MODELLING THE INFLUENCE OF SUSTAINABLE LEADERSHIP ON THE PERFORMANCE OF CONSTRUCTION FIRMS USING STRUCTURAL EQUATION MODELING APPROACH

Monday Otali[1], Emmanuel Achuenu[2] and Anthony Ujene[3]

[1&3]Department of Building, University of Uyo, NIGERIA
[2]Department of Building, University of Jos, NIGERIA
*Corresponding author: otalimonday@yahoo.com

Abstract
The quest for sustainability of construction firms demands that the firms should have leaders who will drive and implement the sustainability agenda at the firm level for improved firm performance. The aim of the study was to establish the influence of sustainable leadership on the performance of construction firms using a structural equation modeling approach. In tandem with the survey approach adopted for the study, 1179 copies of the structured questionnaires were administered while 980 valid responses were received giving a response rate of 83.2%. Data were analyzed using descriptive statistics and structural equation modeling. The model estimation and modification, verification, and validation were carried out. The results revealed that sustainable leadership positively influences the performance of construction firms (β= 0.83). The study showed that sustainable leadership accounts for 68.3 % of the variability in the overall performance of construction firms. Specifically, this study revealed that sustainable leadership accounts for 60.9%, 56.2%, 36%, 85.6%, and 68.6% of the variability in remuneration and benefit of employees, employees relationship, the general employees satisfaction, social performance, and environmental performance of the firm respectively This study concludes that the extent of implementation of sustainable leadership principles among construction firms positively influenced the performance of construction firms.

Keywords: Construction Firms, Influence, Performance, Structural Equation Modelling, Sustainable Leadership.

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INTRODUCTION

The quest for sustainability of construction firms demands that the firms should have leaders that will drive and implement the sustainability agenda at the firm level for improved firm performance. The building and construction sectors create enabling and habitable environments for human existence. It also creates the infrastructural development necessary for economic and social development among people (Zhang *et al*. 2014; Heravi *et al*., 2015)). The construction industry contributes significantly to the gross domestic product of many countries. Furthermore, the sector creates employment opportunities for the skilled and unskilled labor which in turn serves as a catalyst or driver of economic, and social development (Dania *et al*., 2013; Esezobor, 2016). In Nigeria's context, the construction industry is one of the major contributors to national growth. Specifically, the sector contributed 3.71%, 3.72% and 4.51% in 2016 , 2017 and 2018 respectively (NBS 2018a; NBS 2018b; Adewuyi & Ujene 2019). Despite its huge contributions to national development, there are immense concerns about the negative impacts of the construction sector on the natural environment. Some of the consequences of construction industry activities include massive wastes generation, high energy consumption, high consumption of raw materials, and emission of toxic substances into the natural environment (Heravi *et al*., 2015; Sirkeck 2017; Omuh *et al*., 2018; Jackson *et al*., 2019). In addition, the operation stage of the building consumes more than 80% of the energy and this phenomenon contributes significantly to risks of global warming (Dalia *et al*., 2016). Climate change poses serious threats to the environmental and social sustainability of the built environment. This requires the construction firms and construction professionals operating in the

built to strategize ways of implementing their projects without worsening the current situation. The adverse effects of the construction sector on the natural environment calls for proactive measures and principles that are eco-friendly, socially responsible, and economically viable (Swarnkar & Singh 2016**;** Ahn *et al*., 2016; Omuh *et al.,* 2018). Dim and Nzube (2020) revealed that leadership is the essential resource for creating and sustaining organizations, communities, and societies, it involves establishing and clear vision, sharing that vision with others so that they will follow willingly, providing information, knowledge, and methods to realize that vision, coordinating and balancing the conflicting interests of all members and stakeholders. To immensely solve the problems caused by construction activities, there is a call for re-orientation of the top management team on the need to adopt a leadership style that incorporates the three pillars of sustainability into the company's operations.

