International Journal of Civil Engineering, Construction and Estate Management
Vol.3, No.3, pp.46-62, August 2015
Published by European Centre for Research Training and Development UK (www.eajournals.org)

ASSESSMENT OF THE RELATIONSHIP BETWEEN RISK ALLOCATION AND THE PERFORMANCE OF BUILDING INFRASTRUCTURAL PROJECTS IN NIGERIA

IJIGAH Edoka Augustine, AKINYEMI Tobi Akinlolu and FOLORUNSO Tunde Akinola

Department of Building, School of Environmental Technology, Federal University of Technology Akure, P.M.B. 704, Akure, Nigeria

ABSTRACT: *Risk in building infrastructural projects is the exposure of construction activities (related to building) to economic loss, due to unforeseen events or foreseen events for which uncertainty was not properly accommodated. With building infrastructural projects becoming increasingly complex and dynamic in nature as well as the introduction of new procurement methods, many stakeholders are interested in an approach that will enhance project performance within their organizations. The study assessed the relationship between risk allocation and performance of building infrastructural projects. A total of one hundred and eighty copies of questionnaire (180) were administered on randomly selected stakeholders (comprising construction clients, consultants and contractors and insurance companies), out of which one hundred and fifty (150) was found valid and applicable for this study, and this constituted 86.6% of the sample size. Statistical techniques employed for data analyses were percentage of Relative Importance Index (%RII), Cronbach's alpha reliability scale Test, T-test and Spearman's rho correlation analysis. The analyses revealed that clients, consultants, contractors and insurance firms risk allocation affect project performance. Risk elimination by management was ranked first among the tools used to minimize construction projects risk. All the results of the Cronbach's alpha reliability test were above 0.5 which indicated that the items were reliable for the measurement of risk allocation and risk factors. An average Spearman's rho correlation coefficient of 0.6912 showed that risk allocation among stakeholders was significant and directly related to project performance at 0.05 level of confidence. The Paired samples T-test on risk allocation and project performance revealed that there was no significant difference between risk allocation and project performance. It was concluded that there was a positive relationship between building infrastructural risk allocation and project performance. The study therefore recommended that building infrastructural stakeholders should triangulate and use multiple models during the feasibility and viability planning stage of building infrastructural projects in order to reduce pit hole at the construction stage.*

KEYWORDS: Risk Type, Risk allocation, Project performance, Building infrastructural projects.

INTRODUCTION

The construction industry is characterized by one-off projects which are increasingly changing in design and nature as a result of new innovations and technological advancement. These projects by nature are variously attributed to unforeseen eventualities which may affect the overall performance of building projects. Haitham (2013) asserted that the state of the construction industry has necessitated putting various risk analyses and results into practice.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Pawar, Attarde, Ayachit and Kulkarni (2014) described risk as a variable in the construction process whose occurrence results in uncertainty as to the final cost, duration and quality of construction. Research evidence has shown that the source of risk is related to uncertainties in construction which manifest in form of weather change, competitive bidding process, job-site productivity, fluctuating profit margin, inflation, contractual rights and market competition (Pejman, 2012).

In the construction of building infrastructural projects, risk plays a significant role in decision making which may determine the success or failure of the projects. The need to nip the problem of risk in the bud has prompted construction firms to adopt the option of risk management. Risk management practices which assist in controlling risk are risk identification, risk assessment, risk mitigation, risk monitoring and risk allocation (Pawar et al., 2014).

Just like any other construction project, building infrastructural projects are risk-prone and they are associated with different levels of risk which need to be managed effectively through risk allocation (Wang et al., 2007 and Chan et al., 2011). If the problem posed by risk is not adequately addressed, it may result to construction delay in terms of schedule and poor project performance and project failure (Peter et al., 2014). In view of this, cost savings, prevention of construction delays and contractual disputes, and smooth completion of project can be achieved through fair and reasonable risk allocation (Lee, Lee and Wang, 2009).

