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Effect of Human and Materials Related Factors on Successful Performance of Road Construction Projects in IMO State

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ABSTRACT

This study evaluated the effect of human and materials related factors on successful performance of road construction projects in Imo State. The objective is to determine the level of effect that human and materials related factors each have affected the successful performance of road construction projects in the State. Survey method was used in the study where the performance of 19 road construction projects was evaluated. A total of 90 project participants consisting 30 Civil Engineers, 20 Quantity Surveyors, 20 Architects and 20 other construction personnel were selected. Earned Value Analysis and Multiple Regression Analysis were used to analyze the data. The results indicate that the road construction projects had 40% completion rate. Among the human related factors, ineffective planning posed the highest effect on the performance of the road construction projects while fluctuation in prices of construction materials is a material-related factor with the highest effect on the performance of the road construction projects in Imo State. Hence, the study concludes that both human and material related factors have high contribution to the poor performance of road construction projects in Imo State. Based on the above conclusion, the study recommends for the proper planning, effective and efficient payment arrangement as well as reduction in scope variation in order to guarantee good road project performance.

Key words: Road Construction, Project Performance, Human Related Factors; Materials Related Factors.

1. INTRODUCTION

Road construction project performance is no doubt usually affected by many factors. Every investor wants to be sure of the project scope, quality, time and cost. This is because challenges that affect project successful completion have far reaching effects, ultimately on the owner's interest [1]. Based on the prevailing globally economic landscape, project owners are scaling down or eliminating capital construction projects due to lack of financing, uncertainty over costs, poor management and concerns about potential delays that could impact the feasibility basis of project [2].

In Ghana, study reveal increasing cost overruns, delays in completion, unsatisfactory and unmet project objectives in most road construction projects [3]. In South Africa, [4] reveal that clients and project team do not have a comprehensive understanding of road projects from inception to completion stages. In Nigeria, [5] warned that construction delay has become endemic and a lot of funds have been lost as a result of delays in construction projects. They posited that most of the identified factors of delay are traceable to human and material related issues. However, research to underscore the category of factors that have affected the successful performance of these roads are lacking. It is against this background that this study mounted to seek to cover for this gap by evaluating the effect of human and material related factors on the successful performance of road construction projects in Imo State.

1.1 Problem Statement

Successful road construction projects play critical role in the overall development of a country. They assist in the proper distribution of goods and services to facilitate socio-economic development [6]. Unfortunately, most road construction projects in Imo State Nigeria have not been able to meet the major success criteria of time, cost and quality specifications. A situation that has negatively affected the social and economic growth of the State. However, several human and materials related factors have been attributed to poor delivery of road construction projects. However, the current economic landscape, project owners are scaling down or eliminating capital construction projects due to lack

of financing, uncertainty over costs, poor management and concerns about potential delays that could impact the feasibility basis of project [2]. Research has shown that factors which affect successful completion of road projects include planning, project team competence and experience [7].

Construction projects uses more manpower in its implementation activities compared to other fields, but human resource management is still inadequate and with insufficient attention [2]. The issues concerning human resource management in road construction projects need to be identified and methods to improve them need to be ascertained and implemented for successful completion of road construction projects [2]. Sadly, extant literatures have not underscored these factors in the past studies especially as it concerns Imo State; however, attention has been on other places and other factors.

Therefore, this research seeks analyze the human and materials related factors that affect successful performance of road construction projects in Imo State. It is hoped that in addressing these factors, the stakeholders in road construction projects in Imo State will have a full understanding of the critical human and materials factors that constrain road construction projects. Hence, success in completion of road construction projects will greatly be enhanced.

The objectives of this study include:
i.) To evaluate the effect of human related factors on successful performance of road construction projects in the State.
ii.) To evaluate the effect of materials related factors on successful performance of road construction projects in Imo State.

The following research questions were designed to help carry out this research work.
i.) To what extent do human related factors affect successful performance of road construction projects in the state?
ii.) To what extent do materials related factors affect successful performance of road construction projects in the state?

