investment initiatives executed are the reason for an increase in investment over the period of the study (1995-2016). According to theoretical studies such as Mckinnon (1973), Shaw (1973) and Amusa (2014) as investment increases growth increases as well.

**Figure 3.3: Ratio of investment to GDP**



Source: Author's own compilation data extracted from SARB

It is enlightening that the contribution of investment towards GDP continued to decline from 2015, this is explain by a number of economic pressures that were brought by ratings downgrades, political instability and policy uncertainly that has seen investors lose confidence in the country's ability to change. The policy encouraging foreign investment distorts domestic investment and neglects the potential of other factors that could stimulate growth and contribution of investment to GDP (Tawiri, 2010:762).

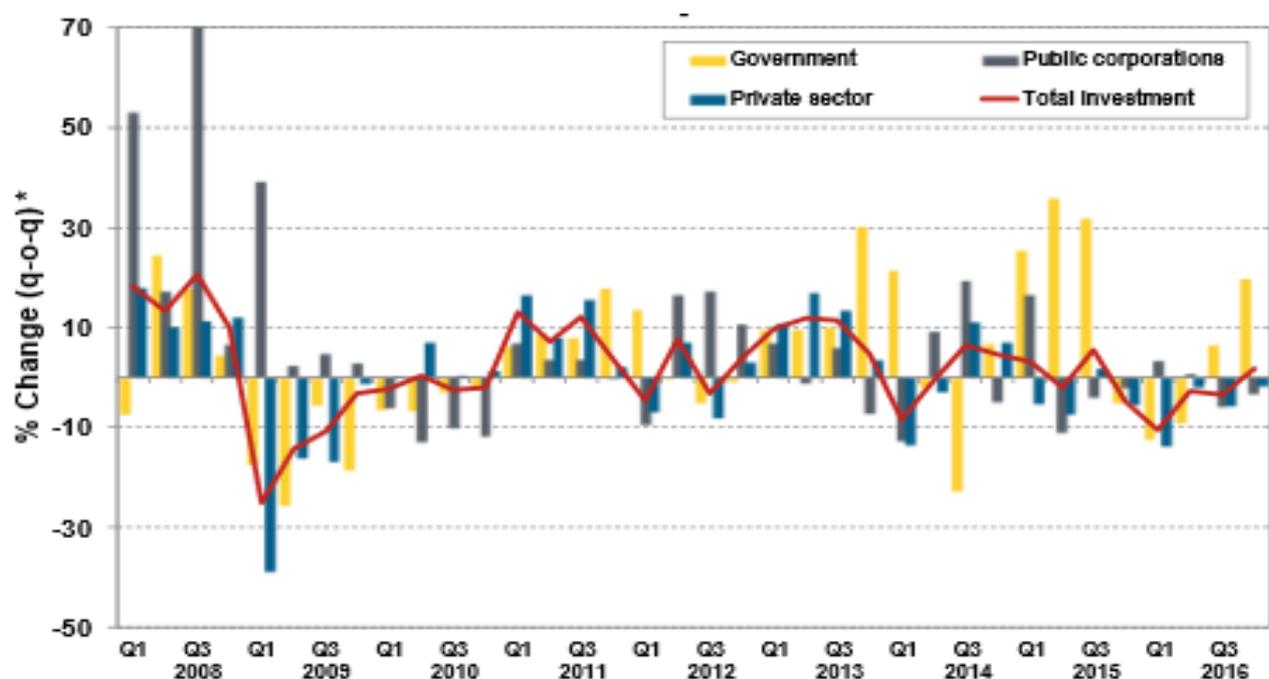
The fundamental contributions, or rather effects of investment, are evident when looking at sectoral composition as well as per institution (see Figure 3.3 and 3.4). Figure 3.3 clearly shows that there are vast differences in investment between government institutions relative to the public corporations and the private sector. It is widely expected that the government will dedicate a substantial fraction of its budget towards investment more than the private sector as

that will encourage foreign investment as well as development within the country. However, in South Africa, the private sector is the dominant investor relative to other institutions such as the government and the public corporations. This is because the government spends a substantial amount of its budget of social services and welfare and are not profit orientated relative to the private sector. The global financial crisis dampened investment in the private, public and government sector. Nonetheless, the percentage change of investment in the private sector and the government continued to be positive as well as that of the government after the global financial crises. The total percentage change of investment shows that despite the current economic turmoil investment continues to increase.

### 3.3.1 Sectoral performance

The fundamental contribution of investment in the institutions is widespread through different industries. The top down approach of investment dwells in the various industries, which are very effective at promoting growth and development. Internationally, South Africa has seen a decline in the production sectors, in particular the manufacturing and mining sectors in recent years. There is a vast difference in investment among the various sectors, which can be explained by each sector's specific influence. As depicted in Figure 3.5, investment in the construction sector remained constant from 2008 to 2016.

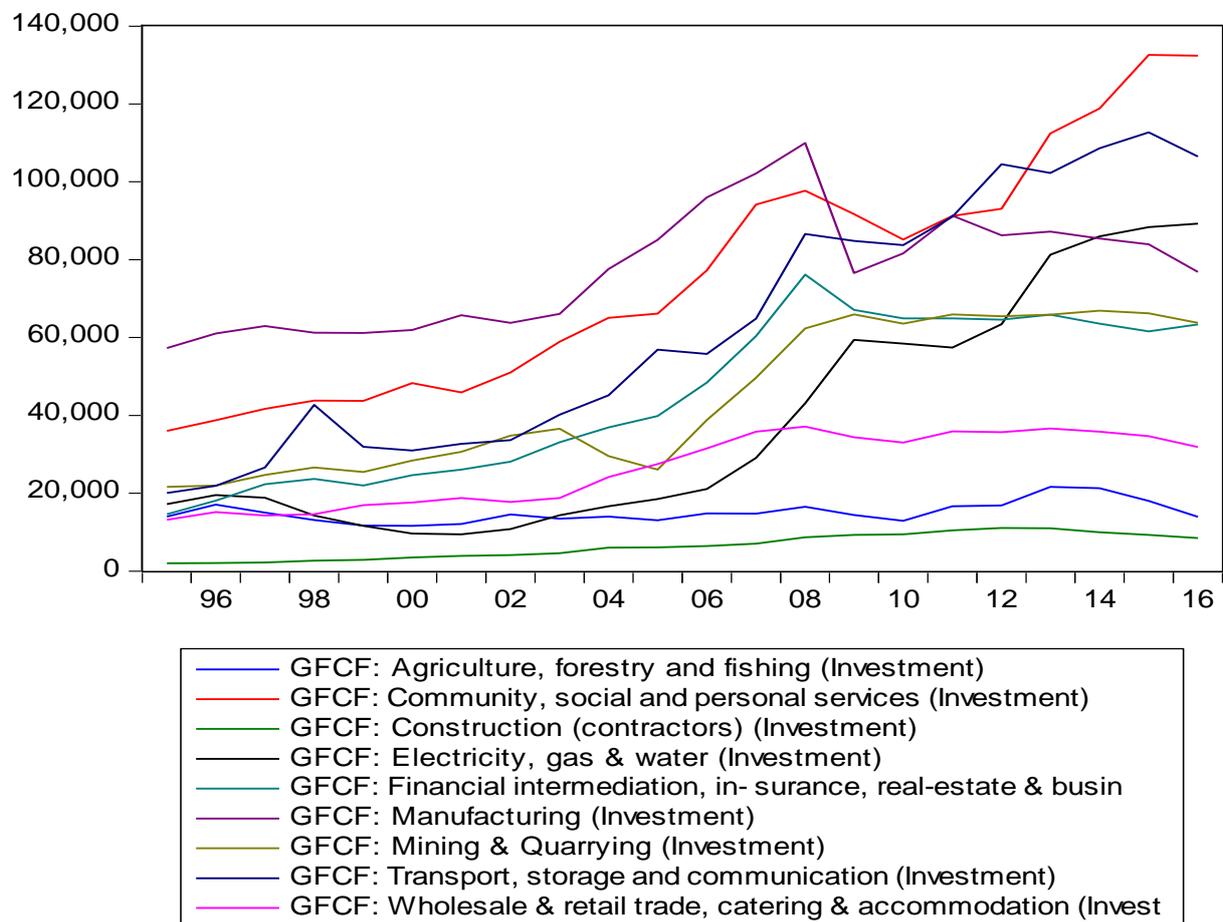
**Figure 3.4: Annual growth in investment per institutional type (% change)**



Source: Authors own compilation adopted from IDC (2017)

Similarly, agriculture, forestry and fishing sector remained constant over the years, whereas the manufacturing sector outperformed all the other sectors from 1995-2009 where it experienced a sharp decline. In contrast, the community, social and personal services sector showed a great increase from 1995-2009 although it experienced a decline. However, it rose more than any other sector and is currently (at the time of writing) among the highest in the country. It is a serious concern that the agricultural sector investment remains constant despite the significant employment contribution and food security it brings to South Africa. Investment in the electricity, gas and water rose sharply after 2009, as there was an immense contribution towards the sector due to the power crises South Africa experienced in 2008.

**Figure 3.5: Investment per industry (2010 constant prices, R Million)**



Source: Author's own compilation data extracted from SARB

The government and private institutions' efforts to combat the electricity crisis paved a way towards the achievement of the NDP. The electricity crisis did not only lead to a decline in the economy but a high percentage of job losses and psychological frustration among the

communities. The power crisis in the electricity, gas and water sector has spillover effects on the economy as a whole as all the other sectors were negatively affected (Van der Nest, 2015).

### **3.3.2 Measures to improve investment climate**

The period following 1994 saw the South African government put measures in place to readdress the effects of the past imbalances, which were brought by the apartheid regime in an attempt to lure investments and create a good reputation for the country. The post-apartheid government spending increased to 57.7 percent, more than 1.6 million new houses were built, concurrently and more than two million new jobs were created (Padayachee & Desai, 2011). Moreover, policies geared to development and growth was established including the Reconstruction and Development Programme (RDP) and the Growth Employment and Redistribution Strategy (GEAR). However, the success of the policies is still debatable and resulted in the establishment of more policies. The majority of South Africa policies focus on readdressing socioeconomic problems. The more South Africa attempts to redress socioeconomic problems the further the gap in reaching its goals as more problems arise.

The South African government has been on a quest to shift its focus from a consumption-driven growth to one led by investment. The latter has been effected through focus on the less energy-intensive economy, reinforcing tradable sectors, which have a high potential of creating employment and investing in cities to reduce inequality (Department of Treasury, 2015). The changes above all have contributed to the NDP vision, which is aimed at uniting South Africa and reducing inequality and poverty, encouraging citizen participation, enhancing economic growth and making it more labour absorptive, focusing on the capabilities of the country and people such as skills development, infrastructure, social security and institutional accountability among others (NPC, 2012 ).

The NDP further resulted in the establishment of the IPAP, which is aimed at supporting the industrial sector in South Africa (DTI, 2013:6). The main goal of the IPAP is to ensure a sustainable growth and prevent the decline within the manufacturing sector. The rest of the policy objectives are as follows:

- Diversify the economy
- Promoting labour absorptive industries
- Industrialisation through inclusive growth
- Contributing towards Africa's industrial development

- Moving towards knowledge economy.

The policy focuses on enhancing the performance of the manufacturing sector because of its great potential in creating job opportunities and enhancing growth and its continuous contribution towards the service sector. The policy has assisted in expanding the manufacturing sector through the advancement in the automotive industry, agro-processing and green industry. The advancements above were achieved through financial support. The action plan of the IPAP is aligned with the infrastructural developmental programmes (Davies, 2013:8). The NGP along with the IPAP identified the agro-processing sector, as a sector that has the capabilities of creating desire jobs due to it is robust backwards and downstream potential and nexus with other sectors of the economy (Toyin, 2017:175). Upon the establishment of sectors by the NGP and IPAP to stimulate employment creation and growth, South Africa government also acknowledges the importance of trade.

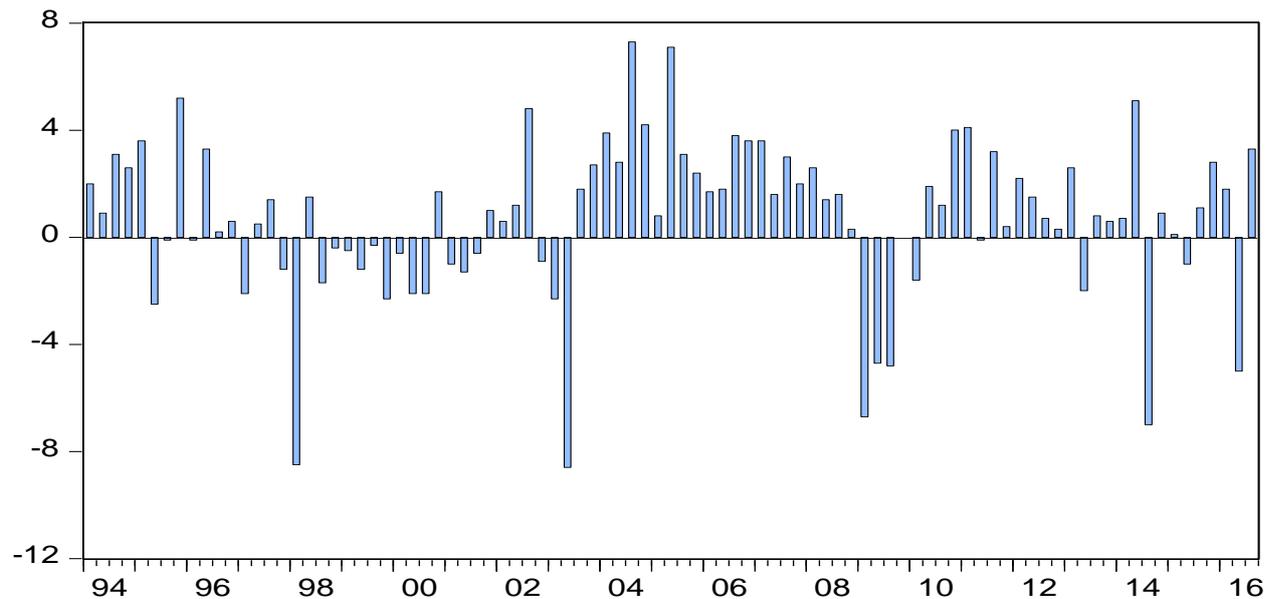
There are other investments led agencies besides the National Plan Commission such as the Trade and Investment South Africa (TISA), which is the division of the Department of Trade and Industry. The TISA focuses on investment promotion by attracting FDI and direct domestic investment, export promotion and development and the provincial specific investment promotion (OECD, 2015). South Africa has realised the importance of sector-specific growth and has directed their policies in that direction.

### **3.4 EMPLOYMENT CLIMATE IN SOUTH AFRICA**

Employment forms part of South Africa's high priority factor in sustainable growth and development. To combat inequality and poverty, South Africa has increased its priority on employment and productive measures, which will absorb more labour. Raising the level of investment is perceived to lead to an increase in employment, productivity, living standards and ultimately reduce inequality (NPC, 2012:115). Despite this, unemployment in South Africa has worsened, reaching an all-time high rate of 27.7 percent (narrow definition) and an even higher expanded unemployment rate of 36.4 percent, the highest since 2003 (Menon, 2017). Identifying areas that can absorb labour and create sustainable job opportunities can act as a measure to combat the vast dilemma of the unemployment rate. This section discusses the employment trend by sector, but first, it looks at the overall employment in South Africa as depicted in Figure 3.6.

After the restructuring of South Africa in 1994, employment trends began to increase until only 1996 slowly and continued to decline. The South Africa's worst level of unemployment was experienced in the years 2000-2003 where it reached over 27 percent (StatsSA, 2017:1). Employment continued to be lost in South Africa exacerbated by the financial crises were more than nine million jobs were lost in the country (ILO, 2015:11).

**Figure 3.6: Employment in South Africa from 1994 to 2016**



Source: Author's own compilation data extracted from SARB

Despite government's attempts to combat unemployment by creating labour absorptive initiatives, the employment rate during the period of 2000-2002 was negative exacerbated by a weak rand (Bhundia & Ricci, 2005). However, between 2004 and 2008 as depicted in Figure 3.6, the employment rate was positive, implying that the measures undertaken to restructure the economy of South Africa were starting to become effective. The government introduced policies such as the RDP followed by the GEAR, which were aimed at increasing employment and growth in the country. However, GEAR could not achieve its target of reaching 400 000 jobs per annum was not achieved (Faulkner & Loewald, 2008).

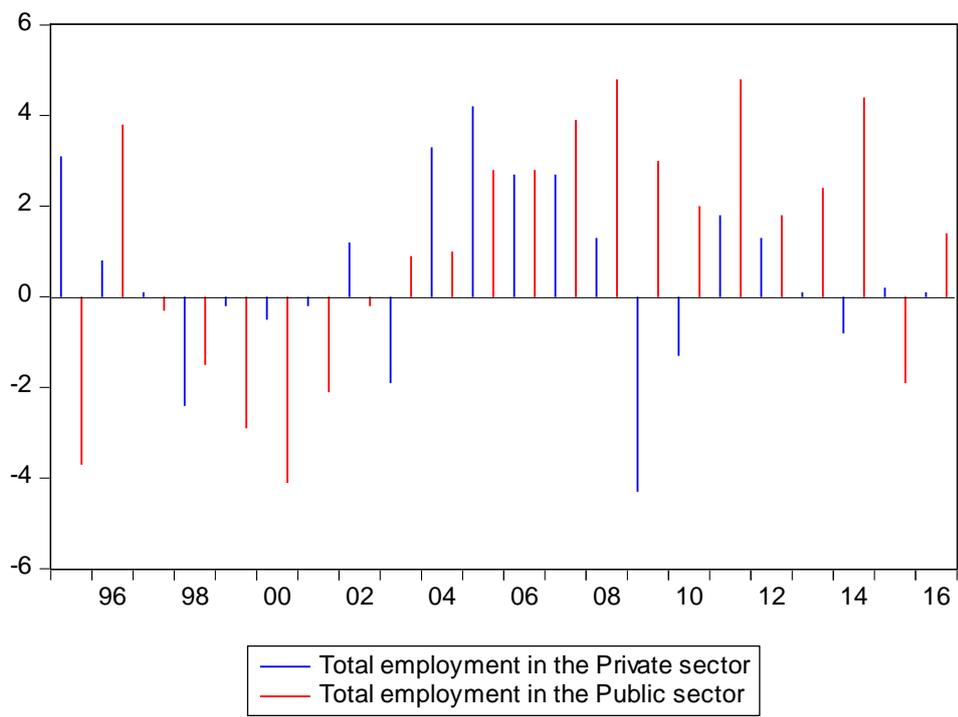
The South African employment trend seems to be very volatile to the growth rate of the country implying that economic growth in the country has a significant impact on job creation. The latter could mean that South Africa's economy is labour intensive. Moreover, the trends validate the hypothesis of Okun, as growth results to employment and the lower the employment, the higher the rate of increase in growth as depicted in Figure 3.6. The figure shows that

employment in South Africa reacts sharply to changes in the economy, such as the sudden decline in the agricultural production in 2015 due to drought (DAFF, 2016). This implies that the bulk of employment in the country comes from the secondary and the primary sector according to the trend.

### 3.4.1 Sectoral employment

To curb the high unemployment rate in South Africa, there has to be a collaboration between both the public and the private sector. Figure 3.7 examines the institutional distribution of employment changes since 1995. As depicted, the contribution of the private sector has been positive throughout the time of the study (1995-2016). In contrast, during the global financial crisis and 2014, institutional employment was negative. This negative contribution was due to the decline in mining output because of the labour unrests in the sector. Additionally other reasons pertain to excessive government spending, corruption, weak global markets and lack of investment.

**Figure 3.7: Annual growth in employment per institutional type**



Source: Author’s own compilation data extracted from SARB

Table 3.2 and Figure 3.8 examine the sectoral distribution of employment change in South Africa since 1995. The South Africa government, in a quest to attain employment creation, has

identified various sectors such as the agriculture and manufacturing as sectors that have the greatest potential for creating employment in the country. The importance of the sectors in South Africa slowly is being recognised. In 2014, the manufacturing sector contributed the second highest with 20.8 percent whereas the primary sector contributed the lowest with only 7.5 percent (Bhorat, 2016:3).

Automation has made life easier enabling firms to come up with faster methods of production, which allows them to have production optimality, increase their profitability and expand. The tertiary sector, which is mostly service driven, has become competitive as a result. The financial sector's contribution towards employment is the second highest with 14.4 percent after community, social and personal services who employ 22.6 percent of the labour force (IDC, 2016).