Moreover, project risk allocation in collaboration with other project elements and other efficient risk management plans are considered to significantly increase the chance of project success (Pejman, 2012). Nonetheless, research studies have revealed that the performance of construction projects in Malaysia, East Asia, Kuwait and Nigeria inclusive, were unsatisfactory and they usually did not meet client requirements (Chan-Albert, 2001, Alwi and Hampson, 2002, Koushki et al., 2005, Kunya, 2006; Alaghbari et al,. 2007, 0tti, 2012, Ijigah *et al*., 2012 (a&b) and Otali and Adewuyi, 2015).

Although, studies conducted by Grimsey and Lewis (2002), Chinyio and Fergusson (2003), Abdul-Rahman et al., (2009), Chan et al. (2011), Ijigah et al. (2013), Micheal et al. (2014) and Tembo et al. (2014) have looked into risk related issues which bother on risk allocation, risk factors, cost indexes, conceptual frameworks, theoretical models and stakeholders perspective on how to overcome future occurrence of risk in construction of building infrastructural projects. However, none of these studies have examined the relationship between risk allocation and the performance of building infrastructural projects. Furthermore, most of these studies have failed to put into consideration the complexity and multi-dynamic nature of building infrastructural projects which makes the construction industry different from other industries such as manufacturing and processing industry.

Therefore, there is need to study the relationship between risk allocation and the performance of building infrastructural projects. The research will assist the Nigerian government (Federal, State and Local Government) policy makers, public and private procurement teams, project monitoring teams, academicians, professionals and researchers in the built environment in evaluating uncertainties related to the management of building projects and enable them provide a better response risk at the planning stage of projects to avoid pitfall during the construction stage.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Construction Project Risk

Risks are an inseparable part of construction projects (Byrne, 2009) and all construction projects are characterized by several types of risk (Wang et al., 2007). Risk is defined as a hazard, or chance of a bad consequence, loss, and exposure to mischance, exposing oneself to loss (Tembo et al., 2014). Similarly, Bunni (2003) defined risk as the combination of the probability or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence. Risk allocation entails assigning management responsibility and accountability for risk (Peter et al., 2014). In building infrastructural projects, the question of who bears the risks should depend on the impact of the risk on the overall project performance. Risk in building infrastructural projects has been described as the exposure of the construction activity to economic loss, due to unforeseen events or foreseen events for which uncertainty was not properly accommodated (Chinyio and Fergusson, 2003). Whenever a building infrastructural project is embarked upon, there are some risk elements inherent in it, such are physical risk, environmental risk, logistics risk, financial risk, legal risk and political risk among others (Ijigah et al., 2013). This has prompted the assessment of the relationship between risk allocation and the performance of building infrastructural projects in Nigeria. Figure 1 shows the relationship between building infrastructural project risk and other performance index. In the diagram the effect of other project elements with building infrastructural project risk is integrated.