Hence, the following hypotheses were formulated.
Ho_1: The human related factors have no significant cumulative effect on the performance of the road construction projects in Imo State.
Ho_2: Materials related factors have no cumulative significant effect on the performance of road projects in Imo State.

2. CONCEPTUAL REVIEW

Cost, time and quality specification are the known criteria for judging the performance of projects [8]. Performance indicators are measurable indicators that demonstrate the level of achievement in a project. They provide information to the decision-makers to measure performance and compare them with the intended outputs, outcomes, goals, and objectives, and are chosen to reflect the critical success factors of a project [5]. Cost is one of the most important indicators to consider when measuring contractor performance. Cost overrun is a major problem in project development and is a regular feature in construction industry; a situation in a construction project in which budgetary estimate exceeds final cost as well as settlements exceeding budget is a universal phenomenon. Project cost that is out of control adds to investment pressure, increases construction cost, affects investment decision-making and wastes the national finance [2]. Hence, it is important to identify the factors that contribute to cost overrun to avoid and reduce the problems.
Delays on the delivery of construction projects are seen as one of the most frequent problems in the construction industry. The aftermath of delays affects all people and organizations involved in the project. This is especially true for the owner´s business since delaying the startup of the project will impede obtaining the expected project revenue and will increase financial costs [2].

The current quality assurance system does not provide a quantitative ground for quality management. But most of the objectives in quality management have qualitative attributes and there is no method to properly assess the quality. Quality problems are intrinsically difficult in detecting before they occur and they are identified when managers confirm them [9]. Hence, quality management are likely to be non-result oriented if a proper preventive system that converts quality result-oriented characteristic to predictable values is not adequately put in place.

2.1. Human Related Factors that affect successful road construction performance

Project planning has been described as an orderly sequence of actions that leads to the achievement of stated goal and maintained that there must be planning before project implementation in order to achieve a successful project within the estimated cost and time limit [10], [11]. However, as the construction industry continues to grow in size, so do planning and budgeting problems arise. Ineffective project plans and schedule will generally result to escalating investment cost, which could adversely affect the viability of the project [12]. In a similar vein, [13] informed that besides political issues, planning is the major cause of failure of public sector projects in Nigeria. Moreover, [14] stated that, project cost overruns can be seen to be the symptoms of inadequate planning and budgeting of projects that in turn is a consequence of accuracy of costing data employed for estimating project budgets. In a bid to understand the nature and factors that precipitate cost overruns, efforts should be tailored towards establishing more accurate project costs contingency in appreciation of the relationship between project budget estimates and final budget for completed projects, this would provide insights on the general profile of budget contingency to be adopted for different types of projects.

In Nigeria, many construction projects are poorly conceived and therefore such projects are often not successfully delivered, resulting in higher cost of

construction [15]. Ideally a client is expected to produce a detailed brief of what he actually requires from his proposed project in terms of size and quality in order to enable his professional consultants to carry out a comprehensive feasibility study of the project. A good feasibility study will give alternative solutions to the problem the client seeks to solve by undertaking the project, including cost-in-use studies dealing with future maintenance of the completed project. In many cases both private and public sector clients do not provide detailed information in their briefs which are often scanty and vague [5]. The consultant thereof does not have adequate data for preparing the initial feasibility study on the project. They have to make a lot of assumptions which may lead to poor feasibility report and unrealizable project as all the risk factors have not been considered.

A study reported that, late appointment of the quantity surveyor ensures the cost control measure does not start in time. The design team is like the engine vehicle [15]. All the components of engine weather big or small are important in the sense that an engine can malfunction even when the smallest part is not in place or defective. The quantity surveyor is an important member of any project design team, yet this late appointment is a frequent occurrence. Cost control measures for the most beneficial effect should commence as early as the earliest aspect of the client's brief to the team [16]. Preliminary advice to be given at that stage by the quantity surveyor will help to indicate the probable region of cost of a proposed project. There is an appropriate time for executing a project and the contractors cost is lowest at that point especially during the period of low work load. This is also true for pre-contract work by consultants. Clients who insist on hasty implementation by rushing through a job are invariably asking for higher cost and some other associated problems such as shoddy implementation [15]. In addition, [17] noted that incorrect planning is one of the most important factors that affect cost of construction. Contractors must be aware of all resources that he might need for any project. Also, the contractors, should utilize all resources in an efficient manner. Proper scheduling is the key to utilizing project resources, if not, the project cost will increase.

