



The Impact of Urbanization on Economic Growth in Gauteng Province, South Africa

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ABSTRACT

The apartheid legacy moulded urbanization changes in South Africa. Post-1994 people were free to migrate to areas with greater economic activities (increased socio-economic opportunities) subsequently, the genesis of migration. Majority of the people aimed for Gauteng Province which is considered the economic hub of the country and a magnet of opportunities. This study looked at the history of Gauteng-primarily the economic position in conjunction to economic theories. This quantitative research investigated the relationship between economic growth and urbanization in the Gauteng Province. Granger causality test were used to ascertain the relationship used in the research and the study focused on the period 1997-2020, using a quarterly data. From the study, it was established that there is a unidirectional causality running from economic growth and employment in Gauteng- meaning that an increase in economic growth enables more jobs to be created, leading to migration of people to the province. The paper also found no causal relationship between population and economic growth- meaning that population increase does not have any effect on economic growth. People seek to progress out of poverty, primarily to urban lifestyle to leverage socio-economic benefits- grow skills and knowledge by accessing public services such as education, infrastructure mainly available in urbanized areas. The paper recommends for government to redefine urbanization policy to manage rapid migration. Failure to do so, will lead to infrastructure (housing, water, and electricity) and employment challenges within the province.

Keywords: Economic Growth, Gauteng Province, Migration, Population Growth, Urbanization

JEL Classifications: E1, O1, O18, O47

1. INTRODUCTION

The relocation of people from rural to urban locations leading to an increase in population concentration is referred to as urbanization (Kuddus et al., 2020:1). According to Chen et al., (2014:1). The evolution of humankind from industrial revolution can be summarized in the following terms industrialization, urbanization and globalization, in theory, these three terms are linked to each other. Industrialization leads to economic growth and industrialization acts as a stimulus for urbanization whereby the mass population migrate for better socio-economic opportunities (Nasution & Ihsan, 2021). Liddle and Messinis (2015:349) asserts that, due to industrialization, the migration of rural agricultural workers to urban manufacturing factories resulted in urbanization and economic development. Briefly, rural-urban migration

leads to urbanization and this process has a major consequence on population density and distribution therefore to economic opportunities- referring to much easier access to schools, jobs, transportation, public health services. While economic growth is one of the contributing factors of urbanization in one hand, but in the long run, concentration of people in particular location results to increase in economic activities leading to economic growth (Raihan et al., 2022). Thus, urbanisation and economic growth nexus was established in the literature as a mutual feedback causality.

Sub-Saharan Africa (SSA) is seen to be the fastest region in the world in terms of growth in urbanization and the United Nations (2018) projects that 80% of the world population will be living in urban areas by the year 2050 (United Nations, 2018; Saghir

and Santoro, 2018). Browne (2014:1) asserts that urbanization is highly compelling for economic growth as it nurtures an innovative environment, produces economies of scale for businesses and payment of higher wages. This study will firstly look at the history of the Gauteng Province, secondly the study will focus on the current and existing literature on economic growth and urbanization. The third section will focus on the methodology used in the study as well as the different types of tests utilized to obtain the results. The fourth section will focus on the results, and the last section will be based on the recommendation about significant urbanization and possible solutions.

In South Africa (SA), apartheid laws and policies controlled the movement of the population especially black people, intending to limit movement to cities and confine them in the previously to called “homelands” which was mostly rural with limited economic opportunities (Todes et al., 2010). The apartheid legacy moulded urbanization changes in South Africa. The apartheid regime established the so-called “Bantu Authority Act, Act 68 of 1951” which prohibited black Africans and Coloureds from living in urban areas and strictly confined them in rural homelands areas with narrow economic resources (South African History Online, 2019). In 1994, when South Africa reached its first democracy, for the first time black South Africans were not restricted to specific areas. Black people and Coloured’s could move to urban areas (provinces or cities) without being restricted by the laws of government. Post-1994 people were free to migrate to areas with greater economic activities thus with increased employment opportunities and that was the genesis of migration. Majority of the people aimed for Gauteng Province which is considered the economic hub of the country and a magnet of opportunities.

Gauteng means “Place of Gold” and the name emanated from the discovery of gold in 1886 in the Witwatersrand region (Baffi et al., 2018). The discovery of gold led to the development of mines and the migration of people seeking employment and better economic opportunities (Statistics South Africa, 2019). South Africa is comprised of nine provinces, with Gauteng being the smallest among them. It takes up a geographical landscape of 18,170 km² and it exhibits 2% of the entire nationwide land area (South African Government, 2020; South African Government, 2021). South African’s population is estimated to be 60.14 million, and although Gauteng is the smallest province, it hosts the greatest proportion of 26%, this equates to over 15,8 million people living in the province (Statistics South Africa, 2021). As a result, it is the most populous province of all provinces in SA. Gauteng province is comprised of two main cities, namely Johannesburg and Pretoria. The number of cities, size and urban density is an important barometer of urban development (Farahmand et al., 2010:2).

