International Journal for Social Studies
Available at https://pen2print.org/index.php/ijss/

ISSN: 2455-3220
Volume 04 Issue 10
October 2018

Institutional Quality, Social Infrastructure and Economic Growth in Nigeria 1990 -2017

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ABSTRACT

The study examined the effect of institutional quality and social infrastructure on economic growth in Nigeria between the periods 1990 to 2017. The study was based on institutional theory of growth which says institution and quality of institution are important to economic growth. The study used secondary data collected from various resources from 1990 to 2017. Institutional quality was proxy by corruption perception index for Nigeria, economic freedom of exchange regulatory quality, and effectiveness of governance. Social infrastructure was proxy by doctor-patient ratio, secondary school and tertiary education enrollment, while economic growth was represented by growth of real Gross Domestic product at 2009 constant price. Engle-Granger Error correction model estimation techniques was applied for estimating the partial effect of institutional quality and social infrastructure on economic growth. The Phillip-Perron Unit root test results revealed that all the variables have unit root at level. However, they became stationary after 1st differencing. Johansen Co-integration test result revealed that there is a stable long run relationship between institutional quality and economic growth on one hand, and relationship between social infrastructure and economic growth on the other hand. Estimate from the parsimonious error correction model proved that institutional quality proxy by quality of regulation, effectiveness of governance, economic freedom, and financial system efficiency have positive relationship with economic growth while corruption perception has negative impact on economic growth. Social infrastructure variables of doctor-patient ratio and tertiary school enrollment had positive impact on economic while secondary was not significant it was therefore recommended that government should strengthen institution quality and invest in development of Nigeria's social infrastructure.

Keywords: **Corruption perception, economic freedom, economic growth, institutional quality, Social infrastructure.**

1 INTRODUCTION

The role of institutional quality and social infrastructure in sustainable development has received tremendous attention in recent times and has been a central issue in development policies of many nations. In recent times, there has been widespread doubt among economists and policy makers alike as to the adequacy of traditional economic theory in offering answers to problems of modern economies. This is based on the underdevelopment of the third world countries irrespective of the degree of the large number of combination of policies they have implemented over the years. This has led to an increased recognition of the role of institutions and infrastructure as critical determinants of the level of economic growth and development of a nation.

According to Siba (2008), the general consensus is that the continued underdevelopment of the third world countries, especially those in sub-Saharan Africa is a product of institutional failure. It was argued that micro and macro -economic policies, no matter how well they are formulated will have little impact in an environment characterized by weak institutions and inadequate infrastructure.

The importance of institutions and infrastructure in the relations of production can be seen in terms of their impact on individual and social behaviour. According to Budak (2006), the quality of social characteristics such as norms, ethics, and morals which are necessary for attainment of efficient economic outcomes are dependent on the quality and strength of a society's institutions. In general, it would be difficult to enforce contracts, perfect property rights, business contracts, ensure adequate and timely dissemination of information to economic agents, and ensure transparency and accountability in an environment of low moral and ethical standards, which is an indication of weak institutions. In such situation, the cost and risk involved in carrying out a business venture become very high

ISSN: 2455-3220
Volume 04 Issue 10
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for firms to invest in such countries.
Institutions play a pivotal role in promoting the enactment of rules and regulations for proper surveillance of political, social and economic activities globally. Further, viable institutions support macro- economic stability and promote social cohesion, thus accelerating market efficiency and business development. Countries with efficient working institutions advance strong legal framework for the promotion of efficient mobilization and allocation of funds, thereby creating less risky business environment. According to Jude and Levieugeyz (2013), strong institutions do not only induce complementarities between foreign and domestic investment, but also promote synergy between foreign direct investment and domestic firms, thereby leading to spillover.

There is a growing global concern over the relationship between social infrastructure, institutional quality and economic growth. In Nigeria several studies have been carried out to evaluate the effect of social infrastructure and institutional quality on economic growth in Nigeria. However the empirical literature is inconclusive on the effect of social infrastructure and institutional quality on economic growth in Nigeria. For instance, Okute and Igbor (2002) and Basil (2003) acknowledged positive contribution of social infrastructure and institutional quality to economic growth. Others like Tango and Ugbada (2000) and Tempest and Oguntuase (1994) acknowledged negative contribution of social infrastructure and institutional quality to economic growth while Brodrick and Fortune (1998) and Akpakot and Roland (2000) found a weak relationship between social infrastructure, institutional quality and economic growth. There is, therefore, the need for further study and this is the main motivation for this work which examines the relationship between social infrastructure, institutional quality and economic growth in Nigeria
The findings of this study would give the government and policy makers insight and clear picture on the effectiveness of institutional quality and social infrastructure in enhancing economic growth in Nigeria .This remaining part of the study is divided into four sections as follows: Section two is the review of related literature which covers theoretical literature and empirical literature review. Section three is the research methodology which model specification, the variables, data collection and sources data and methods of data analysis. Section four is devoted to empirical analysis and discussion of results; while section five deals with the summary of the study and conclusion thereof.

2 LITERATURE REVIE

This section explains important concept in the study,and reviews theoretical and empirical literature relevant to the study

2.1 Conceptual Clarifications

The term “institution” has been used in recent economic researches with different meanings. For instance, Nelson and Sampat (1999) defines institutions by considering them to be a form of “social technology” somewhat similar in its effect on growth to that of regular technology. Also, Hodgson (1998) in a broader definition of institutions considers organizations to be institution. But North (1991) sees institutions as the rules of the game in a society or, more formally , as the humanly devised constraints that shape human interaction. From this point of view , institutions are rules, the organizations are not institutions but rather the players affected by the body of rules imposed by the institutional environment.

Aoki (2000) in his view defines institutions as the collection of rules, beliefs, values and organizations which act together to encourage the proper behaviour of individuals in the society. In the same vein, Grief (2006) sees institution as inter-temporary contracts which determine the action of the individuals in the society and the collection of beliefs within a society with respect to the equilibrium of a game played repeatedly. On the other hand, Levchenko (2006) defines institutions as the collection of structures which influence economic outcomes such as the safeguarding of property rights, the enforcement of contracts and investors. Following the definition of institution as being given by North (1991), the researcher in this study defined institutional quality as the degree of effectiveness of institutions or rules of the game played in the society that will bring about effective conduct and determination of business activities for economic growth and development.