Moreover, many public and private sector clients in Nigeria do not allow sufficient time for project planning, that is, design, contract documentation and costing, cash flow analysis, investigation of executive capacities of tenderers, detailed tender analysis and report etc. [15]. Most of the time, the projects are hurriedly initiated and contracts awarded for either political or personal reasons while paying little attention to detailed project planning [5]. Therefore, during the execution of such projects, many extraneous issues and problems arise which were not properly addressed during project planning and these often lead to increases in the total cost of the project.

Delay in Payment of Contract Sum has also being pointed. Delayed payment that is due beyond the stipulated period for making payment on a contract, breaches a fundamental term in the contract which may lead to determination of the contract by the contractor [6]. However, most contractors in Nigerian construction industry would rather continue if they have not reached the elastic limit of their endurance. In addition, delaying payments for work executed strains the finances of the contractors as they may rely on overdraft facilities with the extra cost of interest charges, to meet some expenses which cannot be postponed, such as staff salaries and workers' wages, yard maintenance and office administration. These costs are invariably passed on to the client through claims [6]. Alternatively, the contractor can abandon the project which will later be awarded by the client to another contractor at a much higher cost than the initial contract sum.

Similarly, [17] reported that financing and payment of completed works is responsible for the cost overrun in Nigeria. Generally, contractors are sometimes not paid in accordance with the contract conditions. There are cases where client fail to honour contractor's certificate of payment for up to 6 months or more whereas the contract conditions, in most cases stipulates about 28 days [5].
In the same vein, most contractors when preparing their tenders make allowance for partial financing of the project. They charge the clients for payments of interests and bank charges on moneys they anticipate borrowing from the banks to finance these projects [17].

Again, the irregular financing of public projects is a major cause of liquidity problem for contractors: however, contractors can be paid in accordance with the contract agreement if client can generate the availability of adequate funds before the project commences [1]. In addition, [18], concluded from their study that the major causes of delay in road construction projects in Zambia were delayed payments, financial deficiencies, contract modification, economic problems, material procurement, changes in design drawings and changes in specification.

In a similar contribution, [19] attributed that delayed payment to contractors, coordination difficultly were important causes of delay in Egypt. Similarly, [6] stated that, delay in payment to the consultants will reduce their productivity in the supervision of the project which will result in extra cost to the client through acceptance of low quality materials, defective work, low standard of workmanship that will lead to higher maintenance cost, and even recommending for payments of frivolous claims made by the contractor.

The constant use of incompetent Contractors and Consultants is also seen as one of the major contributors of poor road construction projects [5]. The procedures designed to enable the selection of the most suitable contractor for any project, is a vital aspect of cost management of projects. Most times, a well-designed and cost managed project at the pre-contract stage begins to suffer defects that can lead to high cost at the post-contract stage [1].

Projects awarded on the basis of open tendering, tend to be more prone to this state of affairs as it is open ended and most times awards tend to fall into the hands of inept and inefficient contractors. Pre-qualification of contractor

followed by competitive tendering is a panacea to this problem. Often clients patronize unqualified and inexperienced professionals for the sake of saving cost on fees and this usually ends up in disaster as the low quality of supervision will lead to increased cost of construction through contractor's claims and even poor workmanship [5]. It is well known that being qualified is not enough to guarantee performance by professionals. Experience counts much for the ability of a consultant to work successfully on a project [15]. Hence, there is the need to adhere to the principles of due process in selecting consultants as is done for selecting contractors. If efficiency is to be achieved without favouring relatives, friends and others who are incapable of executing job at hand is hazardous and can only lead to cost escalation of the project.

Construction Parties' Financial Management is also another factor that affect road construction projects [20]. Client's delay in honouring timely payments certificates has led to project delays to a very large extent. Literature has identified delay in payment by client and financial difficulties by contractors as among the most important causes of delay in Iranian construction projects [20]. Difficulties in accessing credit (contractor and sub-contractor) has also led to project delays in a large extent as in line with [20].

