



Validating Public Governance Quality Measurement Scale with Application to Domestic Private Investment in Renewable Energy for Electricity Generation

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ABSTRACT

Measurement scale plays an important role in academic research without which an instrument could not be developed. The goal of this study is to validate the measurement scale of public governance quality (PGQ) with application to renewable energy investment by means of comprehensive scale validation procedures. Data was collected from 357 individual key conventional energy stakeholders in Nigeria using survey questionnaires. Confirmatory Analysis (CFA) using SPSS version 25 and PLS-SEM version 3.8 was used to determine the reliability and validity of the measures of PGQ. The results from the study offer proof that the measurement scale of the PGQ has fulfilled the standards for reliability and validity. Practically, the validated scale introduced acts as a measurement for PGQ in the area of renewable energy domestic private investment. Also, the validated scale may be used to determine investors' view regarding PGQ in a country or entity as to whether the level of governance is below average, average or high which consequently influence renewable energy investment. Still, it may be used to determine the effect of PGQ on investment intentions and/or behaviours when engaging with domestic investors. In due course, the measurement scale will allow policy makers across the globe to adapt energy investment decisions that will draw domestic private investment particularly in renewable energy based on researches conducted using the scale.

Keywords: Public Governance Quality, Renewable Energy, Investment, Validation, Measurement Scale, Energy Stakeholders

JEL Classifications: Q20, Q28, Q29

1. INTRODUCTION

The current literature has established the important relation between public governance quality (PGQ) and investment specifically foreign direct investment (FDI). However, there is limited empirical evidence linking PGQ with private investments and particularly renewable energy investment. Thus, the need to provide a validation for PGQ dimensions with application to private investments such as renewable energy to serve as a measurement scale to be used in the domain of private investment specifically the energy context.

Providing electricity is a core government obligation, a pillar for sustainable growth and prosperity for all countries. The pivotal role of

electricity in the socio-economic growth of nations makes electricity targets among the most topical global discussions. For example, the inability of some governments, particularly in developing countries, to link people to the national grid and or off-grid, especially those in rural areas, causes low economic activities and poor living standards (Muhammad, 2012). Similarly, climate goals attract global attention due to the detrimental effects of fossil fuels used in the production of electricity. For instance, greenhouse gas emissions from carbon fuels caused global warming and thus contribute to drought, health issues, and other imbalances in the environment (Mohammed et al., 2013). These problems are immense, to the point that the United Nations Sustainable Development Goals required achieving the assess of new and clean energy that is affordable to everyone (Lund, 2005).

However, renewable energy is seen to be an alternative to traditional power and other electricity sources (Harjanne and Korhonen, 2019). Renewable energy is natural and inexhaustible since it is replenished at a higher pace than it is depleted (IEA, 2018). Besides, it can generate the requisite electricity that is clean and safe as it does not create emissions or pollute the atmosphere (Shaaban and Petinrin, 2014). The use of renewable energy sources for electricity generation would minimize carbon emissions and thus contribute to reaching the Paris Agreement of reducing global warming to below 2°C (Harjanne and Korhonen, 2019). Additionally, renewable energy could boost electricity generation to mitigate the energy poverty because of the high demand due to population growth and new technologies need to be powered by electricity. The need for global electricity is enamoured as it serves as the bedrock upon which economic growth and development are built. In Nigeria for example, electricity is required for the basic development services, including health care, water supply, quality education, telecommunications, and poverty alleviation projects, however, even the social backwardness of the people and untapped economic capacity was attributed to a lack of reliable electricity supply (Sambo, 2009). Nevertheless, due to the need and importance of electricity for both domestic and industrial purposes on one hand and the paucity of public finance in the sector on the other hand, there is the need for an initiative by governments to draw private sector participation (Rodrigue, 2018). This will ensure steady and sustainable electricity. However, it is anticipated that public governance quality can spike the private investors investment intention into renewable energy for electricity generation.

Public governance quality (PGQ) measures the level of good governance among countries and entities. Empirically, it is proved that high level of governance result to the provision of basic amenities and general welfare of the people, summarily, with good governance there will be better wellbeing of the people. However, Nigeria is facing governance challenges as the country performs below average based on the PGQ scale (World Bank, 2019). Therefore, the need for good governance that would consequently attract private investments. It is already a fact that PGQ has become a significant determinant of investment especially foreign direct investment (FDI) (Nazim and Hassan, 2018). However, the association of PGQ and investment in renewable energy is therefore twofold. First, the supply of electricity as a necessity is the prime responsibility of every good government. Second, private investment in the electricity sector must be initiated by the government using favourable policies, creation of an enabling business environment and so on. The present literature offers some insight into the effect of PGQ on FDI (see, for example, Nazim and Hassan, 2018; Wei and Zhou, 2018; Kunsch et al., 2014; Quazi, 2014). Moreover, Muhammad (2016) studied PGQ with application to zakat payments in Nigeria. Alabede et al. (2011) with the application on tax compliance, while Saidu et al. (2016) investigated PGQ in the context of entrepreneurship in Nigerian tertiary institutions. However, literature linking PGQ, and renewable energy investment is currently lacking, thus the need for a measurement scale to measure PGQ to open for research in this context.