Efficient and effective institutional framework leads to efficient and effective market regulation which will

ISSN: 2455-3220
Volume 04 Issue 10
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ensure investor-protection. This will also lead to reduction in transaction and agency costs which will cause improve operation and investment performance. Quality institutions bring about low risk expropriation. With high level of investor confidence and assurance as a result of quality rules that favours business activities in the economy, investors will be willing to increase their participation in the market in the form of more investment with the hope that more of the firm's profit would come back to them as interest or dividends. The result of quality institutions is a better performance of market indicators which inturn leads to positive changes that leads to economic growth and development.

For better comprehension of the concept of social infrastructure it is important to shed some light on infrastructure itself.According to Geol (2002) infrastructure is defined as the physical framework of facilities through which goods and service are provided to the public. He further said that its linkages to the economy are multiple and complex and it affect production and consumption directly, and create positive and negative spillover.Hirschman (1958) infrastructure consists of those basic facilities without which primary, secondary and tertiary activities cannot function. These facilities play an important role in creating investment opportunities that in turn leads to economic growth and development.

Akinyosoye (2010) defined infrastructure as the unpaid factor of production which tend to raise productivity of other factors while serving as intermediate input to production. The services engendered due to adequate infrastructure base bring about an increase in aggregate output. According to Udjo et al (2000), infrastructure is seen as having both direct and indirect impact on the growth of an economy. It is said to add to economic growth and development by raising efficiency and providing facilities which enhance the quality of life.
Infrastructure can be classified into economic infrastructure and social infrastructure. The later is our focus in this study. Tunde (1990) defined social infrastructure as a subset of the infrastructure sector, and typically includes assets that accommodate social services. Philips (1992) viewed social infrastructure as the core elements of social change (like schools, colleges, hospitals, and nursing homes) which serves as a foundation for the process of social development of a country. Social development focuses on human resource development, implying the development of skilled personnel as well as healthy and efficient human beings that will bring about economic growth.

The social infrastructure of a country is very important as it not only present human face of economic growth process but represent the very essence of it. Akan (1994) defined social infrastructure as the basic social amenities critical to human existence and social growth which are best served by government through taxes by the citizenry .They include good roads, railways, waterways, housing, portable water and power.

Adanta (2000), examples of social infrastructure are health care (hospital), education (schools and universities), transportation (railways and roads) and public facilities (community housing and prisons). All these structures serve as the backbone for countries in terms of economic growth and development. In this study, the researcher defines social infrastructure as the degree of accessibility of the citizenry to education, health care services transportation, public facilities which can enhance economic growth. Where development of social infrastructure has followed a rational, well-coordinated and harmonized path, economic growth has received a boost. Also, where institutions are weak, infrastructural provision and development can be affected negatively.

2.2 Theoretical Literature

This section reviews some growth theories which underpin the present study. Brief review of the theories are presented below

The Neoclassical growth theory which has its origin in the work of Ramsey (1928) and was popularized by Solow (1956) is an economic theory that outlines how a steady economic growth rate can be accomplished with the proper amounts of the three driving forces: labour, capital and technology. The theory states that by varying the amount of labour and capital in the production function, an equilibrium state can be accomplished. The theory also argues that technological change has a major influence on an economy, and that economic growth cannot continue without advances in technology The neoclassical growth theory is based on the understanding that the accumulation of capital within an economy, and the ways in which people use that capital, is important for economic growth. Further, the relationship between the capital and labour of an economy determines its output. Finally, technology is thought to augment labour productivity in such a way that it increases the output capabilities of labour. The basic neoclassical production function can be written as:

ISSN: 2455-3220
Volume 04 Issue 10
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Y = F(K,L).

Where;

Y = Level of output

K = Capital formation

L = Labour force

However, the model may be criticised for failing to provide any explanation of how and why technology affect economic growth. In addition, the exogenous growth model may be criticised for neglecting entrepreneurship which is argued to have a strong impact on economic growth (Braunerhjelm, 2008; Audretsch et al, 2006).

Endogenous growth theory which was advanced by Romer (1986, 1990) and Lucas (1988) holds that economic growth is primarily the result of endogenous and not external forces (Romer, 1994). Endogenous growth theory holds that investment in human capital, innovation and knowledge are significant contributors to economic growth. The theory also focuses on positive externalities and spillover effects of a knowledge-based economy which will lead to economic development. The theory primarily holds that the long-run growth rate of an economy depends on policy measures. This implies that policies that embrace openness, competition, change and innovation will promote growth (Fadare, 2010). Conversely, policies that have the effect of restricting or slowing change by protecting or favouring particular existing industries or firm are likely, over time, to slow growth to the disadvantage of the community. However, the model has been criticised in the economic literature. For example, Parente (2001) argued that the endogenous growth theory, even though being more complex, still fails to explain why there is a divergence in the national income per capita in emerging economies and developed countries.

The institutional quality hypothesis contends that the institution framework within which economic agents interact with each other in an economy affects economic development. According to this view, what matters most are the rules of the game in a society which are defined by the prevailing explicit and implicit behavioural norms and their ability to create appropriate incentives for desirable economic behaviour. North (1990) advocated the primacy of institutional quality as the fundamental or deep determinant of per capita income levels and growth rates. North (1990) through his study Institutions, Institutional Change and Economic Performances" suggests institutions are the primary cause of economic development and hypothesizes that they matter for short and long term growth. He outlines a clear institutional framework based on a proper setting of property rights structure when he observes that:

> *"We have only to contrast the organization of production in a third world economy with that of an advanced industrial economy to be impressed by the consequences of poorly defined and/or ineffective property rights. Not only will the institutional framework result in high costs of transacting in the former, but also insecure property rights will result in using technologies that employ little capital and do not entail long-term agreements… moreover such Mundane problems as the inability to get spare parts or a two year wait to get a telephone installed will necessitate a different organization of production than an advanced country requires. A bribe sufficient to get quick delivery through the maze of import control or get rapid telephone installation may exist, but the resultant shadow transactions costs significantly alter relative process and consequently the technology employed" (North, 1990).*

The constraints suggested by North (1990) range from formal to informal. At one extreme the constraints are such as constitutions and laws governing economics and politics and at the other are such as taboos, customs, traditions and beliefs. These formal and informal rules and constraints and their enforcement outcomes would subsequently define the incentives and wealth maximizing opportunities of individuals and firms. In an environment with weak institutions, agents or firms typically cannot engage in complex, long-term and multiple- contract

ISSN: 2455-3220
Volume 04 Issue 10
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exchanges with effective enforcement. A relatively good property rights structure that encourages long-term contracting is undoubtedly essential for the creation of capital markets and economic growth (Aron, 2000).