**Table 3.2: Sectoral composition of employment in South Africa 1995-2016 (%)**

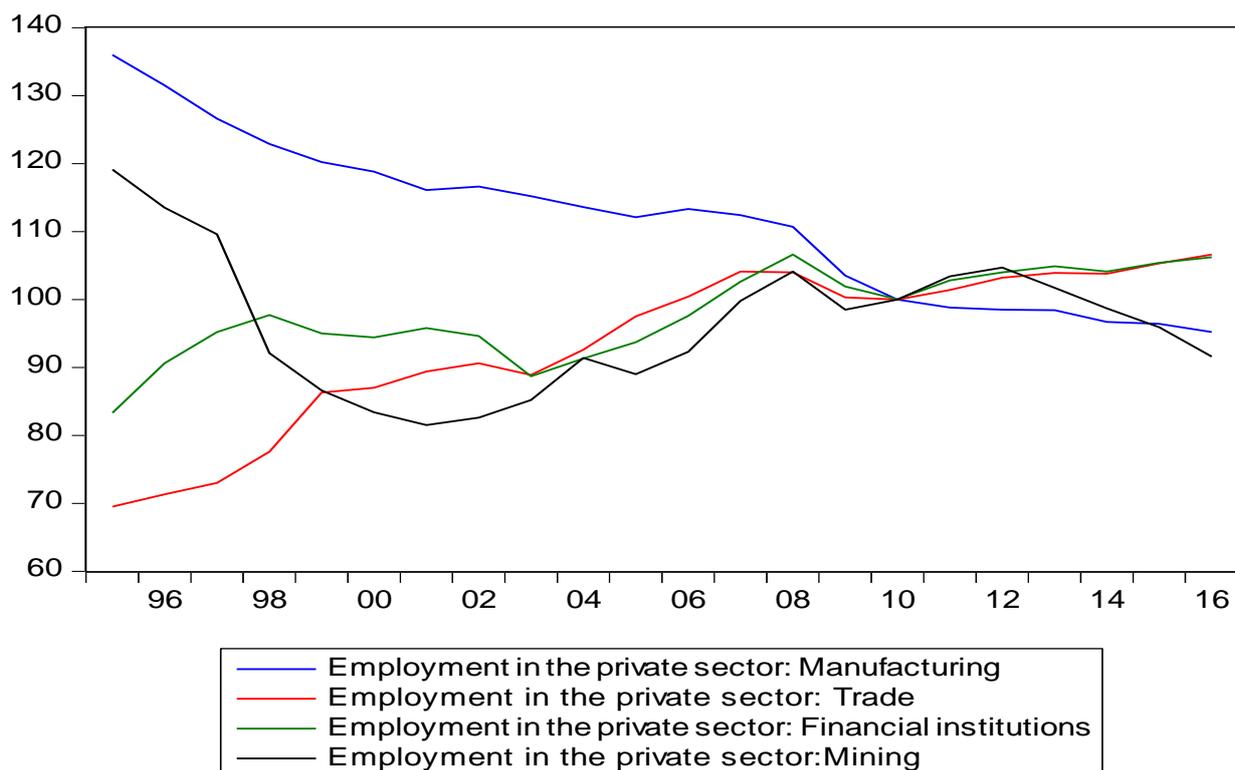
<i>Sectors</i>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2016</b>
<i>Primary sector</i>				
<b>Agriculture, forestry &amp; fishing</b>	7.52	4.38	5.59	5.5
<b>Mining</b>	5.0	6.1	4.7	2.8
<i>Manufacturing sector</i>				
<b>Manufacturing</b>	14.7	12.5	11.5	10.7
<b>Construction</b>	4.8	4.4	4.8	9.1
<i>Tertiary sector</i>				
<b>Finance &amp; business services</b>	18.4	18.9	20.4	14.4
<b>Community, social &amp; personal services</b>	34.2	36.1	4.9	22.6
<b>Transport, storage &amp; communication</b>	4.0	3.8	4.4	5.8

Source: IDC (2016)

The primary sector mostly is endowed with low-skilled labour and has a great potential of absorbing the majority of South Africa's labour force. The agricultural, forestry, fishing and mining subsectors of the primary sector were the cornerstones of South Africa employment and growth sector. However, due to industrial transition, they are among the lacking sectors economically and have shed a large number of jobs.

The agricultural sector's composition of employment in 2016 declined from 8.7 percent in 2015 to 5.5 percent. Concomitantly, the composition of finance and business services declined in 2016 from 14.4 percent to 20.4 percent in 2015. Nonetheless, the finance and business services sector had the greatest composition of employment in 2015 relative to all the other sectors. However, in 2016 the community, social and personal services, surpassed it. The latter constitutes the services, which are non-governmental such as those of the organisations, trade unions, recreational organisations, entertainment and news providers, libraries and activities of the professionals (UE, 2011). The community, social and personal services sector continued to increase while the other sector declined, between 2013 and 2014 it increased by (50 000) 2.1 percent (StatsSA, 2014b:3). Figure 3.8 shows that the composition of employment in manufacturing has been deteriorating from 1995 up to date. Mining has also experienced a sharp decline in 2000 and has been low ever since.

**Figure 3.8: Sectoral composition of employment in South Africa**



Source: Author's own compilation data extracted from SARB

The historical data in Figure 3.8 shows that employment in the primary sector continued to decline, followed by the secondary sector, consequently the tertiary sector is taking over the economy. The tertiary sector employment constitutes a substantial percentage of temporary employment. In 2015 the University of South Africa, Witwatersrand, Telkom and a few mining

companies were involved in a turnaround strategy of either retrenching employees or transferring employees to outsourcing companies (Moyo, 2016; Mataranyika, 2017; Smith, 2017). This shows that firms have resorted to outsourcing instead of hiring permanent employees in an attempt to cut costs. This further substantiates the transition of employment consumption in the tertiary sector. Figure 3.8 shows that while the use of labour in the trade and financial institutions sector continues to increase, the contribution of mining and manufacturing towards employment dramatically declines.

The data indicates that the role of the tertiary sector in South Africa cannot be understated. Despite the economic turmoil and labour unrest by the labour unions, the employment trend in the tertiary sector kept on increasing. Growing demand for services and technological improvement is critical for the development of the sector.

### **3.5 SOUTH AFRICAN POLICIES AND THEIR IMPLICATIONS**

The objectives of the South Africa government have been to eradicate poverty, inequality and achieve a sustainable economic growth. Various policies were established, but not much of their objectives were achieved. In November 1994, the South African government declared the RDP as their main developmental policy, which was going to lead towards redressing the effects of apartheid (Benjamin, 1994). Specifically, the RDP was aimed at redressing the racial biases that resulted in poverty through building an inclusive economy and meeting the basic needs of the people (Nel, 1994). The RDP policy was successful in providing basic education, housing, social welfare and security, among others (Bond & Tait, 1997:4; Mamburu, 2006). However, the policy encountered a number of limitations such as failing to create the targeted number of jobs. The government further extended the RDP with the GEAR in 1996.

GEAR was a policy that was implemented to achieve a macroeconomic balance through trade openness, maintaining exchange rate stability, low inflation and reduced fiscal deficit (Lewis, 2000). In particular, the GEAR policy had an aim to increase the country's international trade performance and fixed investment by achieving 6 percent growth rate by the year 2000 (Heintz, 2002). Additionally, GEAR aimed to create jobs through redistribution of income and labour reforms. However, GEAR had the same objectives as the RDP; the only difference was that GEAR had a clear strategic plan for achieving its goals (Morabe, 2008). Like any government policy, GEAR was not without shortcomings. During its period, economic growth was low, unemployment rose and South Africa was on a budget deficit (Mathe, 2002).

The problem was that both the RDP and GEAR were poorly implemented and as a result, not many of their objectives were thoroughly achieved. The grey sphere led to the establishment of the Accelerated and Shared Growth Initiative (ASGISA). ASGISA was aimed at redressing the gap between the policies and the role actors, due to lack of proper implementation in the RDP and the GEAR, by strengthening policy application and creating economic growth (Hausmann, 2008). ASGISA had to redress the appointment of incompetent and uncommitted government officials, the lack of capacitated human resource to implement policies effectively, maladministration of funds and corruption, lack of financial resources and investment opportunities (The Presidency, 2006:4). Through infrastructural programmes, sector-specific investment strategies, macroeconomic intervention, Joint Initiative on Priority Skills Acquisition (JIPSA) and public administration issues, ASGISA was able to increase the GDP growth rate by 5 percent and investment by 10 percent (The Presidency, 2006:5). Despite these achievements by ASGISA, South Africa was still faced with chronic unemployment.

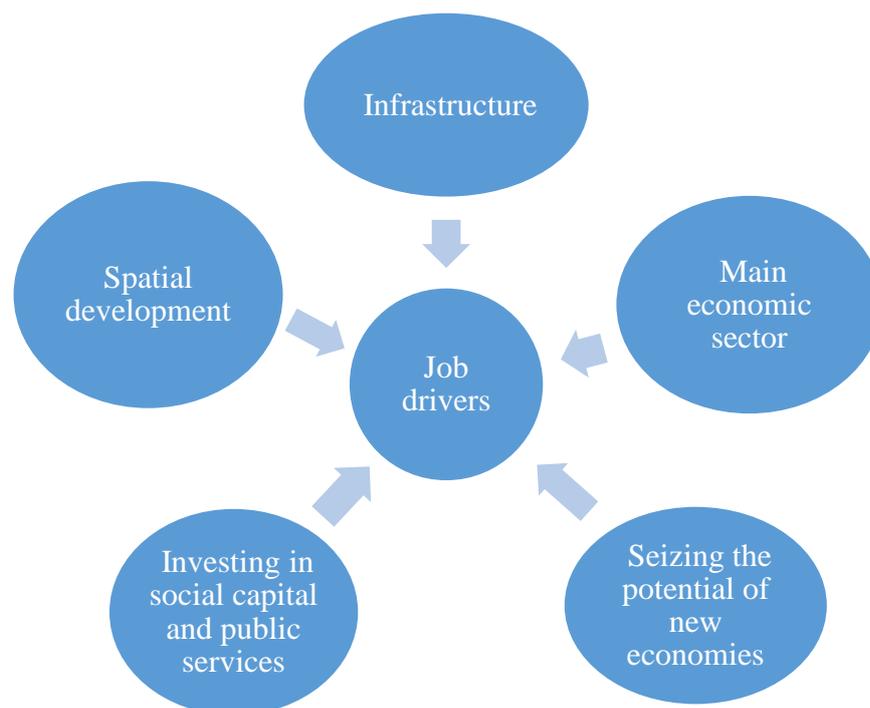
ASGISA was replaced by the NGP 2010, which was then aimed at creating at least five million jobs by 2020 given that the country was suffering from pervasively high unemployment and green economy through manufacturing, recycling and retrofitting (Nattrass, 2011). The NGP policy postulates that to achieve its objectives, there has to be a collaboration, social democratic consensus and macroeconomic and industrial policies. However, the NGPs ambitious targets were not all achieved despite its clear objectives and plans on how to create jobs. The green economy created a new economic activity. However, it was expensive in the domestic market and more emphasis was put on the development of policy implementation, which resulted in the establishment of the Medium-Term Strategic Framework (MTSF).

The MTSF ensures that South African policies are implemented and effected fully across the country. The MTSF is a strategic framework of former president Thabo Mbeki's administration, which was sought to effect policies of the government. The framework's top priority was to foster an accelerated inclusive growth, employment creation and standards of living (The Presidency, 2013). The framework intended at creating inclusive growth through enhancing the poor's penetration to the labour market and expanding the impact and benefit of growth (Fourie, 2015:3). This was to be achieved through the Expanded Public Works Programme (EPWP), Community Works Programme and industrial policies that are elastic in enabling Small, Medium and Micro Enterprises (SMME's) and through trade and industrial policies for decent jobs (MTSF, 2014). The MTSF was established to challenge the critical

areas of South Africa’s economic and social environment. The MTSF hypothesis of faster inclusive growth became prominent in the NGP which is also in the Industrial Policy Action Plan (IPAP).

The NGP focus was to increase economic growth, which it was believed had positive externalities to employment. However, growth in South Africa was sluggish and unemployment on the rise. The NGP identified infrastructural development, agriculture and rural development with the focus on agro-processing, mining, manufacturing, green economy and tourism potential sectors to create employment provided they receive government support (Meyer, 2013:20). The NGP identified five job drivers that are aimed at enhancing employment creation (reach NGP goal of 5 million jobs). These job drivers depicted in figure 3.9 could only be achieved provided there is growth and it is labour intensive.

**Figure 3.9: New growth path job drivers**



Source: EDD (2010)

The NGP alludes to the fact that investment in infrastructure will result in the creation of employment and will create business opportunities. The NGP plans to create jobs via the Expanded Public Works Programme through funding from the IDC and the youth development programmes. The mining, manufacturing, agricultural and service sectors are economic sectors identified as the job drivers of growth and creation of employment. The set job drivers are

interconnected, the creation of employment and opportunities in the rural areas will be successful through infrastructural development in such areas. Moreover, the NDP objectives will be achieved through connecting the rural areas with the urban areas, through opportunities paved by the availability of infrastructure, development of an investment in the sector, which will create new opportunities and sectors.

Meyer (2013) argues that the NGP was more or less the same as the ASGISA and GEAR and lacked innovation and implementation. The Congress of South African Trade Unions (COSATU) also argues that GEAR policy failed to achieve its employment and investment target and was rather a “promise” policy (Koma, 2014:226). It is through the shortcomings of the NGP that the NDP was established to harness further the objectives set. The government formulated the MTSF 2014-2019 to portray the government’s commitment to implementing the NDP (The Presidency, 2006:5). The NDP is thus a new blueprint for socioeconomic and economic growth in the country. Similarly, the GEAR, RDP ASGISA and NGP, the NDP are intended at creating employment and growth. Nonetheless, there is a vast difference between the NDP and the NGP; the NDP is the country’s 2030 vision whereas, the NGP is the government’s strategy tailoring the vision (Nkwinti, 2013). Moreover, the NDP is centred on creating an inclusive growth and eliminating poverty and inequality by 2030. The NDP policy postulates that it can only achieve its mandate through collaboration within the society, enhancing leadership and capacity of the government (NPC, 2014).

The NDP thus acknowledges that to create an inclusive growth, the positive externality of saving rate, in other words investment levels within the country should increase (NPC, 2014:117). The NDP goal is to attain 30 percent of investment to GDP by 2030 and it will be achieved through a sectoral driven economy that is labour absorptive (NPC, 2014). As a result, the NDP plans to create employment and growth by focusing on sectors and through human capital. The plan believes that most jobs will be set up through the service sector and small and medium-sized businesses. The NDP thus acknowledges the importance of employment creation and investment as the drivers for growth and development or rather the elements that are crucial for the achievement of its objectives. The NDP thus established five strategies that are essential for employment creation. These strategies are in line with the sustainable development goals of the United Nations that were aimed at changing the world (UN, 2015) and are discussed below.

- **Creating an environment for sustainable employment and economic growth**

The majority of people in South Africa and Africa are living in poverty and are unemployed. A labour intensive economic growth remains the government's forefront element in uplifting the lives of the people. The NDP thus aims at creating an environment that is conducive for sustainable growth and employment. The State of the Nation Address (SONA) focus is on creating decent employment for South Africa citizens and that is possible through increasing economic growth (The Presidency, 2017). The 2017 SONA set a growth target of 5 percent by 2019 and plans on effecting this through its policies. Despite the NDP's efforts in creating a sustainable and labour intensive economic growth, the economic stance of low growth rates, junk status, increasing unemployment and lack of investment are resistant to achieving the objectives.

- **Promoting employment in labour absorptive industries**

The creation of inclusive growth is imperative in enabling the country to become competitive in the long run. Automation is increasingly taking over the world; the service sector is thus the leading competitive sector, which has the greatest potential of creating employment. The financial support and the penetration of the small and medium sized businesses will enhance growth and employment. The NDP thus believes in the investment of productive sectors to boost the economy and employment. The 2017 SONA alluded to the fact that the focus of job creation is through industrialisation, mining, agriculture and agro-processing, energy, small, medium and micro enterprises (SMMEs) and expanding through tourism (The Presidency, 2017).

- **Promoting exports and competitiveness**

To promote exports and competitiveness in South Africa, NDP aims at creating a domestic market that has a competitive advantage over other markets. Enhancing domestic competitiveness would increase efficiency and competitiveness. The NDP allows newly established productive firms to enter the market, which is done through the financial support of establishing businesses. Allowing new entrants in the domestic market reduces pressure on the domestic companies thus reduces the costs of production. The environment in which businesses are situated has to be beneficial for its operations to run smoothly, therefore, it is important to reduce infrastructural bottlenecks. As a result, the NDP plans on enhancing infrastructure, which will consequently benefit and strengthen the transportation and

communication sectors. This will be very good for the export industry particularly for the SMMEs exporter.

- **Strengthening the capacity of government to implement its economic policy**

For the policy to be effectively implemented the South African government plans on eliminating corruption, enhance accountability and the public sector in general. Strengthening the capacity of the government to implementing its economic policy should not be a unidirectional but bidirectional approach. Thus, the NDP encourages collaboration between the private and public sector. Eliminating the operational risk within the government will lead to efficiency. Deficiencies in the operating systems such as the lack of capacitated stakeholders, poor planning and discrepancies in the technicality of its operations, result in failure to achieve the NDP's objectives.

- **Demonstrating a strategic leadership among stakeholders to mobilise around a national vision**

The NDP alludes to the fact that all participants, the government, private sector and the communities have to be fully capacitated to execute the policy thoroughly. According to the The Presidency (2017) and the NDP, collaboration is the key strategy of taking South Africa to the next level. The success of the NDP lies in the government's ability to fully collaborate with all the sectors of the economy as well as the community. The sectoral focal is set to eradicate the problems highlighted by the NDP. The government constantly holds meetings with the private sectors and the community to plan the execution of the NDP further (Subban & Theron, 2016). The NDP also acknowledges the effect that sectors have on employment and growth and continue harnessing on capacitating them. There is a significant impact that sectors have on the employment creation and scaffolding economic growth (Hussin & Ching, 2013). Table 3.3 below is a comparison of NDP and NGP as explained above. The table compare the NDP and NGP based on the main challenges, job creation vision and their action plan.

**Table 3.3: Comparison of NDP and NGP**

	<b>National Growth Path</b>	<b>National Development Plan</b>
<b>Main challenge</b>	Unemployment Poverty Inequality	Poverty Inequality
<b>Job creation vision</b>	5 million jobs by 2020	11 million jobs by 2030
<b>Action Plan</b>	Identify employment creation opportunities; Use micro and macro policies to create a favourable environment for labour absorptive activities; Have state policies and actions that are steady, consistent and focus; Enable social dialogue; Re-industrialise; Widen South African markets through exports.	Create environment for employment for sustainable growth; Promote employment in labour-absorbing industries; Promote exports and competitiveness; Strengthen government capacity; Show strategic leadership among stakeholders.

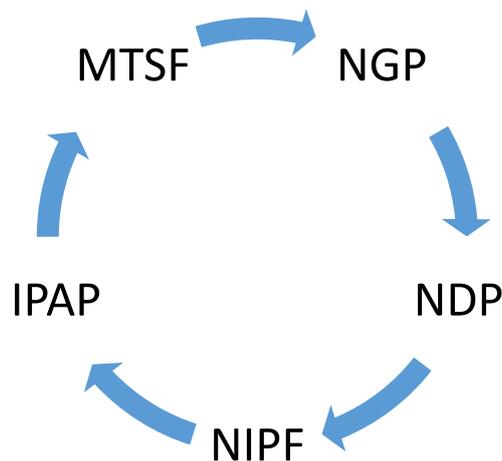
Source: Authors own compilation from NPC (2004)

IPAP objectives are to enable diversification beyond the reliance on traditional commodities and non-tradable services, to transition to a knowledge economy, to promote more labour intensive industries, promote broad-based industrialisation and to contribute to Africa's industrialisation (DTI, 2014). The business process services and agro-processing, green industry and manufacturing are identified as the labour intensive strategic sector. Upon the establishment of the IPAP, new factories were opened and 67 000 jobs were saved in the manufacturing sector (DTI, 2016). The policy has attracted investment to the country, enhancing the business process service sector. Notwithstanding the highlights of the policy, South Africa still finds itself faced with detrimental macroeconomic problems, which hinder the success of the policy. However, the SONA 2017 reiterated that the support of industries is a long-term plan, which will not only be through finance, but the government will also facilitate their growth.

The South African government has policies that can enhance investment and growth in the country. However, the implementation of such policies requires a broad participation of both the private and the public sector in moving South Africa forward. The policies mentioned above

are good initiatives that have a significant potential for advancing the economy of the country thus enhancing the living standards of South Africa. Figure 3.10 shows the integration of the South Africa policy plans; it proves that all the policies are interconnected in some way. Each framework or plan is a continuation of the other.

**Figure 3.10: South African policies integrated**



Source: Authors own compilation

### **3.6 SUMMARY AND CONCLUSION**

Growth and employment creation are paramount to South Africa’s policy formulation. The NDP as well as the NGP, have put emphasis on employment creation and have postulated that it is through inclusive participation by both the private and public sectors that employment will be created. Despite the framework established for the effective collaboration and setting strategies that will enable the implementation of policies, South Africa still lacks the coordination thereof.

South Africa’s economic environment is volatile to changes in the global market and lacks independence. Investment, as a primary objective of creating an inclusive growth in South Africa, has shown desirable effects, which gives hope to the success of the country. The investment climate was able to grow beyond the economic turmoil the country faced. Despite the problems various sectors were faced with, such as the strikes in the mining sector, competition from China in the manufacturing sector and the cyber and lack of technology integration, financial crisis in the financial sector, the sectors are still the major contributor to employment creation and economic growth.