Empirically, PGQ dimensions substantially predicts FDI among different countries in the World. However, there is a paucity of such evidence regarding private investment as evident by Su and Bui

(2017). They investigate how PGQ promote private investment in Vietnam. Their study found PGQ to be crucial to improving private investment and further recommend the testing the effect of these PGQ dimensions on individual private investments. Thus, the need to develop a scale for these indicators in this context to bridge this literature gap. This will aid more research within the energy field and particularly the renewable energy which is highly needed for clean electricity. Various researchers agree that good governance plays a crucial role in economic growth, and research undertaken by the World Bank suggests that countries with good governance may draw foreign investment (Burnside and Dollar, 2004). Therefore, it is anticipated that PGQ may determine private investment in renewable energy for electricity generation in Nigeria. In essence, both government and investors need each other. Investors need the government to create a favourable investment climate, while the government needs investors as future taxpayers to raise revenue.

While PGQ is an important variable in both FDI and private investments, its measurement scale with application to energy finance generally and renewable energy particularly is yet to be validated for empirical studies. This is important for a few reasons which serve as the motivation for this study. First, most of the earlier studies in FDI generated data from secondary sources, primary data sources such as the use of questionnaires and or interviews are currently not given adequate attention. Hence, scarce application of PGQ dimensions in the field of private investment. Thus, validation of these measures will encourage researchers to deploy a primary data source instrument in understanding the influence of PGQ on private investment. Second, within the area of energy finance especially for those researchers investigating factors influencing investment intention and behavior, they may wish to explore the impact of PGQ on investment intentions and subsequent behaviors. However, lack of validation of PGQ measures within the field could likely discourage such efforts. Thus, this study found it imperative to validate these measures using a suitable sample to foster further research in the field. Lastly, within the context of energy finance in particular and the private investment in general, the measures of PGQ are yet to be validated (Su and Bui, 2017). So, the current effort of validating these psychometric properties within the context of energy finance would likely foster further research for PGQ with application to FDI and private investment.

Therefore, in line with these motivations, the objective of this paper is to validate the PGQ measurement scale with application to domestic private investment in renewable energy for electricity generation in Nigeria. To achieve this, the method recommended by Gerbing and Anderson (1988) has been followed. Under this method, Confirmatory Factor Analysis (CFA) was used to determine the reliability and validity of the PGQ measures. To realize this aim, the paper is structured into five parts, with this as the introduction, followed by literature review, methodology, data analysis, and finally discussion.

2. LITERATURE REVIEW

2.1. Concept of the Public Governance Quality

The public governance quality is a common matter of concern to all citizens of a nation, as it specifically determines the gains that can

be derived from governance. The World Bank (2006) sees the PGQ as a mechanism in which leaders are chosen, checked, and replaced. This is along with the ability of the government of a nation to handle the country's resources efficiently and enact sound policies for the good of all. Further, with regard for the populace and the government for the institutions that control the economy and society. Rotberg (2005) also defined good governance to be the control, supply, and delivery of political dividends to the electorates. In his perception, Besançon (2003) PGQ operates to provide political dividends to people and additionally claimed that PGQ is presumed when the government gives high regard for such political dividends.

The World Bank has succeeded in developing indicators, scoring countries on the basis of their level of governance excellence. The data was unwrapped from 32 sources and 340 variables were collected. The origins comprise private intelligence suppliers, family polls and companies, private and public sector entities (Kaufmann et al., 2009). It has been defined that the approach used to develop these indicators has a dual strength by making the World Governance Indicators (WGIs) descriptive and by measuring the margins of error for the approximate indicators. Another importance of this approach is that the data covered the globe made up of 212 countries and territories (Kaufmann et al., 2009). However, the PGQ relies on the way leadership uses its power to accomplish its aims, thus, power can be wielded either in the right or in the negative way (Muhammad and Saad, 2016).

Finally, PGQ is of general interest to both residents and enterprises, as everyone expects a direct benefit from it. Kaufmann et al. have outlined six PGQ indicators from the World Bank indices, which are as follows: (1) Voice and accountability. (2) Political stability and absence of violence/terrorism. (3) Government effectiveness. (4) Regulatory quality. (5) Rule of law. (6) and the Control of corruption.

2.2. Public Governance Quality and Investment

The relation between governance and investment is focused on the government's responsibility of establishing a favourable investment climate in a country. The six World Governance Indicators (WGIs) established by Kaufman and others for the World Bank assess the level of governance around the globe on a scale of -2.5 and 2.5 (Kaufmann et al., 2010). The conduct of a government based upon these indices suggests that the more positive the better the level of PGQ in a nation (World Bank, 2019). Present empirical research demonstrates the relationship between the PGQ and investment, especially foreign direct investment (FDI). For instance, the relationship between voice and accountability with FDI was examined with mixed findings (see, for example, Nazim and Hassan, 2018; Kurul and Yalta, 2017; Mengistu and Adhikary, 2011). Political stability and absence of violence are investigated in relation to FDI with inconclusive results (see, for example, Shan et al., 2018; Kurecic and Kokotovic, 2017; Kurul and Yalta, 2017). Similarly, the association between government effectiveness and FDI has been well-founded (see, for example, Nazim and Hassan, 2018; Saidi et al., 2013). Also, Bannaga et al. (2013) and Gangi and Abdulrazak (2012) reported the effect of regulatory quality on FDI. While Kunsch et al.; (2014); Kurul and Yalta (2017) have researched the effect of the rule of

law on FDI. Finally, the control of corruption and FDI have been correctly documented (see, for example, Cieřlik and Goczek, 2018; Nizam & Hassan, 2018; Bannaga et al., 2013).

Much of the literature on PGQ in the investment domain is primarily within the scope of FDI. Empirical research undertaken to date has provided valuable insights into the effect of PGQ on investment (FDI). In general, the literature presented evidence linking PGQ and investment. However, the dynamic interaction between PGQ and private investment has not obtained significant attention. Consequently, the need to determine the measurement scale of these indicators in order to encourage and ensure the filling of this literature void.