Studies have shown that one of the critical measures, organizations can adopt to improve their performance is sustainable leadership (Pradhan & Pradhan, 2015; Bhargavi & Yaseen, 2016; Bisharat *et al*., 2017). The construction industry is a key sector of the economy that drives the sustainable development agenda, however, the need for sustainable leadership is of great concern to the construction stakeholders. Construction firms need leadership that provides the collective vision of the future that considers the legitimate long-term interest of the parties involved in the organization, develops a strategy for moving forward towards that vision, and motivates employees to implement sustainability principles at the firm level. A construction firm is said to be adopting **s**ustainable leadership when the top management team incorporates sustainability themes comprising environment, society, and long-term sustainable development goals into firms' operations. In addition to making a profit, the top management is conscious of the impacts of their activities on the natural environment, and the people. Construction firms need leaders who do not only focus on short-term goals and priorities but also focus on long-term goals by creating innovative ideas and principles targeted towards improving social and environmental-related issues in the built environment. In other words, sustainable leadership is concerned with creating current and future profits for a corporate organization while improving the lives of all the stakeholders (McCann & Holt, 2010; Inkoom, 2013; Awolusi *et al.,* 2015).

Sustainable Leadership is of great importance in the construction firm. It is a critical driver that enhances firms' commitment towards the implementation of sustainability goals at the firm level. Visser and Courtice (2011) opined that sustainable leaders are individuals who are compelled to make a difference by increasing their knowledge base on the trend of the event in the economic, social, and physical environment. Sustainable leaders transform the present condition of things to better and improve the economic benefits of the firms, humans, and the natural environment. According to Inkoom (2013), the features of transformational leadership can be grouped as follows with their sub-constructs: charismatic leadership- idealized influence, charismatic leadership- idealized influence, charismatic leadership-inspirational motivation, intellectual stimulation, and individual consideration. Sustainable leaders are individuals who motivate employees and support sustainability action towards a better world, either in the present or future.

Lee *et al* (2014) stated that construction stakeholders worldwide are transforming their organizational structures to implement sustainable building practices that boost the 'triple bottom line' of a building's ecological, social, and financial performance. Many kinds of research were conducted to determine key performance indicators (KPIs) but most of them were project-specific. They concentrated on the performance measurement at the project level. Existing research on performance at the company level is limited in the literature (Ali *et al.,* 2012; Inkoom, 2013). Zuofa and Ochieng (2016) noted that there is still a need for further studies on sustainability in developing countries. To bridge this gap, this study incorporated financial and non-financial measures that can be implemented by construction executives in measuring the construction firm's performance. Firm performance indicators used in this study include remuneration and benefits of the employees, employees relationship, general employee satisfaction, social performance, and environmental performance (Selvam *et al.,* 2016).

Maqbool and Mistra (2014) stated that the achievement in organizational performance is the outcome of successful and conscious leadership. According to Avery and Bergsteiner (2011), all sustainable leadership practices have a direct relationship with sustainable financial performance. Furthermore, Zulkiffli and Latiff (2016) stated that leadership is one of the factors that contribute to

construction organization success. Avery and Bergsteiner (2011) also revealed that sustainable leadership principles enhance business performance. In addition, Taouab and Issor (2019) posited that leadership style influences how top management teams lead and maintain the organization and how the organization addresses governance, ethical, legal, and stakeholders' responsibilities and benefits. Furthermore, other studies revealed that there is a significant relationship between leadership and organizational performance **(**Kumari, 2018; Neema *et al.,* 2019; Ibrahim & Daniel, 2019; Daniëls *et al.,* 2019; Al-Khaled & Fenn, 2020). However, Farah *et al* (2019) opined that the role of leadership is not so important in achieving organizational performance.

Several studies have discussed the leadership and sustainability of construction firms as two different entities. However, there is a limited empirical study on the relationship between sustainable leadership and the performance of construction firms in the study area. Hence the study aimed to establish the influence of sustainable leadership on the performance of construction firms using a structural equation modeling approach.

