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ORGANIZATIONAL FACTORS, CONSTRUCTION RISK MANAGEMENT AND GOVERNMENT REGULATIONS IN NIGERIAN CONSTRUCTION COMPANIES: DATA SCREENING AND PREMILINARY ANALYSIS

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ABSTRACT

The aim of this paper is to investigate the accumulated data pertaining to the organizational factors, construction risk management and government regulations in Nigerian construction companies. A total sample of 238 were selected from the total population of 338 contractors (i.e., contract manager, executive director, marketing manager, project manager and engineers) operating in Abuja and Lagos State construction companies in Nigeria. Therefore, a proportionate stratified random sampling approach was employed for this study to further divide the companies into different strata, and they were all picked randomly from each stratum. Furthermore, data cleaning and screening were conducted with the intent to fulfil the multivariate analysis assumptions. Hence, this study carried out various tests like missing data analysis, outliers, normality, Multicollinearity, non-response bias and common method variance with the use of Statistical Package for Social Science (SPSS) v21. Lastly, it was discovered that the data fulfil all the requirements for multivariate analysis.

Keywords: Construction risk management, Organizational internal factors, Organizational external factors, Government regulation, Nigerian construction companies.

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INTRODUCTION

Proper planning, editing and screening of preliminary data are paramount procedures before conducting multivariate analysis. Data screening is also important in order to ascertain any possible violation of the main supposes pertaining to the application of multivariate techniques (Hair et al., 2010). Furthermore, preliminary data investigation makes the researcher to have a deep knowledge about the data collected.

Yet, this paramount pace of data screening and cleaning are being evaded by researchers in most cases (Hair et al., 2013). Evading this pace, will definitely affect the quality of the results rendered by the research. Hence, there is a need to measure the data with series of statistical techniques to ensure the data is error free.

This paper employed an independent samples t-test to ascertain any likely non-response bias on the actual study variables comprising management risks, material risks, design risks, finance risks, labour and equipment, effective communication, team competency and skills, active leadership, political factor, organizational culture, technology factor, economic factor and rules and regulations. Common method variance, missing data, outliers, normality and Multicollinearity were also deeply investigated.

LITERATURE REVIEW

The word "risk" has been defined in several ways. While (Porter, 1981; Perry & Hayes, 1985) have perceived risk as an experience to economic loss or gain growing from participation throughout the construction process; Moavenzadeh & Rosow (1999) and Mason (1973) have viewed this as an experience to only loss. Bufaied (1987) and Bothroyed & Emmett (1998) defined risk that is related to construction as a condition through which the process of the construction project leads to uncertainty in the last cost, time and quality of the project (Adeleke et al., 2017; Arditi et al., 2017; Ansah et al., 2016). In this study, construction risk is defined as the probability of occurrence of some uncertainty, that hinders the achievement of project objectives, which it can be from management, materials, design, finance and labour and equipment risks.

The construction industry, compare to other industries, is risky (Adeleke et al., 2016). However, construction project is comprehended to have more underlying risks due to many contracting parties involved such as contractors, subcontractors, clients, designers and engineers. There is uniqueness in construction projects because they are built only once. The parties also include irregular project team, which is accumulated from different companies, countries and cultures. Moreover, the complexity and size of construction projects are growing higher, which add to the risks. This is because of the social, cultural, political and economic situations where the project is to be contracted (El-Sayegh, 2008). Risk in construction has been the mark of attention by most of the construction parties because of cost, and time overruns that are connected to the construction project.

According to Sambasivan & Soon (2007), twenty-eight major construction risk factors, which lead to delay due to improper effective construction risk management with their effects on the construction projects in Malaysia were identified such as inadequate finance and payments for

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the completed project; lack of materials; labour supply; failure and equipment availability; poor communication between parties; and misapprehensions during the construction stage were the leading factors. Consistent with study of Aibinu & Odeyinka (2006) that identified forty-four risk factors that leads to delay due to deficiency of effective construction risk management among construction projects in Nigeria, the study revealed major risk factors such as; management, material, finance and design risk factors. Frimpong et al., (2003) and Sweis et al., (2008) affirmed a positive relationship between internal and external organizational factors and construction risk management, Consistent with the study of Ahmed et al., (2002) in USA, which revealed a positive relationship between internal, external organizational factors and construction risk management.