2.3 Empirical Literature Review

This section presents a review of empirical literature of the subject matter. The empirical review is presented as follows:

2.3.1 Institutional Quality and Economic Growth

Knack and Keefer (1995) examined the relationship between institutional quality and economic growth in Pakistan. The study used political rights, civil liberties and property right as proxies for institutional quality and real GDP growth rate as a proxy for economic growth. The study employed Engle-Granger two step modeling. Their result showed that political rights and civil liberties have no significant impact on economic growth. Their result also indicated that property rights are significant determinant of economic growth.

Hall and Jones (1999) carried out a study on the impact of institutional quality on economic growth in Nigeria using rule of law, corruption in government, quality of bureaucracy and government effectiveness as proxies for institutional quality and real GDP as a proxy for economic growth. The study used Ordinary Least Square (OLS) .The result of the study revealed a positive and significant relationship between institutional quality and economic growth. The level of corruption in government was found to have a negative impact on economic growth in Nigeria.

Onyebuchi and Egbule (2001) also investigated the relationship between institutional quality and economic performance. They featured voice and accountability, government effectiveness and regulatory quality as variables for institutional quality and real per GDP growth rate for economic growth. The study applied the unit root test and co-integration to evaluate the variables. The result shows a significant weak relationship between institutional quality and economic performance in Nigeria.

Vijayaraghavan and Ward (2001) in their study on empirical relationship between institutions and economic growth in India, used property rights, structure of governance, size of the government and political freedom as variables for institution and real GDP growth rate as a proxy for economic growth. The study employed some econometric techniques such as Ordinary Least Square (OLS), Augmented Dickkey-Fuller (ADF) unit root test and Granger causality test. Their results indicate that well defined property rights and the size of the government are significant determinants of institutional quality which in turn impacts positively on economic growth.

Ulubasiglu and Doucouliagus (2004) explore the relationship between institutional quality and economic performance for the period 1990 to1999, using a sample of 119 countries. They use simultaneous model for econometric analysis, using two proxies for institutional quality, one for political freedom and second for economic freedom .Their findings indicate that, political freedom has positive impact on human capital and total factor productivity (TFP) and physical capital.

Klomp and Haan (2009) examined the relationship between institutional quality and volatility of economic growth for 116 countries for the period 1960 to 2005 using different indicators for political administration like political stability, regime types and uncertainty of policy and a real GDP growth rate as a proxy for economic growth. The study employs specific to general approach and finds that uncertainty and unstable democratic regime and economic growth volatility are negatively related to each other.

Hasan et al (2009) investigated the relationship between institutional quality and economic growth in Nigeria from 1990 to 2003. They used government effectiveness, voice and accountability and ease of doing business as proxies for institutional quality and real GDP as a proxy for economic growth. They applied Generalised Method of Moment (GMM) for analysis. The result shows a significant relationship between institutional quality and economic growth in Nigeria.

Ukpatu (2009) investigated the relationship between institutional quality and economic growth over the period 1990 to 2005 using voice and accountability, government effectiveness, ease of doing business, absence of quality of government and corruption as proxies for institutional quality. The study applied Autoregressive Distributed Lag (ARDL). The result shows that a negative relationship exist between institutional quality and economic growth in Nigeria

Basu and Das (2010) used the generalized kernels estimation method to examine the relationship between

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institutions and economic growth based on data for 102 countries from 1991 to 2008. Their result indicated that the effect of institutional quality on economic growth and development is heterogeneous across countries and with respect to time.

Angel and Kut (2011) examined the relationship between institutional quality and economic growth in Nigeria over the period 1990 to 2010 and made use of civil liberties, number of veto player, quality of government and democratic accountability as proxies for institutional quality and real GDP growth rate as proxy for economic growth. The study used the Multivariate Vector Error Correction approach. Their result indicated a positive significant relationship between institutional quality and economic growth.

Valeriani and Peluso (2011) studied the impact of institutional quality on economic growth and development using three institutional indicators (civil liberties, numbers of veto players and quality government). The study used the Ordinary Least Square regression. Their result revealed that institutional quality does impact positively on economic growth.

2.3.2 *Social Infrastructure and Economic growth*

Aschauer (1990) carried out investigation on the impact of social infrastructure on economic growth in Nigeria. He used total road length, electricity generation capacity and better health delivery service as proxies for social infrastructure and real GDP as a proxy for economic growth. The study used the Ordinary Least Squares (OLS) regression technique. The result revealed a positive causal relationship between infrastructure and economic growth in Nigeria.

Delong and Summer (1991) investigated the relationship between social infrastructure and economic growth in Pakistan. They use total road length and better health delivery service as proxies for social infrastructure and GDP per capita as a proxy for economic growth. The study used Ordinary Least Square (OLS) technique. Their result revealed that social infrastructure has a positive relationship with economic growth.

Ekpenor and Jethro (1993) examined the relationship between social infrastructure and economic growth in Nigeria. The variables used are total road length, electricity generation capacity and educational enrolment as proxies for infrastructure and real GDP for economic growth. The study applied some econometric technique such as Ordinary Least Square (OLS), Augmented Dickey-Fuller (ADF) unit root test and Granger Causality test. The result revealed that social infrastructure has a weak relationship with economic growth.

Stanley and Tom (2000) investigated the relationship between social infrastructure and economic growth in Nigeria. The variables used as proxies for social infrastructure are educational enrolment, better roads and number of passenger vehicles. Real GDP was used as a proxy for economic growth. The study used Augmented Dickey-Fuller (ADF) unit root test and Granger Causality test. Their result revealed a positive relationship between social infrastructure and economic growth in Nigeria.

Buduka and Ukpata (2001) examined the relationship between social infrastructure and economic growth in Nigeria. They used the variables better health delivery service, educational enrolment and electricity generation capacity as proxies for social infrastructure and real GDP as a proxy for economic growth. The study adopted the Ordinary Least Square (OLS) of multiple regression.Their result revealed a positive relationship between social infrastructure and economic growth in Nigeria.