According to Everatt (2014), Gauteng contributes more than 34% to the National GDP and increasingly operates as the single most functional economic region (Statistics South Africa, 2021). According to Chakwizira et al. (2018), the province is the prime center of commerce, industrial development and trade due to its economic and industrial development and economic center not only for South Africa but for the African continent. Chakwizira et al. (2018), further state that Gauteng has concentrated industries

such as business services, manufacturing, mining, trade and innovation. The province is perceived to offer better socio-economic opportunities due to its renowned economic position and will continually attract human mobility. Consequently, Gauteng’s economic and industrial progress attracted migrants leading to rapid urbanization. For Gauteng province, rapid urbanization comes with complex challenges such as social exclusion, high levels of poverty and unemployment along with high levels of crime, pollution, and urban sprawl (Bobbins and Culwick, 2015). On the other hand, urbanization in Gauteng presents an opportunity for policymakers to formulate urban strategies for economic growth.

2. LITERATURE REVIEW

The industrial revolution birthed the phenomenon of urbanization- the migration of people to cities and towns from rural areas (Chen et al., 2014). The research on South African’s urbanization and migration since democracy has been extremely limited, hindered by insufficient data available (Todes et al., 2010:332). The main contribution of this paper is that there have not been studies conducted on Gauteng’s urbanization. Furthermore, this research will contribute to the existing research on urbanization and economic growth. According to (Tang et al., 2022) urbanization is a crucial factor in economic growth, it explains how cities are transformed, modernized and a by-product of socio-economic development.

2.1. Urbanization

Urbanization is the movement of people from rural to urban areas. According to Aroui et al. (2014), urbanization and investment in human capital are shaping economic growth in Africa, to the extent that governments have prioritized budgets to economic sectors such as manufacturing and services. Urbanization unveils how rural agricultural populations emigrate to urban production facilities to take advantage of industries and service sectors that are in big cities (Sancar and Sancar, 2017). (Murakami et al., 2021) asserts that migration takes place due to the change in demand and supply of labour from the rural to the urban sector. This is per the theory of the dual-sector model by Arthur Lewis.

Push factors such as agricultural modernization (the use of technical machines) and rural poverty influence people to migrate Jedwab et al. (2017), further states that lack of employment in the agricultural sector, a poor health care system and a lack of infrastructure amongst others are contributing factors. Pull factors such as industrialization and urban-biased policies are elements that attract people to emigrate to towns and cities (Wazza and Bedeke, 2022) Urban areas are known for their abilities to provide better education, employment, and developmental opportunities, which in most cases lead to improvements in people’s living standards (National Planning Commission, 2012).

According to Tartiyyus et al. (2015:116), the Kuznets- Modern economic growth asserts that rapid population growth has led to higher rates of increase in total products and per capita product. This has been accompanied by a large increase in the working population. High population growth can stimulate capital

formation in developing countries through the use of excess labour that can be used for capital projects (Tartiyus et al., 2015:116). Growth in the population also leads to demand for products and services consequently an increased mass consumption. It can also be noted from Rostow's stages of economic growth. Thereby the stage 3 stages of Rostow- sees a transfer of workers from the agricultural to manufacturing sector consequently economic growth in specific regions reaching between 5% and 10% of the gross national product (Essien, 2016).

Urbanization is a global phenomenon that has now become a reality, especially for developing countries, although some studies highlight the negative effects and other studies highlight the positive impact on economic growth (Chen et al., 2014). The growth of the international capitalist system and how rural populations are marginalized are the primary factors that drive people from rural to join the urban proletariat (King et al., 2021). Ritchie and Roser (2018), asserts that over 50% of the world's population lives in urban areas and that was not the case in earlier times. Therefore, the prevalence of this new global phenomenon prompted a lot of studies on the impact it might have on development, growth, and socio-economic issues.

2.2. Economic Growth

Economic growth can be defined as the rate of increase for a specific country's income and is measured by tracing goods and services produced and consumed at a given time (Roser, 2021). According to Bolderanu and Constantinescu (2015:330), economic growth refers to an increase in the goods and services produced within an economy of a country and is measured by the percentage increase in the real gross domestic product (real GDP) after eliminating the impact of inflation. It is one of the most important tools used to measure people's living standards in the global economy (Pietak, 2014:45). Economic growth is among the most important concepts in the study of economics. Consequently, economists have been developing numerous growth theories and models over the years with attempts to explain and simplify the changing determinants of this phenomenon. As per Keita (2016), substantial investment in human capital is a significant condition that will resolve problems of growth and development in Africa.