RESEARCH METHODOLOGY

A survey research design was adopted for this study. A stratified sampling technique was used in selecting the strata (construction firms). A stratified sampling technique was used because of the heterogeneous nature of the population. It became necessary to stratify before taking the samples. The study area comprises nine (9) states and each state has construction firms operating in it. After stratification, this study took the samples from each state randomly. The population of this study consists of construction firms operating in the Niger Delta region of Nigeria. The population frame for this study was drawn from 1781 construction firms in Niger Delta, Nigeria. The eligibility criteria for selecting building construction firms is based on their years of experience, efficiency, managerial and financial capability. This study adopted Yamene's (1967) equation for determining sample size (1179) because of its simplicity, reliability, and validity. A structured questionnaire was used to collect the data for this research. One thousand, one hundred and seventy-nine (1179) copies of the questionnaire were administered to the firms through their representatives. The construction representatives include project managers, Architects, Builders, and Civil engineers working in the construction firms operating in the Niger Delta region of Nigeria. A Five-point (1-5) scale was used for data collection (Kazaz *et al,* 2008; Santos & Brito, 2012; Ogenma 2018). Scale 1 signifies a very low level of implementation of sustainable leadership/very low level of firm performance while scale 5 signifies very high level of implementation of sustainable leadership /very high level of firm performance (Kazaz *et al*., 2008; Santos & Brito, 2012; Ogenma, 2018). Data were analyzed using descriptive statistics and structural equation modelling. Structural equation modelling was used to establish the influence of sustainable leadership on the performance of construction firms.

Sample Frame and Sample Size

Figure 1 shows the sample frame and sample size of the study. The sample frame comprises 1781 construction firms in Niger Delta, Nigeria. The sample size is 1179 construction firms operating in the study area. Figure 1 revealed that Bayelsa has the least number of construction firms operating in the study area, while River State has the highest number of construction companies operating in its surrounding area. This can be attributed to the volume of economic and construction activities taking place in the states.

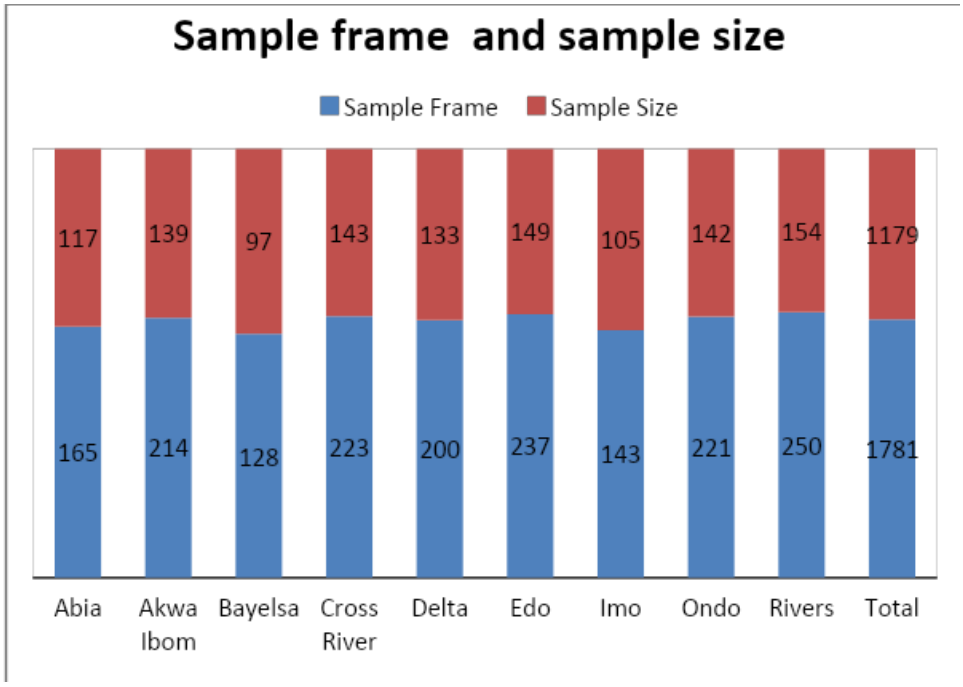


Figure 1: Sample frame and sample size

RESULTS ANALYSIS AND DISCUSSION

This section contains the results of the result analysis of the study. It contains the descriptive results of the questionnaire distributed to the firms and the response rate This section also contains the results of the structural equation model predicting the influence of sustainable leadership on the performance of construction firms.