Also, Perkins, Fedderke and Luiz (2005) investigated the relationship between infrastructure and economic growth in South Africa using the Autoregressive Distributed Lag (ARDL) technique to focus specially on the question of causality, while taking into account the time trend in the data. They find that the direction of forcing varied across the different infrastructural measures:

Owolabi-Merus (2015) investigated infrastructure development and economic growth nexus in Nigeria through the use of Ordinary Least Square(OLS) technique and Augmented Dickey-Fuller (ADF) unit root test. The study covered the period from 1992 to 2013 and used gross fixed capital formation (GFCF) as a proxy for infrastructure and GDP as a proxy for economic growth. The result indicated that a positive and significant relationship exists between infrastructure and economic growth in Nigeria.

Michael (2016) examined the dynamics of infrastructure and economic growth in Nigeria covering the period from 1991 to 2013. He used the Ordinary Least Square (OLS) estimation approach to run the regression. The

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result indicated that infrastructure has a positive linkage with economic growth. The result further suggests that the development of infrastructure creates multiple-year positive impacts on private capital formation and employment. This shows that infrastructure is an integral part of economic growth of Nigeria and as such undermining it (infrastructure) is undermining the growth and development of Nigeria's economy.

2.3.3 *Social Infrastructure, Institutional Quality and Economic Growth*

Investigating the relationship between social infrastructure, institutional quality and economic performance in Nigeria, Manager and Fred (1990) used real GDP as a proxy for economic performance and government effectiveness, control of corruption and total road length as proxies for institutional quality and infrastructure respectively. The study adopted Ordinary Least Square (OLS) of multiple regression approach. Their result revealed a positive relationship between the variables contained in the model and economic performance except control of corruption that did not show any positive impact on economic performance.

Emperor, Jude and Padmor (1992) investigated the relationship between social infrastructure, institutional quality and economic growth in Nigeria. They used real GDP as a proxy for economic growth and voice and accountability, ease of doing business, government effectiveness, better health service, electricity generation capacity, corruption control and total road length as proxies for social infrastructure and institutional quality respectively. The study applied Johansen cointegration techniques. Their result indicated a positive relationship between the variables contained in the model and economic growth except electricity generation capacity that did not indicate any good impact on economic growth.

Tempest and Oguntuase (1994) examined the impact of social infrastructure and institutional quality on economic performance in Nigeria. The study used real gross domestic product (RGDP) as a proxy for economic growth, government effectiveness, control of corruption, better health delivery service and total road length as proxies for institutional quality and social infrastructure respectively. The economic tools used for analysis are Augmented Dickey-Filler (ADF) unit root test, autoregressive distributed lag (ARDL) technique and the error correction mechanism (ECM.) Their result indicated that a negative relationship exists between social infrastructure, institutional quality and economic growth.

Brodrick and Fortune (1998) investigated the relationship between social infrastructure, institutional quality and economic growth in Nigeria using real GDP as a proxy for economic growth, voice and accountability and ease of doing business as proxies for institutional quality and total road length and better health service as proxies for social infrastructure. The study used Auto-regressive Distributed Lag (ARDL) technique as analytical tools. The result indicated a weak relationship between social infrastructure, institutional quality and economic growth.

Tango and Ugbada (2000) examined the relationship between social infrastructure, institutional quality and economic growth in Nigeria. The study featured real GDP as a proxy for economic growth, kilometer of tarred roads, electricity generating capacity, control of corruption and regulatory quality as proxies for social infrastructure and institutional quality respectively. The econometric tools used for analysis are the Ordinary Least Square (OLS) technique. Their result indicated that negative relationship exists between social infrastructure, institutional quality and economic growth.

Akpakot and Roland (2000) examined the relationship between social infrastructural development, institutional quality and economic growth in Nigeria using the variables such as government effectiveness, control of corruption, and regulatory quality as proxies for institutional quality, environmental quality, public health improvement and gross fixed capital formation as proxies for social infrastructure and real GDP as a proxy for economic growth. The study used OLS and their result indicated a weak relationship between social infrastructure, institutional quality and economic growth.

Okute and Igbor (2002) in their investigation on the relationship between social infrastructure, institutional quality and economic growth in Nigeria, used ease of doing business, government effectiveness and regulatory quality as proxies for institutional quality, total road length, environmental quality and public health improvement as proxies for social infrastructure and real GDP as a proxy for economic growth. The econometric instruments used are Johansen cointegration and Augmented Dickey-Fuller unit root test. Their result indicated a positive relationship between institutional quality, social infrastructure and economic growth.

International Journal for Social Studies
Available at https://pen2print.org/index.php/ijss/
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Basil (2003) investigated the relationship between institutional quality, social infrastructure and economic growth in Nigeria using real GDP as a proxy for economic growth, political stability, government effectiveness and ease of doing business as proxies for institutional quality and environmental quality, public health improvement and total road length as proxies for social infrastructure. The Augmented Dickey-Fuller test, Johansen cointegration test, Error Correction Method (ECM) and Granger Causality test were employed as analytical tools in the study. His result indicated a positive relationship between institutional quality, infrastructure and economic growth.

Okoh and Ebi (2013) examined the relationship between social infrastructure, institutional quality and economic growth in Nigeria from the period 1990 to 2010. The study used contract enforcement, control of corruption better health delivery service and educational enrolment as proxies for institutional quality and social infrastructure respectively and real GDP as a proxy for economic growth. Their result indicated a positive and significant relationship between social infrastructure, institutional quality and economic growth. On the other hand, the level of corruption was found to have a negative effect.

The literature reviewed indicated that the results are inconsistent on the relationship between institutional quality and economic growth, social infrastructure and economic growth and social infrastructure, institutional quality and economic growth considering the variables under investigation. Furthermore, none of these studies reviewed covers the subject matter for the period of 1990 to 2016. Also, the variables financial system efficiency (FSE), corruption perception index (CPI) government efficiency (GEF) used in this study were not used by the scholars of the literature reviewed. In the same vein, patient-physician ratio (PDR), secondary school enrolment (SDR) and tertiary institution enrolment (TSR) which are proxies for social infrastructure in this study were not used by the scholars in the literature reviewed. In addition, this study adopted the Philip-Perron approach which was not adopted in the works reviewed, hence the justification for this

3 Method of the Study

This section presents an outline of the procedure that was employed for the collection and analysis of the study data. Specifically, it includes the research design, model specification, the variables, data collection/sources and methods of data analysis.