Economic growth and development are instruments used to improve the quality of life and reduce poverty in developing countries. Economic growth signifies human development, employment opportunities, and in some cases, higher wages, therefore, improving the standard of living, *ceteris paribus*. According to Ivic (2015:57), labour productivity is a factor that influences economic growth. In addition to other factors such as natural resources, physical capital or infrastructure, human capital, technology and government policies (Agarwal, 2020). Countries and cities with growing economies, attract more investments, subsequently, firms and businesses relocate to such areas leading to agglomeration economies (Cottineau et al., 2018).

Zhang (2020) stated that agglomeration economies have a positive effect on economic performance and firms move close to each other to benefit from agglomeration economies. Aritenang (2021) viewed agglomeration as an increase of knowledge at proximity

leading to the eruption of innovative ideas and the technical progress in the production function. Agglomeration exhibits a feature of the endogenous growth concept of increasing returns for regional development (Aritenang, 2021). An eruption of innovative ideas leads to entrepreneurship promoting economic growth. The study conducted by Khyareh and Amini (2021), showed a positive correlation between the economic growth of innovation-driven countries and cities and opportunity-driven entrepreneurship. Hausmann and Hidalgo (2014) stated that, the ability on how to produce different products and the accumulation of productive knowledge drives economic growth. There is a wealth of research done on different determinants of economic growth which highlights that there are many factors that influence economic growth. Therefore, each country in the global economy should find a winning combination that will positively affect its economic growth rate.

2.3. Theories of Economic Growth

This section seeks to present the theories of economic growth.

2.3.1. Classical growth theory

The classical economists (Smith and Ricardo) in early industrialization focused on understanding economic growth and development (Boianovsky, 2017). The theory asserts that an increase in population leads to a decline in economic growth due to the limitation of resources (Gordon, 2021). The paper, further states that, advocates of this theory postulate that, an initial increase in the GDP of a country is due to a significant increase in population growth.

Lanza (2012) explains the Smith's theory of economic growth concentrated on population growth, capital accumulation, labour productivity and economies with no government intervention. In his book, "Wealth of Nations," he focused on economic growth owing to the concept of the division of labour – workers specializing in different tasks leading to increases in productivity (Kurz and Salvadori, 2003).

In simple terms, Smith believed that the additional supply of workers creates growth through the division of labour. Smith reports that in conjunction with the division of labour, the increase in effective labour versus ineffective labour promotes the nation's growth (Monette, 2019). Fei and Ranis model of economic growth categorized under classical theory suggests that economic development takes place if the agricultural labourers are transferred to the industrial sector to increase labour productivity (Boianovsky, 2017). Further states that the amount of labour moved, and the time of moving takes depends on the growth of surplus generated from the agricultural sector. This theory is germane to this study because it helps to provide a clear understanding of the patterns of economic growth in Gauteng Province, South Africa.

2.3.2. Innovative growth theory of Schumpeter

According to Sledzik (2013), Schumpeter's theory focuses on entrepreneurship and firms as being central to economic growth. The theory promotes innovation and skills development that stem from entrepreneurship as the driving force of economic development (Sledzik, 2013). He believed that entrepreneurship

could stimulate economic growth through innovation – the entrepreneur can make more profit depending on the success of their innovative ideas. This theory, however, seemed to apply to more developed economies, as its conditions are more focused on democratic systems, well-functioning financial, and competitive markets (Pietak, 2014). Schumpeter recognizes that creativity primarily strengthens their competitive advantage especially in the fields of technology science and innovation (Aghion and Festre, 2016).

2.3.3. Keynesian growth theories

Keynes school of thought is centred on the government's intervention to stimulate economic growth. The theory asserts that government should trigger aggregate demand (consumption spending businesses and households) which is fundamental to economic growth (Jahan et al., 2014). Furthermore, Keynes theory asserts that free markets frameworks do not lead to full employment, instead government intervention policies are fundamental for price stability and full employment (Jahan et al., 2014). The Harrod-Domar growth model supports the notion that government intervention is paramount to stimulate economic growth. According to Thong and Hao (2019), the Harrod-Domar growth models promote expansionary fiscal and monetary policies to stimulate economic growth.

2.3.4. Neoclassical growth theories

Neoclassical growth theories are theories that primarily view technology, labour and capital as the main factors contributing to economic growth and are characterized by full employment. The theory maintains that technological advancement improves production methods thus effectively improving how the economy operates (Gusev, 2021). The Solow theory is one such model that explains long term economic growth with full employment elements (Sadovin et al., 2015:140). The theory explains the links between three factors of economic growth, namely human capital, investment, and improvement in technologies (Sharipov, 2015:769). Furthermore, Sharipov stated that higher capital (growth of investments) is driven by an increased savings rate leading to high levels of production. Sharipov (2015:768) explains that, in Solow's theory, the increase in population coupled with productive labour are fundamental factors for steady economic growth in an economy.