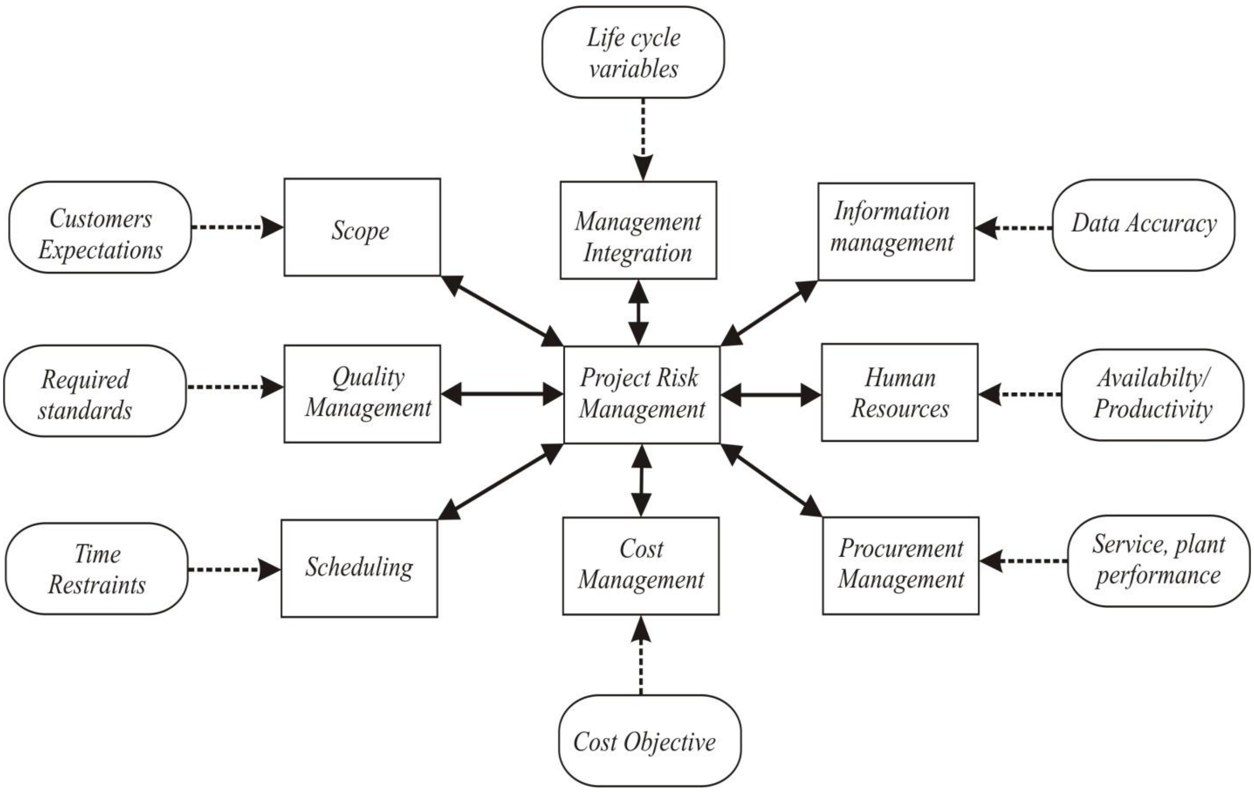

Figure 1. Integrating Risk Allocation with other Project Performance Functions (Pejman, 2012).

ISSN 2055-6578(Print), ISSN 2055-6586(online)