Similarly, the study of Doloi (2009) affirmed effective communication as an organizational internal factor that reduces conflicts, improve decision making and effect on team member performance to their project manager, so lack of all these attributes will influence or affect effective construction risk management within the organization. The empirical investigation of (Karim Jallow et al., 2014, Moe & Pathranarakul, 2006), also confirms that effective communication positively influenced construction risk management. Furthermore, Geraldi et al., (2010) perceived team competency and skills to be seen in terms of skills, knowledge and attitude. Team dynamics are also connected with team competency; that is what type of characteristic team has and what are the characteristics required in the project execution, thus, any organization that lacks team competency and skills, will definitely affect effective construction risk management. Moe & Pathranarakul (2006) highlighted a positive relationship between team competency and skills with effective construction risk management.

Jaafari (2001) revealed the influence of environmental variables such as safety, community perception, and legal acceptability, political and social impacts on the project is mostly high. It was further explaining by the author that political factors include, discriminatory legislative, covering tax regimes, riots, strikes, civil unrest, wars, terrorism, invasions and religious turmoil will positively influence effective construction risk management in an organization. Hofstede et al., (1990) and Schein (2004) also perceived organizational culture as the elementary assumptions, values, beliefs and models of behavior, practices, rituals, heroes, symbols, technology and artefacts. In addition, Hartog & Verburg (2004) indicated that organizational culture is a strong variable that is associated with "behavior and attitude" of contractors, project managers and team members during execution of the project, which significantly influenced effective construction risk management, and in most cases when government regulations are not implemented in the organization.

Therefore, rules and regulations as government tools are enacted to control the risks' occurrence on the construction project caused by management, material, design, finance and labour and equipment. Construction industries are mandated to operate under the requirements of rules and regulations (Gibb, 2011). Previous researcher's results have shown that rules and regulations that are focused on the construction industry have a set of positive influence on construction projects and performance of the construction industries (Niu, 2008). In the presence of an immense attention of clients, stakeholder's pressure and the top management allegiance, a suitable rule and regulation is the best approach to reduce risks' occurrence on construction projects. Rules and regulations strengthen the implementation of internal and external organizational factors by providing standard requirements for organizational conformances. Thus, there is need for rules and regulation's compliances to strengthen the

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dedication of construction industry to minimize risks' occurrence on projects (Adeleke et al., 2016). In the same vein, Ismail (2001) revealed that in the Malaysian context, rules and regulations on housing stated that, there must be a replacement for the traditional building practices by an industrialized building system (IBS), which, on the long run, might save labour, cost, confer quality and durability and time of construction in Malaysian construction companies as cited by (Alaghbari et al., 2007). Figure 1 shows the proposed research framework.