This chapter gave an overview of economic, sectoral composition and contribution of the sector in the economy using employment creation and economic growth through investment. The economic overview through employment and investment in sectors gave a clear view of the country's historical economic performance and identified the significant elements of growth in South Africa. Furthermore, it enabled the identification of the competitive advantages of the sectors. To achieve the study's empirical objectives chapter 4 will explain the use of appropriate model to use.

## CHAPTER 4

### RESEARCH METHODOLOGY

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#### 4.1 INTRODUCTION

Chapter 2 reviewed the empirical as well as the theoretical literature on the impact of sectoral investment on economic growth and employment in South Africa. The review of the literature in Chapter 2 suggested that there is a relationship between economic growth and employment and investment in different sectors. At the same time, the reviewed literature indicated that there exists a gap in the impact of investment in sectors on economic growth and employment in the South African context. Numerous studies have been conducted in other countries, but only a few have been carried out in the case of South Africa. Even so, those that were undertaken in South Africa focused exclusively on the manufacturing sector. This suggests that there are unclear impacts of investment in sectors on economic growth and employment in South Africa. As a result, this chapter uses econometric models to close the gap by resolving the empirical objectives of the study. Two of the empirical objectives of the study are;

- To analyse the relationship between sectoral investment and employment in South Africa with specific reference to the years 1995 to 2016;
- To examine the impact of sectoral investment on South Africa's economy and employment.

Chapter 4 thus provides a clear detail of the methodology used for the research. It further provides a clear description of the variables used, how data were obtained, as well as explaining the econometric models used. Econometric models such as the Granger causality will be used to test the causal link between the investment and economic growth and employment. The error correction model will also be used to estimate the short- and long-run relationship between variables. This chapter will further explain how unit root test was used and the diagnostic tests and why they were used.

## **4.2 DATA SOURCE AND DEFINITION OF THE VARIABLES**

The study made use of secondary data to determine the robustness of the sectoral investment on economic growth and employment in South Africa. In particular, the study uses quarterly times series data on aggregate economic growth, investment in mining, manufacturing and the financial sector and employment in mining, manufacturing and the financial sector in real terms from the first quarter of 1995 to the last quarter of 2016. The data sample was chosen due to economic sanctions, which were imposed on South Africa during apartheid, prior to 1995. As a result, to obtain a reliable and unbiased data, the study had to use the first quarter of 1995 to the fourth quarter 2016. In addition, the sample data chosen was due to omitting the apartheid effects but also due to the unavailability of data. All variables data were extracted from the SARB. Employment is measured as the number of employees in the non-agricultural formal sectors. The sectoral output is adjusted seasonally at an annual rate. The GDP variable is measured at the annual market price, seasonally adjusted at constant price and investment in manufacturing, mining and finance are current prices seasonally adjusted at an annual rate.

The data were transformed for stationarity purposes as stipulated by Brooks (2014) that to have stationarity data have to be transformed into natural logarithms to get more meaningful coefficients and to reduce the size of residuals for data with large variables. The reason for changing the variables to log was due to uniformity regarding data size to obtain reliable results.

### **4.2.1 Dependent variables**

#### **4.2.1.1 Real gross domestic product**

Defined as the gross domestic product, it is a measure of the South Africa's basket of goods and services produced in a period of a year by permanent residents. The real GDP is the macroeconomic measure adjusted for price changes. South African GDP growth rate has contracted by 0.7 percent in the first quarter of 2017 and is used as a benchmark to evaluate the country's economic performance (Stats SA, 2017).

#### **4.2.1.2 Employment**

Employment is a proxy for employment in the non-agricultural sector. It is a measure of the total number of population that has jobs as a percentage of the working-age population. Unemployment to date has been on the rise and fuelling inequality and poverty (Leibbrandt *et al.*, 2010).

## **4.2.2 The explanatory variables (independent)**

Investment is used as a proxy for gross fixed capital formation.

### **4.2.2.1 Investment in the manufacturing sector**

Investment in the manufacturing sector is one of the prominent sectors in South Africa due to its ability to employ semi- and non-skilled labour and growing potential to create more jobs. In 2012, the manufacturing sector was the fourth largest sector in South Africa contributing approximately 12.4 percent towards GDP (IDC, 2013); whereas, in 2014, it was the largest sector in South Africa with a growth of 1.2 percent in the last quarter of 2014 (SARB, 2015).

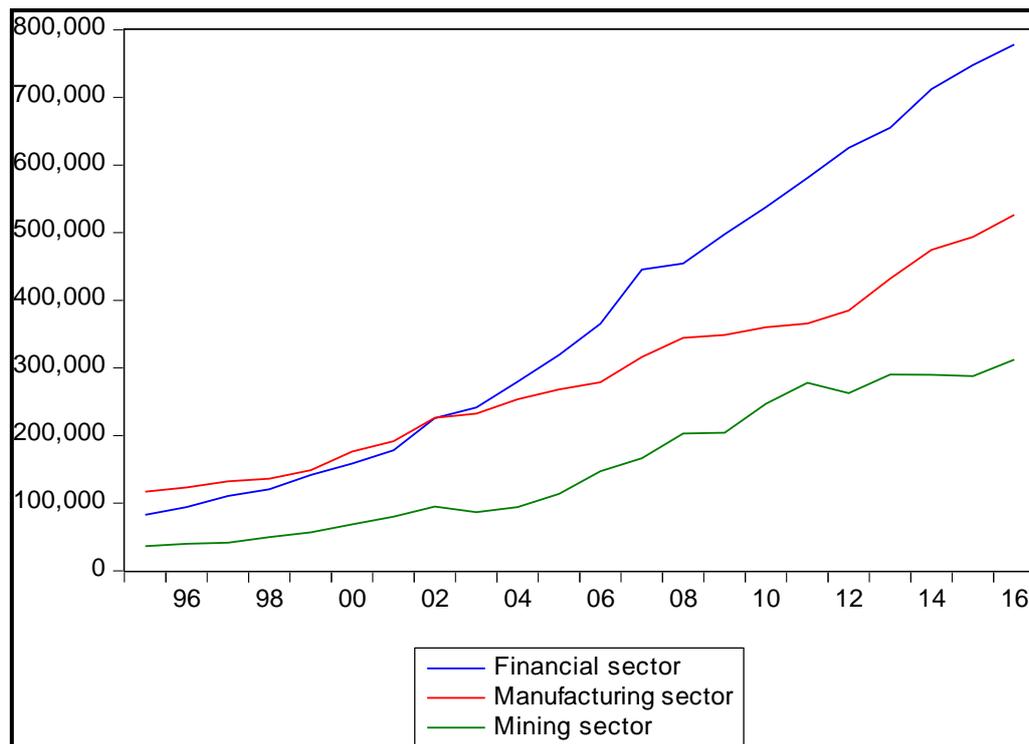
### **4.2.2.2 Investment in mining sector**

Investment in mining represents investment in the mining and quarrying sector. Although the world is moving from the extraction to the service inclined economy, the mining and quarrying sector in South Africa has proven to have a substantial contribution towards employment creation and economic growth in the country. The commonly mined minerals in South Africa are gold, diamonds, platinum and coal. However, there are other minerals as well such as chrome, titanium and vanadium amongst others (CMSA, 2017). The mining sector contribution toward GDP was 9.3 percent in 2012 showing an improvement of 2 percent (IDC, 2013).

### **4.2.2.3 Investment in finance sector**

Investment in the finance sectors represents investment in financial sector as defined by GFCF – financial intermediation, insurance, real estate and business services by the South Africa Reserve Bank. The South African Reserve bank describes the financial sector as the financial and intermediation, insurance, real estate and business services sector and it is one of the fastest growing sectors in South Africa (Bosch, 2006:20).

**Figure 4.1: Annual GDP contribution in sectors between 1995-2016 (real terms)**



Source: Author's own compilation data extracted from SARB

GDP contribution by the sector in figure 4.1 show an upward trend, indicating that the contribution of the mining, manufacturing and financial sector has increased between 1995 and 2016. The financial sector is the largest contributor towards GDP under the period of the study. The manufacturing sector is the second largest contributor, whereas the mining sector is the lowest contributor. The low contribution of the mining sector was the result of the low production due to strikes, which had a detrimental effect on the economy of the country. However, the sector's performance has been increasing from 1996 to 2016 at a low rate.

### 4.3 ECONOMETRIC MODEL

To achieve the abovementioned empirical objectives, various econometric models were employed such as the Granger test technique, Johansen cointegration test, and ARDL and vector auto-regression (VAR) model to analyse the data. ARDL and VAR models are used to evaluate the impact of sectoral investment on economic growth and employment in South Africa, whereas the Granger causality was used to determine the causal relationship between investment in the economic sector, economic growth and employment. According to Pan and Jarrett (2012), a VAR model provides simplified approximations for detecting causes. However, VAR is only applied when the variables are integrated in the same order.

The use of VAR helps in recognising and avoiding various problems such as non-stationarity, autocorrelation, heteroscedasticity and multicollinearity (Brooks, 2014:328). It is thus important that variables be tested for stationarity. When variables are stationary at the same level, then the VAR model can be used, but when they are not, then VAR model cannot be used and therefore only ARDL model is used. The ARDL model can also be used when the variables are not all stationary. In this case, then a cointegrations test is used to test for the linearity combination (Brooks, 2014). This study thus makes use of both ARDL and VAR to test if they produce the same results.

#### **4.3.1 Stationarity and Unit root test**

The first step in conducting a time series analysis is to test for stationarity because non-stationary data results in spurious results (Gujarati & Porter, 2008:762). A spurious regression is one where the time series variables are non-stationary and independent, the  $R^2 >$  Durbin-Watson (DW) resulting in t and F statistics which are uninterruptable (Brooks, 2004:354; Giles, 2007). According to Brooks (2008:318), a stationary series is one with constant mean, variance and auto covariance for each given lag. Equation 4.1 is used as a test that explains whether the data are stationary or not (Cheremza & Deadman, 1992:128).

$$X_t \approx I(d) \tag{4.1}$$

Where  $d$  is the order of integration that refers to the number of unit roots in the series, or the number of differencing processes it takes to make a variable stationary. When  $d = 0$ , a series  $X_t$  is integrated of order zero  $I(0)$  and is stationary (Brooks, 2004:360). In contrast, when  $d \geq 1$ , a series is integrated of order one  $I(1)$ , or higher it is non-stationary (Muzindutsi, 2015:117). In detecting the stationarity of the variables, various stationarity tests were used. The unit root test is the fundamental test for VAR and ARDL model and is conducted to check for order of integration. The study employed the augmented Dickey Fuller (ADF), Phillips-Perron (PP) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root to test for the stationarity of the variables.

##### **4.3.1.1 Augmented Dickey-Fuller (ADF)**

Testing for the unit root was first established by Dickey and Fuller which later enabled them to establish a test with was later referred to as the augmented Dickey-Fuller test (Fuller, 1976; Dickey and Fuller, 1979). The augmented Dickey-Fuller test uses the trend and intercept, for level, first and second difference. With the use of ADF unit root test, the regressed variable can

follow the autoregression of the order  $AR(\rho)$  and able to take into account the effects of lag series. The test thus is based on the following estimated regression:

$$\Delta \gamma_t = \alpha \gamma_{t-1} + \delta x_t + \beta_1 \Delta \gamma_{t-1} + \beta_2 \Delta \gamma_{t-2} + \dots + \beta_n \Delta \gamma_{t-n} + \mu_t \quad (4.2)$$

Where  $\delta$  and  $\beta$  represents the parameters to be estimated,  $x_t$  represents the exogenous variables which can be constant, or a constant with trend and  $\mu_t$  denotes white noise. The hypothesis for ADF unit root test established from Equation (4.2) is:

The null hypothesis ( $H_0$ ):  $\alpha = 0$  the variables has a unit root

The alternative hypothesis ( $H_1$ ):  $\alpha < 0$  The variable has no unit root

When the null hypothesis is rejected, the alternative hypothesis is not rejected. To reject the null hypothesis, the coefficients have to be equal to zero implying non-stationarity, which means that the variables have a unit root. The alternative hypothesis is not rejected when the coefficient is less than zero, implying that there is no unit root. The Phillip-Peron test is interpreted in the same manner as the ADF test and their results are mostly compared (Habanabakize, 2016). However, Brooks (2014:364) and Gujarati (2014:759) argue that the ADF unit root test has low power when stationary but has a root equivalent to the non-stationarity boundary and that it is sensitive to sample size, which may result in a bad conclusion in a small sample size.

#### 4.3.1.2 Phillip-Peron (PP) tests

Although ADF and PP unit root tests are the same, there seems to have a slight difference in that they both include an automatic correction to the ADF test to allow autocorrected residuals and correction of heteroscedasticity (Brooks, 2014:364). The tests are similar in that they both provide the same conclusion and have the same limitations. The PP test is robust to general forms of heteroscedasticity in the error term and the lag length does not have to be tested when employing it. The PP procedure is represented as follows

$$Y_t = \alpha Y_{t-1} + \delta x_t + \mu_t \quad (4.3)$$

$$\Delta Y_t = \theta_0 + \delta \gamma_{t-1} + \mu_t \quad (4.4)$$

The PP test equation is denoted by Equation (4.4), where  $\theta_0$  denotes the constant and  $t$  the trend. When  $\delta = 0$  the variable have unit root, thus they are non-stationary. When  $\delta < 0$ , this

indicates that the variable has no unit root that is the variable is stationary. Like the ADF, the PP test has lower power and sensitive to the sample size, resulting in unreliable outcomes. As a result, Brooks (2014:365) postulates that for the purpose of uniformity, the result of PP and ADF unit root tests should be compared to those of the KPSS stationarity tests.

#### 4.3.1.3 Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test

The KPSS is used to omit the limitations imposed by the ADF and PP unit root tests. Like ADF and PP test, KPSS tests for stationarity tests the null hypothesis against the alternative hypothesis (Brooks, 2014:687). The KPSS null hypothesis is opposite to that of ADF and states that the null hypothesis is stationary at I (0), whereas the alternative hypothesis states that the data are stationary at I(1). The model estimation in KPSS is denoted as follows:

$$Y_t = \partial_0 + \partial_{1t} + \mu_t \quad (4.5)$$

$$\mu_t = \mu_{t-1} + \varepsilon_t, \varepsilon_t \sim WN(0, \sigma_e^2) \quad (4.6)$$

Where  $t$  denotes a trend,  $\partial_0$  a constant and  $\mu_t$  random walk,  $WN(0, \sigma_e^2)$  white noise and  $\sigma_e^2$  denotes a variance. KPSS hypothesis is expressed as follows:

$$H_0: \sigma_e^2 = 0$$

$$H_1: \sigma_e^2 > 0$$

The null hypothesis  $\sigma_e^2 = 0$  mean that variance is zero, implying that the random walk  $\mu_t$  is constant relative to the alternative hypothesis that variance is greater than zero  $\sigma_e^2 > 0$ , implying that unit root exists.

#### 4.3.1.4 Break-point unit root test

Time series data often contains a structural break and testing stationarity, using tests above may result in spurious outputs (Perron, 1989). According to Ling *et al.* (2013:230), most of the financial and macroeconomic time series with a long historical time often has structural breaks. Structural breaks often are linked with abnormal events. ADF and KPSS unit root test has low power when there are structural breaks; thus, fail to reject the unit root null hypothesis. In essence, the traditional unit root test may appear non-stationary whereas the series is stationary. For this reason, the study made use of the breakpoint unit root test as suggested by Perron (1989). The regression is as follows:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 t + \mu_2 D_L + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \varepsilon_t \quad (4.7)$$

Where;  $y_t$  is the time series under consideration,  $\varepsilon_t$  is the white noise error term,  $\alpha$  and  $\beta$  are the changes in parameters for the duration of the time break  $t = T_B + 1$  and where  $D$  denotes the dummy variable. The null and alternative hypotheses are set as follows:

$$H_0: y_t = \alpha_0 + y_{t-1} + \mu_1 D_k + \alpha_t$$

$$H_1: y_t = \alpha_0 + y_{2t} + \mu_2 D_L + \alpha_t$$

The null hypothesis indicates that the time series under consideration has a unit root, confirming the absence of structural break. The alternative hypothesis states that structural break is present. To eliminate the incorrect inference resulting in bias and spurious outcomes, the results of the breakpoint unit root test is compared with those of the ARDL, PP and KPSS tests. The breakpoint unit root test is employed with the trend and intercept at both level and first difference and select Dickey-Fuller min-t t statistic and graph to identify the break.

### 4.3.2 Autoregressive distributed lag (ARDL) model

The ARDL model was used to determine the impact of sectoral investment on economic growth and employment in South Africa. The ARDL model is used to detect the long run relationship between variables that are integrated in different order (Pesaran & Shin, 1999; Pesaran *et al.*, 2001). Unlike other models such as VAR, the ARDL model can be used when variables are integrated at different levels,  $I(0)$  and  $I(1)$ . In contrast, VAR model can only be used when variables are integrated in the same order. Similar studies (Muzindutsi & Maepa, 2014; (Ncanywa & Makhenyane, 2016) made use of VAR model. The study established that the variables are integrated in the same order; as a result, VAR model is appropriate for establishing the impact between variables. However, the study employed both VAR and ARDL model to establish the impact of investment in sector on economic growth and employment in South Africa. However, ARDL cannot be employed if the variables are integrated of the order  $I(2)$ . The order of  $I(2)$  results to crushing of the ARDL (Safdar, 2014; Boachie 2015).

The ARDL model has numerous advantages; first, it is not sensitive to sample size. Secondly, it is not susceptible to the order of integration and, lastly, it allows simultaneous estimates of the short and long-run components of the model (Pesaran & Shin 1999; Ogbokor, 2015:115). Moreover, the ARDL model is flexible, can be used to derive error correction model (ECM) through easy linear transformation, can distinguish between explanatory and dependent

variables and can detect the cointegrating vectors where there are multiple cointegrating vectors (Pesaran *et al.*, 2001). Notwithstanding the advantages above of the ARDL model, the model cannot be employed when there is multiple long-run relationship between the variables. In such cases, the Johansen cointegration becomes more appropriate (Johansen & Juselius, 1990).

The following models were estimated to determine the impact of sectoral investment on economic growth and employment in South Africa in the short and long run:

$$GDP_t = f(Inv_t) \quad (4.1)$$

$$Employment_t = f(Inv_t) \quad (4.2)$$

*Inv* is investment at time *t*. *Inv* has three components, namely investment in manufacturing, finance and mining. *GDP* represents economic growth at time and *Employment* denotes aggregate employment at time. Since the aim of the study is to examine the impact of sectoral investment on economic growth and employment, the model is estimated as follows:

$$GDP_t = f(InvMin_t + InvManu_t + InvFin_t) \quad (4.3)$$

$$Employment_t = f(InvMin_t + InvManu_t + InvFin_t) \quad (4.4)$$

Where,  $GDP_t$  is gross domestic product at time *t*

$Employment_t$  is employment at time *t*

All variables were transformed into the logarithmic form. Transforming variables into logarithmic form enables more significant coefficients and to reduce the size of residuals for data with large variables. The impact of investment in the sector on economic growth and employment was established using the following ARDL models from the function in Equation 4.1:

$$\begin{aligned} \Delta LGDP_t = & \alpha_1 + \sum_{j=1}^k \beta_{1j} \Delta LGDP_{t-j} + \sum_{j=1}^k \lambda_{1j} \Delta LInvMin_{t-j} + \\ & \sum_{j=1}^k \gamma_{1j} \Delta LInvManu_{t-j} + \sum_{j=1}^k \gamma_{1j} \Delta LInvFin_{t-j} + \delta_1 LIGDP_{t-1} + \delta_1 LInvMin_{t-1} + \\ & \delta_2 LInvManu_{t-1} + \delta_2 LInvFin_{t-1} + u_{1t} \end{aligned} \quad (4.5)$$

$$\begin{aligned} \Delta LEmployment_t = & \alpha_2 + \sum_{j=1}^k 1\beta_{2j} \Delta LEmployment_{t-j} + \sum_{j=2}^k \lambda_{2j} \Delta LInvMin_{t-j} + \\ & \sum_{j=2}^k \gamma_{2j} \Delta LInvManu_{t-j} + \sum_{j=2}^k \gamma_{2j} \Delta LInvFin_{t-j} + \delta_2 LEmployment_{t-2} + \\ & \delta_2 LInvMin_{t-2} + \delta_2 LInvManu_{t-2} + \delta_3 LInvFin_{t-2} + u_{2t} \end{aligned} \quad (4.6)$$

Where  $LGDP$  denotes the natural log of GDP and  $LEmployment$  is the natural log of employment. Coefficients,  $\beta_j$ ,  $\lambda_j$ ,  $\gamma_j$  and  $\alpha_j$  represent short-run relationship whereas,  $\delta_1 \dots \delta_3$  denotes the long run relationship of the variables,  $\alpha_1$  denotes the intercept,  $k$  represents the number of lag and  $u_t$  represents the white noise error term. The cointegration is tested using the following hypothesis:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = 0$$

$$H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$$

The null hypothesis implies that there is no cointegration, whereas the alternative hypothesis assumes that there exists a cointegration between variables. When the null hypothesis is rejected, the variables have no long-run relationship. This means that there is no long-run relationship between investment in sector and employment and GDP. The bound test or F test is used to test the ARDL cointegration null hypothesis. The F-statistic is compared with the critical values proposed by Pesaran *et al.* (2001). The null hypothesis of no cointegration is rejected when the F-statistic is greater than the upper critical value in the Pesaran *et al.* (2001) table. However, when the estimated F-statistic is less than the tabulated lower critical values, then the null hypothesis of no cointegration is not rejected. Moreover, when the estimated F-statistic is between the lower and the upper critical values then the results are inconclusive and more information is required. If the null hypothesis is rejected, the error correction model (ECM) has to be estimated to equilibrium. The ECM equations for the ARDL model are:

$$\begin{aligned} \Delta LGDP_t = & \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LGDP_{t-j} + \sum_{j=1}^k \lambda_{1j} \Delta LInveManu_{t-j} + \\ & \sum_{j=1}^k \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \alpha_{1j} \Delta LInvFin_{t-j} + \phi ECT_{t-1} + u_{1t} \end{aligned} \quad (4.8)$$

$$\begin{aligned} \Delta LInvMin_t = & \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvMin_{t-j} + \sum_{j=1}^k \lambda_{1j} \Delta LGDP_{t-j} + \\ & \sum_{j=1}^k \gamma_{1j} \Delta LInvManu_{t-j} + \sum_{j=1}^k \alpha_{1j} \Delta LInvFin_{t-j} + \phi ECT_{t-1} + u_{1t} \end{aligned} \quad (4.8)$$

$$\begin{aligned} \Delta LInvManu_t = & \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvManu_{t-j} + \sum_{j=1}^k \lambda_{1j} \Delta LGDP_{t-j} + \\ & \sum_{j=1}^k \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \alpha_{1j} \Delta LInvFin_{t-j} + \phi ECT_{t-1} + u_{1t} \end{aligned} \quad (4.8)$$

$$\begin{aligned}\Delta LInvFin_t = & \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvFin_{t-j} + \sum_{j=1}^k \lambda_{1j} \Delta LInveManu_{t-j} + \\ & \sum_{j=1}^k \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \alpha_{1j} \Delta LInvFin_{t-j} + \emptyset ECT_{t-1} + u_{1t}\end{aligned}\quad (4.8)$$

$$\begin{aligned}\Delta LEmployment_t = & \alpha_2 + \sum_{j=1}^k 1\beta_j \Delta LEmployment_{t-j} + \sum_{j=2}^k \lambda_{2j} \Delta LInveManu_{t-j} + \\ & \sum_{j=2}^k \gamma_{2j} \Delta LInvMin_{t-j} + \sum_{j=2}^k \alpha_{2j} \Delta LInvFin_{t-j} + \emptyset ECT_{t-2} + u_{2t}\end{aligned}\quad (4.9)$$

The ECT represents the error correction term, which is a measure of the speed of adjustment to equilibrium.