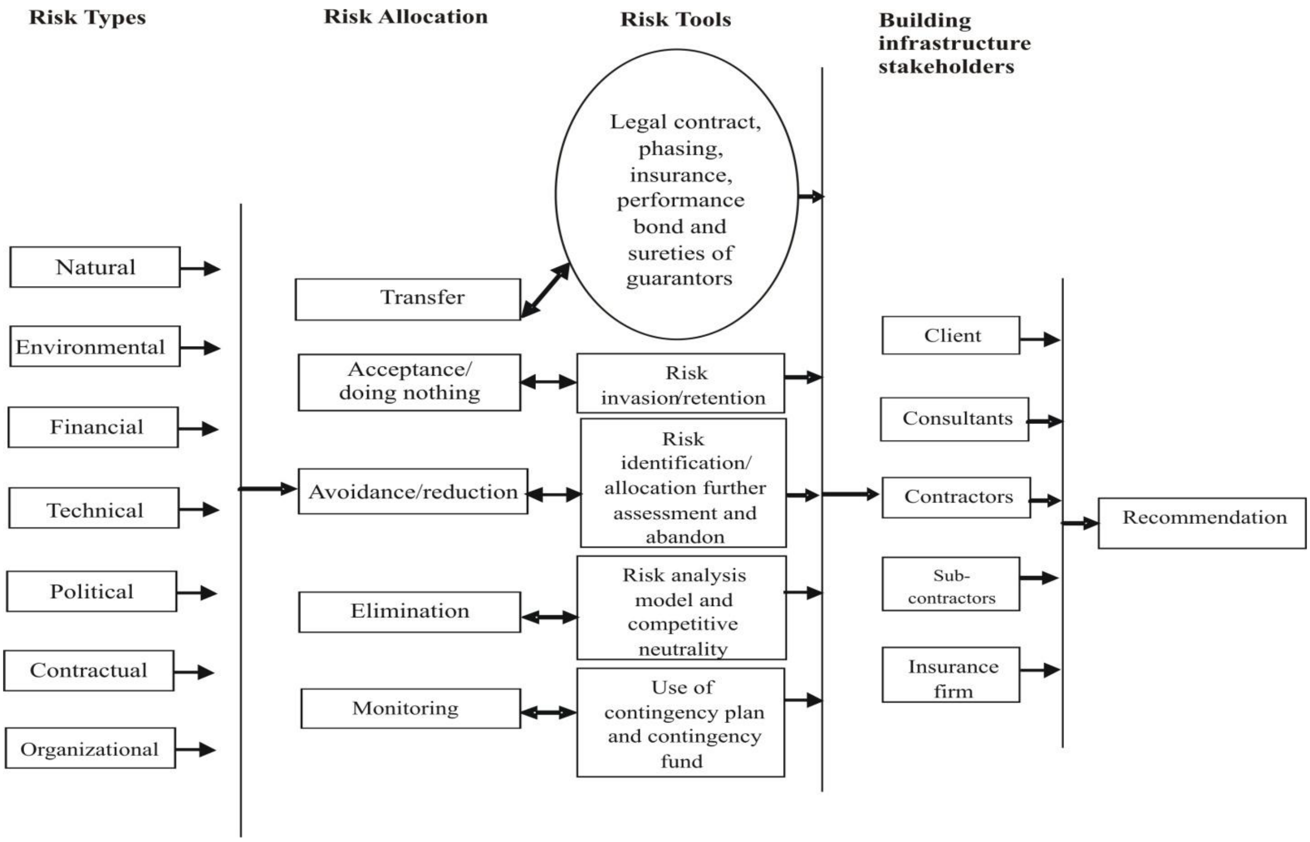

Figure 2. A Conceptual Framework for Allocating Risk in Building Infrastructure Projects.

Figure 2 shows a conceptual framework for risk assessment and allocation on building infrastructural projects. As shown in the figure, the research concept adopted commenced with the identification of various type of risks affecting building infrastructural projects as shown in table 1. The risk types identified were natural, environmental, financial, technical, political, contractual and organizational risk from literature on risk management and discussions with construction clients and their representatives. The next stage allocated the risk types identified using the various risk allocation tools. The project risk was allocated to diverse building infrastructural stakeholders such as client, consultants, contractors, sub-contractors and insurance firm. The validity and predictability of the model was them tested after recommendation from each building infrastructural projects.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Table 1: Description of Risk types in Building Infrastructural Projects.

S/No	Risk type	Description
1	**Natural risk**	Damage by fire, flood and earthquake, physical condition of the ground, cost of testing samples
2	**Environmental risk**	Waste treatment, damage by fire, flood and earthquake, social responsibility, physical condition of the ground and weather condition.
3	**Financial risk**	Inadequate cash flow, inflation and high cost of materials, variation and fluctuation, transportation of material and equipments, cost of testing samples, labour demand and unrest, delay in paying certificates, insolvency of contractors and replacement cost for plants and equipments.
4	**Technical risk**	Material wastage, change in scope, visibility of construction method (buildability), availability of equipment, engineering and design change, transportation of material and equipments, inadequate communication, availability of trained and untrained work force, quality of material, inadequate labour, inadequate plant and equipment, incompetency of contractors and consultants, adaptation to new technology and provision for change in existing technology.
5	**Political risk**	Inflation/high cost of material, review of existing law and policies, political war and conflicts, exchange rate fluctuation, tax policy, social responsibility and devaluation of local currency.
6	**Contractual risk**	Variation and fluctuation, visibility of construction method (buildability), conflict among construction stakeholders, availability of good project good team, compliance with health and safety policy, insurance policy, compliance with requirements and inappropriate choice of contractor and consultants.
7	**Organizational risk**	Visibility of construction method (buildability), labour demand and unrest, delay in resolving disputes and need for research and development.

Risk Allocation on Construction Projects

For risks to be allocated, they have to be identified, analysed and responded to. It is in the event of response that risks are allocated (Tembo et al., 2014). Risk allocation involves assigning management responsibility and accountability for risk(s) (Wang et al., 2007 and Chan et al., 2011). Various methods of risk allocation have been identified. This is also in line with the classification made by Mead (2007) who identified them as risk acceptance, avoidance, elimination, transfer or insurance. Chan et al. (2011) in addition to the aforementioned included monitoring and Smith et al. (2006) included doing nothing as a response to risk. For the purpose of this study Table 2 below presents a summary of authors view on risk allocation, description and tools used as it relates to construction projects.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Table 2: Risk Allocation on Construction Project.