2.2 Materials Related Factors that affect successful road construction performance.

Price fluctuation as frequently used in economic analysis to explain the unstable (up and down) nature of prices of goods and services over a period of time [15]. Another study identified fluctuating price contract as those containing provisions for reimbursement of changes in a wide range of labour, cost and material prices in addition to statutory cost [21]. A study in Zimbabwe by [18] reported that fluctuation in prices of materials as the most significant factor affecting construction cost performance followed by cash flow and financial difficulties faced by contractors. Inflation in material prices has led to increase in construction costs thus affecting performance of construction project [2]. Experience has shown that some clients had abandoned their projects due to staggering increase in the cost caused by fluctuation and/or variation. Escalation in contract sums can emanate from several sources including fluctuations. Also, research revealed that fluctuation was the major source of contract cost overrun accounting for 26.98% of such increase [22].

Similarly, [23] identifies that fluctuation claim is one of the most important cost variables that affect the final cost and the subsequent cost overruns that led to delays and abandonment of building projects in Nigeria. In Nigeria about 64% of the ongoing building projects were ended of as abandoned projects because of the financial conflicts due to the effect of mostly fluctuations [24].

Again, [25] surveyed contractors, consultants and public clients and revealed price fluctuation as the most severe cause of project cost overrun in Nigeria. This could be attributed to the limitation in exchange rate which in turn affects construction materials prices and general price level.

Another factor is the unstable inflationary trend in Nigeria which is a result of demand exceeding supply, creating a scarcity of goods which in turn leads to escalation of prices [26]. Another study also examined the factors influencing construction cost overruns on building projects in Nigeria [27]. He found that cost overrun occur more frequently and are thus a more severe problem than time overruns in Nigeria. The predominant factors influencing cost overruns are materials cost increase due to inflation, inaccurate materials estimating and the degree of project complexity.

Another major cause of fluctuation in the cost of building project as materials price increase is the currency devaluation witnessed in "Naira" and price control has been suggested as an obvious solution in controlling it [26]. Also the manner in which the ordering and delivery of materials are done on site contributes to the problems of fluctuation in the cost of building projects. Ideally site managers will require materials to arrive on site just when they are needed and in required quantity to avoid wastage in one hand and shortages on the other hand. Cost of storage and insurance, valuable working capital might become tie down in stock of materials. Also, when materials and component arrive late on site, costly delay in construction program may result, hence the constructor could face the resulting labour cost which often would have been met which will result to extension of completion time [26].

Variation or change of scope is a contributing factor to road construction project delivery. Variation has been seen by various studies as involving additions, omissions, alteration and substitution in terms of quality, quantity and schedule of works [5]. According to [28], stated that, the problem of cost variation, especially in the construction industry is a worldwide phenomenon, and its consequences are normally a source of friction among clients, consultants and contractors. Project cost variations create a significant financial risk to clients [2], [28]. However, in spite of the risk involved, the history of construction industry is full of projects that were completed with significant cost overruns.

Previous authors have stated that, variation usually causes the construction cost to inflate due to additional works that are required to be carried by the contractor [9,] [5]. They researchers maintained that the most frequent effects of variations as; increase in project cost, additional payment for contractor, increase in overhead expenses, completion schedule delay, and rework and demolition. In addition, [12] stated that, effort should be made to curtail the incidence of price variation during the period of project execution by adopting appropriate contract type and contract strategy together with appropriate project management tools.

Insufficient supply of labour (skilled and unskilled) has led to delays and increase in construction costs to a very large extent. These are presence of unskilled labourers, shortage of technical professionals in the contractors'

organization, improper technical study by the contractor during the bedding stage, and lastly, ambiguities and mistakes in specifications and drawings [29].

2.3 Conceptual Framework

The conceptual framework illustrates the causal relationship between the independent variable and the dependent variable. This is illustrated in the figure 1. Successful completion of road construction project is dependent on independent variables. Road Construction projects are considered completed successfully when executed within scope, schedule, budget and quality [5]. When any of the independent variables fail, there is a higher likelihood that the dependent variables also fail. This research seeks to justify these. It is therefore imperative to ensure that the independent variables are done to the satisfaction of all stakeholders, consequently ensuring successful road construction project.