### 4.3.3 Vector auto-regression

Christopher Sims (Van Dyk, 2014) first introduced VAR model in the 1980s. The components of sectoral investment on economic growth and employment are expressed as from equations 4.3 and 4.4. As a result, the VAR model from the function in equations 4.3 and 4.4 are described as follows:

$$\begin{aligned}GDP_t = & \alpha_1 + \sum_{j=1}^k 1\beta_{1j} GDP_{t-j} + \sum_{j=1}^k \lambda_{1j} LInvMin_{t-j} + \sum_{j=1}^k \gamma_{1j} LInvManu_{t-j} + \\ & + \sum_{j=1}^k \theta_{1j} GFCFF_{t-1} + u_{1t}\end{aligned}\quad (4.10)$$

$$\begin{aligned}LInvMin_t = & \alpha_2 + \sum_{j=1}^k 1\beta_{2j} GDP_{t-j} + \sum_{j=1}^k \lambda_{2j} LInvMin_{t-j} + \\ & + \sum_{j=1}^k \delta_{2j} LInvManu_{t-1} + \sum_{j=1}^k \theta_{2j} LInvFin_{t-1} + u_{2t}\end{aligned}\quad (4.11)$$

$$\begin{aligned}LInvManu_t = & \alpha_2 + \sum_{j=1}^k 1\beta_{3j} GDP_{t-j} + \sum_{j=1}^k \gamma_{3j} LInvMin_{t-j} + \\ & \sum_{j=1}^k \delta_{3j} LInvManu_{t-1} + \sum_{j=1}^k \theta_{3j} LInvFin_{t-1} + u_{3t}\end{aligned}\quad (4.12)$$

$$\begin{aligned}LInvFin_t = & \alpha_3 + \sum_{j=1}^k 1\beta_{3j} GDP_{t-j} + \sum_{j=1}^k \gamma_{3j} LInvMin_{t-j} + \sum_{j=1}^k \delta_{3j} LInvManu_{t-1} + \\ & \sum_{j=1}^k \theta_{3j} LInvFin_{t-1} + u_{3t}\end{aligned}\quad (4.13)$$

Where:  $\alpha_n$  is the constant;  $\beta_n, \lambda_n, \gamma_n, \delta_n$  and  $\theta_n$  are the coefficients;  $k$  is the number of lags and  $u_{1t}, \dots, u_{3t}$  are the stochastic error terms. Similarly, to the ARDL, unit root test was first estimated before the above equations were estimated to test for stationarity. If cointegration exists among the variables the vector error correction method (VECM) will be estimated. The VECM represents the speed at which the dependant variables return to equilibrium after changes in the independent variable. The VECM variables shows how quickly or slowly variables returns to equilibrium and it should be negative, less than one and highly significant. According to Brooks (2014), Johanson's multivariate cointegration requires that all variables

be stationary at the first difference I (1). This study will make use of the derived equation from VAR model in equations 4.10 to 4.13 for VECM equation, derived as follows:

$$\Delta LGDP_t = \alpha_1 + \sum_{j=1}^k \beta_{1j} \Delta LGDP_{t-j} + \sum_{j=1}^k \gamma_{1j} \Delta LIMin_{t-j} + \sum_{j=1}^k \delta_{1j} \Delta LInvManu_{t-1} + \sum_{j=1}^k \theta_{1j} \Delta LInvFin_{t-1} + \varphi_1 u_{1t-1} + u_{1t} \quad (4.14)$$

$$\Delta LIMin_t = \alpha_2 + \sum_{j=1}^k \beta_{2j} \Delta LGDP_{t-j} + \sum_{j=1}^k \lambda_{2j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \gamma_{2j} \Delta LInvManu_{t-j} + \sum_{j=1}^k \delta_{2j} \Delta LInvFin_{t-j} + \varphi_2 u_{2t-1} + u_{2t} \quad (4.15)$$

$$\Delta LInvManu_t = \alpha_3 + \sum_{j=1}^k \beta_{3j} \Delta LGDP_{t-j} + \sum_{j=1}^k \gamma_{3j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \delta_{3j} \Delta LInvManu_{t-j} + \sum_{j=1}^k \theta_{3j} \Delta LInvFin_{t-j} + \varphi_3 u_{3t-1} + u_{3t} \quad (4.16)$$

$$\Delta LInvFin_t = \alpha_4 + \sum_{j=1}^k \beta_{4j} \Delta LGDP_{t-j} + \sum_{j=1}^k \gamma_{4j} \Delta LInvMin_{t-j} + \sum_{j=1}^k \delta_{4j} \Delta LInvManu_{t-j} + \sum_{j=1}^k \theta_{4j} \Delta LInvFin_{t-j} + \varphi_4 u_{4t-1} + u_{4t} \quad (4.17)$$

Where:  $\Delta$  represents the first difference,  $u_{1t-1} \dots \dots u_{4t-1}$  are error correction terms and  $\varphi_1 \dots \dots \varphi_4$  are error correction coefficients for the adjustment of changes in the variables to long run equilibrium; whereas, the coefficients;  $\beta_n, \lambda_n, \gamma_n, \delta_n$  and  $\theta_n$  capture the short-run variations of the model. According to Brooks (2014) before constructing a VAR model the first step is to determine the appropriate lag length, as a result the study selects the lag, which gives the best results. The variables were logged (converted into natural logarithm) to reduce the range between variables and to analyse the relationship between growth rates of the variables.

#### 4.3.4 Granger Causality Model

In determining the impact of sectoral investment on economic growth and employment in South Africa, the Granger causality test was utilised. The Granger causality model tests the statistical causality between the variables to determine whether they have a causal relationship or not. It tests if the independent variable causes the dependent variable or vice versa, by how much of the current independent variable can be explained by the past values of the dependent variables.

The normal Granger Causality test assumes that the variables are integrated in the same order. However Toda and Yamamoto (1995) suggest that the use of the Wald (MWALD) test, which prohibits the results being invalid should they be integrated in different orders. The modified Wald test is based on the VAR model and found to be superior to the ordinary Granger (Konya,

2004). This is because the Wald test does not require the variables to be tested first for the cointegrating properties. As a result, it prohibits the bias linked to unit roots and cointegration tests (Yahaya & Suhaila, 2016). The Wald Granger test will be used to test for the causality for ARDL; whereas, the normal Granger causality will be used to test for the causality using VAR.

When testing the Granger using the modified Walt test the first step is to establish the maximum order of integration of the variables. The maximum lag structure is identified using the Akaike information (AIC), Bayesian information criterion (BIC), Schwarz information criterion (SIC), or the unit root graph (Toda & Yamamoto, 1995). Concurrently, to establish if adding lagged values will improve the explanation or not (Brooks, 2014; Engle *et al.*, 1987). In other words, the independent variable causes the dependent variables when dependent variables can be predicted by the past of independent variable together than the past of dependent variables alone (Freeman, 1983:328; Brooks, 2014:335). The following equations hold for both GDP and employment and were established to estimate the model of Toda Yamamoto Granger approach:

$$LGDP_t = \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LGDP_{t-j} + \sum_{j=1+1}^{k+dmax} \lambda_{1j} \Delta LInvManu_{t-j} + \sum_{j=1+1}^{k+dmax} \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1+1}^{k+dmax} \alpha_{1j} \Delta LInvFin_{t-j} + u_{1t} \quad (4.10)$$

$$LInvMin_t = \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvMin_{t-j} + \sum_{j=1+1}^{k+dmax} \lambda_{1j} \Delta LGDP_{t-j} + \sum_{j=1+1}^{k+dmax} \gamma_{1j} \Delta LInvManu_{t-j} + \sum_{j=1+1}^{k+dmax} \alpha_{1j} \Delta LInvFin_{t-j} + u_{1t} \quad (4.11)$$

$$LInvManu_t = \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvManu_{t-j} + \sum_{j=1+1}^{k+dmax} \lambda_{1j} \Delta LGDP_{t-j} + \sum_{j=1+1}^{k+dmax} \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1+1}^{k+dmax} \alpha_{1j} \Delta LInvFin_{t-j} + u_{1t} \quad (4.12)$$

$$LInvFin_t = \alpha_1 + \sum_{j=1}^k 1\beta_j \Delta LInvFin_{t-j} + \sum_{j=1+1}^{k+dmax} \lambda_{1j} \Delta LGDP_{t-j} + \sum_{j=1+1}^{k+dmax} \gamma_{1j} \Delta LInvMin_{t-j} + \sum_{j=1+1}^{k+dmax} \alpha_{1j} \Delta LInvManu_{t-j} + u_{1t} \quad (4.13)$$

Equation 4.10 and 4.11 are derived from equations 4.2 and 4.3 and are explained in the model.

Where  $dmax$ , represents the maximum number of integration

The hypothesis indicates that there are various possible results, that there can exist causality from investment component to employment and GDP or from employment to investment components and from GDP to investment components. Although the Granger causality model is favourably used to check the direction of relationship among variables, it is sensitive to

model specification and the number of lags (Gujarati, 1995). The time series data are often non-stationary and this could result in spurious regression. Before conducting any econometric test, it is important to first test for stationarity, failure to do so may lead to spurious regression results. Hence, the first test that was performed was the stationarity test.

#### **4.3.5 Lag selection and Diagnostic tests**

The choice of lag when employing ARDL and VAR is important because when the correct lag orders are used, the standard terms will not suffer from non-normality, autocorrelation and heteroscedasticity (Gaussian error) (Nkoro & Uko, 2016:82). When few lag lengths are employed, the regression residuals do not behave like a white noise process and when many lag lengths are employed, the strength of the test to detect a unit root will be reduced (Enders, 2004:191). To ensure that the correct lag order is selected the study made use of Eviews 9, which has an automatic manner of selecting the appropriate lag order. However, to get more favourable results, the study made use of the manual way of detecting the lag order by making use of the information criteria.

To ensure that the results obtained are reliable and accurate, the study performed the diagnostic tests to test for heteroscedasticity, CUSUM test and CUSUM of squares and serial correlation. The serial correlation, normality and heteroscedasticity tests were conducted to check for the model fit. According to Brooks (2014:814), if the errors do not have a constant variance, they are said to be heteroscedastic. Conversely, when the variance of the errors is constant, it is referred to as being homoscedasticity.

The presence of heteroscedasticity in the error terms lead to unbiased coefficient estimates outcomes (Brooks, 2014). There are various ways in which heteroscedasticity can be detected such as the graphical method, park test, Glejser test, Spearman's rank correlation test, Goldfeld-Quandt test, Breusch-Pagan-Godfrey test, Koenker-Bassett test and White's general heteroscedasticity test (Gujarati, 2003). However, all these tests are based on different assumptions. According to Gujarati (2003:415), the White general heteroscedasticity is the simplest method to use.

#### 4.4 SUMMARY AND CONCLUSION

The main purpose of this chapter was to outline how the empirical objectives of the study are to be achieved. This chapter discusses the methodology used in the study, with emphasis on the reasons behind the selection of data, the statistical measures and models used for discussion and results chapter. The chapter begins by defining the variables used for the study and further explained the econometric models used for the study. The study made use of three economic sectors namely mining, manufacturing and finance. This sector are defined from the South African reserve Bank and with accordance to how they are going to be employed in the study.

Upon selecting data to use, data was transformed into natural logarithms to get more meaningful coefficients and to reduce the size of residuals for data with large variables. The reason for changing the variables to log was due to uniformity regarding data size to obtain reliable results. There is a high need to test for stationarity before commencing with both the ARDL and VAR model. The study thus explained the importance of testing for stationarity and explained different tests of stationarity. The study further explained the research models used, ARDL and VAR and their limitations as well as their significance. VAR model can only be employed when variables are integrated in the dame order whereas ARDL model can be employed when variable integrated in different order. For examining the impact of investment on sectors on growth and employment, a modified Walt Granger causality test was used and the chapter explained how the model was going to be used. There was also an explanation on how the diagnostic tests were employed and the lag order criteria used.

Moreover, to confirm the short-run relationship of the variables the study employed the impulse response and variance decomposition. The variance decomposition assesses the movements in the shocks of itself and another variable. Upon discussing the models the study will employ, chapter 5 will make use of those models and establish the relationship between variables.

## CHAPTER 5

### EMPIRICAL INTERPRETATION OF RESULTS AND DISCUSSION

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#### 5.1 INTRODUCTION

The fundamental aim of this chapter is to evaluate the impact of investment on economic sectors and economic growth and employment in South Africa using empirical results. Chapter 3 analysed the policy and trend of South Africa's investment and established that there is a significant impact of sectoral investment on economic growth and employment. It is thus important to evaluate the direction of the contribution of the impact that investment has on economic growth and employment. Moreover, it is important to examine whether there is a long- or short-run relationship between the variables. Upon the analysis of the trends of South Africa's economic growth, Chapter 3 established an increasing diminishing marginal return. The study further determined that the small percentage of growth in South Africa does not support employment creation. Hence, the study's focus is on the contribution of investment in sectors on economic growth and employment. This chapter makes use of econometric models to detect the impact of sectoral investment on economic growth and employment. It thus provides empirical results from the utilisation of the econometric model.

The analysis of the empirical results is done through the employment of the ARDL and VAR models, to detect the long-run relationship between the factors. However, before the long-run relationship is examined, the chapter commences with the graphical analysis to illustrate the trend of the variable in the period under study. It further analyses the descriptive statistics and correlation to assess the sample data. The stationarity of the data is imperative in determining the impact of sectoral investment on economic growth and employment in South Africa. As a result, the next step was to test for unit root and determine the order of integration, which is essential for cointegration in both the ARDL and VAR model. Moreover, the study makes use of the Granger causality test to establish the direction of the relationship between the variables. Lastly, the study gives the results of the diagnostic test, which reveals the stability of the results to ensure that they are reliable.

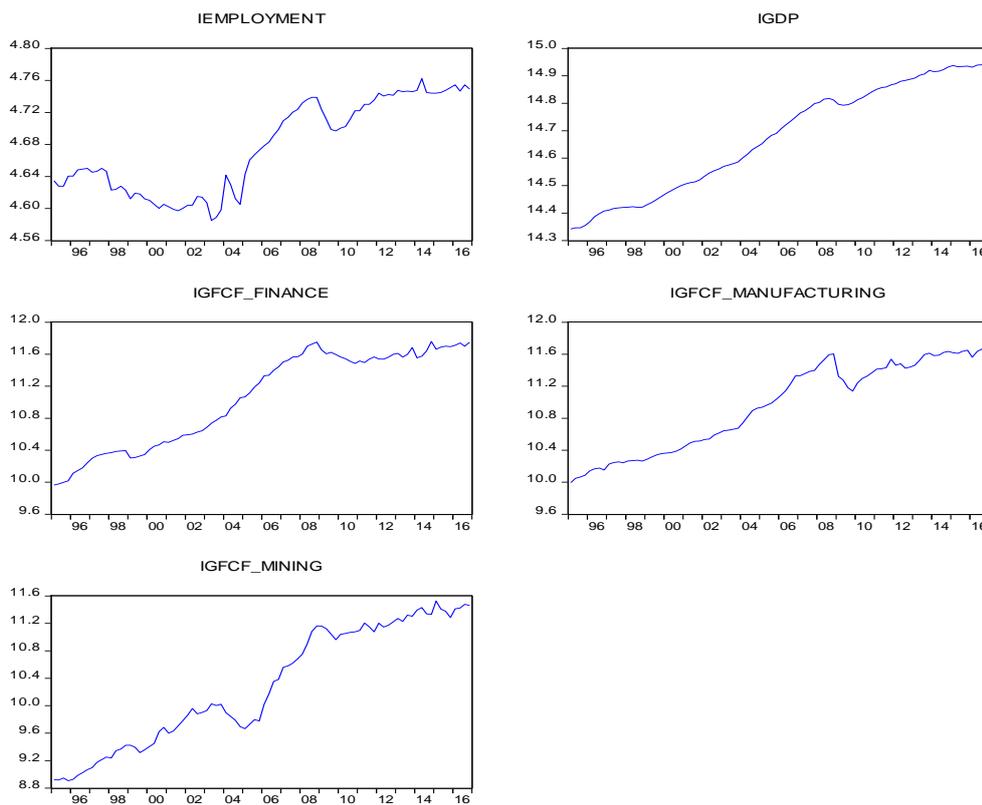
## 5.2 GRAPHICAL ANALYSIS OF THE IMPACT OF SECTORAL INVESTMENT IN SOUTH AFRICA ON EMPLOYMENT AND ECONOMIC GROWTH

The impact of sectoral investment on economic growth and employment is the significant aspect of the study. To examine the impact, the study establishes a graphical analysis to check the trend of the variable. The variables were converted into natural logarithms and, fortunately, none of the variables contained negative values. According to Habanabakize (2016:58), Muzindutsi (2015) and observation from Eviews 9, a logarithm of a negative number gives a syntax error, implying that it does not exist. There is a positive slope in the graphical depiction of investment in mining, manufacturing, finance, economic growth and employment.

The upward trend of the investment components, economic growth and employment are due to policy implementation of creating an inclusive growth focusing on sectors to create employment (Department of Treasury, 2017c). According to Figure 5.1, investment in the mining sector continues to show an upward trend despite the detrimental impact the labour dispute caused. The mining sector contributes approximately 7.3 percent towards economic growth and employment contribution by the sector has shrunk to about 70 000 (CMSA, 2016:7). Figure 5.1 shows that despite the deteriorating contribution of the mining sector towards economic growth, investment kept on increasing.

Concurrently, investment in the finance and manufacturing sector also showed an upward positive trend. Investment in the abovementioned sectors continued to increase despite the low economic growth exacerbated by the financial crises as well as the labour unrest. It is of significant importance for the economy to growth, as indicated in Chapter 2, that not only will economic growth enhance the living standards of the population but it also increases the reputation of the country in terms of management. Despite the increasing trend of the employment sector, it also revealed a deep decline in the year 2000-2002 and in 2008 but continued to increase onwards. During the deep decline of employment, the country was under a lot of pressure due to the global financial crises, the majority of the firms experienced a decline in demand of their goods and services as a results production was reduced and people lost jobs. Moreover, in 2015 South Africa was in a turmoil over the agricultural production decline, where its food security was threatened as a result of the drought. The agricultural sector decreased by 12.6 percent and the international credit rating downgrading made things even worse (Willemse *et al.*, 2015); thus, the decline in the employment rate.