Questionnaire Administration and Response Rate in the Study

A structured questionnaire was used as a research tool for data collection in the study. Figure 1 showed the number of questionnaires administered to construction companies through their representatives, the number of questionnaires returned, the percentage of the questionnaire returned, and the overall response rate. Figure 1 showed that the response rate ranged between 76.10% and 90.10%. It showed that a good number of the questionnaire was returned. It also indicates that firms operating in River state had the highest response rate (90.10%) while the construction firms operating in Abia state had the least response rate (76.10%). According to Groves (2006), the overall response rate of 83.2% in the study is considered very good and adequate. In addition, the response rate is high enough and adequate for the generalization of the outcome of this study.

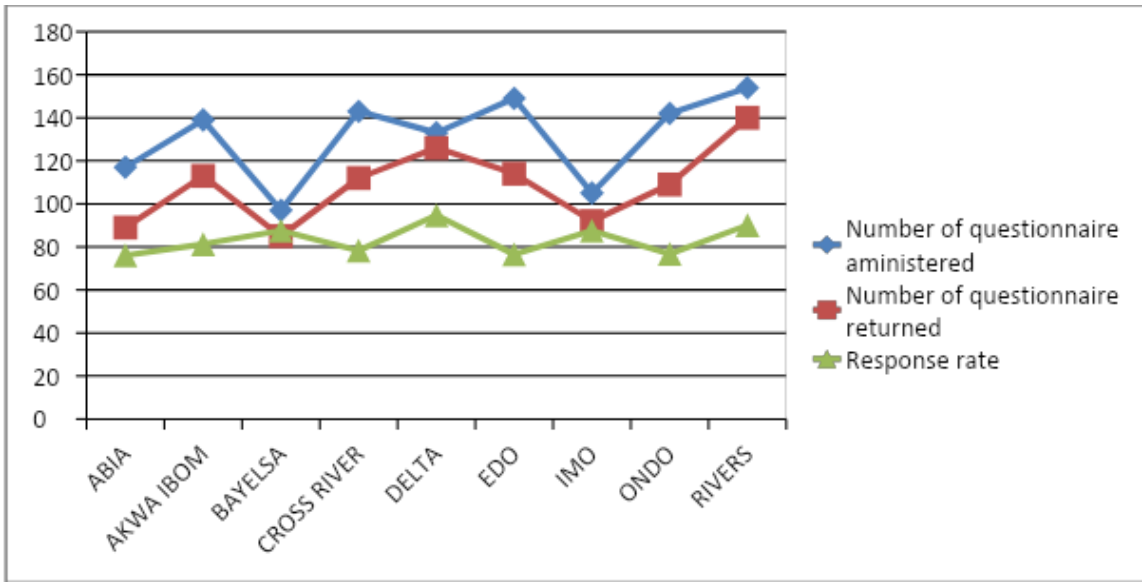


Figure 1: Questionnaire Administration and Response Rate

Structural Equation Modelling (SEM) for Predicting the Influence of Sustainable leadership on Performance of Construction Firms

Structural equation modeling was used to establish the influence of sustainable leadership on the performance of construction firms. These processes include model estimation, verification, and validation of the final model.

Model Estimation

Maximum likelihood estimate (MLE) was applied in the study to determine the unique contrast between the elements. The Promax rotation method was used to reveal the underlying dimensions that formed contrast patterns between the variables. Moreover, the Promax rotation method was used because of the large data involved and it also accounted for the correlation between variables. The result showed that KMO was 0.776, which confirmed the appropriateness and adequacy for conducting factor analysis for the data set. This value is greater than the cut-off of 0.5 for KMO and Bartlett's test. This confirmed the appropriateness and adequacy of conducting factor analysis for the data set.