2.3. Studies that Initially Developed Measurements for Public Governance Quality

In view of the paucity of literature regarding PGQ and private investment relationship, the measurement scale for the six indicators is currently scanty, thus, the imperative need to observe the stages and studies which leads to the evolution of these items to have an overall better view of the trends in the development of PGQ items. The initial first stage was the development of indicators with the operational definition of them by Kaufmann et al. (2010) as follows: (1) Voice and accountability—implies the right of people to engage in matters that have a direct impact on their lives, including the opportunity to choose a government, freedom of speech and association, and access to free communication. (2) Political stability and absence of violence/terrorism – implies government stability against likely transition by unconstitutional means through political violence and terrorism. (3) Government effectiveness – implies the capacity of the government apparatus to be efficient, particularly the standard of public and civil service in terms of political freedom. Moreover, the consistency level of policy formulation and execution is calculated by the government's dedication and reputation to certain policies. (4) Regulatory quality – implies the capacity of government agencies to formulate and enforce sound policies capable of supplying, sustaining, and supporting the growth of the private sector. (5) Rule of Law – implies the degree to which the person trusts in his or her government and agency and therefore relies on the rule of society, with the guarantee that the police and judiciary system is reliable and successful. (6) Control of corruption – implies the extent to which the state executives used the government office for their personal benefit. Therefore, these variables have been influential in the assessment of foreign direct investment at the country level using secondary data.

Nevertheless, three studies conducted in Nigeria using the PGQ are in the context of tax compliance (Alabede et al., 2011), zakat payment (Adamu, 2016), and lastly, entrepreneurship by Saidi et al. (2016) who conducted a study to evaluate the effect of PGQ on entrepreneurship using primary data such as the two other studies. The findings of the study have demonstrated that PGQ is instrumental to entrepreneurship. This research did, however, make a considerable effort to develop items using a questionnaire to determine the validity and reliability of the instrument.

Nonetheless, the study took PGQ as a single variable, drawing only items directly relevant to the study. Therefore, it is also important

to regard these indicators as separate variables with comprehensive items that will collect their precise operational definitions in order to measure these constructs full-scale. This would make the use of these indicators as combined or disaggregate, based on the need for a study. Finally, the present research proposes to resolve this gap by adding more items to be derived from the operational definition by the adherent of the indicators to adjust and re-align the items to measure the constructs more accurately.

2.4. Items Generation

Having conceptually described the focal construct and briefly discussed the research that usually generated the items, the next step in the process is to develop some items that adequately depict the operational definition of the constructs offered by the advocate (Mackenzie et al., 2011). Thus, Control of corruption has four items, government effectiveness has five, political stability has three, regulatory quality has four, rule of law has seven while voice and accountability have six items, respectively. Table 1 shows the original and updated items.

The researcher adapts the questions to come up with the items that could be used to measure the constructs under examination from prior studies (Kaufmann et al., 2010; Saidu et al., 2016). This methodology parallels the work of Mas'ud et al. (2017), Manaf et al. (2016), Manaf et al. (2015). As presented within Table 1, twenty-nine cumulative items were generated as possible measures to the six PGQ dimensions. Accordingly, for a better comprehension of the situational variables, again, to provide further understanding into the basics or motivation of the present study, quantitative data was collected from energy stakeholders in the electricity distribution companies and energy-related ministries, and agencies to establish valid and reliable PGQ measurements.

3. METHODOLOGY

3.1. Stage I Content Validity

Here, the twenty-nine developed items are subjected to the content validity technique proposed by Athalye et al. (2018), who argues the need for expert assessment and analysis of the content validity of items to be carried by only those with firm expertise and thorough acquaintance with the constructs examined, also, by the specialist in scale development. This effectively helps to determine if each item in the questionnaire will measure the construct in a critical and acceptable manner (Bleckner and Saunders, 2011). Foremost, the study built a seven-point Likert-type questionnaire to test investors' PGQ perception regarding renewable energy investment. The questionnaires were submitted to nine experts who had studied numerous energy-related investments. The chosen experts are practitioners within academia and the industry with published articles as suggested by scholars (Gamiz et al, 2003). Experts considered are within two to twenty suggested limits (Gable and Wolf, 1993). Triple aspects were required upon the experts; items clarity and conscience and recommending for some related items that are extremely important but yet to be included in the instrument, and to advise the items understandability and the necessary measurements. After observation and suggestions collected from these professionals, adjustments were implemented,

such as the terminology, inclusion of few more items, and the proposed choice of the Likert scale were inferred.

3.2. Stage II Pilot Study

Here, pilot test was undertaken to stimulate the instrument validity and reliability (Creswell, 2012) ahead of reaching the targeted respondents for the final administering of the questionnaires. As claimed by Hulley et al. (2001), pilot is an open-label study undertaken by a researcher to evaluate the feasibility, length, and expense estimated to be sustained in order to approximate the required sample size and further enhance the design of the study prior to conducting the main research. Furthermore, Altman and Royston (2006) highlighted the significance of the pre-test, emphasizing the crucial need for a pilot by the researcher, as it could demonstrate imperfections in the structure and design of the research. Again, misconceptions in the questions, the measurement scale to be deployed and the guides can also be seen. Thus, this cycle should therefore be conducted before fully engaged in the main research project.