2.3.5. Endogenous growth theories

The theory states that factors that grow the economy are endogenous forces (Konishi, 2022). Endogenous models suggest that investment from capital stock led to technical improvements (Chand, 2021). Ul Hag and Naeem (2019) stated that Romer's model recognizes improvement in innovation and the proficiency sector have a paramount effect in economic growth, in simple terms endeavours by researchers and entrepreneurs (Jones, 2019). Another model is the Lucas two-sector model. According to Chilarescu and Viasu (2019), the model asserts investment in human capital (education and skills) and effective production of goods through technical progress to grow the economy.

2.4. Empirical Literature Review

Mercandalli et al. (2019) conducted a study on migration concentrating on the patterns and drivers of rural migration in

SSA. Their study aimed to understand the multifaceted and diverse drivers of rural migration in Africa over the last decades. They used secondary data from the United Nations Department of Economic and Social Affairs (UNDESA), microdata from Migration and Remittances Households Surveys (MRHS) and Rural Livelihoods Information System (RuLIS). The study was conducted using a cross-sectional survey on the following countries: Burkina Faso, Kenya, Nigeria, Senegal, South Africa, and Uganda. The study concluded that migration is not about the movement of labour from rural to urban areas or labour transfer from agriculture to other sectors (Mercandalli et al., 2019). But people migrate to achieve a range of socio-economic factors such as better education, employment and living conditions (Hagen-Zanker, 2008).

China has experienced unprecedented economic growth since its restructuring and opening-up in 1978 and has continued to perform extraordinary than many countries (Jetin and Ortiz, 2020), as such, China has experienced urbanization and influx of population into cities. Adebayo et al. (2021) did a study to re-assess the Kuznets curve (EKC) hypothesis on China's urbanization and the effect of hydroelectricity using data from 1985 to 2019. The theory asserts that the increase in economic growth will result in the damage of the environment at an early stage of the country's development until to a level where there is a negative relationship between economic growth environmental damage (Adebayo et al., 2021). Further used autoregressive distributed lag (ARDL) to evaluate long-run co-integration protected by a structural break. The ARDL results indicated both urbanization and economic growth causes environmental degradation whereas hydroelectricity boosts the quality of the environment (Adebayo et al., 2021). The result from ARDL confirms the EKC hypothesis that China's economic growth will harm the environment.

Many people in India have moved from rural areas to urban areas to look for better socio-economic opportunities (O'Neill, 2021). A third of the total population now lives in cities subsequently, urbanization has increased by 4% in the last decade (O'Neill, 2021). Kanjilal (2021) conducted a study on the relationship between urbanization and the development of the ICT sector in India. The paper analysed secondary time series data of urbanization using census data from 1951 to 2011. The variables from telephone density, mobile subscribers with internet and school with computers per 100 persons were used to analyse the development of information communication technology (ICT). In theory, it is anticipated that the ICT sector will expand due to the growth of urbanization. From the analysis, it was proven that economically developed and urbanized cities have a developed ICT sector. While the results for rural areas have low and undeveloped ICT sectors (Kanjilal, 2021).

Lewis (2014) evaluated the impact of urbanization on economic growth in Indonesia and explored both the positive and negative impacts of urbanization. The paper made use of time-series data from the period of 1960-2009 and the results revealed that economic growth is positively related to the level of urbanization (Lewis, 2014). However, the percentage change of urbanization over a specified period was found to be negatively related to economic output. In addition to that, their paper made use of

sub-national panel data to examine the negative and positive effects. The results suggested that the negative effect of the urban population growth was associated with a lack of local infrastructure expenditure (Lewis, 2014).

According to United Nations (2018), 80% of South Africa's population is expected to live in urban areas by 2050 as the country is urbanizing at a rapid rate. Todes et al. (2010) conducted a study on urbanization patterns and trends in South Africa focused on driving forces and key dynamics causing migration and urbanization. In their paper, they pointed out limited and data challenges thus used data from 1946 to 2007. The findings in their paper were that major metropolitan areas and secondary cities post-apartheid, have been the focus of migration and these trends are due to economic growth and poor living conditions in rural areas. They further stated that cities with more socioeconomic opportunities and economic growth are the main force behind migration and urbanization (Todes et al., 2010).