3.1 Research Design

The study adopted the quasi experimental design. It enables the researcher to observe the effects of the explanatory variables on the explained variable.

3.2 Model Specification

This study requires two models for the achievement of the three specific objectives. Consequently, the various models are specified as follows:

3.2 1 Model 1

Model 1 which is for the achievement of specific objective one is adopted from the model specified by Hall and Jones (1999) with some modifications. The model examines the relationship between corruption perception, effectiveness of government, economic freedom, financial system efficiency, and quality of regulations as proxies for institutional quality and real GDP Model 1. is mathematically specified as follows:

$$RGDP = F(CPI, EFR, FSE, RLQ, GEF) \quad 3.1$$

The model is transformed into the following econometric model

$$RGDP = \beta_0 + \beta_1 CPI + \beta_2 EFR + \beta_3 FSE + \beta_4 RLQ + \beta_5 GEF + U \quad 3.2$$

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Where:

RGDP = Real GDP Growth Rate (proxy for economic growth)

CPI = Corruption Perception Index.

EFR = Economic Freedom.

FSE = Financial System Efficiency.

RLQ = Regulatory Quality.

GEF = Government Efficiency.

$\beta_1 \ldots \beta_5$ = Parameters to be estimated.

U = Random variable to account for other variables which influence RGDP but which are not included in the model

3.2.2 Model 2

Model 2 is designed for the achievement of specific objective two is adopted from the model specified by Stanley and Tom (2000) with some modifications. The model featured educational enrolment, and patients –doctors ratio as proxies for social infrastructure and real GDP as a proxy for economic growth. Model 2 is mathematically specified as follows: RGDP = F(PDR, SDR, TSR,) 3.3

The mathematical model is transformed into the following econometric model:

$RGDP = a_0 + a_1PDR + a_2SDR + a_3TSR + U$ 3.4

Where;
RGDP = Real GDP growth rate (proxy for economic growth)
PDR = Patient –Physician Ratio.
SDR = Secondary School Enrolment.
TSR = Tertiary Institutions Enrolment
$a_1 \ldots a_3$ = Parameters to be estimated.

U = Random variable to account for other variables which influence RGDP but which are not included in the model.

3.3 Data Required and Sources

The data required for this study are:
(i) Real Gross Domestic Product Rate (RGDP).
(ii) Government Efficiency (GEF).
(iii) Regulation Quality (RLQ).
(iv) Corruption Perception Index (CPI).
(v) Financial system Efficiency (FSE).
(vi) Economic Freedom (EFR).
(vii) Patients – Physicians Ratio (PPR).
(viii) Secondary School Enrolment (SDR).
(ix) Tertiary – School Enrolment (TDR).

The data used for the study are secondary in nature and were collected from 1990 to 2016

Data for real economic growth, and patient – doctor ratio were taken from the World Development Indicators (WDI) on the internet. Data for secondary school enrolment and tertiary enrolment were collected from the Nigeria Bureau of Statistics (NBS, various issues) and the ,Central Bank of Nigeria (CBN) Statistical Bulletin (various issues). Data base of political institution, and journals.

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The data collected were on real gross domestic product rate, government efficiency, regulatory quality, corruption perception index, financial system efficiency, economic freedom, patients - physicians ratio, secondary school enrolment and tertiary school enrolment.

3.5 Methods of Data Analysis

In order to estimate the relationship between institutional quality and economic growth in Nigeria , the Engle –Granger Error Correction Model approach was adopted. The Engle –Granger Error Correction approach involves three important steps as follows:

a**) Unit Root Test:** it is important to examine time series variables for unit root to avoid the possibility of spurious regression, 4nd to ascertain the order of integration of the variables. The Philip-Perron (pp) unit root test was utilized (Phillips- Perron,1988).

(b) Co-integration Test: Economically, variables are co-integrated if they have a long-term, or equilibrium relationship between them. If co-integration exists, then, their relationship can be model and estimated as error correction model. In the light of this, this study adopted the Johansen co-integration approach (Johansen' 1992)

(d) The Error Correction Model estimate: After testing for unit roots and co-integration, the short-run dynamics specified and estimated using the error correction models. In the light of this, the parsimonious Error Correction Model (ECM) model was estimated to determine the model parameter estimates This is based on the Granger Representation Theory (GRT) which states that if two or more variables are co-integrated then the relationship between the variables can be expressed as Error Correction Model (Engle and Granger, 1987). The estimates were examined for significance at 0.05 levels.

4 Empirical Results and Discussion

This section presents the available data for analysis, analyzed and discussed the empirical findings

4.2.1 Unit Root Test

It is an established fact that econometric estimation of a model based on time series data assumes that the time series are stationary. Non-stationary series give rise to spurious result. Therefore, the estimate begins by conducting stationarity test to ascertain the stationarity of the variables, order of integration and for appropriate specification. The unit root results are shown in table 4.2.

Table 4.2: Unit Root Test Result Phillips -Perron

Variables	Level	1st Difference	Integration order
CPI	-1.580636	-5.310339	1(1)
SDR	5.908700	-4.496079	1(1)
EFR	1.445513	-5.356588	1(1)
FSE	-0.011427	-5.165042	1(1)
POR	1.294095	-4.898979	1(1)
RGD	2.571907	-5.630121	1(1)
TSR	4.931907	-4.854595	1(1)
RLQ	0.097699	-11.42252	1(1)
GEF	-0.669694	-4.997561	1(1)

Source: **E-view computer print out**

From table 4.2 the Philip-Perron (PP) test indicates that all the variables are stationary at first difference. Given that the variables are stationary at first difference, there is the need to examine the differenced variables for co-integration Thus, the analysis proceeded to testing for co-integraion among the variable using Johansen co-integration technique. The results of the co-integration test is presented in Table 4.2 below

Johansen Co-integration for Economic Growth and Institutional Quality Models

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Tabbe 4.2 : Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.794153	112.2285	83.93712	0.0001
At most 1 *	0.744434	72.71290	60.06141	0.0030
At most 2	0.430237	38.60602	40.17493	0.0713
At most 3 *	0.401865	24.54266	24.27596	0.0463
At most 4	0.340031	11.69418	12.32090	0.0635
At most 5	0.050866	1.305131	4.129906	0.2960