**Figure 5.1: Graphical depiction of investment components, GDP and employment**



Source: Author's own compilation data extracted from SARB

### 5.3 DESCRIPTIVE AND CORRELATION ANALYSIS

Table 5.1 illustrates the descriptive statistics of the impact of sectoral investment on economic growth and employment in South Africa. The table shows that the average for employment, economic growth, manufacturing, mining and finance are positive. The average employment (4.67) is the lowest in all the other variables; mining, finance and economic growth have slightly the same average. The standard deviation for all the variables is lower than the mean, suggesting that the average distance between the mean and standard deviation is longer. The skewness for all the variables is negative, implying that they are negatively skewed; that being skewed to the left. The kurtosis and Jarque-Bera test check whether the distribution of the variables are distributed normally.

**Table 5.1: Descriptive statistics**

	<i>Employment</i>	<i>IGDP</i>	<i>InvManufacturin</i> <i>g</i>	<i>Invmining</i>	<i>Invfinance</i>
<b>Mean</b>	4.676467	14.67382	10.95191	10.28432	11.05325
<b>Median</b>	4.675625	14.69862	11.06264	10.02375	11.28478
<b>Maximum</b>	4.762174	14.94040	11.66413	11.52458	11.76014
<b>Minimum</b>	4.584967	14.34182	9.994242	8.906664	9.965053
<b>Std. Dev.</b>	0.057386	0.199013	0.551191	0.866006	0.593299
<b>Skewness</b>	-0.018556	-0.165546	-0.212552	-0.045678	-0.339295
<b>Kurtosis</b>	1.400050	1.541498	1.477575	1.483731	1.509995
<b>Jarque-Bera</b>	9.391125	8.201780	9.161130	8.460530	9.828862
<b>Probability</b>	0.009136	0.017253	0.010249	0.014549	0.007340

Source: Author's own compilation data extracted from SARB

The correlation coefficient has to be between -1 and +1 (Chandra & Sharma, 2013:40). A coefficient value that is closer to one indicates a strong positive linear relationship (Bluman, 2000). This implies that the variables move together in the same direction. Inversely, a negative coefficient value closer to -1 indicates a strong negative linear relationship (Bewick *et al.*, 2003). This indicates that the variables are moving in opposite direction. In cases where the coefficient variable is zero, there exists no relationship between the variables.

Table 5.2 depicts the strength of the relationship between employment, economic growth and investment in manufacturing, finance and mining. According to the correlation coefficients in Table 5.2, there is a positive relationship between all the variables. This means that changes in investment in the manufacturing, mining and financial sector have a positive correlation with employment creation and economic growth; when investment in such sectors increases, economic growth and employment will also increase.

The positive relationship between the investment in manufacturing, finance, mining and economic growth is 0.99, 0.97 and 0.98, which is closer to one implying that there is a strong positive correlation between investment in sectors and economic growth. Similarly, there is a positive but weak correlation between investment in manufacturing, finance and economic growth to employment as their correlation coefficient is not close to one. The correlation between economic growth and employment, as depicted in Table 5.2 is 0.35, away from one, although it is positive it is weak, implying that the changes in economic growth have a minor effect on the employment rate The results obtained were further substantiated by Well and

Thirlwall (2003) who established a positive correlation between economic growth and the manufacturing sector.

Moreover, when looking at the probability values of the variable to employment, GDP, investment in finance and manufacturing have a p-values that are greater than 5 percent level of significance. This suggest that there is a high level of association between investment in mining and employment. However, the results also show that there is a high association of investment in mining, manufacturing and finance to GDP.

**Table 5.2: Results of the correlation analysis**

<i>CORRELATION PROBABILITY</i>	<i>EMPLOYMENT</i>	<i>LGDP</i>	<i>LInvFINANCE</i>	<i>LInvMANUFACTURING</i>	<i>LInvMINING</i>
<i>EMPLOYMENT</i>	1.000000 -----				
<i>LGDP</i>	0.100341 -----	1.0000			
	0.3523 -----	-----			
<i>LInvFINANCE</i>	0.101157 -----	0.9803	1.000000		
	0.3484 -----	0.0000	-----		
<i>LInvMANU-FACTURING</i>	0.128044 -----	0.9909	0.988144	1.000000	
	0.2345 -----	0.0000	0.0000	-----	
<i>LInvMINING</i>	0.007152 -----	0.977215	0.951098	0.960786	1.000000
	0.9473 -----	0.0000	0.0000	0.0000	-----

\*Correlation is significant at 5 percent

Source: Author's own compilation data extracted from SARB

## 5.4 THE RESULTS OF THE UNIT ROOT AND STATIONARITY TEST

The unit root test was among the first test conducted prior to the employment of the ARDL model and determining cointegration. This is due to its significance of ensuring that the variables are stationary and determining the order of integration among them. Moreover, as stipulated in Chapter 4, it is vital to ensure that the variables are not spurious and do not give meaningless results, that are determined via the conduction of the stationarity and unit root test. To succeed in the abovementioned, the study performed the ADF, PP and KPSS tests. The ADF and PP test the null hypothesis stating that the variables have unit root against the alternative that the variables have no unit root. While the KPSS test the null hypothesis that the series is stationary, against the alternative that the series in not stationary.

Table 5.3 is the summary of the results of the unit root and stationarity. The table shows the order of integration at a level and first difference with trend and both trend and intercept. The results of the unit root test show that for both ADF and PP, economic growth, Employment,

InvManufacturing, InvMining and InvFinance have p-values that are greater than the 5 percent level of significance at a level with intercept and both intercept and trend. This suggests that the null hypothesis, that economic growth, Employment, InvManufacturing, InvMining and InvFinance has unit root, is not rejected and the alternative is rejected at a level. This further implies that the variables are not stationary at a level.

Upon establishing that economic growth, employment, InvMining, InvManufacturing and InvFinance are not stationary at a level, the study further ran the test of both ADF and PP at first difference and determined that the economic growth, employment, InvManufacturing, InvMining and InvFinance are all significant at 1 percent level of significance. This further imply that the null hypothesis, that the economic growth, employment, InvManufacturing, InvMining and InvFinance have unit root is rejected and the alternative hypothesis that the economic growth, employment, InvManufacturing, InvMining and InvFinance have no unit root is not rejected. Nonetheless, the KPSS test shows that the variables are not all stationary at a level, confirming the results of the PP and ADF.

**Table 5.3: Results of the unit root and stationarity test**

<i>Series</i>	<i>Methods</i>		<i>ADF</i>	<i>PP</i>	<i>KPSS</i>	<i>Decision</i>
<i>GDP</i>	At level	Intercept	0.5471	0.5941	1.193389	I(1)
		Intercept & trend	0.9667	0.9819	0.188872	
	1 <sup>st</sup> difference	Intercept	0.0002	0.0003	0.283002	
		Intercept & trend	0.0008	0.0008	0.140980	
<i>Employment</i>	At level	Intercept	0.8968	0.8693	0.988124	I(1)
		Intercept & trend	0.6678	0.5863	0.156767	
	1 <sup>st</sup> difference	Intercept	0.0000	0.0000	0.135554	
		Intercept & trend	0.0000	0.0000	0.103501	
<i>InvManu</i>	At level	Intercept	0.7106	0.6334	1.162170	I(1)
		Intercept & trend	0.7566	0.7660	0.192118	
	1 <sup>st</sup> difference	Intercept	0.0000	0.0000	0.142041	
		Intercept & trend	0.0002	0.0000	0.063342	
<i>Inv Mining</i>	At level	Intercept	0.8127	0.8095	1.169015	I(1)
		Intercept & trend	0.4545	0.5562	0.094562	
	1 <sup>st</sup> difference	Intercept	0.0000	0.0000	0.083472	
		Intercept & trend	0.0000	0.0000	0.069645	
<i>InvFinance</i>	At level	Intercept	0.8127	0.8095	1.135053	I(1)
		Intercept & trend	0.4545	0.5562	0.206745	
	1 <sup>st</sup> difference	Intercept	0.0000	0.0000	0.324300	
		Intercept & trend	0.0000	0.0000	0.127242	

\* Means the rejection of the null hypothesis at the 1 percent level of significance

\*\* Means the rejection of the null hypothesis at the 5 percent level of significance

Source: Author's own compilation data extracted from SARB

As discussed in Chapter 4, a time series data often contains a structural break and most financial and macroeconomic time series, with long historical time, often have structural breaks (Ling *et al.*, 2013:230). Upon the estimation of the stationarity and shocks observed from the variables, the study estimated the breakpoint unit root test to confirm further and/or reject the results of the unit root test in Table 5.3. The null hypothesis indicates that the variable has unit root confirming the absence of structural break. The alternative hypothesis states that structural break is present.

The results of the structural breakpoint in Table 5.4 indicate that the variables are integrated at the same order confirming the results obtained in Table 5.3. The table shows that all variables

are integrated at first difference with both trend and intercept. This implies that economic growth, employment, InvMining, InvManufacturing and InvFinance are stationary with intercept and trend at first difference confirming stationarity among the variables

The break dates of the variables are closely similar as most are during the financial crises (2008 and 2007). The breaks indicate that the study shall employ the dummy variable. Most variables have breaks during the financial crisis (1996) and after the financial crisis (2011). This might be due to economic problems and political inferences in that time. Moreover, the breaks may be attributable to the global economic events such as the downward trend in growth in Europe – South Africa's largest trading partner (Bauer, 2012).

Upon the stationarity established from tables 5.3 and 5.4, the next step is to examine the long-run relationship between investment in selected sectors and economic growth and employment. As a result, the null hypothesis implying that there is no cointegration is rejected and the alternative hypothesis that there exists a cointegration between variables is not rejected. This means that there is a long-run relationship between investment in the sector to employment and economic growth. Moreover, the study made use of the bound test or F test to check the ARDL cointegration/Johansen cointegration VAR null hypothesis. However, before the examination of the long-run ARDL/VAR test, the study made use of the Akaike information lag order criteria to determine the number of lags that the model should utilise.

**Table 5.4: Breakpoint unit root test results**

<i>Series</i>	<i>Methods</i>		<i>P-value</i>	<i>T-value</i>	<i>Time of Break</i>	<i>Decision</i>
<b><i>GDP</i></b>	At level	Intercept	0.9630	-2.733621	2003Q4	Unit root
		Intercept & trend	0.7164	-2.979510	2011Q3	
	1 <sup>st</sup> difference	Intercept	<0.01*	-5.686394	2007Q4	Stationary
		Intercept & trend	<0.01*	-5.382933	2005Q3	
<b><i>Employment</i></b>	At level	Intercept	0.4184	-3.927274	2004Q4	Unit root
		Intercept & trend	0.8092	-2.784049	1998Q2	
	1 <sup>st</sup> difference	Intercept	< 0.01*	-7.517843	1996Q1	Stationary
		Intercept & trend	<0.01*	-7.645964	1996Q2	
<b><i>InvManu</i></b>	At level	Intercept	0.7954	-3.314402	2003Q4	Unit root
		Intercept & trend	0.6620	-3.075921	2007Q4	
	1 <sup>st</sup> difference	Intercept	<0.01*	-7.609966	2008Q4	Stationary
		Intercept & trend	< 0.01*	-7.317345	1996Q3	
<b><i>InvMining</i></b>	At level	Intercept	0.3607	-4.018217	2005Q4	Unit root
		Intercept & trend	0.6507	-3.095575	2012Q2	
	1 <sup>st</sup> difference	Intercept	<0.01*	-8.728206	2005Q1	Stationary
		Intercept & trend	<0.01	-7.879199	1996Q3	
<b><i>InvFinance</i></b>	At level	Intercept	0.8765	-3.109825	2004Q1	Stationary
		Intercept & trend	<0.01*	-9.854942	2008Q2	
	1 <sup>st</sup> difference	Intercept	<0.01*	-9.854942	2008Q2	Stationary
		Intercept & trend	<0.01*	-8.500537	1996Q2	

\* Rejection of the null hypothesis at 1 percent level of significance

\*\* Rejection of the null hypothesis at 5 percent level of significance

Source: Author's own compilation data extracted from SARB

## 5.5 The impact of sectoral investment on economic growth

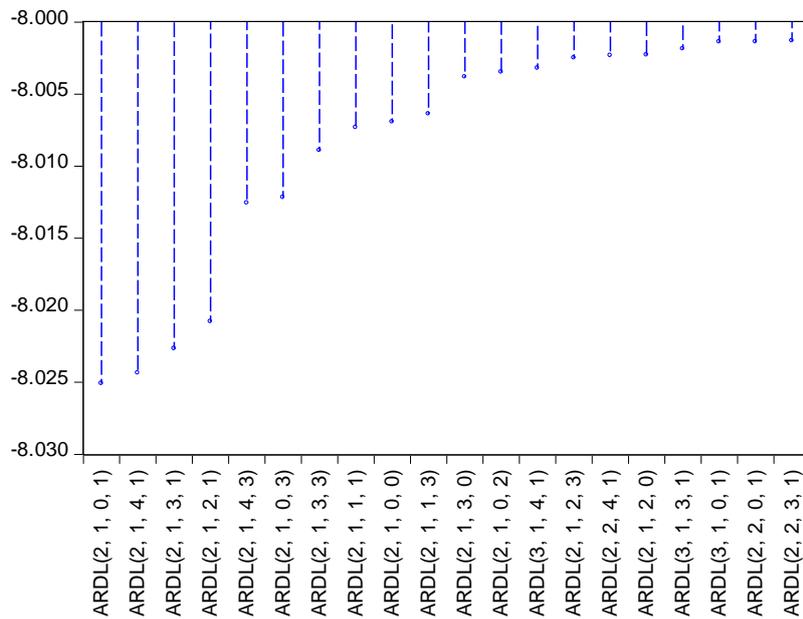
The results of the unit root test confirmed the use of the ARDL and VAR at I(1). The ARDL and VAR models are thus used to examine the long-run relationship between the variables. The ARDL will first be determined in the impact of investment on economic growth and section 5.6 will determine the impact of sectoral investment on employment. This is done to get the robustness of the results from the variables. The first tests are run between investment in finance, secondly between investment in manufacturing and, lastly, between investment in mining and economic growth. Moreover as alluded from the results of the breakpoint unit root test that the study will employ a dummy since there exist structural breaks, the study will in contrast, not add it as the dummy is statistically insignificant implying that the events of the breaks in the years have no impact on the results.

## 5.5.1 Autoregressive distributed lag (ARDL) model

### 5.5.1.1 ARDL lag order criteria

The Akaike lag order criteria (AIC) depicted the maximum order of lags to be used. The lower bound is preferred and the first three are robust in determining the number of lags to use. The results obtained from the preliminary analysis of lag order criteria in Figure 5.2, show that the number of lags to be used by the model is 2,1,0,1.

**Figure 5.2: ARDL model summary**



Source: Authors own compilation data extracted from SARB (2017)

### 5.5.1.2 Residual diagnostic test

To confirm whether the results of the ARDL are reliable, the study conducted a diagnostic test. The results of the diagnostic test indicated in Table 5.5 show the results of the heteroscedasticity indicating a p-value of 0.1616. These results indicate that the null hypothesis of no heteroscedasticity is not rejected, implying that there is homoscedasticity. Table 5.5 further show the p-value of 0.8658 for serial correlation, which is greater than 5 percent level of significance. This implies that the null hypothesis of no serial correlation is not rejected, implying that there is no serial correlation. According to the p-value of Jarque-Bera, the null hypothesis that the variables are normally distributed is not rejected and the alternative that the residuals are not normally distributed is rejected. The CUSUM (Cumulative Sum) and CUSUM of squares test of the recursive residual dynamic stability (Figure 5.3 and 5.4) depicts that the

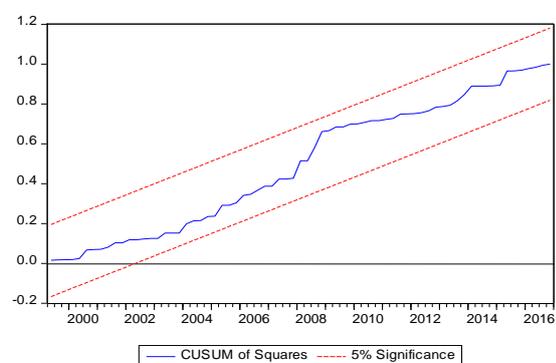
residual line is within the bounds, that is , that is less than 5 percent level of significance, implying that it is stable.

**Table 5.5: Results of the diagnostic tests**

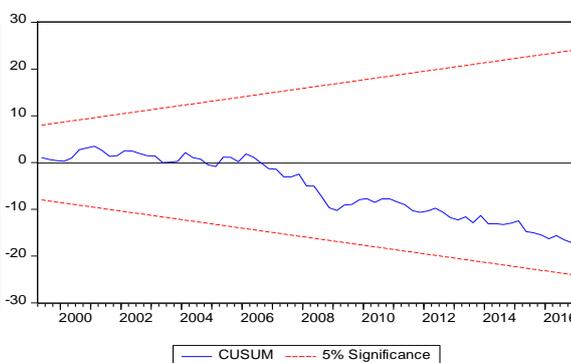
Test statistics	$H_0$	P-value	Decision
Jarque-Bera	Residuals are normally distributed	0.9538	Do not reject $H_0$
LM test	No serial correlation	0.8658	Do not reject $H_0$
White	No Heteroscedasticity	0.1616	Do not reject $H_0$

Source: Authors own compilation data extracted from SARB

**Figure 5.3: CUSUM test**



**Figure 5.4: CUSUM of squares test**



### 5.5.1.3 Long-run relationship of sectoral investment on economic growth

The study made use of the bound test of cointegration to examine the long-run relationship of sectoral investment on economic growth (GDP). To determine the relationship, the study formulated the null hypothesis stating that there is no cointegration and the alternative that there is cointegration between the variables. This means that there exists a long-run relationship between the variables. According to Pesaran *et al.*, (2001), when testing cointegration the F-statistic is compared with the critical values of 1, 5 and 10 percent level of significance. The results of the bound cointegration test as illustrated in Table 5.4 show that the estimated F-value is 6.045 respectively and it is lower than the upper bound critical value of 4.66 at 1 percent level of significance. Thus, the null hypothesis of no cointegration is not rejected. This implies that there is long-run relationship between sectoral investment and economic growth. This further implies that changes in sectoral investment influence changes in economic growth. This can also be the result of an increasing need to enhance the productivity of the country and realising the importance of sectors in South Africa.

The South African government desire to create an inclusive growth through both private and public engagement has increased the capacity of the sectors. Hence, there is a long-run relationship between the variables. The results are further supported by Tsoku *et al.* (2017) who determined the relationship between manufacturing and economic growth, Aryee (2000) and Akabzaa (2009) who established a long-run relationship on the mining sector and Odhiambo (2004), Hassan *et al.*(2011), Ageli and Zaidan (2012) and Fethi and Katicioglu (2015) on the financial sector to economic growth.

**Table 5.6: Results of the bound cointegration test**

Dependent variable	Estimated F-Statistic <b>6.045792</b>		
GDP			
Critical values	Lower bound critical values	Upper bound critical values	Decision
<b>1%</b>	3.65	4.66	Reject
<b>2.5%</b>	3.15	4.08	Reject
<b>5%</b>	2.79	3.67	Reject
<b>10%</b>	2.37	3.2	Reject

*Note: Rejection of the null hypothesis at 3.538*

Source: Authors own compilation data extracted from SARB

$$GDP = 11.355 + 0.215InvMining + 0.412InvManufacturing - 0.322InvFinance \quad (5.1)$$

The results in Equation 5.1 indicate that investment in mining and manufacturing has a positive relationship to economic growth, whereas, investment in finance has a negative relationship. The equation shows that 1 percent increase in investment in mining and manufacturing would lead to 0.215 and 0.412 percent increase in economic growth. In contrast, 1 percent increase in investment in finance will result to 0.322 percent decline in economic growth. The results are in conflict with those of Fethi and Katicioglu (2015) who established that financial sector contributes positively to economic growth. However, the results are significant with the notion of Solow (1956) and King and Levine (1993) who believed that the financial sector had little impact on the economy. Moreover the negative impact of the investment in the financial sector to economic growth is further substantiated by Iheanacho (2016) who examined a negative impact between the financial sector and economic growth.

#### **5.5.1.4 Short-run relationship of sectoral investment to economic growth**

The objective of the study is to determine if there is an existence of long- and short-run relationship between economic growth and investment in sectors. The bound test established

that there is a long-run-relationship between the variables, it is therefore imperative that the study test for a short-run relationship. The ECM is used to test how long it takes the variables to return to equilibrium (Brook, 2014). Henceforth, the ECM determines the adjustment of the system to equilibrium. According to the rule of thumb, the error correction term should be negative and statistically significant. Table 5.7 shows that the coefficient for ECM is 0.027 with a p-value of 0.000 and does not meet the standard requirements as it is positive although significant. This implies that the long-run equilibrium will not regain a steady state; that is, the model does not converge in the long run.

This could be due to instabilities in the model, specification problems or data issues. However, with regards to stability, the model is stable as depicted in Table 5.5 and figure 5.3 and 5.4. The significant ECT confirms the existence of short-run relationship variables in the model. However, in the model, ECT proves otherwise depicting that there is no short-run relationship in the model. The ECT also implies that 2 percent of disturbances in a system are not corrected each quarter. Furthermore, changes in investment in sectors would have taken just about 13.531 ( $\frac{1}{0.0739}$ ) quarters to impact GDP. This means that it would have taken approximately three years for investment in sectors to return to equilibrium had the ECT been negative.