Traditionally, a sample size for a pilot test is smaller comprising of 15 to 30 components, but it may increase considerably based on the peculiarities (Malhotra and Galletta, 1999). According to Emory and Cooper (1991), a sufficient pilot sample size is roughly 25–100 respondents before conducting exploratory factor analysis. Accordingly, an aggregate of 45 questionnaires was administered to energy stakeholders in Nigeria in line with this assertion. A total of twenty-nine questions were used in the pre-test, which is at first modified on experts' advice. In preventing bias in the collection of samples and misconception of sample specification, Heckman (1979) affirmed the avoidance of individual self-sample choice and sample choice by an analyst or the use of a data processor. In addition, Berk (1983) stressed that non-random sampling results in a possibility of bias in the collection of the sample. Centred on these assertions, and in order to prevent bias and error in the collection of samples, the present study utilizes simple random sampling to conduct the pilot.

As earlier pointed seven-point Likert ranging from one the lowest score and seven the highest score was used for rating the response scale following Hinkin et al. (1997). Adopting simple random sampling, 30 wholly completed questionnaires were retrieved given a 66.70% response rate. Nonetheless, for any scale to be deemed reliable, the results yielded must reflect a certain true condition of the construct investigated (DeVellis, 1991). Furthermore, the most commonly scale reliability measure is the internal consistency assessment (Pallant, 2011). The assertion of Nunnally (1978) was Cronbach's alpha value of 0.70 or above implied a high internal consistency of an instrument. Hair et al. (1998) proposed Cronbach's alpha value of 0.6 or higher implied internal consistency. Additionally, Sood et al. (1999) indicated Cronbach's alpha value of 0.5 or higher deemed appropriate if the researcher is performing an evaluation on attitudes. In line with the above claims, all the instruments used in this study as depicted in Table 2 are valid and reliable measures of the constructs. Consequently, the Cronbach's alphas are expected to have higher values later in the field survey due to the increased number of respondents.

Table 1: Items generation

Governance dimensions	References	Original items	Operationalization in this study
Control of corruption	Kaufmann et al. (2010); Saidu et al. (2016)	Public power is exercised for private gain	Public office is used for personal gains in Nigeria
		Petty and grant forms of corruption	There are petty and grand forms of corruption in Nigeria
		“Capture” of the state by elites “Capture” of the state by private interests	The country has been controlled by the elites Private interests control the affairs of the state
Government effectiveness	Kaufmann et al. (2010); Saidu et al. (2016)	Quality public services	There is quality public service in Nigeria
		Quality civil service	There is quality civil service in Nigeria
		Quality of policy formulations	There is quality policy formulation in Nigeria
		Quality policy implementation	There is effective policy implementation in Nigeria
		The credibility of the government’s commitment to policies	There is credibility in government commitment to policies in Nigeria
Political stability	Kaufmann et al. (2010); Saidu et al. (2016)	The likelihood that the government will be destabilized	There is a likelihood for government destabilization in Nigeria
		The likelihood that the government will be overthrown	There is a likelihood of overthrowing the government in Nigeria
		Politically motivated violence and terrorism	There is a tendency of politically motivated violence and crime in Nigeria
Regulatory quality	Kaufmann et al. (2010); Saidu et al. (2016)	The ability of the government to formulate sound policies and regulations	The government is capable of formulating sound policies and regulations
		Implementing sound policies and regulations	The government can implement sound policies and regulations
		Permit private sector development	The government permit private sector participation
Rule of law	Kaufmann et al. (2010); Saidu et al. (2016)	Promote private sector development	The government promote private sector development
		Agents have confidence in the rules of the society	Citizens have confidence in the rules guiding the society
		Agents abide by the rules of the society	Citizens abide by the rules of the society
		Quality contract enforcement	There is enforcement to ensure quality contract agreement in Nigeria
		Property rights	Property rights are guaranteed in Nigeria
		Quality police	The law enforcement agents are effective in enforcing laws in Nigeria
Voice and accountability	Kaufmann et al. (2010); Saidu et al. (2016)	Quality courts	The courts of law are independent in Nigeria
		Likelihood of crime and violence	There is a likelihood of crime and violence in Nigeria
		Citizens can participate in selecting their government	Citizens participate in electing their government in Nigeria
		Citizens have freedom of expression	The government allows freedom of expression in Nigeria
		Citizens have freedom of association	The government allows freedom of association in Nigeria
		Citizens have a free media	The government makes free and available information using print and electronic media
		Extended	The government is transparent in its financial and non-financial information
Extended	There is honesty in budget implementation in Nigeria		

Table 2: Summary of reliability test for pilot study

Variables	No of items	Cronbach alpha
Control of corruption	4	0.666
Government effectiveness	5	0.831
Political stability and absence of violence/terrorism	3	0.780
Regulatory quality	4	0.774
Rule of law	7	0.814
Voice and accountability	6	0.781

3.3. Stage III Final Stage

At this phase, data was generated through the survey. Final questionnaires were sent to 556 conventional energy stakeholders from energy-related Ministries, Agencies, and Electricity Distribution Companies. The sample size of this study was determined using simple random sampling, this sampling technique was initially adopted by studies to help the interpretation of a collection of data or to predict entertained

parameters (Olken and Rotem, 1986). Furthermore, they emphasize the need for the entire population to be identified before choosing this sampling technique in a survey. Following the above statement, the present research acquired the comprehensive sample frame of the shareholders and management staff of electricity distribution companies and directorate cadre staff of the energy-related ministries and agencies through the human resource management department of the respective organizations. Consequently, the population became known which exhibits the ground for the application of this sampling technique. While the technique does not pledge for misconception in the sample, the misconception is greatly decreased by a larger sampling (Lindner et al., 2001).