In this research the independent variables which constitute project objectives, include project performance criteria of cost and time. Intervening variables identified include ineffective project planning, delay in payment of construction cost, use of incompetent contractors and poor contractor's financial management as proxies of human related factors while price fluctuation in construction materials, change in scope of work and untimely availability of construction materials as proxies of materials related factors.

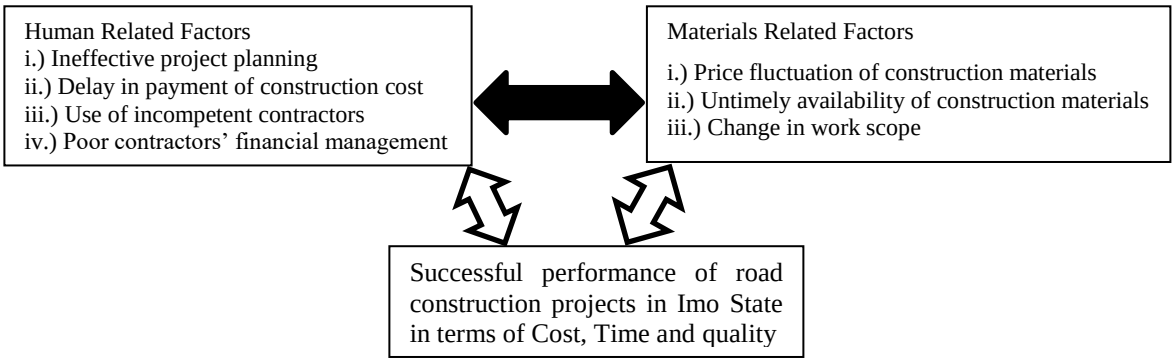

Figure 1: Conceptual framework for this study.

2.4 Empirical Studies

In Nigeria, [2] did a study to evaluate the delay related factors in Niger Delta Development Commission (NDDC) Construction Projects in University of Port Harcourt, Rivers State, Nigeria. The objectives include to analyze hostel construction project to determine their level of performance, and identify and analyze the delay factors in the face of the level of delay witnessed in the delivery of public sector NDDC hostel projects. Questionnaire was used to collect data. Descriptive statistics and multiple regression techniques were used to analyze the data which indicated high level of variations in cost and time objectives of the projects. The t-test analysis show that all the identified factors significantly affected the performance of the NDDC hostel project with contractor related factors having the highest effect. Among others, the study recommends honesty and transparency among the players in the public sector or government agencies and construction industry, maximum attention by contractors to detailed design before tendering for projects, stability in the market prices of construction materials and efficient and effective tendering process before projects are awarded. Unfortunately, their study was not related to road projects. As claimed by [2], factors affecting Construction Cost Performance of Projects in Nigeria include: Contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design. Other factors include, Project complexity, shortening of project period and fraudulent practices.

A study in Ghana on the factors affecting quality performance of construction firms based on Consultants and Contractors perspectives concluded that: fraudulent practices and kickbacks, lack of coordination between designers and contractors, poor monitoring and feedback, Lack of training on quality for staff, lack of management leadership as well as lack of previous experience of contractor was also identified [3]. Also, the study stated that most commonly occurring and also leading factors to poor performance are poor project documentation, excessive bureaucratic conditions and over reliance on casual labour [3]. Similarly, [5] claimed that the most important factors agreed by owners, consultants and contractors as the main factors affecting the performance of construction projects were availability of personnel with high experience and qualifications, quality of equipment and raw materials in project. Other factors include conformance to specification, planned through project duration, average delay in payment from owner to contractor, information coordination between client and project parties. Another study identified seven critical success factors affecting performance in India which include project manager's competence, top management support, project manager's coordinating and leadership skill (28). Others include top management and owner involvement in the project, interaction between

project participants, monitoring and feedback by project participants, owner's competence and favourable climatic condition.