S/No	Risk allocation	Description	Tools	Authors/year
1	Risk transfer	Allocating the risk to a third party	❖ Legal contract phasing ❖ Insurance ❖ Performance bond ❖ Sureties or guarantors	(Mead, 2007) (Wang et al.,2007). (Chan et al., 2011) (Ijigah et al 2013) (Tembo, et al ., 2014)
2	Risk acceptance / Doing nothing	This is when both parties accept the responsibility to mitigate or share the risk	❖ Risk invasion ❖ Risk retention	(Smith et al., 2006) (Mead, 2007) (Hughes and Murdock, 2008) (Chan et al., 2011)
3	Risk avoidance/ Reduction	This involves the identification of risk and allocating them accordingly	❖ Identification ❖ Allocation ❖ Further assessment ❖ abandoned	(Mead, 2007) (Smith et al., 2007) (Chan et al., 2011)
4	Risk elimination	This is when possible risks are identified and dealt with proactively	❖ Risk analysis ❖ Risk model ❖ Competitive neutrality	(Grimsey and Lewis, 2002) (Mead, 2007)
5	Risk monitoring	This the employment of predictive indictor to watch the project as it approaches a risky point	❖ Contingency plan ❖ Contingency fund	(Chan et al., 2011) (Tembo et al., 2014) (Micheal et al., 2014) (Peter et al., 2014)

METHODOLOGY

This research assessed the relationship between risk allocation and the performance of building infrastructural projects with the view of improving the performance of construction projects. The research instrument employed for the study was questionnaire administered on construction stakeholders (constituting clients, consultants and contractors, sub-contractors and insurance companies). A pilot survey was conducted on thirty five (35) construction stakeholders who were randomly selected prior to data collection in order to ascertain the reliability and clearness of the questionnaire. The population of the study were 320 construction stakeholders comprising (100) clients, (100) consultants, (100) contractors and (20) registered insurance companies. The sample size selection was based on non-response bias using the minimum sample size technique (Israel, 2007 and Simon and Clinton, 2014), which brought the total sample size to one hundred and eighty (180) using the formula:

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n = $\frac{N}{1+N(e)^2}$ ((Israel, 2007 and Simon and Clinton, 2014))

Where,

n = sample size,

N = finite population and

e = level of significance of 0.05 at 95% un-tolerable error.

Hence, a total of one hundred and eighty (180) copies of questionnaire were distributed and information on one hundred and fifty (150) of them was found valid and applicable for this study and this constituted 86.6% of the sample size. Five-point Likert scale was adopted for the measured variables.

Methods of Data Analyses

The statistical techniques employed for data analyses were Relative Important Index (RII), Cronbach's alpha reliability scale Test, T- Test and Spearman's Rank Order Correlation (rho) (Ijigah et al., 2013). The percentage Relative Importance Index (%RII) was calculated as follows:

$$\%RII = \frac{RII\ X\ 100}{A} \text{ RII/A or } \%RII = \frac{MS\ X\ 100}{NA}$$

Where,

Mean Score (MS) = $5n5 + 4n4 + 3n3 + 2n2 + 1n1$ from the five-point Likert scale used,

Relative Importance Index (RII) = $\frac{5n5+4n4+3n3+2n2+1n1}{N}$ where; or RII = MS/N

N = Total number of respondents

N = Number or weight given to each factor as indicated in the five-point Likert scale

A = Highest weighted factor (5)

Table 3: Percentage Relative Important Index (%RII) Interpretation and Values Distribution

Likert scales	Percentage Relative Important Index (%RII) description	Value allocation
1	Not at all	20-29.9
2	Slightly important	30-49.9
3	Moderately important	50-69.9
4	Mostly important	70-89.9
5	Completely important	90-100

The Relative Important Index (RII) as represented in Table 3 was employed to rank the stakeholders' risk allocation factors while the Cronbach's Alpha Reliability Scale Test was used to test the reliability of the research instrument. Furthermore, T- Test and Spearman's rho correlation were used to predict the relationship between risk allocation and some selected projects performance in the study area. All data were analysed using Microsoft Excel and Statistical Package for Social Scientist (SPSS 9.0) for windows.