Lastly, Greyling and Rossouw (2017) conducted their study on the relationship between population density and non-economic quality of life in the South African context. They used panel estimation techniques and data from 1996 to 2014, using income variables from eight metropolitan cities. To compare the relationship between population density and non-economic quality of life and added spatial dimensions. In their paper, it mentioned that there is an assumption that population density is crucial for economic growth-it promotes elevated levels of productivity and income. The results showed a significant and negative relationship between population density and non-economic quality of life. The results mean that high productivity and income does not necessarily mean better quality of life. Based on these results, they recommended that policy measures to boost urbanization should be discouraged if the aim is to develop the non-economic quality of life (Greyling and Rossouw, 2017).

3. THEORETICAL FRAMEWORK AND METHODOLOGY

The study sought to empirically investigate the relationship between economic growth and urbanization in the Gauteng Province. This study made use of secondary quarterly data obtained from Quantec for the duration ranging from 1997 to 2020 and E-Views was used to analyse the model. The variables employed in this paper were gross domestic products, employment, fixed capital assets (FCA) and population. The study employed quantitative research methods to analyse the relationship between the variables.

The study used the structure of the neoclassical growth model established by Robert Solow. Solow's growth model is an exogenous model aimed to evaluate changes in output level in an economy resulting from population change or capital accumulation or increased productivity (i.e., technological advancement) over time. The model examines variations in the level of output over time in the economy resulting from population change. Demographic points out the socio-economic component of a

population that firms use to establish the product options and growth rate, the rate of technological progress and savings rate.

The model asserts that changes in input over time result in output also changing over time. The level of output achieved from specified quantities of labour and capital increases over time, on the condition that there is technological improvement such as the efficiency of labour growth over time (Geda & Yimer, 2022). Important to note physical capital embodies human capital (skill set) since all output employed is not used to increase capital alone but as well as skillset (stock of human capital through education level). Furthermore, exhibits productivity of population growth through urbanization. Variables (L) and (A) enter multiplicity into the model so that the term AL is denoting "effective labour" suggesting that technological improvements are labour enhancing (Geda & Yimer, 2022).

The model's equation consists of four variables:

$$Y_t = f(K_t, A, L_t) \quad (1)$$

Where: Y_t is the total output at a time (t)
 K_t is the acquired capital at a time (t)
 L_t is the total labour at a time (t)
 A is the supplementing knowledge or technologies.

One crucial aspect of the model is that it can be constructed and adopted altered techniques using altered measurement metrics (Mahmud, 2015:9). Thus, the study appropriates the structure and reforms it into a model by use of alternative variables. Therefore, Y_t - total output is substituted by Gross Domestic Product (GDP), K_t acquired capital is substituted by FCA, L_t - labour is substituted by employment and urbanisation proxied by total population in Gauteng province. The model resulting as:

$$GDP_t = f(FCA_t, EMP_t, POP_t) \quad (2)$$

Where: GDP_t = Gross domestic product
 FCA_t = Fixed capital assets (proxy for physical capital stock)
 POP_t = Total population in Gauteng Province (proxy for urbanisation)
 EMP_t = Employments (proxy for labour employed)

$$GDP_t = \alpha + \beta_1 FCA_t + \beta_2 EMP_t + \beta_3 POP_t + \epsilon_t \quad (3)$$

4. EMPIRICAL RESULTS AND DATA ANALYSIS

This section is intended to discuss the results achieved from all tests using different methods discussed in this paper. The first step was to conduct a stationarity test to obtain an order in integration.

4.1. Unit Root Tests

To obtain the order of integration amongst the variables namely GDP, employment, population and FCA-the research study made use of annual time series data as such, a stationarity test was performed to avoid the model producing unreliable results which

might lead to misleading forecasts. Table 1 illustrates the results obtained for the variables.

The Augmented Dickey-Fuller (ADF) and Phillips Perron unit root test was employed to test for stationarity before estimating the regression model. The rule of thumb is that if the value of R-square is greater than the Durban-Watson statistic, showing the spurious regression. Hence, we conclude that the data series of all the variables was made stationary at first difference. This means that some of the absolute t-values turn out to be more than their respective critical t-statistics. Hence the variables are considered integrated of order one $I(1)$, which is the important condition for deploying the general vector autoregressive (VAR) model. However, to decide which VAR will be suitable, the study conducts a cointegration test to establish if long-run equilibrium exists among the variables.

4.2. Optimal Lag Selection Test

The AIC and SC results are presented in Table 2.

4.3. Cointegration Test

In the view of all the variables integrated at order one, imperative to test the long-run relationship between the variables meaning to test the presence of equilibrium in the long run. The paper adopted the Johansen cointegration test. The tables below reflect the results of trace statistics together with the maximum Eigenvalue.

Table 3 reflects the results of trace statistics of the Johansen test of cointegration. The null hypothesis at none is rejected at 0.05 level of significance as the probability is 0.0001 which is far <5%. Furthermore, the critical value at 0.05 level which is 54.079 is lesser than the trace statistic amount of 79.199. While at most 1, the null hypothesis is acceptable seeing that the probability is a greater value than 0.05 level at 35.193 than the trace statistic of 33.957. This implies that there is one cointegration equation between the variables, following the trace statistic.