The study was not about grouping data. The breakdown of sustainable leadership traits and firm performance into categories from the literature was made at a preliminary stage. In the same way, sustainable leadership constructs, and variables beneath each construct and firm performance indicators are already categorized in the preliminary phase. PCA was used in this study to reduce the variables and find the smallest components that explained most of the variations in the data set. The result of the rotated matrix of components indicates that no component had less than three variables. It was also found that the correlation coefficient (r) is greater than 0.5 for each variable. This shows a strong relationship between the variables. This also met the condition stated in the literature by Tabachnick and Fidell (2007), who argued that the correlation coefficient (r) must be 0.30 or greater because anything below suggests a really weak relationship between the variables.

Verification and Validation of the Final Model

The final model was validated using the model fit indices. The results in table 1 showed that the model fit indices of the final model satisfied the benchmarks set in the literature. The results showed that the estimates are within the expected limits. The values of chi-square/degree of freedom, the goodness of fit, root mean square, error of approximation, comparative fit index, tucker lewis index, normed fit index, incremental fit index, and relative index are 1.956, 0.967, 0.058, 0.971, 0.963, 0.952, 0.955 and 0.968

respectively. The values of these model fit indices showed a satisfactory model fit. This study is in tandem with Schumacher and Lomax (2004), Zulu (2007), Hair *et al*. (2010), and Byrne (2010) that used many model fit indices to determine the overall fitness of the model.

Table 1. Model Fit Indices (developed by the authors)

Model Fit Indices	**Recommended**	**Source(s)**	**Final Model**	**Remark**
X^2/Degree of freedom	< 2	Byrne, 2001	1.956	satisfactory
Goodness of fit (GFI)	0 – 1	Bagozzi and Yi, 2012	0.967	satisfactory
Root Mean Square Error of Approximation (RMSEA)	≤ 0.10	Tabachnick and Fidell (2007)	0.058	satisfactory
Comparative Fit Index(CFI)	> 0.9	Kline, 2005	0.971	satisfactory
Tucker Lewis Index(TLI)	≥ 0.90	Bagozzi and Yi, 2012	0.963	satisfactory
Normed Fit Index (NFI)	0 – 1	Doloi *et al.,* 2011	0.952	satisfactory
Incremental Fit Index (IFI)	0 – 1	Molenaar *et al*., 2000	0.955	satisfactory
Relative Fit Index (RFI)	0 – 1	Doloi *et al.,* 2011	0.968	satisfactory

Table 2 shows the estimates of the standardized regression weight, the standard errors (S.E), and the *p*-values. Furthermore, another set of criteria that assess the adequacy of the model are the feasibility of parameter estimates, the appropriateness of standard errors, and the statistical significance of parameter estimates. To check the feasibility, the parameters were checked to ensure that the estimates are correct. The correctness of the estimates implies that each of the estimates has the correct values and signs. This is to avoid estimates having a correlation coefficient greater than one(1). The appropriateness of the standard error is also a key parameter for evaluating the adequacy of the model. Table 2 indicates that the values of standard errors are small, which implies a good model fit. The results in Table 2 also show that all the *p*-values are less than 0.05 level of the significant set for the test. This indicates the estimates are significant at 95 % confidence level. These criteria and checks showed that the model fit is good.

Table 2. Regression Weights: Group number 1 - Default model

			Estimate	S.E.	*P*-value
FP	<---	SL	.826		
CLIIAD	<---	SL	.957		
CLIMAD	<---	SL	.992		
ISAD	<---	SL	.951		
ICAD	<---	SL	.928		
EP	<---	FP	.828		
SP	<---	FP	.925		
GES	<---	FP	.600		
ER	<---	FP	.750		
RBOC	<---	FP	.780		
CLII6AD	<---	CLIIAD	.673		