RESULT AND DISCUSSION OF FINDINGS

Client Risk Allocation as it Affects performance of building Infrastructural Project

Table 4 below depicts the result of the extent to which Client Risk allocation affect the performance of building infrastructural projects. Inadequate cash flow(%RII= 90.133%), inappropriate choice of contractor and consultants(%RII= 85.33%)and change in scope (%RII= 83.200%) are the three most important clients risk allocation affecting the performance of building infrastructural projects in the study area; while Damage by fire, flood or earthquake (%RII= 60.267%) was ranked least in the table. The mean Percentage Relative Important Index (%RII) score for all the parameters tested was 71.778% which implies that all these factors constitute risk to clients in relation to building infrastructural projects. Consequently, a project will continue to be setback, exceeding the initial agreed project parameters for project delivery when these indicators are allowed to surface in building infrastructural projects.

Table 4: Client Risk Allocation as it Affects performance of building Infrastructural Projects.

S/no	Risk Type	N	MS	RII	% RII (%)
1	Inadequate cash flow	150	676	4.507	90.133
2	Inappropriate choice of contractor and consultants	150	640	4.267	85.333
3	Change in scope	150	624	4.160	83.200
4	Variation and fluctuation	150	608	4.053	81.067
5	Conflict	150	603	4.020	80.400
6	Inadequate communication	150	602	4.013	80.267
7	Delay in resolving disputes	150	597	3.980	79.600
8	Insolvency of contractors	150	535	3.567	71.333
9	Need for research and development	150	549	3.660	73.200
10	Review of law and policies	150	537	3.580	71.600
11	Exchange rate fluctuation	150	517	3.447	68.933
12	Tax policy	150	517	3.447	68.933
13	War/conflicts	150	511	3.407	68.133
14	Availability of project team	150	510	3.400	68.000
15	Insurance policy	150	507	3.380	67.600
16	Social responsibility	150	473	3.153	63.067
17	Weather condition	150	464	3.093	61.867
18	Physical condition of the ground	150	464	3.093	61.867
19	Devaluation	150	460	3.067	61.333
20	Cost of testing of samples	150	459	3.060	61.200
21	Damage by fire, flood or earthquake	150	452	3.013	60.267
	Mean		**538.3**	**3.589**	**71.778**
	Standard deviation		**67.80**	**0.452**	**9.0395**

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Consultants Risk Allocation as it Affects performance of building Infrastructural Projects

The result in table 5 shows the extent to which Consultants risk allocation affect the performance of building infrastructural projects From the result of the study, adaptation to new technology(%RII= 85.333%), need for research and development(%RII= 85.067%), visibility of construction method (buildability) (%RII= 84.133%) were the top most important consultants allocated risk affecting project performance in the study area. War/conflicts was ranked least on the table while the mean Percentage Relative Important Index (%RII) score for all the parameters tested was 75.89% which implies that all these factors constitute the greatest risks to consultants in relation to building infrastructural projects. These findings are in consonance with the works by Pejman (2012), Tembo et al., (2014), Micheal et al., (2014) and Peter et al., (2014) which submitted that project performance can be improved by appropriate identification and allocation of risk factors on building infrastructural projects.

Table 5: Consultants Risk Allocation as it Affects performance of building Infrastructural Projects

S/No	Risk Type	N	MS	RII	% RII(%)
1	Adaptation to New technology	150	640	4.267	85.333
2	Need for research and development	150	638	4.253	85.067
3	Visibility of construction method (buildability)	150	631	4.207	84.133
4	Inadequate cash flow	150	624	4.160	83.200
5	Change in scope	150	616	4.107	82.133
6	Variation and fluctuation	150	608	4.053	81.067
7	Inadequate communication	150	601	4.007	80.133
8	Compliance with requirements	150	590	3.933	78.667
9	Delay in resolving disputes	150	579	3.860	77.200
10	Engineering and design change	150	576	3.840	76.800
11	Conflict	150	546	3.640	72.800
12	Work force (trained and untrained)	150	537	3.580	71.600
13	Incompetency	150	524	3.493	69.867
14	Weather condition	150	523	3.487	69.733
15	Quality of material	150	503	3.353	67.067
16	Waste treatment	150	472	3.147	62.933
17	War/conflicts	150	468	3.120	62.400
	Mean		**569.18**	**3.800**	**75.890**
	Standard deviation		**56.830**	**0.379**	**7.577**