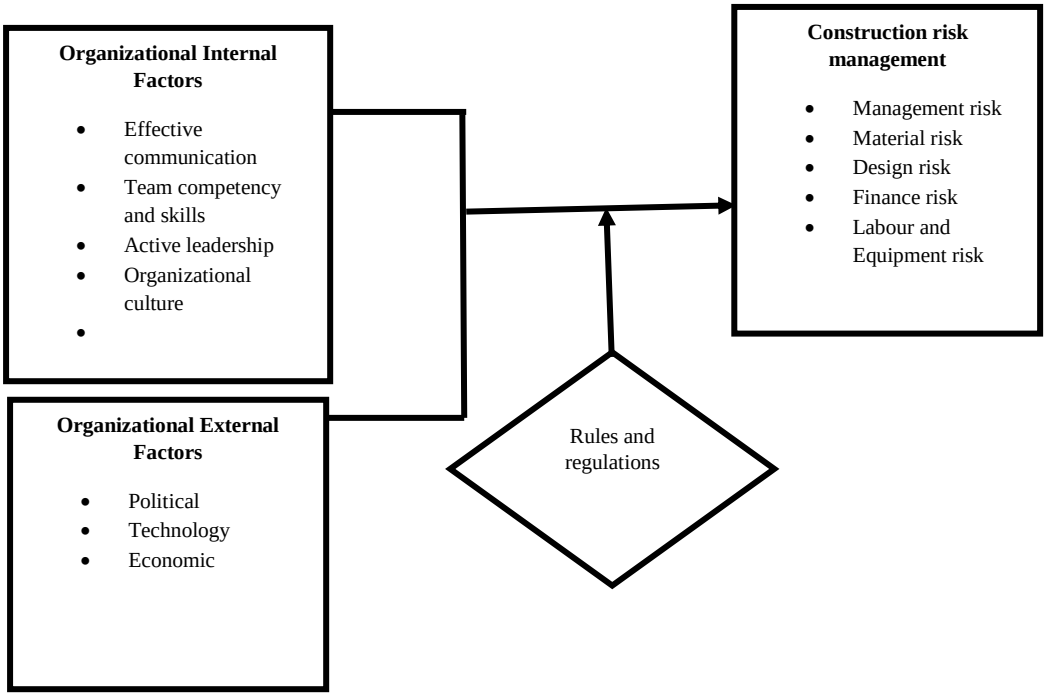

Fig1: Conceptual framework

METHODOLOGY

This study is a cross-sectional research design. Which means, data were collected at a single-point-in-time using structured questionnaire (Kumar et al., 2013; Sekaran & Bougie, 2013). However, proportionate stratified random sampling technique was also employed in the on-going research. The research approach is quantitative, which is a research approach that is mostly adopted in social sciences (Sekaran, Robert & Brain, 2001). Considering this study as the pilot test of an on-going research which was conducted in Abuja and Lagos Nigeria on 19th, June 2015, among the contract manager, executive director, marketing manager, project manager and engineer. According to Malhotra (2008), a pilot study mostly necessitates a range of (15-50) respondents. Therefore, a total number of fifty (50) questionnaires were personally distributed with the return rate of forty (40) which is suitable for the pilot study analysis.

Instrument Design

Asika (1991) affirmed questionnaire as one of the appropriate survey instruments for research. To make sure all the variables in this research framework are all measured, items for this study

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were adapted from various sources in order to create item pool and content validity, which include previous research findings on the construct of this study (internal and external organizational factors, construction risks and government rules and regulations. These items were adapted and modified from preceding literatures (Kumaraswamy & Chan, 1998; Jaafari,

2001; Kamaruddeen et al., 2012; Sun & Meng, 2009; Aibinu & Odeyinka, 2006; Mezher & Tawil, 1998) with the purpose of creating the validity of the construct, including (a) create contact prior to the main study between the researcher and the organizations (b) ascertain the reliability of the constructs and (c) anticipate the likely challenges that may arise before the actual data collection of the study. Similarly, the study adopted the use of five-point likert scale rating from 0.1 = 'very low,' 0.3 = 'low', 0.5 = 'medium', 0.7 = 'high', 0.9 = 'very high', to measure the feedback to the questionnaires (Adeleke et al. 2015).

A rating scale helps the researcher in computing the standard deviation and the mean feedback on variables and also the mid-point of the scale (Sekaran, 2003; Sekaran and Bougie, 2009). Previous study of Krosnick and Fabrigar (1991) argued that any scale between 5-7 points, has a propensity of high reliably and validly measure items compare to a shorter or a longer rating. However, Dawis (1987) and Garland (1991) proposed that the choice of the measurement scale mostly depends on the taste of the researcher since there is no single superlative method of constructing a scale. An appropriate method for one research problem might be appropriate be appropriate might be appropriate for another. It was further argued by Krosnick and Fabrigar (1991) that the conduct established by respondents is either to satisfy or optimize the survey. Thus, this study adopts the use of a five-point likert scale in order to avoid the respondents from selecting an unbiased point which may reduce the quality of the questionnaire. More so, all the constructs/variables in this study are multidimensional. The detail of the constructs and their analogous dimensions are depicted in Table 1.

Table 1: Source of measurement

S.N	Constructs	Dimensions	Source	Remarks
1	Internal factors	Effective communication Team competency and skills Active leadership	Kumaraswamy & Chan (1998)	Adapted
2	External factors	Political factor Organizational culture Technology factor Economic factor	Jaafari (2001) Kamaruddeen et al., (2012) Sun & Meng (2009) Sun & Meng (2009)	Adapted
3	Government policy	Rules and regulations	Mezher & Tawil (1998)	Adapted
4	Effective construction risks management	Management Material Design Finance Labour and equipment	Aibinu & Odeyinka (2006)	Adapted

ISBN 978-967-2054-37-5

RESULT AND DISCUSSION

Response Rate

The word response rate refers to the total number of completed and returned survey questionnaires, classified by the number of sample respondents who are qualified for the survey (Frohlich, 2002). Prior managerial studies depicted that 32% were the average response rate for survey studies (Fohlich, 2002). Thus, the author suggested some approaches to improve response rate in survey studies such as:

1) The respondents must be aware before the survey.
2) Give a sincere appeal on the cover letter.
3) Conduct a pilot study, and use the existing scale for survey.
4) Be sure the items are well formatted and managed.
5) Mailed the questionnaire more than once.
6) Provide a prepaid postage.
7) Make non-stop follow up.
8) Send the questionnaire to the appropriate respondent.
9) Provide the third party logo (such as construction company logo) on the survey questionnaire, and
10) Add more effort to get accurate result at the end of the research.