The sample frame considered for this study is 973 shareholders and management staff of the electricity distribution companies and directorate cadre staff of energy-related ministries and agencies in Nigeria. These ministries and agencies promote and regulate the electricity sector while the electricity distribution companies serve as the practitioners in the industry. As mentioned earlier, the sample frame was acquired from the human resource department of the respective organizations. Moreover, a sample of 278 was arrived based on Krejcie and Morgan's (1970) table, however, the number is doubled to be 556 in order to take care of the anticipated low response rate (Aremu et al., 2019). To prevent bias in the sample selection, the instruments were self-distributed to all the organizations

that served as the population with the aid of research assistants. This meant the entire population had an equal probability of choosing. Consequent to follow-ups, 378 aggregate responses were retrieved (constituting 68percent of the sample). This acts as the concluded sample randomly picked out of the population as all enjoy an equal probability of engaging in the research. From the 378 retrieved responses, twenty-one were removed due to missing values, outliers, or response absence variation, resulting in an ultimate usable sample of 357 elements. CFA was performed because the original measures were deployed in the FDI perspective and some few other contexts comprising tax compliance and entrepreneurship, the next phase demands ratifying internal consistency and reliability of these items from renewable energy private investors' perspective with the aid of CFA (Thien et al., 2014; Johari et al., 2011; Worthington and Whittaker, 2006). Consequently, at this phase, convergence and discriminate validity, internal consistency reliability of the measures was executed. Main purpose of internal consistency reliability is to tests how questions correspond to each other in a particular structural model while measuring a construct. To achieve internal consistency of PGQ measures, Cronbach's alpha, Indicator reliability, and Composite reliability were three main statistical measures assessed. The threshold for indicator reliability stands at 0.7 and above regarded as substantial Hair et al. (2010), 0.6 and above as adequate Hair et al. (2016). 0.7above for Cronbach's alpha (Nunnally, 1978) also, 0.7 above for composite reliability (Hair et al., 2010).

Table 3: Internal consistency reliability

Dimensions of Governance Factors	Items	Indicator Reliability	Cronbach's Alpha	Composite Reliability	AVE
Control of Corruption (CC)	PGQ 1	0.755	0.817	0.877	0.642
	PGQ 2	0.851			
	PGQ 3	0.863			
	PGQ 4	0.728			
	PGQ 5	0.747			
Government Effectiveness (GE)	PGQ 6	0.697	0.762	0.806	0.513
	PGQ 7	0.619			
	PGQ 8	0.488			
	PGQ 9	0.811			
Political Stability (PV)	PGQ 10	0.642	0.700	0.778	0.645
	PGQ 11	0.164			
	PGQ 12	0.934			
Rule of Law (RL)	PGQ 13	0.703	0.839	0.872	0.507
	PGQ 14	0.723			
	PGQ 15	0.825			
	PGQ 16	0.802			
	PGQ 17	0.796			
	PGQ 18	0.693			
	PGQ 19	0.310			
Regulatory Quality (RQ)	PGQ 20	0.808	0.823	0.892	0.673
	PGQ 21	0.770			
	PGQ 22	0.866			
	PGQ 23	0.834			
Voice and Accountability (VA)	PGQ 24	0.730	0.827	0.870	0.534
	PGQ 25	0.777			
	PGQ 26	0.854			
	PGQ 27	0.808			
	PGQ 28	0.656			
	PGQ 29	0.502			

5. DISCUSSION

Table 4: Final twenty-five items measuring PGQ

Item's code	Measures
PGQCC1	Public office is used for personal gains in Nigeria
PGQCC2	There are petty and grand forms of corruption in Nigeria
PGQCC3	The country has been controlled by the elites
PGQCC4	Private interests control the affairs of the state
PGQGE5	There is quality public service in Nigeria
PGQGE6	There is quality civil service in Nigeria
PGQGE7	There is quality policy formulation in Nigeria
PGQGE8	There is credibility in government commitment to policies in Nigeria
PGQPV9	There is a likelihood for government destabilization in Nigeria
PGQPV10	There is a tendency of politically motivated violence and crime in Nigeria
PGQRQ11	The government is capable of formulating sound policies and regulations
PGQRQ12	The government can implement sound policies and regulations
PGQRQ13	The government permit private sector participation
PGQRQ14	The government promote private sector development
PGQRL15	Citizens have confidence in the rules guiding the society
PGQRL16	Citizens abide by the rules of the society
PGQRL17	There is enforcement to ensure quality contract agreement in Nigeria
PGQRL18	Property rights are guaranteed in Nigeria
PGQRL19	The law enforcement agents are effective in enforcing laws in Nigeria
PGQRL20	The courts of law are independent in Nigeria
PGQVA21	Citizens participate in electing their government in Nigeria
PGQVA22	The government allows freedom of expression in Nigeria
PGQVA23	The government allows freedom of association in Nigeria
PGQVA24	The government makes free and available information using print and electronic media
PGQVA25	The government is transparent in its financial and non-financial information

4. DATA ANALYSIS

Presenting valid and reliable measurement items serve as the major aim of this study since the established literature has limited evidence of such. Reliability and validity assessment analyses were conducted using CFA to allow for a firmer Unidimensionality assessment of the constructs as Gerbing and Anderson (1988) indicated. For the analyses, SPSS 25 and PLS-SEM3.2 were adopted. The essence of CFA intends to assess internal consistency reliability and validity of PGQ measures. Table 3 depicts indicators' reliability, Cronbach's alphas, composite reliabilities, and average variance extracted (AVEs) of PGQ measures.

