RELATIVE CONTRIBUTIONS OF PROJECT QUALITY TO CUSTOMER SATISFACTION IN NIGERIAN ROAD CONSTRUCTION PROJECTS

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In Nigerian construction and road projects in particular, customers continue to be dissatisfied with the poor quality of constructed roads as well as uncoordinated construction activities. Identifying the key sources of satisfaction would provide a big step towards redressing this chronic problem. Hence, statistical modelling was employed to evaluate the relative contributions of key attributes of project quality to customer satisfaction. The research involved road construction projects in Rivers State of Nigeria where a total of 503 respondents participated in a quantitative survey between August 2013 and August 2014. Stepwise multiple regression analysis was utilised to show the interrelationship between aspects of project quality (i.e. performance, reliability and aesthetics) and customer satisfaction (which was measured through contractor referral and re- patronage). The constituents of customer satisfaction were regressed against the aforementioned elements of project quality and it was established that 58.3% of the variables of project quality could be utilised to explain the variations in customer satisfaction. In addition, project performance was found to be the biggest contributor to contractor re- patronage: 43.1%; while project aesthetics contributed the largest to contractor referral: 57.1%. The findings so far suggest that cost and schedule related activities, use of professional experts, implementation of quality standards, presence of excitement factors amongst others greatly influenced the level of satisfaction obtained from road construction projects in Nigeria. Further analyses are being explored in an endeavour to ensure that construction stakeholders optimise the findings from this research.

Keywords: customer satisfaction, project quality, regression.

INTRODUCTION

Customer satisfaction in Nigeria, especially pertaining road construction has continued to gain research attention as there is an increasing need to optimise the expenditure on construction resources while executing road projects. Scholars and industry professionals have been challenged to identify construction activities that not only provide the basic need of a road, but satisfy its users, otherwise known as the customers (Okoye *et.al.,* 2015). Nigeria, a developing economy has in recent times witnessed a reduction in the expected life span of constructed roads which could be an indication of poor construction and maintenance practices (Idoro 2010). Furthermore, irrespective of the huge financial expenditure on road construction projects, construction stakeholders such as Project managers, Engineers, Architects and even the project owner are confronted with identifying critical paths where more resources

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need to be channelled to aid the construction processes. Obinna *et al.,* (2010) attribute the decline in the life span of roads to the increase in road users evident in the increasing migration of individuals to cities and urban areas. According to Obinna *et al.,* (2010) within the Port Harcourt metropolis of Nigeria, there has been an increase in the commuting needs of the growing population of people living in Port Harcourt, which is the capital of Rivers State, one of the 36 states in Nigeria. Port Harcourt hosts diverse oil companies and construction firms and hence a desired destination for individuals and firms seeking to benefit from its huge economic gains.

According to Obinna *et al.,* (2010), the UN- Habitat projected that by 2025, 60% of the population of less developed countries would be living in urban areas. However, over the last two decades, there has been a 50% growth in the population of Port Harcourt and road transportation has become the most common means of commuting (Olatunji and Diugwu, 2013). Although road construction firms within the area constantly update their construction activities to ensure satisfaction from the constructed roads, the huge traffic of individuals and machinery and the increasing commuting needs indicate that road construction projects within Port Harcourt are seemingly a never ending process. This is primarily as the government and other construction stakeholders strive to continuously meet the needs of its citizenry.

Despite the huge financial expenditure on road construction projects within the Port Harcourt metropolis, the Nigerian construction industry has been plagued with challenges that affect the quality of the finished roads. These challenges impinge on the reliability, durability, performance and finishing of the constructed roads as well as the satisfaction obtained from these (Oluwakiyesi 2011). In addition, the prevalence of referrals or re-patronising the contracting firms who built the roads is a possible indication of the satisfaction obtained from these constructed roads.

This research understudied the extent to which each attribute of project quality could predict and consequently enhance customer satisfaction. The research aimed at finding out which attribute of project quality had the greatest impact on the level of satisfaction obtained within road construction projects in Rivers State of Nigeria. Three specific attributes of project quality namely Project performance, Project reliability and Project aesthetics were studied and regressed with two attributes of satisfaction which were contractor referral and contractor re-patronage (Idoro, 2010; Masrom *et al.,* 2013; and Xiong *et al.,* 2014). The percentage contributions of the attributes of project quality that predict or enhance customer satisfaction are therefore presented to inform construction stakeholders on areas to channel their efforts while developing and managing new road construction projects, especially in Rivers state.