Table 4 reflects the results of the Maximum Eigenvalue statistic of the Johansen test of cointegration. At 0.05 level, the null hypothesis is rejected seeing that the probability is significant at 0.0002. Similarly, the critical value of Max-Eigen at 28.588 is of less value to the trace static of 45.243. In contrast, at most one, the null hypothesis is acceptable seeing that the probability has a greater value of 22.299 at 0.005 level as compared to 16.359 of trace statistics. Therefore, Trace Statistic and Maximum Eigen Value both propose that there exists one cointegration equation between variables in this paper. This denotes a long-run relationship between the variables; therefore, the first aim of the study is achieved.

4.4. Vector Error Correction Mechanism

Error correction model helps to find the short-run relationship-whether the variables have a significant relationship in the short run or not. While the long-run adjustment – indicates whether the model is capable to adjust towards long-run equilibrium after some shock or not (Eric, 2020).

Vector error correction mechanism (VECM) has been employed to establish an association between the cointegrated variables (Asteriou, 2011). The ECT has a negative sign and significant

meaning that, the long-run adjustment will be possible. The coefficient of ECT is 0.348 which shows the speed of adjustment towards equilibrium (Table 5). This means that the speed is 34.8% per unit time (quarterly). The variables in this paper were found to have a long-run relationship the VECM was used to establish how significant is the error correction term, the coefficients of all independent variables.

4.5. Granger Causality Test

The 3rd and 4th research objectives aimed to establish whether

Table 1: Results of ADF and PP unit root test

Variable level	Test with intercept		Test with intercept and trend		Test with no intercept or trend
	ADF test	PP	ADF test	PP	ADF test
First difference					
D (LGDP)	0.0001*	0.0001*	0.0000*	0.0000*	0.0392*
D (LEMS)	0.4791	0.0353*	0.6512	0.0877	0.0963*
D (LPOP)	0.4636	0.3359	0.7350	0.5663	0.0859*
D (LFCA)	0.7893	0.1631	0.7818	0.1356	0.1886

*Significant at 10%. Source: (Researcher’s construct 2022)

Table 2: AIC and SC

Akaike Information Criteria by Rank (rows) and Model (Columns)					
0	-32.40421	-32.40421	-32.39098	-32.39098	-32.37549
1	-32.44573	-32.54588*	-32.51602	-32.49756	-32.50164
2	-32.44331	-32.52294	-32.51458	-32.48269	-32.47610
3	-32.32319	32.48309	-32.47986	-32.43182	-32.44114
4	-32.16320	-32.34097	-32.34097	-32.33033	-32.33033

Source: (Researcher’s construct 2022). The rule of thumb is to choose the criterion with an asterisk(*). Therefore choose Aikaike with the 1st lag. Lower AIC values indicate a better-fit model

Table 3: Unrestricted cointegration rank test (trace)

Hypothesized number of cointegration equations	Eigen value	Trace statistic	Critical value (at 0.05 level)	Probability
None*	0.382023	79.19969	54.07904	0.0001
At most 1	0.159738	33.95708	35.19275	0.0675

Source: (Researcher’s construct 2022)

Table 4: Unrestricted cointegration rank test (maximum eigenvalue)

Hypothesized number of cointegration equations	Eigen value	Trace statistic	Critical value (at 5% level)	Probability
None*	0.382023	45.24261	28.58808	0.0002
At most 1	0.159738	16.35994	22.29962	0.2735

*Denotes rejection of the null hypothesis at the 0.05 level. Source: (Researcher’s construct 2022)

Table 5: VECM E-views results

ECT (-1)	Coefficient	Std. error	t-statistic	Probability
	-0.0348026	0.101020	-3.445110	0.0009

Source: (Researcher’s construct 2022)

there is a causal relationship between urbanization and economic growth and the direction of the causality. The results recorded in Table 6 depicts all the variables employed in this study. The null hypothesis of no causal correlation between employment and economic growth, directed from employment to economic growth cannot be rejected at 5%, seeing that the probability is insignificant at 9.3%. Conversely, the null hypothesis of no causal relationship directed from GDP to employment can be rejected at 5%, the probability accounting for 0.07% which is greatly significant. As a result, there is unidirectional causality between employment and economic growth, running from economic growth to employment in Gauteng for the period observed in the paper. Meaning that an increase in economic growth enables more jobs to be created in Gauteng.