Other critical failure factors identified by the authors are: conflict among project participants, ignorance and lack of knowledge, indecisiveness, hostile social economic and climatic condition. Reluctance in timely decision, aggressive competition at tender stage and short bid preparation time were also identified. However, they concluded that the most important factor among all success and failure factors is coordination among project participants. However, [9] concluded that delays, unavailability of resources, low level of project leadership skills, escalation of material prices, unavailability of highly experienced and qualified personnel and poor quality of available equipment and raw materials are affecting the performance of construction projects in the Gaza strip. Relying on this, this research identified human and materials related factors affecting the successful performance of construction projects in our study area.
So far, available literature revealed that previous studies have studied delay factors in different aspect of projects, but none have done anything to evaluate human and materials related factors in road construction projects in Imo State, Nigeria. This study intends to close this gap for enhanced delivery of road construction projects in Imo State.

3. METHODOLOGY

Survey design was adopted for this research work. This is considered necessary because the method enabled the researchers to determine and evaluate quantitatively the human and materials related factors that constrained road construction in Imo State. To achieve this, questionnaire that solicited reactions from the respondents who were also stakeholders in road construction was distributed and their responses formed the basis for our judgment.

The totality of elements under study is called the population [30]. To this therefore, the population of this study cut across all the road projects in Imo State. The population of the study is ninety (90) road project stakeholders which include; 20 Civil Engineers, 20 Quantity Surveyors, 20 Architects and 20 personnel from Ministry of Works and 10 private contractors in the State. This population size was obtained from the database of the Imo State Ministry of Works and Rural Development. Based on the size census technique was adopted and all the population were sampled.

Data were gathered from both primary and secondary sources. Questionnaire and personal discussions were the sources of primary data. Questionnaire was preferred because of its simplicity in administration and low cost in implementation. Responses were rated using the Likert's five-point scale ranging from the lowest score of 1 to the highest score of 5.

Multiple Regression Analysis (MRA) techniques involving coefficient of multiple correlation (R), coefficient of determination (R^2), t-test and the F-test were used to analyze the data collected from the participants. T-test score from MRA was used in achieving the set objectives. The result of the MRA was used to develop a model that was used in ascertaining the level of effect of the factors on the performance of road construction projects in Imo State. The data analysis was thus conducted in the following ways;

The tests of significance of the derived models were carried out through a combination of F – test and t – test. In doing this, we formulated two regression models of the form:

$$Yi = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \ldots + b_nx_n + e_0 \ldots. (1)$$

$$Yii = b_0 + b_1z_1 + b_2z_2 + b_3z_3 + \ldots + b_nz_n + e_0 \ldots. (2)$$

Where: Y = Road Construction Project performance in Imo State (representing Dependent variable in the two equations).
X_1, X_2 . . . Xn = identified human related factors that affect successful road construction performance in Imo State (Independent variables).
Similarly, Z_1, Z_2, Z_3 . . .. Zn = identified materials related factors that affect successful road construction performance in Imo State (Independent variables).
b_0, b_1, b_2, . . .b_n = coefficients to be estimated.
e_0 = Error margin in the estimation.

3.1 Decision Rule for Testing Hypotheses

The null hypothesis (Ho) i.e. b = 0 is accepted at α level of significance and n-k-1 degree of freedom, if $t^*_{cal} < t_{1-\alpha}$, n-k-1 degree of freedom. Otherwise the null hypothesis (Ho) is rejected. $t_{1-\alpha}$; k, n-k-1 is the critical value obtainable from the standard t – distribution table, and α = the chosen level of significance, which for the purposes of this study is 0.5 or 5%.
Alternatively, the null hypothesis is accepted if the p-value is less than 0.05 the level of significance.

3.2 Definition of the Variables Used in the Analysis

A: Human related factors

Y - Successful Road Construction Project performance in Imo State
X1 – Delay in payment of contract sum
X2 – Inefficient project planning
X3 – Construction party's financial management
X4 – Incompetent contractors

B: Materials related factors

Y = Successful Road Construction Project performance in Imo State
Z1 = Change in project scope
Z2 = Materials price fluctuation
Z3 = Untimely availability of construction materials

4. DATA ANALYSIS AND DISCUSSIONS

The responses from the questionnaire are analyzed below in line with the research questions. A total of 90 copies of the questionnaire were distributed among the selected respondent group. Based on the technique adopted in questionnaire distributions (one-on-one), all the questionnaire was retrieved and used for the analyses.