The construction customer

Torbica and Stroh (2000: 35) gave two simple definitions of a customer as, *"one who pays the bills"* and *"one who uses a product or service"*. Hence there exists basically two types of customers; a *"paying"* customer and a *"user"* customer. In some instances, the paying customer is also referred to as the owner or client, as most construction projects have been designed and built for a client instead of the potential users, although such client may not be a user of the construction project. Hence both the client who pays for such project and the user of the product from the construction project is termed as the customer in this respect. Similarly, Karna (2004: 69) defined a customer as *"the owner of the project and the one that needs the constructed facility"*. Karna (2004) further opined that both the client who pays for a project and the users of the project desire some level of satisfaction from the constructed facility. In the

Nigerian context, the customers refer to the users of the road construction project, and when involving government road construction projects, the customer could also refer to the government body that needs the project constructed.

The uniqueness of the construction environment and the expectations of the potential users are believed by construction professionals to have an impact on the level of satisfaction desired of the customer. Thus it is eminent to discuss the nature of the Nigerian construction industry and outline the probable challenges as well as the opportunities entailed within.

Challenges facing the Nigerian Construction Industry

The Nigerian construction industry alone, accounts for 1.4% of its GDP (6.6% in 2011) (Oluwakiyesi, 2011). Oluwakiyesi (2011), reports that despite the growth seen in the Nigerian construction industry, its contribution to GDP has remained at abysmally low levels in the past three decades. This is as a result of the presence of barriers that hinder the progress and success of construction projects in Nigeria such as corruption, technical expertise and general laxity (Obunwo *et al.,* 2013). Sanni and Windapo (2008), highlight that the Nigerian construction industry occupies a significant portion of the capital base of the Nations' economy, adding that its success or failure has positive or negative impacts on the nation's economy. Odediran *et al.,* (2012) elucidate that the Nigerian construction industry is still at an infancy state of development, a state where the government is the major client to construction activities across the nation, with construction projects that provide basic amenities such as shelter, roads, water, electricity, etc. Odediran *et al.,* (2012) further decry the poor growth of indigenous construction firms in Nigeria, due to preference of international firms although this is responsible for the impressive growth of the Nigerian construction industry through enhanced government spending. Despite these challenges, as well as the growing transportation and commuting needs, Nigerian construction firms seem to be misinformed on areas that need extra attention when delivering road projects in Nigeria generally and in Port Harcourt specifically. This developed the need to understudy areas of construction management that need stronger attention especially by identifying the relative contributions of the attributes of project quality to customer satisfaction and the predicting capability of each attribute.

Opportunities within the Nigerian Construction Industry

Notwithstanding the aforementioned challenges, improvements in the construction activities in Nigeria entail a number of benefits. Oluwakiyesi (2011) opine that construction projects aid economic developments as they provide jobs, enhance trade of materials and supplies as well as develop the technological capacity of the organisations involved in construction within the domain. According to Okoye *et.al.,* (2015), the contributions of construction to GDP, especially in developing economies such as Nigeria could increase by 10% annually if adequate attention and scrutiny are employed to construction activities. Similarly, the reliability of road construction projects, which is the expected life span prior to failure (Masrom *et al.,* 2013) can be optimised through improvements in the construction activities in Nigeria. Construction stakeholders are therefore endeared to develop strategies that identify critical areas where resources could be channelled to enhance the quality of constructed roads, benefit from its economic opportunities as well as improve on the nature of satisfaction recorded by its customers.

RESEARCH METHODOLOGY

Saunders *et al.,* (2009) defined research methodology as the theory of how a research should be undertaken and should include the theoretical and philosophical underpinnings upon which the chosen methods were selected. A positivist philosophical stance was maintained in the course of this research as the research entailed the development of a single objective truth on the contributions of project quality to customer satisfaction from a large population. Collis and Hussey (2009) however state that quantitative research methods are based on the positivist claim to knowledge which suggests that there is a single objective reality or truth in the world out there. The quantitative method thus entails the generation of numerical measurements of observations and verification of the theories/ laws that govern the single objective reality in the world. The epistemological consideration in a quantitative research suggests that the researcher detaches himself/ herself from the subject matter to avoid bias and subjectivisms in an inquiry (Creswell, 2009). The researcher hence assumed the objective existence of quality and satisfaction and accordingly embarked on a quantitative study.