The ECT also depicts that only investment in manufacturing has a positive p-value of 0.0004, which is significant at 1 percent level of significance. This implies that only investment in manufacturing would have had a positive impact on economic growth in the short run. Thus, the results of the ECT suggest that there is no short-run relationship.

**Table 5.7: Short-run relationship and error correction results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>D(LGDP)</b>	0.295339	0.092282	3.200404	0.0020
<b>D(LInvMin)</b>	-0.001862	0.006689	-0.278349	0.7814
<b>D(LInvManu)</b>	0.038797	0.010508	3.691976	0.0004
<b>D(LInvFin)</b>	0.010764	0.013337	0.807115	0.4219
<b>CoIntEq(-1)</b>	0.027328	0.013809	-5.354687	0.0000

Source: Authors own compilation data extracted from SARB

### 5.5.2 Vector autoregression model

The study made use of the VAR model to examine the impact of sectoral investment on economic growth further. Upon establishing that the ARDL model established a long-run relationship between sectoral investment and economic growth with no short-run relationship,

the study thus used VAR to validate the results. The unit root tests confirmed that no variable is stationary at a level, as a result it is appropriate to use VAR. When conducting VAR model it is of great importance that the lag order is established as well as the diagnostic test to confirm the validity and reliability of the model.

### 5.5.2.1 Lag length selection criteria

The lag selection process in the VAR model (Figure 5.8) shows that two (FPE and AIC) out of six lag selection criteria points to the use of two lags. Whereas two (SC and HQ) of the six lag selection criteria points to the use of one lag. In contrast, one of the (LR) six lag selection point to the use of 5 lags. As a result, based on the conflicting suggestion by the lag selection criteria the study run the stability test with the use of the 5 lags suggested by LR and 2 lags suggested by FPE and AIC and lastly 1 lag suggested by SC and HQ. Upon running the stability test with the use of 1, 2 and 5 lags, the study established that the use of one and five lags show instabilities in the model. The suggested two lags by AIC and FPE showed better results as opposed to one and five lags suggested by SC, HQ and LR. Thus, the study made use of two lags which has no instabilities.

**Table 5.8: VAR lag order selection criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
1	704.1631	NA	3.97e-13	-17.20408	-16.72767*	-17.01307*
2	724.3859	36.40101	3.58e-13*	-17.30965*	-16.35684	-16.92764
3	739.5357	25.75466	3.68e-13	-17.28839	-15.85918	-16.71538
4	746.0999	10.50274	4.72e-13	-17.05250	-15.14688	-16.28848
5	771.9513	38.77708*	3.77e-13	-17.29878	-14.91676	-16.34376
6	775.9947	5.660755	5.25e-13	-16.99987	-14.14144	-15.85384
7	793.1243	22.26842	5.35e-13	-17.02811	-13.69327	-15.69108
8	807.8577	17.68011	5.90e-13	-16.99644	-13.18520	-15.46841

Source: Authors own compilation data extracted from SARB

### 5.5.2.2 Residual diagnostic tests

To confirm whether the results of the VAR are reliable, the study conducted the diagnostic test. The study made us of the Lagrange multiplier test to establish if there is presence of serial correlation within the variables. Concurrently, for detecting the presence of homoscedasticity or heteroscedasticity the study performed the White heteroscedasticity test and further tested for normality using the Jarque-Bera test. The results of the diagnostic test as indicated in Table 5.9 show that the model passed the diagnostic test. That means that the null hypothesis of no heteroscedasticity is not rejected. This is because the p-value of 0.15 is greater than the 5

percent level of significance. The study formulated the following hypothesis for the heteroscedasticity test:

$$H_0: \text{No Heteroscedastic}$$

$$H_1: \text{Presence Heteroscedasticity}$$

Moreover, Table 5.6 shows that the p-value of no serial correlation (0.61) is greater than the 5 percent level of significance. As a result, the null hypothesis of no serial correlation is not rejected and the alternative that there is presence of serial correlation is rejected.

$$H_0: \text{No serial correlation}$$

$$H_1: \text{Presence of serial correlation}$$

The model has no presence of heteroscedasticity and serial correlation and the study further tested for normality and determined that the model is normally distributed. That means that the p-value of the Jarque-Bera test is 0.80, greater than the 5 percent level of significance. As a result, the null hypothesis that the residuals are normally distributed is not rejected.

$$H_0: \text{Residuals are normally distributed}$$

$$H_1: \text{Residuals are not normally distributed}$$

**Table 5.9: Results of the diagnostic test**

Test statistics	$H_0$	P-value	Decision
<b>Jarque-Bera</b>	Residuals are normally distributed	0.8050	Do not reject $H_0$
<b>LM Test</b>	No serial correlation	0.6166	Do not reject $H_0$
<b>White</b>	No Heteroscedasticity	0.1531	Do not reject $H_0$

Source: Authors own compilation extracted from SARB

### 5.5.2.3 Long-run relationship of sectoral investment to economic growth

The results of the cointegration in table 5.10 show that the null hypothesis that there is no cointegrating equation ( $r=0$ ) is rejected. The null hypothesis is rejected because the p-value for trace statistic and max-eigenvalue is less than the 5 percent level of significance. Thus, the null

hypothesis that there is at least one cointegrating equation is not rejected. This implies that there is a long-run relationship between sectoral investment and economic growth (GDP).

**Table 5.10: Johansen cointegration results**

		Trace			Maximum Eigenvalue		
$H_0$	$H_1$	Trace statistic	t-critical value	P-value	Max-Eigen Statistic	t-critical value	P-value
$r=0$	$r>0$	61.03853	61.03853	0.0018*	34.46355	27.58434	0.0056*
$r\leq 1$	$r>1$	26.57498	29.79707	0.1125	16.51348	21.13162	0.1963
$r\leq 2$	$r>2$	10.06150	15.49471	0.2760	6.794026	14.26460	0.5138
$r\leq 3$	$r>3$	3.267477	3.841466	0.0707	3.267477	3.841466	0.0707

\*denotes the rejection of the null hypothesis at 5% significance levels and the rank of cointegration is denoted by “r”

Source: Authors own compilation data extracted from SARB

The long-run cointegrating equation is as follows:

$$LGDP_{t-1} = -10.016 + 0.112LInvMin - 0.945InvManu + 0.410InvFin \quad (5.2)$$

[2.50103]
[-7.32282]
[4.22143]

The equation of the long-run relationship above show that all the variable t-statistics are greater than the critical t-value of two. The equation shows that in the long run, investment in manufacturing and finance has a significant impact on economic growth. Whereas, investment in manufacturing has a negative impact on economic growth. If investment in mining and finance increases by 1 percent then real economic growth will increase by 0.112 and 0.41 percent respectively; whereas one percent increase in investment in manufacturing will lead to 0.945 percent decline in real economic growth in the long-run. The results of this study are consistent with those of Ademola (2012), Aryee (2001), and Hassin and Yoke Yik (2012) who examined the economic sectors’ impact on economic growth.

#### 5.5.2.4 Short-run relationship

The study made use of the VECM, which enables the determination of a short-run relationship amongst variables. The VEC also allows the study to identify the adjustment to equilibrium. Based on the results of the VECM in Table 5.11, economic growth has a negative coefficient and t-statistic that is less than the critical t-value of two. This implies that economic growth does not change to long-run equilibrium, that is, it does not adjust to equilibrium in the long run. Thus, the economic growth equation cannot be used to analyse the short-run relationship. The coefficient of -0.001520 implies that about 0.152 percent of deviation from equilibrium is not restored to equilibrium in each quarter.

Nonetheless, the short-run coefficients for economic growth are positive, implying that the past changes in economic growth have a positive effect on the current economic growth. Similarly, the coefficient of investment in mining (with both lag 1 and 2) is negative, implying that the previous changes in investment in the mining sector have a negative effect on the current economic growth. However, the t-statistic for investment in mining, manufacturing and finance has small t-statistic. As a result, the model has no short-run relationship between investment in sectors and economic growth.

**Table 5.11: Vector error correction estimates**

<b>Error Correction:</b>	<b>D(LGDP)</b>	<b>D(LINVMINING)</b>	<b>D(LINVMANUFACTURING)</b>	<b>D(LINVFINANCE)</b>
<b>CointEq1</b>	-0.001520 (0.01126) [-0.13499]	-0.040032 (0.16557) [-0.24177]	0.259452 (0.10591) [ 2.44972]	-0.338118 (0.08669) [-3.90048]
<b>D(LGDP(-1))</b>	0.507636 (0.13246) [ 3.83230]	0.410314 (1.94826) [ 0.21060]	2.679601 (1.24621) [ 2.15020]	0.236893 (1.02000) [ 0.23225]
<b>D(LGDP(-2))</b>	0.294278 (0.13517) [ 2.17717]	-0.770983 (1.98802) [-0.38782]	2.049591 (1.27164) [ 1.61177]	3.565883 (1.04082) [ 3.42604]
<b>D(LINVMINING(-1))</b>	-0.007766 (0.00758) [-1.02456]	0.069913 (0.11148) [ 0.62711]	0.036331 (0.07131) [ 0.50947]	0.003659 (0.05837) [ 0.06269]
<b>D(LINVMINING(-2))</b>	-0.012984 (0.00739) [-1.75802]	0.099501 (0.10863) [ 0.91595]	-0.024151 (0.06949) [-0.34757]	-0.084634 (0.05687) [-1.48812]
<b>D(LINVMANUFACTURING(-1))</b>	-0.011014 (0.01471) [-0.74890]	0.263076 (0.21632) [ 1.21615]	0.091909 (0.13837) [ 0.66423]	-0.043123 (0.11325) [-0.38077]
<b>D(LINVMANUFACTURING(-2))</b>	-0.012720 (0.01469) [-0.86575]	-0.093258 (0.21609) [-0.43157]	0.028377 (0.13822) [ 0.20530]	-0.342987 (0.11313) [-3.03172]
<b>D(LINVFINANCE(-1))</b>	0.008063 (0.01443) [ 0.55883]	0.352342 (0.21222) [ 1.66029]	0.006813 (0.13575) [ 0.05019]	-0.091093 (0.11111) [-0.81988]
<b>D(LINVFINANCE(-2))</b>	-0.023446 (0.01473) [-1.59137]	0.520082 (0.21670) [ 2.40003]	-0.077949 (0.13861) [-0.56236]	-0.151401 (0.11345) [-1.33450]
<b>C</b>	0.002761 (0.00098) [ 2.81132]	0.005912 (0.01445) [ 0.40925]	-0.015981 (0.00924) [-1.72946]	0.008707 (0.00756) [ 1.15127]

Notes: () Standard error, [] T-statistic

Source: Authors own compilation data extracted from SARB

### 5.5.2.5 Granger causality

The Granger causality test is used to determine if one variable is useful in forecasting another variable (Granger, 1969). The pairwise Granger causality results in Table 5.12 show that investment in the manufacturing and financial sector Granger causes employment. As a result, the null hypothesis for no causal relationship from investment in finance and manufacturing to employment is rejected. Moreover, there is bidirectional relationship between investments in the mining sector to economic growth and investment in finance to economic growth. However, there is a unidirectional relationship between investment in the manufacturing sector and economic growth. This means that investment in the manufacturing sector Granger cause economic growth but economic growth does not Granger cause investment in the manufacturing sector.

**Table 5.12: Pairwise Granger causality test results**

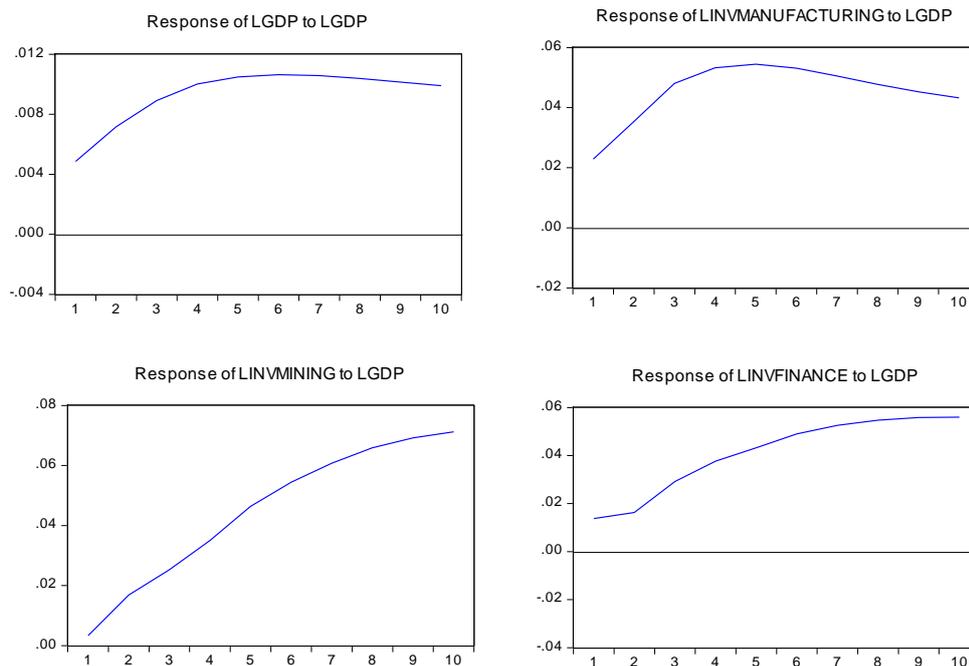
<b>Null Hypothesis:</b>	<b>F-Statistic</b>	<b>Prob.</b>	<b>Decision</b>
LINVMINING does not Granger Cause LGDP	3.04990	0.0528	Reject
LGDP does not Granger Cause LINVMINING	6.26740	0.0029	Reject
LINVMANUFACTURING does not Granger Cause LGDP	0.96594	0.3850	Accept
LGDP does not Granger Cause LINVMANUFACTURING	10.9602	6.E-05	Reject
LINVFINANCE does not Granger Cause LGDP	0.02221	0.9780	Reject
LGDP does not Granger Cause LINVFINANCE	2.75087	0.0698	Reject

Source: Authors own compilation data extracted from SARB

### 5.5.2.6 Impulse response function and variance decomposition

The variance decomposition assesses the movements in the shocks of itself and another variable. The impulse response function depicts the response of economic growth to investment variables over a period of 10 months. Figure 5.5 shows that the shocks to economic growth are positive throughout the year. The shock to economic growth increases from the first quarter rapidly until the third quarter where it became stagnant. Investment variables displayed a positive shock throughout the 10 quarters. The shock to economic growth by investment in manufacturing displayed an upward trend up to the fourth quarter where it became stagnant throughout to the last quarter. Moreover, the shocks to employment by investment in mining and finance began with an upward trend of positive shocks from the first quarter up to the last quarter. The result of the impulse response shows that the investment components persisted to positive shock throughout the year.

**Figure 5.5: Results of the impulse response function**



Source: Authors own compilation data extracted from SARB

Table 5.13 shows that in quarter three, the variance contribution of economic growth to itself is 96.81 percent of its own shocks, whereas in the long run, that is the last quarter economic growth account for 84.58 percent of its own shocks. The variance contribution rate of investment in finance, manufacturing and mining to economic growth in the short term are 0.26, 0.90 and 2.02 percent of making. In the short run, the variance contribution of investment in mining is the highest followed by investment in manufacturing with only 0.90 percent. This means that the shocks in investment in mining in the short run to economic growth are greater relative to other investment components. Furthermore, the results show that the variance contribution of investment in the economic sector in the short run is remarkably low. In the long run the variance contribution of economic growth to itself is 83.58 percent of its own shocks, making it lower than in the short run. Remarkable, investment in mining proves to have a greater effect as its variance contribution to economic growth is the highest again with 8.09 percent. Investment in finance proves to be the lowest again in the long run as it was in the short run, its shocks to employment is only 5.61 percent to the fluctuations to employment.

**Table 5.13: Variance decomposition of economic growth**

Period	S.E.	LGDP	LINVMINING	LINVMANUFACTURING	LINVFİNANCE
1	0.004852	100.0000	0.000000	0.000000	0.000000
2	0.008679	99.39298	0.412160	0.116206	0.078651
3	0.012626	96.81204	2.020155	0.905119	0.262690
4	0.016488	93.71235	3.580376	2.050491	0.656779
5	0.020025	90.97695	5.007003	2.813769	1.202283
6	0.023214	88.68410	6.102455	3.499428	1.714020
7	0.026043	86.93622	6.883963	4.073842	2.105971
8	0.028548	85.57306	7.433087	4.608583	2.385274
9	0.030780	84.48155	7.818748	5.126042	2.573656
10	0.032787	83.58351	8.097599	5.619172	2.699715

Source: Authors own compilation data extracted from SARB

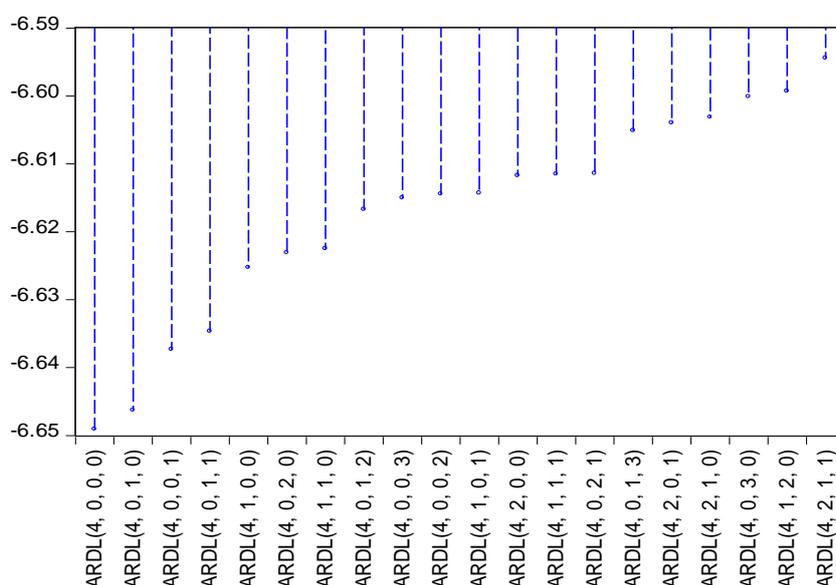
## 5.6 THE IMPACT OF SECTORAL INVESTMENT ON EMPLOYMENT

### 5.6.1 Autoregressive distribution lag

#### 5.6.1.1 ARDL lag order criteria

The number of lags used in the study was determined using the Akaike information criteria (AIC) and the best model selected is (4, 0, 0, 0).

**Figure 5.6: ARDL model summary**



Source: Authors own compilation data extracted from SARB

### 5.6.1.2 Residual diagnostic test

It is important to determine the stability of the results first before further estimating the ARDL. As a result, the study utilised the Jarque-Bera, autocorrelation, heteroscedasticity and the cumulative sum test to check for the stability of the data. The summary of the stability test results in Table 5.14 shows that ARDL model can be estimated further without worry as the model passed the stability test. The table shows that the model has no heteroscedasticity as the p-value is greater than 5 percent level of significance, proving homoscedasticity. Moreover, Table 5.14 shows that the p-value for Jarque-Bera and serial correlation are greater than 5 percent level of significance. Therefore, the null hypothesis of normality, homoscedasticity and no serial correlation was not rejected. The cumulative sum of recursive residuals and the cumulative sum of squared recursive residuals in figure 5.7 and 5.8 show that the model is within the 5 percent level of significance, confirming stability. As a result, the study can continue without doubt to test for the long-run relationship.

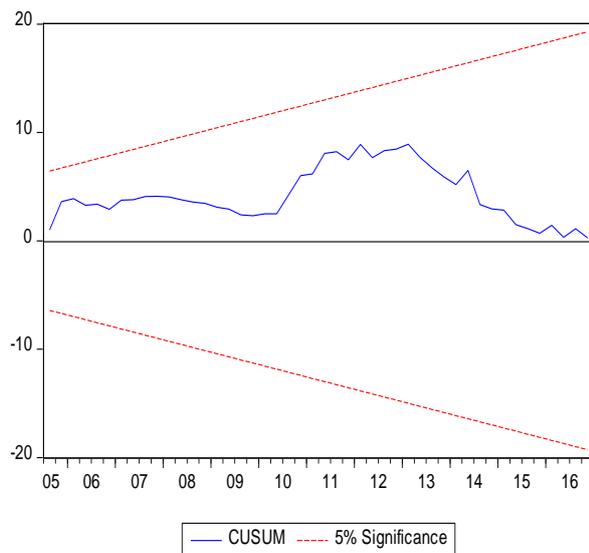
**Table 5.14: Results of diagnostics**

Test Statistics	$H_0$	P-value	Decision
<b>Jarque-Bera</b>	Residuals are normally distributed	12.16493	Do not reject $H_0$
<b>L M test</b>	No serial correlation	0.8442	Do not reject $H_0$
<b>White</b>	No Heteroscedasticity	0.2104	Do not reject $H_0$

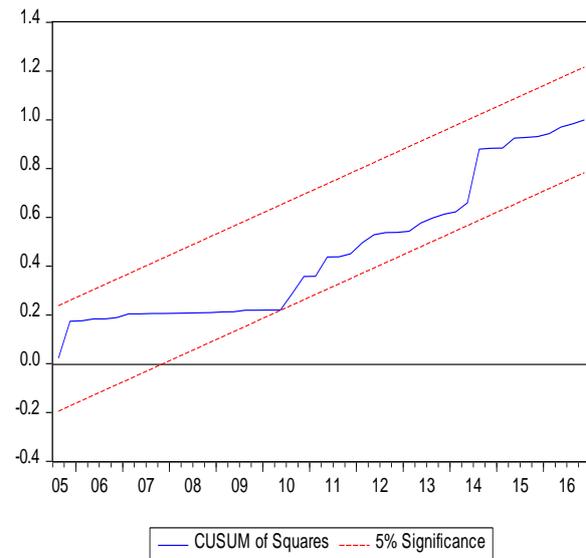
*Note: Rejection of null hypothesis at 5 percent*

Source: Authors own compilation data extracted from SARB

**Figure 5.7: CUSUM test results**



**Figure 5.8: Cumulative sum of square of recursive**



### 5.6.1.3 Long-run relationship of sectoral investment on employment

The bound test for cointegration was used upon determining the order of integration using the unit root test. The bound test was used to determine the long-run relationship among the variables. As stipulated in Chapter 4 the null hypothesis for cointegration states that there is no cointegration against the alternative hypothesis that there exists cointegration. The result of the bound test was obtained by comparing the critical values with the estimated F statistic of 5.491179. The null hypothesis is rejected when the F-statistic is greater than the critical values of the upper bound as well as those of the lower bound. The results in Table 5.15 of the bound test show that the F-statistic is greater than the critical values of the upper bound and as a result the null hypothesis of no cointegration is rejected. The estimated F-value of 5.491179 is greater than the 5 percent level of significance of the upper bound. This suggests that there exists a long-run relationship between sectoral investment and employment in South Africa.