Trace test indicates 2 cointegratingeqn(s) at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 4.2b: Unrestricted Co-integration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.794153	39.51561	36.63019	0.0224
At most 1 *	0.744434	34.10688	30.43961	0.0166
At most 2	0.430237	14.06336	24.15921	0.5949
At most 3	0.401865	12.84848	17.79730	0.2377
At most 4	0.340031	10.38905	11.22480	0.0699
At most 5	0.050866	1.305131	4.129906	0.2960

Max-eigen value test indicates 2 cointegratingeqn(s) at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

The Johansen co-integration technique was employed to perform the co-integration test. Table 4.2 a and 4.2b show the Johansen co-integration test result for the first model. Johansen co-integration test uses two statistics to determine the number of co-integrating equations. The two test statistics are the trace and maximum Eigen value test statistics. The values of these statistics as shown in table 4.2a and 4.2b are greater than the critical values at 0.05 level of significance. This means that there exists a long run relationship among the variables. Both the trace and maximum Eigen value criteria reject the null hypothesis of at most none co-integrating vector against the alternative of at most one co-integrating equation for institutional quality and economic growth model. The trace statistic test indicates 2 co-integrating equations at the 0.05 significance level. The maximum Eigen value test, also, indicates 2 co-integrating equations at 0.05 levels of significance.

Co-integration Test for Social Infrastructure - Growth Model.
Series: RGDP PDR SDR TSR
Table 4.2c**: Unrestricted Co-integration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.607672	61.99564	40.17493	0.0001
At most 1 *	0.604916	38.60422	24.27596	0.0004
At most 2 *	0.457661	15.38781	12.32090	0.0148

At most 3	0.003642	0.091208	4.129906	0.8040

Trace test indicates 3 cointegratingeqn(s) at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 4.2d:Unrestricted Co-integration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.607672	29.39143	24.15921	0.0033
At most 1 *	0.604916	23.21641	17.79730	0.0069
At most 2 *	0.457661	15.29660	11.22480	0.0092
At most 3	0.003642	0.091208	4.129906	0.8040

Max-eigenvalue test indicates 2 cointegration at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 4.2c and 4.2d shows the Johansen result for social infrastructure and economic growth model. The trace statistic indicates 3 co-integrating equations at 0.05 level of significance while the maximum Eigen value indicates 2 co-integrating equations at 0.05. The Trace is a better test compared to the maximum Eigen (Chang & Lai, 1993). Given the above results, the null hypothesis of no co-integrating is rejected, and the alternative hypothesis of at least 2 co-integrating equation is maintained. The result established the existence of long run relationship among the social institutions variables and economic growth

4.2.3a Lag Selection Criteria

The lag order selection criteria employed in the study are the popular econometrics model selection criteria. The results is presented below

Table 4.4: Lag Order Selection Criteria Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-562.9103	NA	4.08e+11	43.76233	44.05266	43.84594
1	-470.6040	134.9092*	5.83e+09*	39.43108*	41.46339*	40.01631*

** 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

T

The lag order selection criteria shows that the optimum lag order for the model is the one that contain one lag of the variables for the institutional quality economic growth model

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4.2.3b Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-358.9136	NA	47762277	29.03308	29.22810	29.08717
1	-263.9615	151.9233*	88191.85*	22.71692*	23.69202*	22.98737*
2	-251.8807	15.46341	135135.5	23.03045	24.78564	23.51727

** 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

The result of the maximum lag selection for social infrastructure growth model is shown in table 4.8. The result indicates that the maximum lag for the model is also 1. Having determined the maximum lag order of the empirical, the analysis proceeded to examining the error correction model

4.2.4a Parsimonious Error Correction Model Result for Institutional Quality and Economic Growth

Having established the existence of co-integrating equation, using Johansen technique, we take a step further to investigate the dynamics of the model hypothesized.

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Table 4.5a: Parsimonious Error Correction Mode Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19290.18	8711.438	2.214351	0.0392
D(CPI-1)	-0.871879	1588.061	2.495691	0.0258
D(EFR-1)	0.322137	3255.927	-2.020335	0.0204
D(FSE-1)	3.085073	1788.698	-2.172476	0.0049
D(RLQ-1)	1.452564	53707.61	-0.270458	0.7897
D(GEF-1)	1.258692	36994.01	0.340242	0.7374
ECM(-1)	-0.513713	0.125819	-2.108987	0.0144
R-squared	0.790929			
Adjusted R-squared	0.696146			

Source: **E-view computer print out**

The table 4.5 reports the parsimonious estimated equation. The result from table 4.5 shows that the coefficient of the error correction term (ECM) is well specified and it is significant with the p value of 0.0144. This buttresses our earlier conclusion that economic growth and its regressors (Institutional quality) are indeed co-integrated. The speed of adjustment is the coefficient of the error correction term (ECM). The coefficient of the error correction term (ECM) is -0.513713 which suggest a moderate adjustment process. About 51 percent of deviation from the long run equilibrium relationship which exists between RGDP (Economic Growth) and its determinant (Institutional quality) are corrected for within one year. Thus there is a valid error correction mechanism in the model

The explanatory variables explain about 70 percent of the variation in the explained variable (RGDP). This is confirmed by the value of the adjusted coefficient of determination. The Durbin-Watson test statistic shows that there is no serial correlation among the variables. The result of the F-Statistic shows the model is correctly specified and has a very good fit given its probability value of 0.000214.

Corruption proxy by corruption perception index (CPI) has a negative coefficient and it is statistically significant, and has the theoretical expectation sign. This result supports the cog in the wheel hypothesis and also Felix (2015), who established that corruption is a clog in the wheel of economic growth. Corruption perception index (CPI) proxy for corruption) has a coefficient of -0.871879 with a p value of 0.0258 which buttresses its significance. The implication is that corruption (CPI) affect economic growth negatively. A percentage increase in corruption will all things being equal reduce economic growth (RGDP) by 0.9 percent.

Economic freedom (EFR) another proxy for institutional quality has a positive coefficient of 0.322 and is statistically significant; the coefficient is in line with theoretical expectation for the variables. This result shows that there is positive relationship between economic growth (RGDP) and institutional quality proxy by economic freedom. This means one percent increase in economic freedom will increase economic growth by 0.3 percent.