Consequently, a quantitative research methodology using survey research methods was adopted for this research. This method was employed to obtain information on the quality of road construction projects within the Port Harcourt metropolis and the satisfaction derived from these. The units of analysis consisted of employees of contracting firms involved with road construction projects in Port Harcourt, as well as road users with relevant knowledge of road construction. The adopted research methodology took into consideration the type of data needed, its location, means of obtaining and mode of data analysis in order to obtain relevant information to solve the research problem (Saunders *et al.,* 2009).

In order to obtain data for the research, a questionnaire was developed based on the attributes of project quality; Performance, Reliability and Aesthetics, and customer satisfaction; Contractor Referral and Re-patronage identified from an extensive review of literature. Respondents were asked to rate their perceptions on a 5- Point Likert scale which ranged from 1 for strongly disagree to 5 for strongly agree and 1 for highly dissatisfied to 5 for highly satisfied. This strategy was adopted to obtain ordinal data as well as a true and realistic view of the respondents' preferences to satisfaction in road construction projects.

A pilot study was carried out to ascertain the relevance of the questions asked in the survey to the research aim as well as to visualise the trend of the anticipated responses. Consequent to the pilot survey, the instrument was refined and a comprehensive survey was carried out to obtain primary data for the research. A total of 600 questionnaires were distributed to employees of road construction companies within Port Harcourt, and 518 of these were returned. However, only 503 of the completed questionnaires were found useful, the discarded questionnaires were either incomplete or lacked coherence; representing a response rate of 83%. The organisations surveyed were obtained from the list of registered road construction companies in the Rivers State ministry of works, while a demographic assessment of the respondents aided in ensuring that the right people were surveyed while carrying out the research. Despite the considerably low response rates recorded in quantitative research within construction management, the high response rate could be attributed to the long period of data collection as well as the choice of personally distributing and retrieving the questionnaires.

To evaluate the relationship between the dependent and independent variables and hence the contribution of each variable of project quality to customer satisfaction, Step-wise Multiple Regression Analysis (SMRA) was employed to analyse the data obtained while the statistical tool SPSS was used to ease data presentation and computation. Soetanto and Proverbs (2001) opined that SMRA was a valuable means of predicting satisfaction in construction research and could be employed when the need arose to predict the value of a variable based on two or more other variables. The coefficient of determination (R^2) which is a statistical measure that indicates the relevance of the regression line in the approximation of real data points was thus calculated. The model summary and regression coefficients are presented in the preceding tables.

Relationship between Project quality (Performance, Reliability and Aesthetics) and Customer satisfaction (Re-patronage).

Table1. Model summary of stepwise regression analysis on the relative contribution of project quality variables to customer satisfaction (Re-patronage)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.657a	.432	.431	9.17885
2	.730b	.533	.532	8.32937
3	.742c	.550	.548	8.18379

a. Predictors: (Constant), Performance

b. Predictors: (Constant), Performance, Reliability

c. Predictors: (Constant), Performance, Reliability, Aesthetics

Table 2: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.921	2.525		8.285	.000
	Performance	.720	.037	.657	**19.529**	**.000**
2	(Constant)	5.816	2.712		2.144	.032
	Performance	.557	.037	.508	15.061	.000
	Reliability	.343	.033	.351	10.412	.000
3	(Constant)	4.555	2.680		1.699	.090
	Performance	.460	.043	.419	10.778	.000
	Reliability	.257	.038	.264	6.795	.000
	Aesthetics	.192	.044	.198	4.353	.000

a. Dependent Variable: Repatronage

Rp=20.921+.720Pf   (1)
Rp=5.816+.557Pf+.343Ry   (2)
Rp=4.555+.460Pf+.257Ry+.192As   (3)