The null hypothesis of no causal correlation between population and economic growth, directed from population to economic growth cannot be rejected at 5%, seeing that the probability is insignificant at 72.6%. As well as the null hypothesis of no causal relationship directed from GDP to population growth cannot be rejected at 5%, the probability accounting for 6.75% which is lightly insignificant. As a result, there is no causal relationship between the population and economic growth of Gauteng.

The null hypothesis of no causal correlation between population and employment, directed from population to employment cannot be rejected at 5%, seeing that the probability is highly insignificant at 97.2%. As well as the null hypothesis of no causal relationship directed from employment to population cannot be rejected at 5%, the probability accounting for 5.71% which is slightly insignificant. As a result, there is no causal relationship between population growth and employment.

However, observing the significant levels, running from population growth to employment, it means that people move to Gauteng with the hope of being employed. The relationship between FCA and Employment according is assumed to be unidirectional causation. The null hypothesis of no causality between the variables running from FCA to Employment is rejected with the probability accounted for 1%. This means that the FCA of Gauteng enables more jobs to be created. However, the null hypothesis of no causality between employment and FCA cannot be rejected with the probability of 12.25% and its higher than the 5% to reject it.

The model captured a unidirectional causal relationship between FCA and population growth. The null hypothesis of no causality between the variables running from FCA to population growth is rejected with the probability accounting for 1%. Meaning that FCA may lead to a population increase in Gauteng. This might be due to people migrating to Gauteng with the hope of housing provided by the government. While the two variables running from population growth to FCA is acknowledged with the probability value of 29.63% and is higher than the required 5% to reject it.

Post estimation Tests This section seeks to present the post-estimation tests carried out in this study.

Table 6: Granger causality results

Null hypothesis	Obs	F-statistic	Probability
LEMS does not Granger cause LGDP	94	2.43	0.093
LGDP does not Granger cause LEMS		7.86	0.0007
LPOP does not Granger cause LGDP	94	0.32	0.72
LGDP does not Granger cause LPOP		2.77	0.067
LFCA does not Granger cause LGDP	94	5.03	0.008
LGDP does not Granger cause LFCA		8.02	0.0006
LPOP does not Granger cause LEMS	94	0.028	0.97
LEMS does not Granger cause LPOP		2.95	0.057
LFCA does not Granger cause LEMS	94	4.84	0.010
LEMS does not Granger cause LFCA		2.14	0.122
LFCA does not Granger cause LPOP	94	4.208	0.017
LPOP does not Granger cause LFCA		1.233	0.296

Source: (Researcher's construct 2022)

Table 7: Heteroskedasticity results

F-statistic	P-value
1.889	0.1368

Source: (Researcher's construct 2022)

4.5.1. Heteroskedasticity

Ho: No Heteroskedasticity

The null hypothesis of no Heteroscedasticity is acceptable seeing the probability is 13.68% which is greater than the 5% significance level (Table 7). Therefore, the data used in this study was free from heteroskedasticity.

5. CONCLUSION

From the research results, some conclusions can be drawn from the relationship between Gauteng's economy, employment, population, and FCA. Firstly, the ADF and Phillips Perron unit root test is employed to test stationarity before estimating the regression model. The variables were established to be integrated of order one $I(1)$. For the optimal lag selection, the paper employed Akaike Information Criterion (AIC) and to test the long-run relationship between the variables, the Johansen cointegration test was adopted while the VECM assisted to establish the short-run relationship.

The 3rd and 4th objective of this paper was to establish whether there is a causal relationship between urbanization and economic growth and the direction of the causality thus employing the Granger causality test. It was established that there is a unidirectional causality running from economic growth and employment in Gauteng- meaning that an increase in economic growth enables more jobs to be created in Gauteng. There was no causal relationship found between population and economic growth- meaning that population increase does not have any effect on economic growth. Furthermore, no causality between population growth and employment. However, observing the significant levels, running from population growth to employment, it means that people move to Gauteng with the hope of being employed. For the relationship between FCA and employment – the paper established unidirectional causation running from FCA to employment. Lastly, the model captured a unidirectional causal relationship between FCA and population growth. Meaning that FCA may lead to a population increase in Gauteng. This might

be due to people migrating to Gauteng with the hope of housing provided by the government. As earlier stated in the literature review, Solow's growth model is an exogenous model aimed to evaluate changes in output level in an economy resulting from population change or capital accumulation or increased productivity (technological advancement) over time.

This paper's findings confirm some of the research's already conducted on economic growth and urbanization and are following the Solow growth model. Therefore, it can be concluded that Gauteng's population increase through migration is the consequence of this economic growth and development. In addition, population growth of Gauteng lead to demand for products and services consequently an increased mass consumption. According to South Africa Gateway (2021), Gauteng is the leading economic hub in South Africa hosting sectors such as real estate, finance and business services that contribute almost a quarter to the province economy. People seek urban lifestyle to leverage from socio-economic benefits hence population growth to urbanized areas. Khambule et al. (2018) assert that people can progress out of poverty to social benefits- grow skills and knowledge by accessing public services such as education infrastructure mostly available in urbanized areas.