CLII5AD	<---	CLIIAD	.833	.055	***
CLII4AD	<---	CLIIAD	.800	.054	***
CLII3AD	<---	CLIIAD	.758	.057	***
CLII2AD	<---	CLIIAD	.829	.055	***
CLII1AD	<---	CLIIAD	.737	.061	***
CLIM6AD	<---	CLIMAD	.691		
CLIM5AD	<---	CLIMAD	.763	.059	***
CLIM4AD	<---	CLIMAD	.806	.058	***
CLIM3AD	<---	CLIMAD	.825	.058	***
CLIM2AD	<---	CLIMAD	.830	.057	***
IS5AD	<---	ISAD	.745		
IS4AD	<---	ISAD	.728	.060	***
IS3AD	<---	ISAD	.770	.060	***
IS2AD	<---	ISAD	.742	.064	***
IS1AD	<---	ISAD	.716	.064	***
IC5AD	<---	ICAD	.734		
IC4AD	<---	ICAD	.775	.055	***
IC3AD	<---	ICAD	.823	.055	***
IC2AD	<---	ICAD	.730	.055	***
IC1AD	<---	ICAD	.698	.059	***
EP6	<---	EP	.827		
EP7	<---	EP	.908	.041	***
EP8	<---	EP	.836	.042	***
EP9	<---	EP	.749	.049	***
SP3	<---	SP	.814		
SP4	<---	SP	.849	.040	***
SP5	<---	SP	.919	.039	***
SP6	<---	SP	.902	.041	***
SP7	<---	SP	.910	.038	***
SP8	<---	SP	.896	.043	***
SP9	<---	SP	.916	.045	***
GES4	<---	GES	.397		
GES7	<---	GES	.701	.043	***
GES8	<---	GES	.799	.050	***
GES9	<---	GES	.193	.146	***
ER2	<---	ER	.869		
ER3	<---	ER	.806	.042	***
ER4	<---	ER	.785	.040	***
RBOC6	<---	RBOC	.899		
RBOC7	<---	RBOC	.767	.041	***
RBOC8	<---	RBOC	.641	.037	***

Table 3 shows the squared multiple correlations of each of the variables in the model. Table 3 revealed the proportion of variability in firm performance as explained by the level of implementation of sustainable leadership traits. The implication of each of the estimates in table 3 is that each variable is considered to be a dependent variable. For example, the construction firms' performance with a squared multiple correlations of 0.683 means that 68.3 percent of the variability in the performance of construction firms in Niger Delta, Nigeria is explained by the level of implementation of sustainable leadership.

Table 3: Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
SL	.000
FP	.683
RBOC	.609
ER	.562
GES	.360
SP	.856
EP	.686
ICAD	.861
ISAD	.904
CLIMAD	.984
CLIIAD	.916
RBOC8	.411
RBOC7	.588
RBOC6	.807
ER4	.617
ER3	.650
ER2	.755
GES9	.037
GES8	.638
GES7	.491
GES4	.158
SP9	.839
SP8	.804
SP7	.829
SP6	.814
SP5	.844
SP4	.721
SP3	.663
EP9	.561
EP8	.699
EP7	.825
EP6	.684
IC1AD	.487
IC2AD	.532
IC3AD	.678
IC4AD	.601
IC5AD	.539
IS1AD	.513

IS2AD	.551
IS3AD	.592
IS4AD	.529
IS5AD	.555
CLIM2AD	.689
CLIM3AD	.681
CLIM4AD	.649
CLIM5AD	.582
CLIM6AD	.477
CLII1AD	.543
CLII2AD	.687
CLII3AD	.575
CLII4AD	.640
CLII5AD	.694
CLII6AD	.452