Table 3: Regression ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32132.392	1	32132.392	381.387	.000[a]
	Residual	42209.934	501	84.251		
	Total	74342.326	502			
2	Regression	39653.122	2	19826.561	285.774	.000[b]
	Residual	34689.204	500	69.378		
	Total	74342.326	502			
3	Regression	40922.064	3	13640.688	203.670	.000[c]
	Residual	33420.262	499	66.974		
	Total	74342.326	502			

Table 4: Excluded Variables[c]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Reliability	.351[a]	10.412	.000	.422	.820
	Aesthetics	.359[a]	8.833	.000	.367	.596
2	Aesthetics	.198[b]	4.353	.000	.191	.435

a. Predictors in the Model: (Constant), Performance

b. Predictors in the Model: (Constant), Performance, Reliability

c. Dependent Variable: Re-patronage

Information in Table 1 confirmed that from the respondents surveyed, project performance was the best predictor of contractor Re-patronage among construction companies in Rivers State when compared with Performance and Reliability. It showed project performance alone accounted for approximately 43.1% of the variance in Re-patronage (R^2 =.432, Adjusted R^2 =.431). Table 2 (Coefficients) gives the predictor variables in the regression equation, the Beta values, and significant T corresponding to the variables regressed against the dependent variable. A glance at Table 2 (Coefficients) reveals that the Beta values for performance, reliability and aesthetics were found to be highly significant (β =.720; t = 19.529, p=0.00), (β =.343; t = 10.412, p=0.00) and (β =.192; t = 4.353, p=0.00) respectively. The equations 1, 2 and 3 respectively indicate that any increase in the value of any of the independent variables will yield a resultant increase in the value of re-patronage. However, when considering contractor referral, the other attribute of customer satisfaction, project aesthetics alone accounted for approximately 57.1% of the variance of Referral (R^2 =.572, Adjusted R^2 =.571). According to Bedeian and Mossholder (1994) the R^2 value varies between 0% and 100%. Whereas an R^2 value of 0 indicates that the model explains none of the variability of the response data around the mean, 100% indicates that the model explains all the variability of the response data around the mean. Thus, an R^2 value of 57.1 indicates that project aesthetics accounted for more than half of the variability in contractor referral and on a wider

scale, customer satisfaction. Tables 5-8 present the findings from the stepwise regression analysis on contractor referral.

RELATIONSHIP BETWEEN PROJECT QUALITY (PERFORMANCE, RELIABILITY AND AESTHETICS) AND CUSTOMER SATISFACTION (REFERRAL)

The preceding tables highlight the computations from the stepwise regression between the attributes of project quality and contractor referral. Referral in this context denotes the recommendation of a road construction contractor for further construction activities based on recorded successes. Although there is often a tender and bid process in construction contract procurement, referral aids in ensuring that competent contractors are prioritised when contracts are being awarded.

Table 5: Model summary of stepwise regression analysis on the relative contribution of project quality variables to customer satisfaction (Referral)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.572	.571	8.70086
2	.787[b]	.619	.618	8.21573

a. Predictors: (Constant), Aesthetics

b. Predictors: (Constant), Aesthetics, Performance

Table 6: Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.012	2.345		5.975	.000
	Aesthetics	.802	.031	.756	25.884	.000
2	(Constant)	5.431	2.468		2.200	.028
	Aesthetics	.612	.038	.577	16.151	.000
	Performance	.337	.043	.281	7.869	.000

a. Dependent Variable: Referral

Regression equations

$Rf = 14.012 + .802As$ (5)

$Rf = 5.431 + .612As + .337Pf$ (6)

Table 7: Regression ANOVA[c]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	50721.660	1	50721.660	669.991	.000[a]
	Residual	37928.197	501	75.705		
	Total	88649.857	502			
2	Regression	54900.741	2	27450.370	406.683	.000[b]
	Residual	33749.116	500	67.498		
	Total	88649.857	502			

a. Predictors: (Constant), Aesthetics

b. Predictors: (Constant), Aesthetics, Performance

c. Dependent Variable: Referral

Table 8: Excluded Variables[c]