This research adopted the strategy listed above but with the exceptions of number of 5 and 6 because the questionnaires were delivered by hand to all respondents to get more response.
In this study, a total of 331 questionnaires were distributed to the Local, National and Multi-national construction companies in Abuja and Lagos state of Nigeria. In an effort to attain high response rates, a lot of SMS (MacLean et al., 2005) and phone call reminders (Sekaran, 2003) were sent from time-to-time to all the respondents who were yet to complete their given questionnaires after four weeks (Dillman, 2000; Porter, 2004).

Consequently, the outcomes of this survey yielded 248 returned questionnaires, out of 331 questionnaires that were distributed to the target respondents. This gives a response rate of 75% following Jobber's (1989) response rate definition. Out of the 248 returned questionnaires, 10 were void because a substantial part of those questionnaires were not filled by the respondents; and the remaining 238 useable questionnaires were used in this study analysis. This there indicated 72% useable response rate (Adeleke et al., 2016). Therefore, a response rate of 72% is regarded appropriate for this study analysis because Sekaran (2003) proposed that 30% response rate was abundant for surveys (see Table 2), as this study followed Sekaran.

Table 2: Questionnaire distributed and decisions

Response	Frequency/Rate
No. of distributed questionnaires	331
Returned questionnaires	248
Return and usable questionnaires	238
Return and excluded questionnaires	10
Response rate	75%
Valid response rate	72%

ISBN 978-967-2054-37-5

Normality Test

Previous studies of (Haenlein, & Henseler, 2009; Wetzels et al., 2009) have conventionally presumed that PLS-SEM offers accurate model estimations in circumstances with enormously non-normal data. Nevertheless, these presumptions may change to be false. Lately, Hair, Sarstedt, Ringle and Mena (2012) proposed that researchers should carry out a normality test on the data. Extremely kurtotic or skewed data can amplify the bootstrapped normal error estimates (Chernick, 2008), which in turn undervalue the statistical significance of the path coefficients (Dijkstra, 1983; Ringle et al., 2012a). Going by Field's (2009) proposition, in the current study, a histogram and normal probability plots were carried out to ensure that normality presumptions were not breached. Figure 2 shows that collected data for this study follow a normal rule since all the bars of the histogram were shut to a normal curve. Therefore, Figure 2 shows that normality presumptions were not breached in the present study.