4.1 Nature of Relationship between Human Related Factors and Successful Performance of Road Construction Projects in Imo State

The regression result for human related factors and performance of road construction projects in Imo State were shown in tables 1 and 2.

Table 1: The coefficients of R, R-Square and adjusted R-square

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.891[a]	.793	.784	2.97390

a. Predictors: (Constant), X4, X3, X1, X2

Regression result from table 1 shows adjusted R value of 0.784 indicating that the variable can explain about 78% of the situation. Again, the value of R of 0.891 indicates a strong correlation between human related factors and performance of road projects in Imo State (89%).

Table 2 : Coefficients of the human related factors affecting road performance in Imo State

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.516	1.625		-1.548	.125
	X1	.301	.081	.254	3.709	.000
	X2	.776	.136	.455	5.688	.000
	X3	.082	.098	.045	1.837	.040
	X4	.372	.080	.324	4.678	.000

a. Dependent Variable: Y

Result of regression analysis in table 2 shows that if the coefficients of the variables are put into our model formula for this study, the outcome would be thus:

$Yi = -2.516 + 0.301X_1 + 0.776X_2 + 0.082X_3 + 0.372X_4$. eqn. (3)

From the derived equation 3, it can be seen that all the human related factors (X1 – Delay in payment of contract sum, X2 – Inefficient project planning, X3 – Construction party's financial management, X4 – Incompetent contractors) have positive effects on the performance level of road construction projects in Imo State with inefficient project planning having the highest influence.

4.2 Nature of Relationship between Material Related Factors and Successful Performance of Road Construction Projects in Imo State

In the same vein, the regression result for material related factors and the performance of road construction projects in Imo State were shown in tables 3 and 4.

Table 3: The R, R square and adjusted R-values

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.860[a]	.740	.731	3.31535

a. Predictors: (Constant), X3, X2, X1

Regression result from table 3 shows adjusted R-square value of 0.740 indicating that the variable can explain about 73% of the variations while 27% remain unexplained. Again, the R-value of 0.860 indicates 86% correlation between material related factors and performance of road projects in Imo State. This a high level of relationship.

Table 4: Coefficients of the materials related factors constraining road performance in Imo State

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.111	1.781		-.624	.535
	Z1	.323	.090	.273	3.586	.001
	Z2	1.143	.124	.670	9.190	.000
	Z3	.083	.109	.045	1.763	.048

a. Dependent Variable: Y

Similarly, result of regression analysis in table 4 shows the coefficients of the variables identified. The unstandardized coefficients were inserted into our multiple regression model formula for this study, the derived outcome is:

$Yii = -1.111 + 0.323Z_1 + 1.143Z_2 + 0.083Z_3$. eqn. (4)

From the derived Equation 4, it can be seen that all the material related factors (Z_1 = Change in project scope, Z_2 = Materials price fluctuation, Z_3 = Untimely availability of construction materials) have positive effects on the performance level of road construction projects in Imo State. The variable with the highest influence on performance of road construction projects in Imo State is materials price fluctuation (Z_2). This is based on its coefficient of 1.143.

4.3 Tests of Hypotheses

Hypothesis One:

H_{01}: The human related factors have no significant cumulative effect on performance of the road construction projects in Imo State.

To accept or reject this hypothesis, we refer to Table 5.

Table 5 : Analysis of Variation (ANOVA) showing level of significance of human related factors

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2886.255	4	721.564	81.587	.000[b]
	Residual	751.745	85	8.844		
	Total	3638.000	89			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X3, X1, X2

The result of analysis of variance (ANOVA) in table 5 shows that F_{cal} with a value of 8.844 is less than that of F_{tab} with a value of 81.587 at a significant level of 0.000. With this, going by our decision rule, we shall reject the null hypothesis and accept that the human related factors have significant cumulative effect on performance of the road construction projects in Imo State.