Financial system efficiency (FSE) has a positive coefficient of 3.0850 and it is statistically significant at 0.05 levels. the coefficient conforms to the *a priori* expectation for this variable. This implies that a percentage increase in financial system efficiency will, all things being equal, increase economic growth by 3.1 percent.

Regulatory quality (RLQ) has a positive but t statistically insignificant coefficient. The reason for this lack of statistical significance may emanate from the poor regulatory system in Nigerian economy. Government efficiency (GEF) has a positive but insignificant coefficient of 1.2586. the insignificant coefficient contradicts the *a priori* expectation for this variable

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4.2. Parsimonious Error Correction model of Social Infrastructure and Economic Growth

Having established the existence of co-integrating vector in model 2, the error correction model was specified and estimated. The result of the parsimonious error correction model is shown below.

Table 4.9: Parsimonious Estimate for Social Infrastructure and Economic Growth Model.

Dependent Variable: D(RGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0 .064576	6824.611	3.876962	0.0009
D(PDR-1)	0.516323	274180.4	-2 .883155	0.0036
D(SDR-1)	0.539995	2045.605	-5.084044	0.0008
D(TSR-1)	0.869808	13204.31	2.643257	0.0152
ECM(-1)	-0.684657	0.125381	-2.675196	0.0069
R-squared	0.570464			
Adjusted R-squared	0.488647			
F-statistic	6.972483	Durbin-Watson stat		2.017996
Prob(F-statistic)	0.000979			

Source: **E-view computer print out**

Table 4.9 shows the result of the parsimonious estimated equation. The over parameterized is reported in the appendix. The result from table 4.8 shows that the coefficient of the error term is well specified and it is significant with the p value of 0.0069, supporting our earlier conclusion that economic growth and its determinants or regressor are cointegrated. The coefficient of the error term (ECM) is negative – 0.684657 which means that about 70 percent of the deviation from the long run equilibrium relationship between economic growth (RGDP) and its determinants are corrected. This result shows a speedy adjustment process.

From table 4.9, the coefficient of the intercept(C) is 0.06 and it is statistically significant given its probability value of 0.0009. This implies that if all the variables are held constant economic growth rate will be at0.06 percent.

Patient – physician ratio (PDR) has a positive coefficient of0.516323 and it is statistically significant, thus, confirming the *apriori* expectation. This implies that a positive and direct relationship exist between economic growth and patient – physician ratio, aproxy for social infrastructure. Given that health is wealth, the right physician – patient ratio the healthier the population all things being equal and the reduction in man hour lost to sickness or ill health. Thus, the more productive the population will be given rise to economic growth.

Secondary school enrolment (SDR) a proxy for social infrastructure has a positive coefficient of 0.539 and it is statistically significant given its probability value of 0.0008 and therefore confirming our *aprori* expectation. This implies that a positive relationship exist between secondary school enrolment and economic growth. A percentage increase in secondary school enrolment will result to 0.539 percent increase in economic growth all things being equal. The higher the rate of enrolment, the greater the percentage of the population, whose cognitive, affective and psychomotor domain are developed. Given the development of their cognitive and psychomotor domain, they will contribute positively to economic growth all things being equal.

Tertiary Institutions Enrolment (TSR), a proxy for social infrastructure also has a positive coefficient of 0.869 and it is statistically significant given its probability value of 0.01 and it confirms to our *apriori* expectation. This means a positive or direct relationship exist between economic growth and social infrastructure, proxy by

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tertiary institutions enrolment (TSR). One percent increase in tertiary institutions enrolment all things being equal, will result to 0.869 percent increase in economic growth in Nigeria. The reason for this positive relationship is not farfetch. The higher the educational attainment of an individual the more the skills acquired by him or her and the more productive he or she will be, all things being equal. Thus, the more he or she will contribute to economic growth. It is this positive relationship between tertiary institutions enrolment and economic growth that gave to the assertion that education is the bed rock of any nation

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4.2.6a Granger Causality Result for Economic Growth and Institutional Quality

Table 4.6 Granger Causality Result

Null Hypothesis:	Obs	F-Statistic	Prob.
CPI does not Granger Cause RGDP	25	0.09290	0.9117
RGDP does not Granger Cause CPI		0.62551	0.5451
EFR does not Granger Cause RGDP	25	8.41217	0.0019
RGDP does not Granger Cause EFR		0.50386	0.6117
FSE does not Granger Cause RGDP	25	5.24545	0.0357
RGDP does not Granger Cause FSE		0.77425	0.4744
RLQ does not Granger Cause RGDP	25	3.03593	0.0432
RGDP does not Granger Cause RLQ		0.10204	0.9035
GEF does not Granger Cause RGDP	25	0.00114	0.9989
RGDP does not Granger Cause GEF		1.50936	0.2452
EFR does not Granger Cause CPI	25	0.38864	0.6830
CPI does not Granger Cause EFR		0.62839	0.5437
FSE does not Granger Cause CPI	25	1.57265	0.2321
CPI does not Granger Cause FSE		1.84664	0.1837
RLQ does not Granger Cause CPI	25	0.52592	0.5990
CPI does not Granger Cause RLQ		1.69019	0.2098
GEF does not Granger Cause CPI	25	0.87793	0.4311
CPI does not Granger Cause GEF		6.43049	0.0070
FSE does not Granger Cause ERF	25	0.46061	0.6374
EF does not Granger Cause FSE		0.22401	0.8013
RLQ does not Granger Cause EFR	25	1.31341	0.2911
ERF does not Granger Cause RLQ		0.24593	0.7843
GEF does not Granger Cause EFR	25	0.97829	0.3932
EFR does not Granger Cause GEF		4.00814	0.0344
RLQ does not Granger Cause FSE	25	1.30584	0.2931
FSE does not Granger Cause RLQ		0.30329	0.7417
GEF does not Granger Cause FSE	25	1.93056	0.1712
FSE does not Granger Cause GEF		0.05985	0.9421
GEF does not Granger Cause RLQ	25	0.18907	0.8292
RLQ does not Granger Cause GEF		0.15657	0.8561

Source: E-view computer print out

The granger causality result is shown in table 4.6. The result shows that corruption does not granger cause

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economic growth. Financial system efficiency (FSE) Granger cause economic growth, given its p value of 0.035 and it is unidirectional causation. Economic freedom (EFR) Granger cause economic growth. Its p value is 0.001 and it is unidirectional causation. Regulatory quality (RLQ) does Granger cause economic growth.