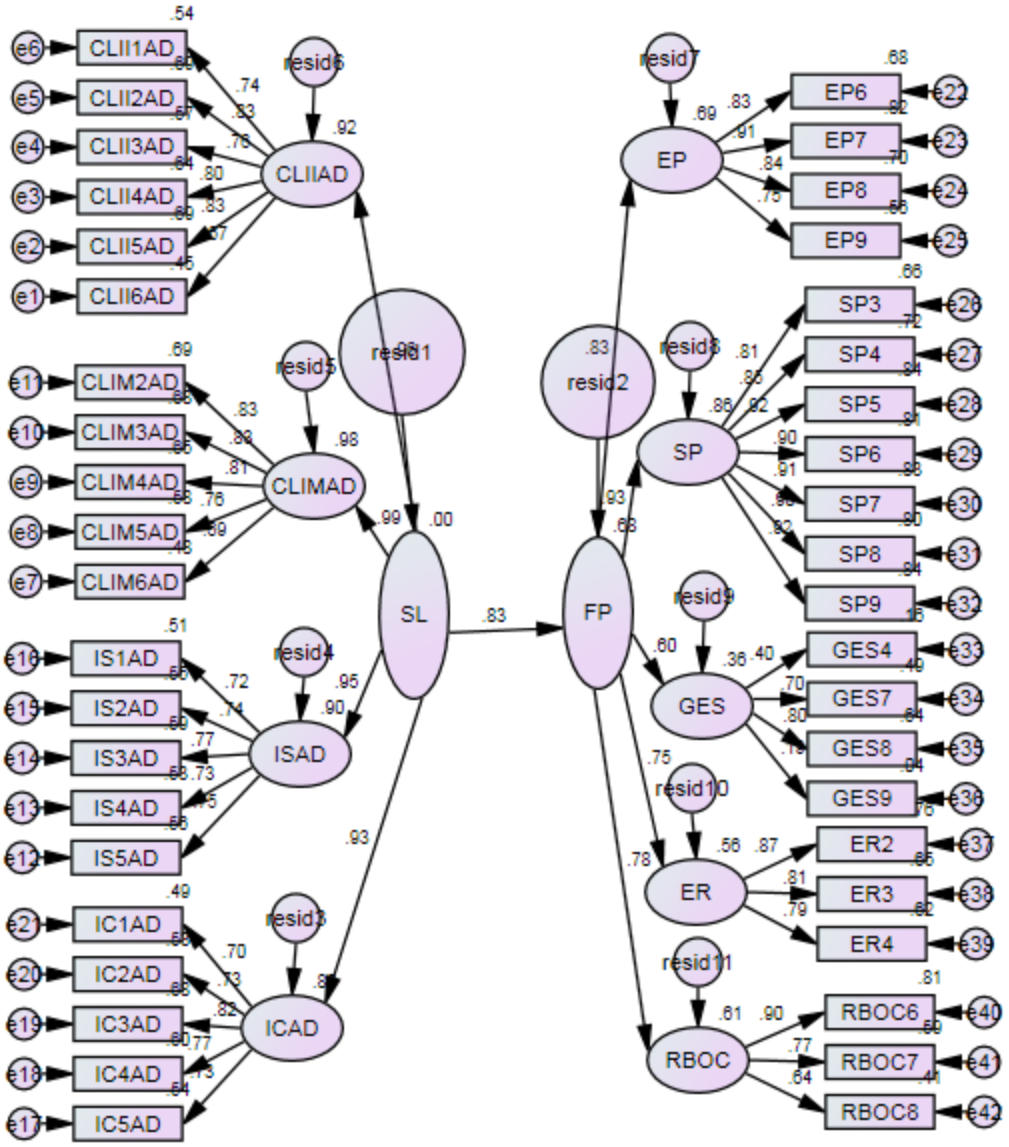
Relationship between Sustainable Leadership and Performance of Construction Firms

Data in Table (1 – 3) indicate a satisfactory model fit as all output values are within acceptable limits. The statistical significance of parameter estimates was assessed and the result indicates all the *p*-values are less than 0.05. This implies that all the estimates are significant at a ninety-five percent (95%) confidence level. The values of these model fit indices showed a satisfactory model fit. This study is in tandem with Schumacher and Lomax (2004), Zulu (2007), Hair *et al*. (2010), and Byrne (2010) that used many models fit indices to determine the overall fitness of the model.

Figure 2 reveals that sustainable leadership has a direct and positive influence on the performance of construction firms in the Niger Delta region of Nigeria (β = 0.83). The study showed that the ability of the leaders who emphasize the importance of having a strong sense of mission, go beyond self-interest for the good of the organization, acts in ways that build others' respect for him/her, emphasize the need to persevere towards goals despite problems, encourages organizational members to think beyond the immediate, and challenge employees to see changing environment as situations full of opportunities influence the performance of the firm. Other sustainable leadership traits that greatly influenced the firm performance include the ability to articulate a compelling vision of the future, set high standards, express confidence that goals will be achieved, have a clear understanding of where the organization is going, and consistently generate new ideas for the future of the organization. Furthermore, the study showed that leaders who re-examine critical assumptions to question whether they are appropriate, encourage each other to rethink ideas that had never been questioned before, seek a broad range of perspectives when solving problems, get others to look at problems from many different angles, and encourage others to challenge the status quo to improve the overall performance of the firm. In the same manner, for the firm better performance, the leaders should spend time teaching and coaching organization members, consider individuals as having different needs, abilities, and aspirations from others, recognize the limitations of other members of the organization, focus on developing the strength of team members, and seek that the interest of employees is given due consideration. This study is in agreement with Zheng *et al* (2017) who posited that transformational leadership and transactional leadership have significant effects on organizational performance.