As Table 3 depicted, four items (PGQ8, PGQ11, PGQ19, and PGQ29) failed to meet the reliability index of substantial 0.7 and adequate 0.6 advocated by Hair et al. (2016). Consequently, these four items are viewed as invalid and non-reliable measures for the PGQ, thus, deleted. Table 4 gives the final scale summary.

As Table 3 presented, all items indicator reliabilities are 0.6 implied as adequate following Hair et al. (2016) excluding 4 items (PGQ8, PGQ11, PGQ19, and PGQ29) with respective indicator reliability of 0.488, 0.164, 0.310, and 0.502. The reliability indicators for these four items are below the standard of been substantial (0.7) and adequate (0.6) as prescribed by (Hair et al., 2016). Consequently, the four items did not follow the criteria of indicator reliability. As a result, only twenty-five items have reached the standard of indicator reliability. Besides, the Cronbach's alphas have the required 0.70 and above. Nunnally (1978) presents the reliability and consistency of these items in measuring the examined constructs. In addition, the composite reliabilities are above 0.7 in consistent with the (Hair et al., 2013, 2012, 2011) suggestion, showing internal consistency of items measuring the constructs to be high. Additionally, AVEs are above the 0.50 cut-off point (Hair et al., 2011; Hair et al., 2012; Hair et al., 2013) stipulated the strongness of the measures with respect to convergent validity.

6. CONCLUSION AND POLICY IMPLICATION

This study validates PGQ instrument, which is rare within the established literature. Findings of the study provide an important contribution to established PGQ literature regarding its impact on the individual investment intention into renewable energy among energy stakeholders. The findings also suggest that a reliable scale on PGQ has been established on the basis of, individuals' opinion, statistical analysis, and theory. Methodologically, previous research employs SPSS with Analysis of Moment Structures (AMOS) in determining CFA, see, for example, Adamu and Muhammad (2019), Mas'ud et al. (2017), Manaf et al. (2015), Brown and Ki (2013) however, the present paper employed SPSS with PLS in determining CFA. Specifically, the developed instrument meets the internal consistency criteria through reliability loadings, Cronbach's alpha, composite reliability, and AVE. The research thus leads methodologically by availing measurement to be implemented by subsequent studies with various samples.

The current study has threefold practical implications. First, the validated instrument given by Table 4 could be used as an index for private investors in the renewable energy sector when evaluating the PGQ in their country. Second, the instrument validated may aid to determine the renewable energy investors' perception towards PGQ. Finally, it may also be used to evaluate the role of PGQ in determining renewable energy investments when negotiating with private investors. The scale will help in conducting empirical studies that will aid policymakers in due course to adapt investment decisions, especially regarding energy investments.

Substantially, the initial scale consisted of twenty-nine items, however, four items failed to meet the threshold requirement due to low loadings and were ultimately removed. The remaining twenty-five items as seen in Table 3 exhibit high reliable internal consistency. While the data is derived within renewable energy

investment in Nigeria, it can be extended to other investment areas within and across the globe beginning with developing countries with ample renewable energy resources and other investment potentials. Provided that countries could have a unique public governance performance, the current PGQ scale could be useful in enhancing good governance that will permit and promote private investment in renewable energy in countries with ample resources. Because poor governance drives away investment.

Finally, revising the level of PGQ by renewable energy host nations may then encourage fresh investments while, in exchange, restrict current stockholders pulling out from the sector. PGQ validated scale could serve as an instrument in most renewable energy host nations with possible PGQ challenges to boost governance performance to draw further investment in this energy sub-sector. Especially now that the renewable energy market is facing increasing attraction in recent times due to the climate problems caused by conventional energies, its predicted shortage and volatility in the global price of fossil fuels. This has resulted in the structural developments in the electricity market that have led to renewable energy-producing countries focusing on avenues to draw further investments in this energy sub-sector. The paper presents an instrument for PGQ centred on acquiring the views of energy stakeholders on PGQ to gain insight into the effect on renewable energy investment. Provided that some conventional energy stakeholders viewed weak governance as a barrier to renewable energy investment intention, the scale could serve as a policy instrument and framework for renewable energy countries bedevilled with governance challenges to boost the respective PGQ of their countries where necessary. This will draw further investments in this energy sub-sector. Scholars should test empirically the influence of the instrument in future studies, particularly within fields related to energy. PGQ scale can be tested with prospective dependent variables like private investment, renewable energy investment decisions, investors' sentiment, gains of investment, renewable energy investment behaviour. Focusing only on renewable energy investment may be the key limitation of this research, thus, prospective studies should concentrate on other investment areas where public governance matters. SPSS with PLS are the tools of analysis in the present study hence, alternative analysis tools like AMOS may be deployed to confirm reliability and validity of similar instruments.