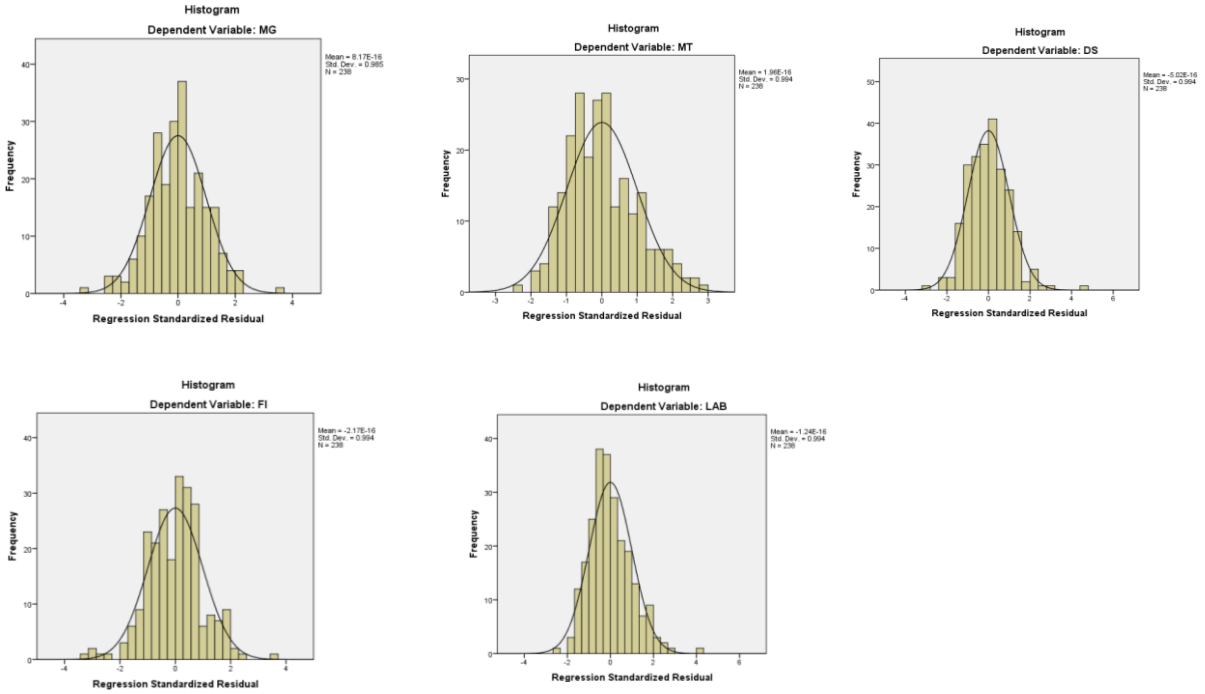

Figure 2: Histogram and normal probability plot

Multicollinearity Test

Multicollinearity is a state where more exogenous latent constructs are highly correlated. The existence of multicollinearity between the exogenous latent constructs can considerably change the estimates of regression coefficients of the tests for their statistical significance (Chatterjee & Yilmaz, 1992; Hair et al., 2006, Nawanir, Lim, Othman, 2013, 2016). Specifically, multicollinearity increases the standard errors on the coefficients, which later makes the coefficients statistically non-significant (Tabachnick & Fidell, 2007). To detect multicollinearity, variance inflated factor (VIF) with its tolerance value were examined to detect the multicollinearity problems. Hair, Ringle and Sarstedt (2011) proposed that multicollinearity was a concern if VIF value is more than 5 and the tolerance value is less than .20.

ISBN 978-967-2054-37-5

Non-response Bias Test

Non-response bias was defined by Lambert and Harrington (1990) as "the dissimilarities in the answers provided by the non-respondents and respondents." Hence, in order to eradicate the likelihood of non- response bias, Armstrong and Overton (1977) proposed a time-trend extrapolation method, that involves relating the early and late respondents (i.e., non-respondents). It was further disclosed from the author's argument that late respondents share akin features with non-respondents. To be specific, an independent samples t-test was carried out to discover any likely non-response bias on the actual study variables comprising management risks, material risks, design risks, finance risks, labour and equipment, effective communication, team competency and skills, active leadership, political factor, organizational culture, technology factor, economic factor and rules and regulations. Table 3 depicts the results of independent-samples t-test attained.

Table 3: Results of independent-sample T-test for non-response bias

Variable	GROUP	N	Mean	Std. Deviation	Levene's Test for Equality of Variances	
					F	Sig.
EC	Early response	25	2.8640	.72277	1.182	.278
	Late response	213	2.7174	.76598		
TC	Early response	25	2.6240	.80482	.046	.831
	Late response	213	2.7362	.80941		
AL	Early response	25	2.5600	.70814	2.529	.113
	Late response	213	2.7817	.85877		
PL	Early response	25	2.3520	.66151	.123	.726
	Late response	213	2.4122	.68131		
OC	Early response	25	2.5600	.68866	.440	.508
	Late response	213	2.5282	.63340		
TG	Early response	25	2.4400	.82689	.543	.462
	Late response	213	2.4988	.87365		
EN	Early response	25	2.3000	.69970	.186	.667
	Late response	213	2.4460	.66279		
MG	Early response	25	2.6862	.60239	.219	.640
	Late response	213	2.6941	.61336		
MT	Early response	25	2.8100	.95274	1.632	.203
	Late response	213	2.7171	.79620		
DS	Early response	25	2.6200	.81155	.257	.613
	Late response	213	2.6886	.70732		
FI	Early response	25	2.1700	.75939	.044	.834
	Late response	213	2.3439	.73570		
LAB	Early response	25	2.5657	.75534	.008	.931
	Late response	213	2.7103	.76239		
RG	Early response	25	2.2800	.73711	.264	.608
	Late response	213	2.4404	.69802		

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EC= effective communication, TC= team competency and skills, AL= active leadership, PL= political factor, OC= organization culture, TG= technology factor, EN= economic factor, MG= management risk, MT= material risk, DS=design risk, FI= finance risk, LAB= labour and equipment risk and RG= rules and regulations.