Model		Beta In	T	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Performance	.281[a]	7.869	.000	.332	.596
	Reliability	-.029[a]	-.781	.435	-.035	.599
2	Reliability	-.040[b]	-1.120	.263	-.050	.599

a. Predictors in the Model: (Constant), Aesthetics

b. Predictors in the Model: (Constant), Aesthetics, Performance

c. Dependent Variable: Referral

Despite the fact that project Aesthetics accounted for approximately 57.1% of the variance of Referral (R^2 =.572, Adjusted R^2 =.571) project Performance and Reliability did not enter the equation at 0.05 levels of significance in the first interaction. This revealed that the project performance and Reliability were weaker predictors of Contractor Referral when compared with Aesthetics. The prediction model-1 contained only one of the three predictors with two excluded and the result on Table 7 (ANOVA-1) further indicated that project Aesthetics was a significant predictor of contractor Referral ($F_{(1, 501)}$ =669.991, *p=0.00*). Consequently, Performance and Aesthetics accounted for about 61.8% of the observed variance in Customer satisfaction (Referral). That is, only project Performance accounted for about 4.7% to the variance in Referral (R^2 =.619, Adjusted R^2 =.618).

DISCUSSION

On subjecting the data obtained to stepwise multiple regression and considering the variables of project quality, performance was found to be the best predictor of re-patronage (variable of customer satisfaction). Project performance entails the financial and schedule related attributes of a construction project. These include activities such as cost management, innovative project designs, organisational team work, project supervision, employee training, avoidance of project abandonment as well as employee motivation. Project reliability on the other hand refers to the time frame a system consistently performs its intended function without degradation or failure under specified environmental conditions (Oluwakiyesi 2011, Olatunji and Diugwu 2013). Hence, reliability in road construction projects would involve clear design specifications, use of professional experts, pro-active maintenance culture bench marking, as well as constant inspection of the construction processes. Project Aesthetics refers to the implementation of quality standards, the presence of excitement factors, the durability of the finishing employed as well as health and safety considerations while using the constructed road. The SWMA also revealed that performance and reliability accounted for 53.2% of the variance in re-patronage while performance, reliability and aesthetics jointly accounted for 54.8% of the variance in re-patronage. Consequently, as the regression equations uphold, any change in the constituents of performance, reliability and aesthetics would have a concomitant effect on the nature of satisfaction obtainable from the constructed road.

Admittedly, project quality alone is not responsible for customer satisfaction in road construction projects. This is because road construction involves activities embedded in Engineering (Civil, Electrical, Structural, etc), Land and quantity Surveying, Architecture, Construction project management, amongst others. These activities all

have their key performance indices and requirements for satisfaction of their intended customers. Unlike the activities mentioned above, construction project management which encompasses the attributes of project quality discussed in this research involves all the construction activities that occur throughout the project life cycle, that is from the initial conception of the project to the project handover or even post project maintenance. The aforementioned activities are however not included within the scope of this research. The contributions obtained from the statistical modelling are nonetheless not a *"one size fits all"* implying that there are other construction factors that could enhance customer satisfaction which account for the variations in 100% R^2 value. Nevertheless adherence to the constituents of project performance, reliability and aesthetics are a step in the right direction for firms and construction stakeholders who intend to optimise construction activities and ensure that the intended customers are satisfied with the constructed road.

CONCLUSIONS

By means of statistical modelling through stepwise multiple regression analysis, the impact of project quality on customer satisfaction in road construction projects has been highlighted. Construction stakeholders are therefore enjoined to focus their attention on the attributes of performance, reliability and aesthetics if the desire is to deliver a durable road project that meets the commuting and transportation needs as well as the satisfaction requirements of its users. These attributes include cost management, innovative project designs, organisational team work, project supervision, employee training, avoidance of project abandonment, employee motivation, clear design specifications, use of professional experts, pro-active maintenance culture, bench marking, constant inspection of the construction processes, implementation of quality standards, presence of excitement factors, durability of finishing employed as well as health and safety considerations.

Agreeably, road construction involves a great deal of Civil Engineering activities, project success is however greatly embedded in the nature of construction project management employed while carrying out the road construction. Whereas project performance was averred to be the highest predictor of re-patronage (43.1%) while aesthetics was the highest predictor of referral (57.1%), 58.3% of the combined variables of project quality (performance. Reliability and aesthetics) jointly influence customer satisfaction. It is therefore expedient that construction companies as well as stakeholders revisit the implementation of the attributes of project quality in their organisations in order to optimise its benefits in enhancing road construction within Port Harcourt, and enhancing customer satisfaction from constructed roads.

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