REFERENCES

- Adamu, A.A., Mohamad, B. (2019), A reliable and valid measurement scale for assessing internal crisis communication. *Journal of Communication Management*, 23(2), 90-108.
- Alabede, J.O., Ariffin, Z.Z., Idris, K.M. (2011), Public governance quality and tax compliance behavior in Nigeria: The moderating role of financial condition and risk preference. *Issues in Social and Environmental Accounting*, 5(1/2), 3-24.
- Altman, D.G., Royston, P. (2006), The cost of dichotomizing continuous variables. *BMJ*, 332(7549), 1080.
- Aremu, A.Y., Shahzad, A., Hassan, S. (2019), The empirical evidence of enterprise resource planning system adoption and implementation on firm's performance among medium-sized enterprises. *Global Business Review*, 22(1), 1-30.
- Athalye, A., Engstrom, L., Ilyas, A., Kwok, K. (2018), Synthesizing robust adversarial examples. In: *International Conference on Machine Learning*, PMLR. p284-293.
- Bannaga, A., Gangi, Y., Abdrazak, R., Al-Fakhry, B. (2013), The effects of good governance on foreign direct investment inflows in Arab countries. *Applied Financial Economics*, 23(15), 1239-1247.
- Berk, R.A. (1983), An introduction to sample selection bias in sociological data. *American Sociological Review*, 48(3), 386-398.
- Besançon, M. (2003), *Good Governance Rankings. The Art of Measurement*. World Peace Foundation. WPF Reports No. 36.
- Bleckner, C.D., Saunders, C.M. (2011), U.S. Patent No. 7, 953, 730. Washington, DC: US Patent and Trademark Office.
- Brown, K.A., Ki, E.J. (2013), Developing a valid and reliable measure of organizational crisis responsibility. *Journalism and Mass Communication Quarterly*, 90(2), 363-384.
- Burnside, C., Dollar, D. (2004), *Aid, Policies, and Growth: Revisiting the Evidence*. United States: The World Bank.
- Cieřlik, A., Goczek, Ł. (2018), Control of corruption, international investment, and economic growth-evidence from panel data. *World Development*, 103, 323-335.
- Creswell, J.W. (2012), *Collecting qualitative data*. In: *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. Upper Saddle River, NJ: Pearson. p204-235.
- DeVellis, R.F. (1991), *Applied social research methods series*. In: Brickman, L., Rog, D.J., editors. *Scale Development: Theory and Applications*. Thousand Oaks, CA: Sage Publications. p26.
- Emory, C.W., Cooper, D.R. (1991), *Business Research Methods*. Homewood, IL: Richard D. Irwin.
- Gable, R.K., Wolf, M.B. (1993), *Instrument Development in the Affective Domain: Measuring Attitudes and Values in Corporate and School Setting*. New York: Kluwer Academic Publisher.
- Gámiz, P., Rubio, C., de Los Santos, M.J., Mercader, A., Simón, C., Remohí, J., Pellicer, A. (2003), The effect of pronuclear morphology on early development and chromosomal abnormalities in cleavage-stage embryos. *Human Reproduction*, 18(11), 2413-2419.
- Gangi, Y.A., Abdulrazak, R.S. (2012), The impact of governance on FDI flows to African countries. *World Journal of Entrepreneurship Management, and Sustainable Development*, 8(2/3), 162-169.
- Gerbing, D.W., Anderson, J.C. (1988), An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25(2), 186-192.
- Hair, J.F. Jr., Sarstedt, M., Matthews, L.M., Ringle, C.M. (2016), Identifying and treating unobserved heterogeneity with FIMIX-PLS: Part I-method. *European Business Review*, 28(1), 63-76.
- Hair, J.F., Black, W., Babin, B., Anderson, R. (2010), *Multivariate Data Analysis*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M. (2013), *A Primer on Partial Least Squares Structural Equation Modelling (PLS-SEM)*. Thousand Oaks, CA: SAGE Publications.
- Hair, J.F., Ringle, C.M., Sarstedt, M. (2011), PLS-SEM: Indeed, a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-152.
- Hair, J.F., Sarstedt, M., Ringle, C.M., Mena, J.A. (2012), An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414-433.
- Harjanne, A., Korhonen, J.M. (2019), Abandoning the concept of renewable energy. *Energy Policy*, 127, 330-340.
- Heckman, J.J. (1979), Sample selection bias as a specification error. *Econometrica: Journal of the Econometric Society*, 47, 153-161.
- Hinkin, T.R., Tracey, J.B., Enz, C.A. (1997), Scale construction: Developing reliable and valid measurement instruments. *Journal of Hospitality and Tourism Research*, 21(1), 100-120.
- Hulley, S.B., Cummings, S.R., Browner, W.S., Grady, D.G., Hearst, N., Newman, T. (2001), Conceiving the research question. In: *Designing Clinical Research* No. 335.