4.2.5b Granger Causality Test for Social Infrastructure Economic Growth Model

Table 4.10 Granger Causality Result

N ull Hypothesis:	Obs	F-Statistic	Prob.
PDR does not Granger Cause RGDP	25	7.21441	0.0179
RGDP does not Granger Cause PDR		0.12446	0.8836
SDR does not Granger Cause RGDP	25	1.66661	0.2141
RGDP does not Granger Cause SDR		0.37680	0.6908
TSR does not Granger Cause RGDP	25	5.23853	0.0027
RGDP does not Granger Cause TSR		0.20271	0.8182
SDR does not Granger Cause PDR	25	1.42516	0.2639
PDR does not Granger Cause SDR		7.78325	0.0032
TSR does not Granger Cause PDR	25	3.61538	0.0457
PDR does not Granger Cause TSR		1.27709	0.3006
TSR does not Granger Cause SDR	25	5.90349	0.0097
SDR does not Granger Cause TSR		0.62436	0.5457

Source: E-view computer print out

The result of the Granger causality test shown in table 4.10 depicts that patient physician ratio granger cause economic growth, tertiary institution enrolment also granger cause economic growth. But economic growth Granger cause secondary school enrollment. causality are unidirectional in all.

4.11 Stability of the Result

The stability of the model is tested using the cusum test. The result of the cusum test is shown in figure 4.1 and shows that the model is stable, because the graph remained within the acceptance region throughout the period of the study. indicating that the model estimate is good.

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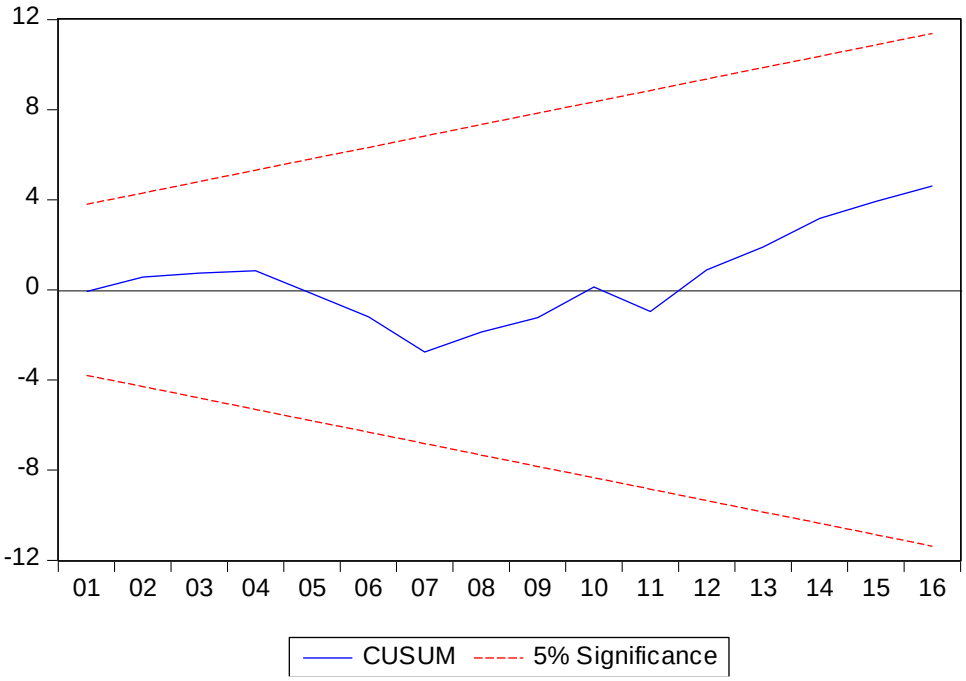
Figure 4.1: CUSUM Test Result



5 Summary and Conclusion

This study examined the relationship between social infrastructure, institutional quality and economic growth in Nigeria from 1990 to 2016. Some relevant theoretical literature which are the neoclassical and endogenous growth theories and the institutional the study employed the Engle-Granger Error Correction approach The result indicated that all the variables are stationary at first difference. The result also shows that corruption perception index (CPI) a proxy for institutional quality has a negative coefficient but statistically significant. The result also shows a positive relationship between economic freedom of exchange (EFR) and economic growth. Also, financial system efficiency (FSE) has a positive coefficient and it is statistically significant.. Regulatory quality (RLQ) and government efficiency have positive coefficient but not statistically significant.

Furthermore, patient physician ratio (PDR), secondary school enrolment (SDR) and tertiary institution enrolment (TSR) which are proxies for social infrastructure have positive coefficient and are statistically significant. They have direct positive relationship with economic growth. The findings of the study could be summarized as follows:

i. Economic freedom had positive and significant impact on economic growth in Nigeria during the period under review.

ii. Financial system efficiency had positive and significant effect on economic growth during the period of the study.

iii. Regulatory quality had positive, but insignificant effect on economic growth during the period of the study.

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iv. Efficiency of government has positive but insignificant effect on economic growth in Nigeria during the period of the study.

v. There is a stable long run relationship between institutional quality variables and economic growth.

vi. Institutional quality variables accounted for about 79% variation in economic growth.

vii. Patient-Doctor Ratio had positive and significant relationship with economic growth.

viii. Secondary school enrolment ratio has positive and significant impact on economic growth.

ix. Tertiary education enrolment ratio has positive and significant impact on economic growth in Nigeria.

The findings of the study are in support of the fact that quality institutions and social infrastructure as fundamental for effective and efficient economic growth in Nigeria. This is because institutional quality and social infrastructure have positive effect on economic growth. They both matter for economic growth in Nigeria. Therefore, policy makers should give attention to corruption which is inimical to economic growth and ensure enhancement of regulatory quality and government efficiency in Nigeria. Quality institution provides conducive environment for innovation and adoption technology and more generally an incentives to invest in innovative ideas as well as human and physical capital. There should be a change of attitude towards strengthening and development of the country's institutions fiber .the government at all levels should enhance the quality of all institutions or at least quality of social and economic institutions in the country.

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