Common Method Variance

Common method variance can be viewed as a potential problem in behavioral research, CMV is defined as the variance which is constantly attributable to the measurement process relatively than the main constructs the measures characterize (Podsakoff et al., 2003). There has been a serious issue on how to eliminate method biases because it is one of the primary sources of measurement error detected in behavioral research.

This research has used self-reported data acquired from Local, National and Multi-national construction companies in Abuja and Lagos state Nigeria, which generate potential for common method variance (CMV). The implication of this is that the predictors (i.e., effective communication, team competency and skills and active leadership), and criterion variables (i.e., management risks, material risks, design risks, finance risks, labour and equipment) are gathered from a single rater or source (employee). Some statistical and procedural measures were therefore taken in the research process to solve the issue of CMV (Podsakoff et al., 2003).

Sample Characteristics

This part depicts the demographic profile of the respondents to the sample. The demographic features observed during this study contain positions at the company, years of experience and gender. Out of 238 respondents who participated in this survey, 10.9% are the contract manager; 3.4% executive director; 5.0% marketing manager; 31.5% project manager; 30.3% engineer and 18.9 % other employees. Their year of work experience was rated from 1 to 47. The highest (5.9%) percentage of work experience was 14 years, followed by 12 years and 13 years respectively. As for gender, the percentage of male respondents was 76.5% compared with 23.5% female. Again, a total of 36.6% of the companies specialized in building apartment, another 54.7% specialized in roads' construction, and 6.7% specialized in bridge construction, while 2.1% of the respondents are in other specializations. This was followed by company's ownership with 63.0% as the highest which were local companies; 6.3% for the national companies, 30.3% for the multi-national companies and other companies were 0.4%. The company's operational business location ranged from local markets to international markets. The local company operations represent 60.1%, which was the highest percentage. This was followed by companies operating within few states, with 3.8% of the total respondents. Companies within a region was only 2.5% of the total respondents. Companies operating across the entire Nigeria represents 16.8%, while those that operate within the international market represent 18.4%. As regards the year of company's existence, which ranged from 3 to 65 years of experience, the lowest was 0.4% of the total respondents, while the highest was those with 12.2%. Finally, the size of all the sampled company's influences the number of their employees, thus, the employees rated from 5 to 87156, where the lowest and the highest number represent 0.4% and 5.9% respectively as shown in Table 4 and 5.

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Table 4: Demographic breakdown of the respondents

Respondents	Frequency	Percentage (%)
Position in the company		
Contract manager	26	10.9
Executive director	8	3.4
Marketing manager	12	5.0
Project manager	75	31.5
Engineer	72	30.3
Other employees	45	18.9
Working experience (Years)		
Lowest working experience	1	0.4
Highest working experience	47	5.9
Gender		
Male	182	76.5
Female	56	23.5

Table 5: Demographic breakdown of the companies

Parameters	Frequency	Percentage (%)
Company specialization		
Apartment buildings	87	36.6
Roads	130	54.7
Bridges	16	6.7
Others	5	2.1
Company ownership type		
Local	150	63.0
National	15	6.3
Multi-national	72	30.3
Others	1	0.4
Company business location		
Local market areas	143	60.1
Within few states	9	3.8
Regional	6	2.5
Across Nigeria	40	16.8
International markets	39	18.4
Company existence (years)		
Lowest	1	0.4
Highest	29	12.2
Company employee		
Lowest	1	0.4
Highest	14	5.9

CONCLUSION

Inclusion, this paper has evaluated the gathered data through series of statistical techniques to ensure it is error free and to fulfil the multivariate assumptions. Therefore, all the assumptions were achieved from the data cleaning and screening procedures from the response rate, normality test, multicollinearity test, non-response bias test and common method variance missing data analysis, outliers, normality and multicollinearity assessments that were conducted. Hence, this study data fulfilled all the multivariate analysis assumptions, and future studies can effectively make use of the investigated variables, which will further provide more empirical evidence to the growing body of knowledge of this domain.

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