- IEA. (2018), International Energy Agency Atlas of Energy. Available from: <http://www.energyatlas.iea.org/#!/tellmap/1378539487>
- Johari, J., Yahya, K.K., Mit, D.A.C., Omar, A. (2011), The dimensions of job characteristics: a validation study in a Malaysian context. *International Business Management*, 5, 91-103.
- Kaufmann, D., Kraay, A., Mastruzzi, M. (2009), *Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008*. United States: The World Bank.
- Kaufmann, D., Kraay, A., Mastruzzi, M. (2010), *The Worldwide Governance Indicators: Methodology and Analytical Issues* (World Bank Policy Research Working Paper No. 5430). Washington, DC: The World Bank.
- Krejcie, R.V., Morgan, D.W. (1970), Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.
- Kunsch, D.W., Schnarr, K.L., Rowe, W.G. (2014), The relational effect of the rule of law: A comparative study of Japanese and South Korean foreign direct investment. *Asian Academy of Management Journal*, 19(1), 1-21.
- Kurecic, P., Kokotovic, F. (2017), The relevance of political stability on FDI: A VAR analysis and ARDL models for selected small, developed, and instability threatened economies. *Economics*, 5(3), 22.
- Kurul, Z., Yalta, A. (2017), Relationship between institutional factors and FDI flows in developing countries: New evidence from dynamic panel estimation. *Economics*, 5(2), 17.
- Lindner, J.R., Murphy, T.H., Briers, G.E. (2001), Handling nonresponse in social science research. *Journal of Agricultural Education*, 42(4), 43-53.
- Lund, H. (2005), Large-scale integration of wind power into different energy systems. *Energy*, 30(13), 2402-2412.
- Mackenzie, S.B., Podsakoff, P.M., Podsakoff, N.P. (2011), Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, 35(2), 293-334.
- Malhotra, Y., Galletta, D.F. (1999), Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. In: *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences, 1999, HICSS-32, Abstracts and CD-ROM of Full Papers*. New Jersey, United States: IEEE. p14.
- Manaf, N.A.A., Mas'ud, A., Ishak, Z., Saad, N., Russell, A. (2016), Towards establishing a scale for assessing the attractiveness of petroleum fiscal regimes-evidence from Malaysia. *Energy Policy*, 88, 253-261.
- Manaf, N.A.A., Saad, N., Ishak, Z., Mas'ud, A. (2015), Validation of tax incentive dimensions for marginal oil fields' development in Malaysia. *Advanced Science Letters*, 21(6), 1712-1716.
- Mas'ud, A., Manaf, N.A.A., Saad, N. (2017), Validating a second-order model for oil and gas projects' investment climate scale. *International Journal of Energy Sector Management*, 11(1), 65-79.
- Mengistu, A.A., Adhikary, B.K. (2011), Does good governance matter for FDI inflows? Evidence from Asian economies. *Asia Pacific Business Review*, 17(3), 281-299.
- Mohammed, Y.S., Mustafa, M.W.N., Bashir, N., Mokhtar, A.S. (2013), Renewable energy resources for distributed power generation in Nigeria: A review of the potential. *Renewable and Sustainable Energy Reviews*, 22, 257-268.
- Muhammad, S.A., Saad, R.A.J. (2016), The impact of public governance quality, accountability and effectiveness on intention to pay zakat: Moderating effect of trust on zakat institution. *International Journal of Management Research and Reviews*, 6(1), 1-10.
- Muhammad, U. (2012), Rural Solar Electrification in Nigeria: Renewable Energy Potentials and Distribution for Rural Development, *SOLAR* No. 2012-0332.
- Nazim, I., Hassan, Z. (2018), The impact of good governance of foreign direct investment inflows: A study in the South Asia region. *International Journal of Accounting and Business Management*, 6(1), 2289-4519.
- Nunnally, J.C. (1978), *Psychometric Theory*. New York: McGraw-Hill.
- Olken, F., Rotem, D. (1986), *Simple Random Sampling from Relational Databases*.
- Pallant, J. (2011), *SPSS Survival Manual: A Step-by-Step Guide to Data Analysis Using SPSS*, Allen and Unwin, Crows Nest.
- Quazi, R.M. (2014), Corruption and foreign direct investment in East Asia and South Asia: An econometric study. *International Journal of Economics and Financial Issues*, 4(2), 231-242.
- Rodrigue, D.N.S., Jiao, J., Emilienne, L., Alberic, M.D. (2018), Research on the investment strategy of new energy projects. In *IOP Conference Series: Earth and Environmental Science*, 170(5), 052003.
- Rotberg, R.I. (2005), *The Horn of Africa and Yemen: Diminishing the Threat of Terrorism*. Washington, DC: Brookings Institution Press. p1-22.
- Saidi, Y., Ochi, A., Ghadri, H. (2013), Governance and FDI attractiveness: Some evidence from developing and developed countries. *Global Journal of Management and Business Research*, 13(6), 1-11.
- Saidu, A. A., Din, B., Kling, Z. (2016), Empirical evidence on good governance in public tertiary institutions of Nigeria: The effects on entrepreneurship and performance. *International Journal of Management Research and Review*, 6(2), 241-255.
- Sambo, A.S. (2009), Strategic developments in renewable energy in Nigeria. *International Association for Energy Economics*, 16(3), 15-19.
- Shaaban, M., Petinrin, J.O. (2014), Renewable energy potentials in Nigeria: Meeting rural energy needs. *Renewable and Sustainable Energy Reviews*, 29, 72-84.
- Shan, S., Lin, Z., Li, Y., Zeng, Y. (2018), Attracting Chinese FDI in Africa: The role of natural resources, market size, and institutional quality. *Critical Perspectives on International Business*, 14(2/3), 139-153.
- Sood, R., Strauss, R., Hodes, M., Hottensen, R., Cholnoky, T., Zief, J., Tukman, J. (1999), *E-Commerce Financial Services at a Glance*. United States, New York: Goldman Sachs and Co., Investment Research.
- Su, T.D., Bui, T.M.H. (2017), Government size, public governance, and private investment: The case of Vietnamese provinces. *Economic Systems*, 41(4), 651-666.
- Thien, L.M., Razak, N.A., Ramayah, T. (2014), *Validating Teacher Commitment Scale Using a Malaysian Sample*. Newbury Park, CA: SEGE Open Access. p4.
- Wei, S.J., Zhou, J. (2018), *Quality of Public Governance and the Capital Structure of Nations and Firms*, No. W24184. Cambridge, Massachusetts, United States: National Bureau of Economic Research.
- World Bank Group. (2019), *That is What it is All About: Boosting Renewable Energy in Africa*. Available form: <http://www.worldbank.org/.../this-is-what-it-s-all-about-boosting-renewable-energy-in-africa>
- World Bank. (2006), *Sustainable Energy for All (SE4ALL) Database from the SE4ALL Global Tracking Framework Led Jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program*.
- Worthington, R.L., Whittaker, T.A. (2006), Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist*, 34(6), 806-838.