Hypothesis Two

H_{02}: Materials related factors have no cumulative significant effect on the performance of road projects in Imo State.

For us to accept or reject the hypothesis as stated above, explanation of the analysis in table 6 is necessary.

Table 6 : The level of significance of the material related factors constraining road performance in Imo State

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2692.725	3	897.575	81.660	.000[b]
	Residual	945.275	86	10.992		
	Total	3638.000	89			

a. Dependent Variable: Y

b. Predictors: (Constant), X3, X2, X1

Results in table 6 help to either accept or reject the null hypothesis. With the F_{cal} value of 10.992 being less than that of F_{tab} with a value of 81.660 at a significant level of 0.000, we shall reject the null hypothesis and accept the alternate. Hence, materials related factors have cumulative significant effect on the performance of road projects in Imo State.

4.4 Result Discussions

The discussions on the outcome of the analyses are done in line with the research objectives earlier stated.
The study identified and evaluated 4 human related factors namely: delay in payment of contract sum (X_1), ineffective project planning (X_2), construction party's poor financial management(X_3) and use of incompetent contractors(X_4) that have affected the successful performance of the road construction project in Imo State. Result of regression analysis revealed that among the human related factors evaluated, ineffective planning posed the highest effect on the performance of the road construction projects with a coefficient of 0.776. This was followed by use of incompetent contractors (0.372); delay in payment of contract sum (0.301). The factor with least effect on the successful performance of road construction projects in Imo State according to our findings is construction party's poor financial management with a coefficient of 0.082. This is shown in table 2 and is in tandem with Echeme & Nwaribe, (2020).

Similarly, the study identified and evaluated 3 materials related factors namely: change in project scope (Z_1), Fluctuation in price of construction materials (Z_2) and untimely availability of construction resources(Z_3) that have affected the successful performance of the road construction project in Imo State. Result of regression analysis revealed that among the materials related factors evaluated, Fluctuation in price of construction materials with coefficient of 1.142 has the highest effect on the performance of the road construction projects in Imo State. This is followed by change in project scope (0.323). The factor with least effect on the successful performance of road construction projects in Imo State according to our findings is untimely availability of construction resources with a coefficient of 0.083. This is shown in table 4. [5] corroborate with this finding. Also the findings agree with [14], who stated that in Nigeria, factors affecting Construction Cost Performance of Projects include: Contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design. Other factors include, Project complexity, shortening of project period and fraudulent practices.

5. CONCLUSION

With this, the study concludes that:
1). There is an average 40% completion rate recorded by the road each of the road construction projects evaluated in Imo State.

2). 4 human related factors affected the successful performance of the road construction project in Imo State. They include: delay in payment of contract sum(X1), ineffective project planning(X2), construction party's poor financial management(X3) and use of incompetent contractors(X4).

3). 3 materials related factors namely: change in project scope (Z1), Fluctuation in price of construction materials (Z2) and untimely availability of construction resources (Z3) affected the successful performance of the road construction project in Imo State.

From the summary of findings, the following are recommended:

The poor performance level of the road construction projects is as a result of the human and materials related factors. Hence, there is need for construction firms to put more effort at addressing them.

In view of the fact that human related factors led to the projects suffering both time and cost overruns, it is therefore recommended that proper project planning, effective and efficient payment arrangement and minimization of variation in the scope of work should be ensured so as to guarantee good project performance.

Also, in view of the fact that materials related factors contributed to the projects suffering both cost and time overruns, the study recommends that construction materials should be acquired early enough so as to avoid price fluctuation. And, contractors should at all times avoid sharp practices aimed at reducing costs at the expense of quality.

5.1 Contribution to Knowledge

This research has successfully filled the following gaps:

The study was able to establish that human and materials related factors can only contribute to 40% performance level of road construction projects in the State.

The study also reveal that the most critical human related factors are delay in payment of contract sum and ineffective project planning while materials related factors are change in project scope, and fluctuation in price of construction materials. These assist stakeholders to pay more attention to these critical factors in subsequent road construction projects in Imo State Nigeria.

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