**Table 5.15: Bound test**

Dependent variable	Employment	Estimated F-Statistic	5.491179
<b>Critical values</b>	<b>Lower bound critical values</b>	<b>Upper bound critical values</b>	<b>Decision</b>
<b>1%</b>	4.3%	5.61%	Accept
<b>2.5%</b>	3.8%	4.89%	Reject
<b>5%</b>	3.38%	4.35%	Reject
<b>10%</b>	2.97%	3.77%	Reject

Note: Rejection of the null hypothesis at 5.49

Source: Authors own compilation data extracted from SARB

$$\text{Employment} = 0.0951 + 0.7666 \text{ LInvManu} - 0.2624 \text{ LInvMin} - 0.2030 \text{ LInvFin}$$

According to the results of the long-run relationship investment in manufacturing has a positive impact on employment. This means that 1 percent increase on investment in manufacturing will result to 0.7666 percent increase in employment rate. In contrast, investment in mining and finance shows a negative impact on employment as their coefficients of -0.2645 and -0.2030 are negative. This means that a 1 percent increase in investment in mining and finance will result to 0.2645 percent and 0.2030 percent decline in employment rate.

However, the variables have p-values that are greater than the 5 percent level of significance with an exception of investment in manufacturing which has a p-value less (0.06) than 10 percent level of significance. This implies that investment in finance and mining has no significant impact on employment, whereas, investment in manufacturing has a significant impact. This implies that investment in manufacturing positively impacts employment. It is however not surprising to establish that investment in manufacturing has positive impact on employment since the sector is labour absorptive and manufactures products and services, which other sectors require. Manufacturing sector can enhance the demand for services thus the financial sector. The promotion of the domestic production such as the vehicle production enables the creation of employment and inclusive growth.

The negative contribution of the financial sector is despite the structural shifts the country is experiencing. Countries are moving towards the tertiary sector; a more service inclined economy. In contrast to the findings of negative contribution of finance sector to employment, Mkhize (2015) established that finance sector has a positive impact on employment. It is however surprising to establish that the mining as well as the finance sector in particular have no significant impact on the employment rate. However, the mining sector is largely capital

intensive, this negative impact of the sector to employment also account for increasing use of technology and changes in productivity. With a high rate of low skilled labour it becomes difficult for the sector to absorb labour which will make use of the improved use of technology. The financial sector has been the largest growing sector over the years and absorbs the majority of the skilled labour. In contrast, the South African population has a low level of skilled labour; hence, such a low impact or rather no impact. Despite the negative impact established by the study on the mining and finance sector to employment, studies of Galeotti and Checchi (1993), Hajkowicz *et al.* (2011) and Muzindutsi and Maepa (2014) established a long-run relationship between investment in the manufacturing sector and employment. This findings by the aforementioned researchers confirms the positive impact the study found on manufacturing sector to employment. However, Mkhize (2015) argued that although manufacturing sector has a significant impact of employment, its contribution is low due to the sectors capital intensity.

#### **5.6.1.4 Short-run relationship of sectoral investment to employment**

The objective of the study is to determine if there is an existence of long- and short-run relationship between employment and investment in sectors. The bound test established that there is a long-run relationship between the variables, it therefore is imperative that the study test for a short-run relationship. The ECM is used to test how long it takes the variables to return to equilibrium (Brook, 2014). Hence, the ECM determines the adjustment of the system to equilibrium. According to the rule of thumb, the error correction term should be negative and statistically significant. Table 5.16 shows that the coefficient for ECM is -0.0739 with p-value of 0.000 and meets the standard requirements, as it is negative and significant. This implies that the long-run equilibrium will regain a steady state. The significant ECT confirms the existence of long-run relationship between investment in manufacturing, mining and finance and employment in the model. The ECT also implies that 7 percent of disturbances in a system are corrected each quarter. Furthermore, changes in investment in sectors take just about  $13.531 \left( \frac{1}{0.075618} \right)$  quarters to impact employment.

Moreover, Table 5.16 also demonstrates that investment in mining and finance has a negative impact on employment in the short run. This implies that investment in mining and finance does not create employment in the short run because they have p-values that are greater than 5 percent significance level. The global financial crises had a detrimental impact on the economy of South Africa, which replicated over the years. The global financial crises among other factors that contributed to the negative impact of these sectors such as labour disputes and

political upheavals to employment creation has resulted in sectors such as mining to reduce its capital investment. South Africa's infrastructural challenge has also resulted in the decline in the sector, forcing the sector to shutdown mine shafts (Baxter, 2012).

In contrast, employment in the manufacturing sector has a positive coefficient and a p-value less than 5 percent significance level. This implies that investment in manufacturing creates employment in the short run. This is as expected due to programmes such as the expanded public works programme that are aimed at creating short-term jobs for South Africans.

**Table 5.16: Short-run relationship and the error correction model**

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>D(LEmployment)</b>	-0.047778	0.098418	-0.485462	0.6287
<b>D(LEmployment)</b>	-0.252707	0.096499	-2.618757	0.0106
<b>D(LEmployment)</b>	-0.414486	0.101244	-4.0932930	0.0001*
<b>D(LInvMin)</b>	-0.002998	0.011633	-0.257704	0.7973
<b>D(LInvManu)</b>	0.061322	0.018916	3.241747	0.0018*
<b>D(LInvFin)</b>	-0.039762	0.022466	-1.769843	0.0808
<b>CointEq(-1)</b>	-0.075618	0.013703	-5.518341	0.0000

Note: \* rejection of the null hypothesis at 1% level of significance

Source: Author's own compilation data extracted from SARB

### **5.6.2 Vector autoregression model**

The study made use of the VAR model to examine the impact of sectoral investment on employment further. Upon establishing that the ARDL model established a long-run relationship between sectoral investment and employment, the study thus uses VAR to validate the results. The unit root tests confirmed that no variable is stationary at a level; as a result, it is appropriate to use VAR. When conducting VAR model, it is of great importance that the lag order is established as well as the diagnostic test to establish the validity and reliability of the model.

### 5.6.2.1 Lag length selection criteria

The ADF and PP unit root test established that all variables are I(1), the next step is to check the number of lags that will be used for Granger causality, cointegration test and the vector error correction model. The lag order selection criteria shown in Table 5.17 are unanimous. FPE, AIC, SC and HQ recommended the use of one order. Whereas, LR recommended five lags order criteria. However, the use of the suggested lags were not chosen after determining that with one/five lag the model is unstable. As a result, the study made use of two lags as it gave favourable results (passed stability tests).

**Table 5.17: VAR lag order selection criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
1	643.0848	NA	1.83e-12*	-15.67712*	-15.20071*	-15.48611*
2	652.6025	17.13196	2.15e-12	-15.51506	-14.56225	-15.13305
3	666.2683	23.23183	2.30e-12	-15.45671	-14.02749	-14.88369
4	681.8067	24.86137	2.35e-12	-15.44517	-13.53955	-14.68115
5	700.1449	27.50730*	2.27e-12	-15.50362	-13.12159	-14.54860
6	713.3248	18.45190	2.52e-12	-15.43312	-12.57469	-14.28709
7	728.9872	20.36116	2.66e-12	-15.42468	-12.08984	-14.08765
8	736.5129	9.030817	3.51e-12	-15.21282	-11.40158	-13.68479

\*indicates lag order selected by the crit 1 indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author's own compilation data extracted from SARB

### 5.6.2.2 Residual diagnostic test

To confirm whether the results of the VAR are reliable, the study conducted the diagnostic test. The study is made up of the Lagrange multiplier test to establish if there is a presence of serial correlation within the variables. Concurrently, for detecting the presence of homoscedasticity or heteroscedasticity the study performed the White heteroscedasticity test and further tested for normality using the Jarque-Bera test. The results of the diagnostic test, as indicated in Table 5.18, show that the model passed the diagnostic test. That means that the null hypothesis that the model has no heteroscedasticity is not rejected. This is because the p-value for of 0.26 is greater than the 5 percent level of significance. The study formulated the following hypothesis for the heteroscedasticity test:

$H_0$ : No Heteroscedastic

$H_1$ : Presence of Heteroscedasticity

Moreover, the bale shows that the p-value of autocorrelation is 0.195 and is greater than the 5 percent level of significance. As a result, the null hypothesis of no serial correlation is not rejected and the alternative that there is presence of serial correlation is rejected.

$H_0$ : No serial correlation

$H_1$ : Presence of serial correlation

Upon establishing that the model has no presence of heteroscedasticity and serial correlation, the study further tested for normality and determined that the model is normally distributed. That means that the p-value of the Jarque-Bera test is greater than the 5 percent level of significance. As a result, the null hypothesis that the residuals are normally distributed is not rejected.

$H_0$ : Residuals are normally distributed

$H_1$ : Residuals are not normally distributed

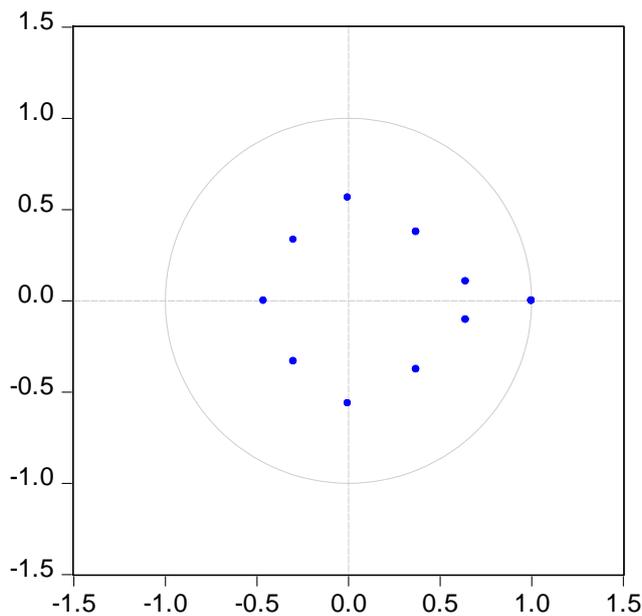
**Table 5.18: Results of the diagnostic tests**

Test Statistics	$H_0$	P-value	Decision
<b>L M Test</b>	No serial correlation	0.1954	Do not reject $H_0$
<b>White</b>	No Heteroscedasticity	0.2696	Do not reject $H_0$
<b>Jarque-Bera</b>	Residuals are normally distributed	0.7988	Do not reject $H_0$

Source: Author's own compilation data extracted from SARB

Lastly, the study performed the roots of characteristic polynomial and similarly established that the model meets the stability properties of a good model. The results of the inverse of AR characteristic polynomial show that the polynomial falls within the unit circle, confirming stability.

**Figure 5.9: Inverse roots of AR characteristic polynomial**



Source: Author’s own compilation data extracted from SARB

### 5.6.2.3 Long-run relationship of sectoral investment to employment

The results of the cointegration in Table 5.19 show that the null hypothesis that there is no cointegrating equation ( $r=0$ ) is rejected. The null hypothesis is rejected because the p-value for trace statistic and max-eigenvalue are less than the 5 percent level of significance. Thus, the null hypothesis that there is at least one cointegrating equation is not rejected. This implies that there is a long-run relationship between sectoral investment and employment.

**Table 5.19: Johansen cointegration results**

$H_0$	$H_1$	Trace			Maximum Eigenvalue		
		Trace statistic	t-critical value	P-value	Max-Eigen Statistic	t-critical value	P-value
$r=0$	$r>0$	57.15255	47.85613	0.0053*	36.99129	27.58434	0.0023*
$r\leq 1$	$r>1$	20.16126	29.79707	0.4120	9.593622	21.13162	0.7818
$r\leq 2$	$r>2$	10.56764	15.49471	0.2396	5.639456	14.26460	0.6598
$r\leq 3$	$r>3$	4.928179	3.841466	0.0264*	4.928179	3.841466	0.0264*

\*Denotes the rejection of the null hypothesis at 5% significance levels and the rank of cointegration is denoted by “r”

Source: Author’s own compilation data extracted from SARB

The long-run results equation below was extracted from the VECM:



### 5.6.2.4 Short-run relationship of sectoral investment to employment

The vector error correction model enables the determination of the short-run relationship.

**Table 5.20: Error corrections from the VECM results**

Error Correction:	D(LEMPLOYMENT)	D(LINVMINING)	D(LINVMANUFACTURING)	D(LINVFINANCE)
<b>CointEq1</b>	-0.009955	-0.020010	0.089756	-0.224556
	(0.01247)	(0.09299)	(0.06434)	(0.04936)
	[-0.79856]	[-0.21520]	[ 1.39496]	[-4.54892]
D(LEMPLOYMENT(-1))	0.126806	0.012119	0.951717	0.271339
	(0.11357)	(0.84712)	(0.58618)	(0.44972)
	[ 1.11650]	[ 0.01431]	[ 1.62360]	[ 0.60335]
D(LEMPLOYMENT(-2))	-0.217031	-0.047841	0.867654	0.480500
	(0.11419)	(0.85170)	(0.58934)	(0.45215)
	[-1.90065]	[-0.05617]	[ 1.47224]	[ 1.06270]
D(LINVMINING(-1))	-0.002785	0.071257	0.044751	0.053877
	(0.01517)	(0.11318)	(0.07831)	(0.06008)
	[-0.18356]	[ 0.62962]	[ 0.57144]	[ 0.89671]
D(LINVMINING(-2))	-0.003011	0.095252	-0.072962	-0.039963
	(0.01400)	(0.10446)	(0.07228)	(0.05545)
	[-0.21498]	[ 0.91188]	[-1.00945]	[-0.72065]
D(LINVMANUFACTURING(-1))	0.030935	0.261559	0.219457	-0.004771
	(0.02575)	(0.19209)	(0.13292)	(0.10198)
	[ 1.20116]	[ 1.36164]	[ 1.65105]	[-0.04678]
D(LINVMANUFACTURING(-2))	0.001524	-0.126061	0.032282	-0.218410
	(0.02624)	(0.19573)	(0.13544)	(0.10391)
	[ 0.05807]	[-0.64405]	[ 0.23835]	[-2.10191]
D(LINVFINANCE(-1))	-0.006472	0.359969	0.113340	-0.138691
	(0.02804)	(0.20911)	(0.14469)	(0.11101)
	[-0.23085]	[ 1.72145]	[ 0.78330]	[-1.24934]
D(LINVFINANCE(-2))	0.038364	0.499072	0.069894	-0.106749
	(0.02913)	(0.21725)	(0.15033)	(0.11534)
	[ 1.31712]	[ 2.29719]	[ 0.46493]	[-0.92555]
<b>C</b>	0.000410	0.004436	0.008037	0.028465
	(0.00150)	(0.01119)	(0.00775)	(0.00594)
	[ 0.27333]	[ 0.39631]	[ 1.03759]	[ 4.79000]

Notes: () Standard Error,  
[] T-statistic

Source: Author's own compilation data extracted from SARB

The results of the short-run vector error correction model in table 5.20 linked with the long-run relationship interpreted as the speed of adjustment to the long-run equilibrium show that the coefficients of employment is significant but its t-statistic is insignificant. This implies that employment does not change to long-run equilibrium. However, the employment equation is used to analyse the short-run relationship. The coefficient of -0.009955 implies that approximately 0.99 percent of deviation from equilibrium is not restored within each quarter. That is, the current rate of employment is not because of the results of the previous quarter's growth.

The T-statistic of investment in mining and manufacturing and finance sectors are less than the critical value of two (t-value < 1.96). Nonetheless, the coefficient of investment in mining manufacturing and finance is statistically significant. Thus, no short-run relationship is observed from the equation.

#### 5.6.2.5 Granger causality

Granger causality test is used to determine if one variable is useful in forecasting another variable (Granger, 1969). The pairwise Granger causality results in Table 5.21 show that investment in the manufacturing and financial sector Granger cause employment. As a result, the null hypothesis for no causal relationship from investment in finance and manufacturing to employment is rejected. However, there is unidirectional relationship between investment in finance and manufacturing to employment. This means that in the short-run, investment in finance and manufacturing thus impacts employment.

**Table 5.21: Pairwise Granger causality test results**

<i>Null hypothesis:</i>	<i>F-Statistic</i>	<i>Prob.</i>	<i>Decision</i>
LINVMINING does not Granger cause LEMPLOYMENT	0.70265	0.4983	Accepted
LEMPLOYMENT does not Granger cause LINVMINING	2.33158	0.1036	Accepted
LINVMANUFACTURING does not Granger cause LEMPLOYMENT	4.15786	0.0191	Rejected
LEMPLOYMENT does not Granger cause LINVMANUFACTURING	1.88688	0.1581	Accepted
LINVFINANCE does not Granger cause LEMPLOYMENT	2.88357	0.0617	Rejected
LEMPLOYMENT does not Granger cause LINVFINANCE	2.02094	0.1392	Accepted

Source: Author's own compilation data extracted from SARB

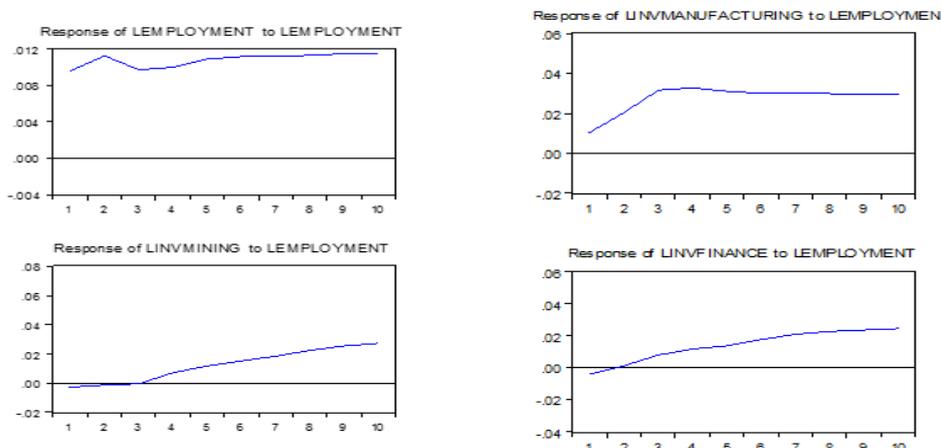
#### 5.6.2.6 Impulse response function and variance decomposition

The variance decomposition assesses the movements in the shocks of itself and another variable. The impulse response function depicts the response of employment to investment

variables over a period of 10 months. Figure 5.10 shows that the shocks to employment are positive throughout the year, however, on the third quarter they decline and pick up in the fourth quarter up to the last quarter. Among the investment variables, investment in manufacturing displayed a positive shock throughout the 10 quarters. The shock to employment by investment in manufacturing displayed an upward trend up to the third quarter where it became stagnant throughout to the last quarter. Moreover, the shocks to employment by investment in mining and finance began with a negative shock in the first quarter and rose up to a positive shock from the third quarter up to the last quarter. The result of the impulse response shows that the investment components persisted to positive shock after the third quarter.

The findings of the impulse response thus suggest that movement in the employment have a significant effect on each other and that investment components have an effect on employment. Thus, the findings are in conflict with the results of the VECM and granger causality, suggesting that investment components have no significant relationship to employment in the short-run.

**Figure 5.10: Results of the impulse response function**



Source: Author's own compilation data extracted from SARB

The variance decomposition is used to detect by how much each variable contributes to the other. Brooks (2002:342) asserts that variance decomposition is used to determine how much the dependent variable reacts to its own shocks and to shocks of other variables. The results of the variance decomposition are reported in Table 5.22.