Contrary to the aforementioned, migration to urban areas does not always guarantee socio-economic benefits. Infrastructure challenges such as housing, employment, basic services, education, health, and protection of the natural environment are some of the challenges accompanied by the evolution of urbanization (Jones, 2017:1). While urban zones offer human development opportunities and economic growth, they are also a source of negative impacts to the environment such as air pollution.

Environmental decay, an eruption of slums, increased levels of crime are due to migration whereby people do not get the employment and housing they hoped for (Greyling and Rossouw, 2017:2). This has been the case in Gauteng where people moved and hoped to better their lives and be employed. Seemingly, the population grew faster than employment opportunities. Gauteng unemployment at 33.7% and the 3rd highest amongst the 9 provinces (Statistic South Africa, 2021). In addition, housing shortage whereby people have been opportunists to land grabbing and building shacks. The province is the most populous and is rated the highest in crime rates (BusinessTech, 2019). The abovementioned is an indication that urbanization is not always rosy but requires well-coordinated policy interventions and strategies from all sectors of government- national, provincial and local.

6. RECOMMENDATIONS

This section seeks to present the key policy recommendations.

6.1. Housing Shortage

One of the main challenges faced by Gauteng province is the influx of people migrating with the hope of improving their lives. According to the Parliamentary Monitoring Group (2020), it is estimated 300 000 people (including students coming to attend

tertiary institutions) are migrating annually to the province, adding to the housing crisis consequently, there are 1.2 million people who could not be accommodated on the housing budget allocated. Adding to the challenge of the housing shortage is the challenge of land grabbing by people who have been on the waiting list for RDP houses (Nzimande, 2020). The increase in informal settlements is one of the main consequences of urbanization especially in developing countries (Jones, 2017:2).

According to Legodi (2019), it is the government's responsibility to provide students with safe and affordable accommodation. Firstly, it will be advisable for the government to identify buildings in various cities of Gauteng that could be renovated and used as student's accommodation. This could be done with a partnership with the private sector. The rental income from student accommodation could also add to Gauteng economic growth and employment creation. When the private sector renovates the building, employment will be created and through maintenance. Secondly, the government must build more affordable houses that could be rented out to the middle class and receive rental income that could be used to build more RDP houses. Jones (2017) stated that people living in informal settlements greatly suffer from social and economic exclusion which are the benefits of urbanization.

6.2. Employment Creation

There is a perception that people receive employment and other socio-economic opportunities which is the primary driver of Gauteng's migration. High unemployment levels are a hindrance to economic growth due to a dormant population that is not involved in economic activities. Carr (2015) stated that government has a constitutional responsibility to create employment opportunities for its citizens. Therefore, the government must identify projects within the province to create employment. For instance, due to Gauteng population growth, it has been stated by the Premiers that 100 schools must be built to accommodate migrant learners (Tandwa, 2020). Secondly, maintenance of Roads infrastructure in the province. According to Hendricks (2021), there is a backlog estimated over R400 billion of maintenance of roads and R197 billion for Gauteng alone. The construction sector could be used to absorb unskilled labour and reduce high levels of unemployment.

6.3. Migration and Urbanization Policy

Although South Africa have an overall national policy and strategy which can be used as a blueprint to pro-actively prepare and tackle urbanization (Abrahams et al., 2018). The Integrated Urban Development Framework (UIDF) (2017) was a policy drive aimed to regulate urbanization to accomplish to improve people living conditions, job creation and achieve economic development goals. The challenge has been implementation. This paper recommends that the provincial urban policy be refined and support related policy frameworks such as governance, anti-corruption and transparency.

6.4. Improve Service Delivery

Poor administration of basic services such as refuse collection, safe water supply, refuse collection, sewage collection, electricity and free housing leads to service delivery protests. According to the Development Bank of South Africa (2021), one of the major

challenges faced by South Africa is reliable and effective service delivery. Gauteng province has recorded the highest number of service delivery protests according to data released by Municipal IQ (Njilo, 2020). Protest actions, especially in townships, lead to property and infrastructure damage, people not being able to commute to work thus negatively affecting labour hours and the economy. Lack of services, unresponsive government and elevated levels of corruption has led marginalized and disgruntled communities to voice out their concern through protest actions (Khambule et al., 2018). These protest actions are destructive and violent- burning of tyres and public infrastructure. The paper recommends that government improve service delivery at the municipal level to avoid service delivery protests. Consequently, communities will be able to pay for services thus revenue collection for the government. In addition, people will be able to commute to work with no loss of labour days.

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