Table 3 shows squared multiple correlations of the variables. The result in table 3 shows that 68.3 percent of the variability in the overall performance of construction firms in Niger Delta, Nigeria is explained by the adoption level of sustainable leadership traits. Specifically, the remuneration and benefit of employees with squared multiple correlations of 0.609, means that 60.9 percent of the variability in the remuneration and benefits of employees is explained by the adoption level of sustainable leadership. This connotes that the opportunity for personal growth and development in the organization, the extent that the employees receive information from their supervisor about their job performance, and the level of satisfaction of the employees with respect to the money they receive for their job are influenced by sustainable leadership. Also, the employees' relationship with squared multiple correlations of 0.562, means that 56.2 percent of the variability in employees relationship is explained by the adoption level of sustainable leadership. This implies that sustainable leadership influences the extent to which the employees to get along well with their coworkers, the level of their happiness with their relationship with their fellow workers, and how employees stimulate each other.

In the same vein, the general employees' satisfaction of the firm with squared multiple correlations of 0.360, means that 36 percent of the variability in general employees satisfaction is explained by the adoption level of sustainable leadership. This indicates that sustainable leadership affects career plans, the level of employees' commitment to the organization, and employees' loyalty to their organization. Furthermore, the social performance of the firm with a squared multiple correlations of 0.856, means that 85.6 percent of the variability in the social performance of the firm is explained by the adoption level of sustainable leadership. The level of standard of living, public and private sector investment, peace and security, bio-diversity and eco-system stability, poverty reduction, human health standard, and pollution control are influenced by the level of implementation of sustainable leadership traits. In addition, the environmental performance of the firms with a squared multiple correlations of 0.686 means that 68.6 percent of the variability in environmental performance is explained by the implementation of sustainable leadership by the top management. This study showed that sustainable leadership influences the use of standardized management systems such as ISO 14001 or environmental management system in the organization, implementation of environmental management programs, use of certified professionals, the inclusion of sustainability and other environmental management measures in the tendering requirement, and the use of innovative features and renewable energy forms such as solar panels. This study is in tandem with Zulkiffli and Latiff (2016) who posited that leadership is one of the factors that contribute to construction firm success. In the same way, this study is in alignment with Avery and Bergsteiner (2011) who revealed that sustainable leadership principles enhance business performance. This study is also in consonance with Amisano and Anthony (2017) who stated that there is a strong relationship between sustainable leadership traits and social and environmental sustainability of the organization.



CONCLUSIONS

This study evaluated the level of implementation of sustainable leadership principles and the performance of construction firms. A structural equation model was developed to determine the influence of sustainable leadership on firm performance. The model estimation and modification, verification, and validation of the final model were carried out. The results revealed that sustainable leadership positively influences the performance of construction firms. (β= 0.83). The study also showed that sustainable leadership accounts for 68.3 percent of the variability in the overall performance of construction firms. Specifically, this study revealed that sustainable leadership accounts for 60.9%, 56.2%, 36%, 85.6%, and 68.6% of the variability in remuneration and benefit of employees, employees' relationship, the general employees' satisfaction of firm, social performance, and environmental performance of the firm respectively. Based on the findings, this study concludes that the extent of implementation of sustainable

leadership principles among construction firms positively influenced the performance of construction firms operating in the Niger Delta region of Nigeria. This implies that construction firm's performance can be improved by the effective implementation of sustainable leadership. It is recommended that the top management team of the construction firms implement sustainable leadership principles that are eco-friendly, socially responsible, and economically viable.

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