**Table 5.22: Variance decomposition of employment**

Period	S.E.	LEMPLOYMENT	LINVMINING	LINVMANUFACTURING	LINVFINANCE
<b>1</b>	0.009577	100.0000	0.000000	0.000000	0.000000
<b>2</b>	0.014918	98.03205	0.147930	1.723986	0.096037
<b>3</b>	0.018202	94.28267	0.467585	4.967869	0.281881
<b>4</b>	0.021252	91.17775	0.807915	7.702623	0.311714
<b>5</b>	0.024311	89.66778	1.151990	8.936401	0.243834
<b>6</b>	0.027233	88.25794	1.505494	10.04102	0.195548
<b>7</b>	0.029944	86.84252	1.794456	11.19974	0.163279
<b>8</b>	0.032516	85.68045	2.028248	12.15210	0.139208
<b>9</b>	0.034977	84.77829	2.220175	12.88099	0.120552
<b>10</b>	0.037314	84.03811	2.379994	13.47581	0.106087

Source: Author's own compilation data extracted from SARB

The results show that in the first month all variance in employment is explained by its own shocks. In the third month, employment explains approximately 94 percent of its own shock while investment in mining and finance are explained by less than 1 percent and investment in manufacturing about 4 percent. The contribution of investment variables to the shock in the total employment increases gradually over the period; from the 1<sup>st</sup> period to the 10<sup>th</sup> period. However, the increase in investment in finance is significantly low below 1 percent and continues to declines over the period. The results of the variance composition suggest that investment in manufacturing and mining affects employment. However, the variance percentage of investment in mining to employment is significantly low. This points out that there might to be a vast contribution of investment in mining to employment in the short run.

## 5.7 SUMMARY AND CONCLUSION

In examining the impact of sectoral investment on economic growth, Chapter 5 used ARDL and VAR to establish the impact. The results of the ARDL were compared with those of the VAR model. The study thus estimated cointegration between dependent and independent variables using ARDL and Johansen cointegration for the VAR model. Furthermore, the study made use of the ECT to establish the short-run relationship for ARDL and VECT for VAR. The Granger causality test and diagnostic test were also used to further achieve the objective of the chapter. The diagnostic test assisted in ensuring that the model is stable and reliable for basing a conclusion on it. The chapter's main focus was on answering the following questions:

Is there a relationship between sectoral investment and economic growth?

Is there a relationship between sectoral investments and employment?

When looking at the results of the ARDL in comparison with that of VAR, the two models are not in support of each other as the ARDL revealed that there exists a short-run relationship between investment in sectors and economic growth, whereas, the VAR model shows no relationship between investment in sectors and economic growth as well as employment. However, the two models agree that there is a significant relationship between investment in sectors and economic growth and employment. In the long run, both models show that investment in the mining sector has a positive impact on the economic growth. As depicted in Table 5.23, both models are in consensus that investment in the manufacturing sector has a positive impact, whereas for other variables they are in conflict. As a result, the study thus concludes a positive relationship between investment in sectors and economic growth and employment.

**Table 5.23: Summary of the long-run relationship**

<b>Economic growth</b>		
<i>Variables</i>	<i>ARDL</i>	<i>VAR</i>
<b>LInvMin</b>	+	+
<b>LInvManu</b>	+	-
<b>LInvFin</b>	-	+
<b>Employment</b>		
<i>Variables</i>	<i>ARDL</i>	<i>VAR</i>
<b>LInvMin</b>	-	+
<b>LInvManu</b>	+	+
<b>LInvFin</b>	-	+

Source: Author's own compilation data extracted from SARB

Despite the positive impact that investment in sectors has on economic growth and employment, in the long run, the sectors have no significant impact on economic growth and employment in the short run. This implies that investment in sectors is only significant in the long run and does not yield result in the short run. This is understandable as investment in fixed assets takes time to yield positive outcomes. Upon establishing that there is a significant relationship between sectoral investment and economic growth and employment, the study provides the limitations of the study and the summary of all the other chapters in the study in Chapter 6.

## CHAPTER 6

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

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#### 6.1 INTRODUCTION

Growth and development are of colossal importance and the first priority of many countries. The South African government has taken measures in ensuring that it achieves high growth rates and curbs unemployment rates. To eradicate unemployment and enhance growth, the country has resorted to boosting the performance of sectors. Investment is essential in enhancing the production of economic sectors. The economic contribution of sectors and labour absorption is crucial in ensuring economic sustainability in South Africa. The South Africa government introduced strategies and policies that are aimed at enhancing the capabilities of the sectors. The investment forms a crucial part of an element that results in an increase in sectors performance.

The study examined the impact of sectoral investment on economic growth and employment in South Africa from 1995 to 2016. The aim of the study was to evaluate the general impact of the mining, manufacturing and finance sector investment on economic growth and employment and to determine whether the sectoral investment is a key determinant of South Africa's economic and employment growth. These primary objectives assisted in determining the long- and short-run relationship of sectoral investment on economic growth and employment. The study made a comparison between the ARDL and VAR models to determine the long and short-run relationship between the variables. This chapter aims at providing a summary of the study, achievements of objectives and recommendations based on the major findings in Chapter 5.

#### 6.2 SUMMARY OF THE STUDY

The study comprised of different sections, which were aimed at achieving different objectives. The summary of the study thus comprises of simplified findings of chapter 1 to 5. Chapter 1 was responsible for providing the reader with the background of the study and introducing the study. Chapter 2 was responsible for providing empirical as well and theoretical literature; Chapter 4 explained the methodology used in the study and Chapter 5 represented the empirical findings of the study. As a result, this section gives the summary of all the chapters mentioned, where Chapter 1 to 3 are summarised in one section and chapters 4 to 5 in the other.

### **6.2.1 Summary of background, theoretical and empirical review of the study**

The study commenced with Chapter 1, which was aimed at introducing the study, identifying the objectives of the study, research gap, problem statement, and the research design of the study. The introduction presented the concept of investment in sectors in South Africa, economic growth and employment. The inefficiency/inadequacy in objects enables the innovation or interest in such objects. As a result, the study highlighted on the problem statement which further enabled the formulation of the objectives. The chapter went further to give the primary, followed by the theoretical and empirical objectives which will enable the study to achieve the primary objectives. Upon formulating objectives of the study, the chapter orchestrated how the objectives will be achieved through the analysis of theoretical and empirical findings. The chapter also highlighted the significance of the study and gave a brief overview of all the chapters.

The main focus of Chapter 2 was to provide a theoretical explanation of investment, sectoral investment, economic growth, economic development and employment. Chapter 2 defined and explained the aforementioned concepts. The theoretical part of this chapter gave and explained different forms of investment and growth theories that have a significant meaning to the study. The review of the empirical studies from developing and developed countries showed that there is a significant impact of investment on economic growth and employment. The study also established that not all sectors result in employment creation and economic growth. The literature review also showed that growth results in employment creation. The role played by investment in enhancing growth was found to be unidirectional, as the reviewed studies posit that it is not always the case where investment enhances growth, sometimes it is growth that enhances investment. The empirical findings thus showed that although investment plays a significant part on economic growth its role differs with sectors.

The empirical review of sectoral investment impact on economic growth and employment in South Africa was challenging for the study, as the aspect of specific investment in sectors was not available in the studies reviewed. As a result, Chapter 3 evaluated the economic performance, investment, employment and sectoral contribution to economic growth and employment in South Africa. The chapter also evaluated the impact that policies had on the economy and employment of South Africa. Moreover, Chapter 3 analysed the South African sectoral investment and measures to increase it. Chapter 3 was aimed at investigating the

problems affecting investment decisions by analysing the current economic, investment and employment trends (1994-2017).

## **6.2.2 Summary of the methodology and finding of the study**

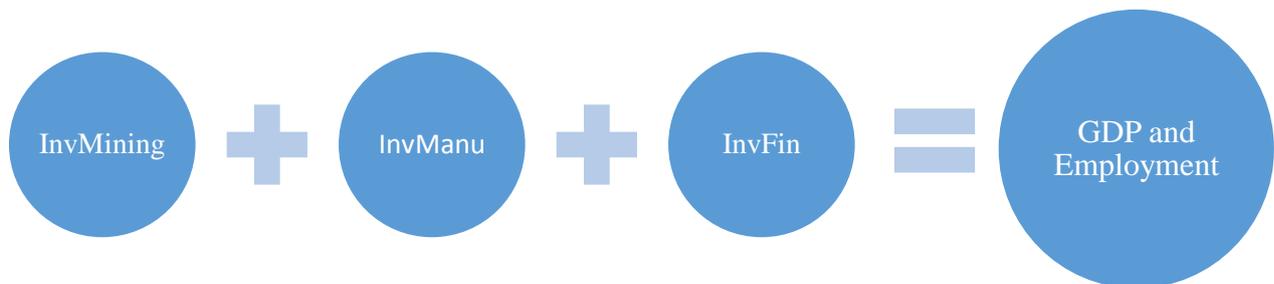
To analyse the relationship between sectoral investment and economic growth and employment in South Africa with specific reference to the years 1994 to 2016, Chapter 4 explained how the study performed the test to achieve its objectives. To achieve the study's primary objectives, the study employed various econometric models, which were able to identify the impact of sectoral investment on economic growth and employment in South Africa. Chapter 4 commenced with explaining where the study gathered its data and defined variables used in the study. The study employed two econometric models (ARDL and VAR) that are both explained in Chapter 4. Upon identifying the econometric models to use, Chapter 4 explained and hypothesised the stationarity tests and diagnostic tests.

Chapter 5 achieved the objectives of the study through employing econometric models such as VAR and ARDL that enabled the study to determine the impact that sectoral investment has on economic growth and employment. Chapter 5 analysed the graphical depictions of the impact of sectoral investment on economic growth in South Africa. The graphical analyses illustrated that investment in mining, manufacturing and finance sector, and employment and economic growth have a positive upward trend. The graphs also show that the investment components were volatile in 2004 and stabilised after-ward. The descriptive and correlation results showed that the model is distributed normally as proved by kurtosis value. Furthermore, the correlation results showed that the variables are correlated strongly and positively; implying that changes in investment in sectors will result in changes in economic growth and employment.

The results of the unit root test revealed that all variables are stationary at  $I(1)$ , none of the variables were stationary at  $I(0)$  or  $I(2)$ . The results of the unit root test confirmed the use of the cointegration test. As a result, the study examined cointegration relationships between the variables. With the use of both VAR and ARDL, the study established a long-run relationship. However, for both models the study established that there is no short-run relationship between investment and economic growth and investment and employment. Moreover, the results of the Granger causality test established a bidirectional relationship between investment in mining and economic growth and investment in finance and economic growth. In contrast, the results showed that there is a unidirectional relationship between investment in manufacturing and

economic growth. Moreover, the results of the Granger causality showed that there exists no causal relationship between investment in mining and employment. Nonetheless, there exists a unidirectional relationship between investment in manufacturing and finance to employment. The results of the study are summarised in Figure 6.1.

**Figure 6.1: Impact of sectoral investment on economic growth and employment**



Source: Author's own compilation

Figure 6.1 depicts the summary of the results of the study. It shows that investment in the mining, manufacturing and finance sector has a positive impact on economic growth and employment and that for economic growth and employment to be realised, the country should invest in the abovementioned sectors.

### 6.3 REALISATION OF OBJECTIVES

The study constructed three major objectives that were highlighted in Chapter 1, namely primary, theoretical and empirical objectives. The aforementioned objectives each were achieved in different chapters. The primary objectives formed the major objective of the study and were achieved through Chapter 5, aligned with the empirical objectives. The theoretical objectives were achieved in chapter 2 and 3.

#### 6.3.1 Primary objective

The study is grounded from the primary objectives stipulated in Chapter 1, the objective were as a result achieved through examining the empirical and theoretical studies. The study analysed the economic, employment and investment stance of South Africa. This assisted in understanding and knowing how impactful investment to employment and economic growth is. The study further analysed the sectoral contribution of investment to economic growth and investment and established that the contribution of sectors towards economic growth and employment varies in accordance to sectors, manufacturing sector showed a positive

correlation relative to the mining sector and finance sector and at time economic growth result to increase in investment.

### **6.3.2 Theoretical objectives**

Chapter 2 provided a theoretical explanation of sectoral investment and employment and reviewed theoretical concepts explaining investment and growth regimes in South Africa. The chapter defined investment, economic sectors, a distinction between economic growth and development and employment. This was done for understanding and elaborating on concepts of the study. The theoretical background of Chapter 2 explained different theories of investment; Keynes, Accelerator, Tobin q, and McKinnon and Shaw theories, which all explained how investment results in growth and how it impacts productivity. Moreover, the study explained theories of economic growth and employment: Neoclassical, wealth of nations, endogenous, classical and Keynes theory of growth, Keynes theory of employment and Okun's law.

The theories of growth all agree that labour has an impact on the total production and that increasing the quality of labour will lead to growth. Concurrently, wealth of nation and endogenous both put emphasis on physical capital. The review of empirical studies enabled the study to identify sectors that are robust determinates of growth and employment in both developing and developed nations. Upon achieving the theoretical objectives, the study further analysed South Africa policies and economic stance to understand the factors that affect investment decisions in South Africa further.

### **6.3.3 Empirical objectives**

The empirical objectives were the heart of the study as they allowed the study to know the impact that investment in sectors has on South Africa's economic growth and employment. The objective were achieved in chapter 4 and 5, where econometric modeling was thoroughly explained and modeled. The results of Chapter 5 showed that investment is more impactful in the long-run than in the short-run. This is because the investment of physical assets takes effect in the long-run. The results show that for both VAR and ARDL models, investment in sectors has no short-run relationship. The empirical results were able to give answers in the context of South Africa, where there was ambiguity in the literature, such as that not many studies were found in the context of South Africa and with a particular interest in investing in sectors.

## **6.4 POLICY RECOMMENDATIONS**

This section aims at giving recommendations based on the results presented in Chapter 5.

### **6.4.1 Stimulate the mining sector**

The study confirmed that economic sectors have a significant impact on economic growth and employment creation in South Africa. The main issue affecting South Africa is the issue of slow growth and high rate of unemployment. The abovementioned problems can thus be resolved through enhancing and supporting economic sectors for them to absorb labour. The mining sector is responsible for a substantial percentage of employment particularly in its surrounding areas. Supporting such a sector will thus enhance job creation and living standards of its communities. Investing in the mining sector will enable the sector to be competitive in the global market, thus stimulating its returns on investment. The mining sector is able to absorb the skilled, semi-skilled and low-skilled labour, enabling employment for all. If much focus is dedicated to such sector, growth and employment will increase in South Africa.

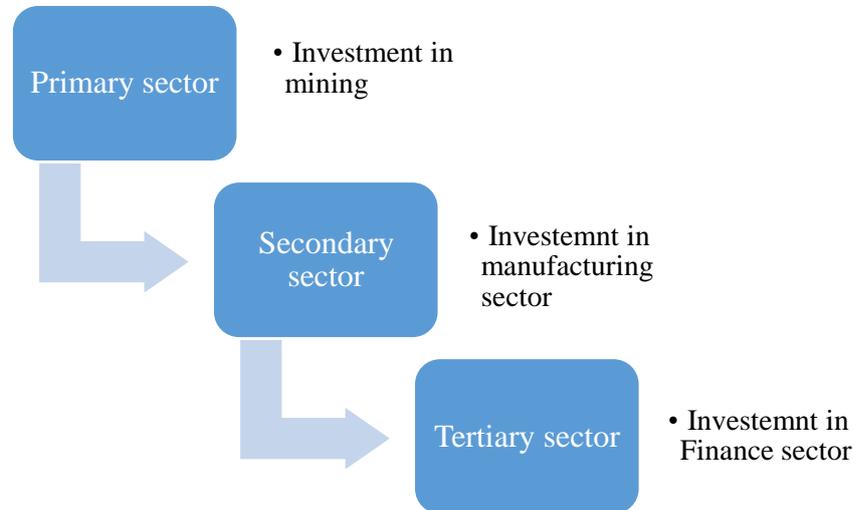
### **6.4.2 Acknowledge the interconnectivity between sectors**

There is a great interrelationship between the mining, manufacturing and finance sectors. The major problem faced by these sectors is that the raw material from South Africa is transformed in foreign countries and sold back to South Africa at a higher price. Investment in the manufacturing sector will assist in creating an inclusive growth, which is at the forefront of South Africa's main developmental objectives. Investing in the manufacturing sector will enable the sector to transform products that were manufactured abroad previously. This will stimulate employment as the sector will expand and more employees will be required. The greatest advantage of the manufacturing sector is that it does not require much of the skilled labour that South Africa lacks, but can absorb the majority of the semi-skilled labour (47%) and low-skilled labour (23%). Investing in the use of resources that will increase the production of the sector, will increase the sector's contribution towards economic growth.

The significant contribution of the mining, manufacturing and finance sector to economic growth and employment shows that the sectors are interconnected. The mining sector has a positive spill over effects on manufacturing sector and manufacturing sector has positive spill over effect on the finance sector. Supporting one sector will increase the demand of the other sector. The capabilities of the economic sector on economic growth and employment is undermined due to increasing rate of unemployment and slow growth, however, the sector do

have a positive impact on the economy. As a result, increasing the capacity of each sector in producing more will enhance growth.

**Figure 6.2: Interrelationship between economic sectors in South Africa**



Source: Authors own compilation

Figure 6.2 show the interrelationship between the primary, secondary and tertiary sector with main reference to the three main sector of the study: mining, manufacturing and finance sector. The figure show that production in the primary sector has spill over effects to production in secondary sector and that production in the manufacturing sector has spill over effects on the tertiary sector.

### **6.4.3 Invest in skills development and technology**

The results confirmed that investing in the mining, manufacturing and finance sector does not result in any benefit in the short-run; as a result, South African policies should be those that will stimulate and create sustainable economic growth without compromising the consumption of the future generation. Long-run benefits are thus sustainable and what South Africa needs. The world is diverting to a more service-inclined production, the use of technology is without a doubt taking over the world. It is of crucial importance that South Africa invests in the use of technology through the service sector. This will enhance the productivity of the financial sector and thus stimulate growth and employment.

The greatest problem with South Africa is that it is behind, thus always trying to keep up with the innovation in the global markets. This inhibits the productivity and leads to less growth.

The financial sector is very competitive and continuously changing with the use of new technology. If South Africa could invest in such sector and the use of the latest innovation, the country will enjoy the benefits of high growth rates and fewer unemployment rates. As indicated in chapter 3 that finance sector contributes the second highest percentage of employment after community, social and personal services, the sector requires an in-depth support to increase employment in South Africa further.

It is unfortunate that South Africa has a high rate of unskilled labour relative to skilled labour. This is the main reason why there is a high rate of unemployment, the labour market cannot absorb the currently available labour due to lack of skills. It will be of great benefit to the community if the abovementioned sectors are supported, as that will enable them to provide training and offer internships to those that need skills.

#### **6.4.4 Boost wage rates**

The low performance of sector is of the result of high wage costs to the firms. This puts pressure on the labour costs, as a result, increases the cost to company. As a result, the firms are forced to employ cheap methods of production and reduce costs; that is retrench employees. The government can assist in increasing the productivity of this sector by assisting the firms with the increasing wage rate. This will enable firms within the sectors to increase production as they will be saving on the cost of production.

### **6.5 LIMITATIONS OF THE STUDY AND AREAS OF FURTHER RESEARCH**

The main limitation faced in conducting this study was that investing specifically in economic sectors appeared as a limitation due to a lack of literature in South African context. Studies that investigated the concept were mostly focusing on the manufacturing sector and could not link all the other economic sectors. Among other limitations, the lack of data and time prevented the researcher in further determining the impact of investment in other sectors on economic growth and employment. The use of non-agricultural employment is also a limitation as it excludes all the other labour force in the non-agricultural sector. This does not give a true reflection of the total employment rate in South Africa. To get the impact of investment on all the economic sectors without being biased, future research may include all the other sectors not covered by the study.

## 6.6 CONCLUSION

This study investigated the impact that investment in mining, manufacturing and financial sectors has on economic growth and employment in South Africa over the period of 1995-2016, in the short-run and long-run, respectively. The study used two econometric models to analyse the impact of sectoral investment on economic growth and employment. The ARDL and VAR model were compared to each other. The results of the study show the investment in sectors has a positive impact on economic growth. However, only investment in mining and manufacturing has a positive impact on growth with the use of ARDL model. In contrast to the ARDL, the VAR model established that investment in manufacturing has a negative impact on economic growth whereas mining and finance yield positive results. When comparing the two model it is evident that investment in sectors has a positive impact on economic growth. The study thus concludes that country has to put more efficient measure in place to support the sectors production to increase economic growth in South Africa.

Furthermore, for the impact of sectoral investment on employment in South Africa the study established that only manufacturing has a positive impact on employment whereas investment in finance and mining yield negative results. This is with the use of ARDL model, the use of VAR model showed that only investment in mining yield negative results to employment whereas investment in manufacturing and finance showed significant impact to employment. Comparing the results of the two models, the study concludes that investment in sectors has a positive significant impact on employment rate. As a result, the study concludes that the country should invest more in sectors to increase employment creation in South Africa.

The sectors are responsible for a substantial percentage of employment and growth in the country and thus require more support to enhance their capabilities. There are great benefits of investing in the economic sectors as that leads to increases in economic growth and employment rate in the long-run. The study thus further concludes that South Africa has to create policies which are investment driven to increase employment and economic growth in the long run and to create a conducive environment for promoting an inclusive growth.

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