Contractor's Risk Allocation as it Affects performance of building Infrastructural Projects

Table 6 above depicts the responses on the extent of Contractors risk allocation as it affect the performance of building infrastructural project, Visibility of construction method (buildability) (%RII = 91.200%), availability of Equipment (%RII= 90.667%) and engineering and design change (%RII= 90.267%) are the three most important risk allocation to contractors affecting

ISSN 2055-6578(Print), ISSN 2055-6586(online)

project performance in the study area. While Social responsibility (%RII= 60.267%) was ranked least among the consultants risk allocation. The mean Percentage Relative Important Index (%RII) score for all the parameters tested was 79.362% which implies that all these factors constitute risk to contractors in relation to building infrastructural projects.

Insurance Risk Allocation as it Affects performance of building Infrastructural Projects

The result in table 7 shows the extent to which insurance firms Risk allocation affects performance of building infrastructural project. From the result of the study, Replacement cost for plant and equipment (%RII= 89.733%), Need for research and development(%RII= 83.733%), Health and safety policy (%RII= 80.533%) were the top most important insurance firms allocated risk affecting project performance. Cost of testing of samples was ranked least in the table while the mean Percentage Relative Important Index (%RII) score for all the parameters tested for was 76.578% which implies that all these factors constitute risk to insurance companies in relation to building infrastructural projects.

Table 6: Contractor's Risk Allocation as it Affects performance of building Infrastructural Projects

S/no	Risk Type	N	MS	RII	% RII (%)
1	Visibility of construction method (buildability)	150	684	4.560	91.200
2	available of Equipment	150	680	4.533	90.667
3	Engineering and design change	150	677	4.513	90.267
4	Inflation/ high cost of material	150	672	4.480	89.600
5	Adaptation to New technology	150	664	4.427	88.533
6	Inadequate plant and equipment	150	663	4.420	88.400
7	Inadequate staff/ labour	150	658	4.387	87.733
8	Delay in paying certificates	150	656	4.373	87.467
9	Replacement cost for plant and equipment	150	649	4.327	86.533
10	Inadequate communication	150	642	4.280	85.600
11	Provision for change in existing technology	150	641	4.273	85.467
12	Review of law and policies	150	641	4.273	85.467
13	Inadequate cash flow	150	638	4.253	85.067
14	Work force (trained and untrained)	150	635	4.233	84.667
15	Delay in resolving disputes	150	632	4.213	84.267
16	Labour demand and unrest or strikes	150	629	4.193	83.867
17	Compliance with requirements	150	625	4.167	83.333
18	Conflict	150	620	4.133	82.667
19	Material wastage	150	617	4.113	82.267
20	Waste treatment	150	605	4.033	80.667
21	Transportation of material and equipments	150	598	3.987	79.733
22	Weather condition	150	591	3.940	78.800
22	Insurance policy	150	567	3.780	75.600
23	Physical condition of the ground	150	550	3.667	73.333
24	Insolvency of contractors	150	543	3.620	72.400
25	Tax policy	150	542	3.613	72.267

ISSN 2055-6578(Print), ISSN 2055-6586(online)

26	Health and safety policy	150	507	3.380	67.600
27	Need for research and development	150	496	3.307	66.133
28	Cost of testing of samples	150	482	3.213	64.267
29	Exchange rate fluctuation	150	473	3.153	63.067
30	War/conflicts	150	466	3.107	62.133
31	Devaluation	150	452	3.013	60.267
32	Social responsibility	150	447	2.980	59.600
	Mean		**595.21**	**3.968**	**79.362**
	Standard deviation		**73.92**	**0.493**	**9.856**

Risk Allocation Tools/ Models Used to Enhance Building Infrastructural Projects Performance

The result in table 8 shows the risk allocation tools/ models used by stakeholders to enhance building infrastructural project performance in the study area. From the result of the study, Risk elimination by management (%RII= 89.600%) was ranked first; risk avoidance and reduction (%RII= 83.733%) was ranked second while risk monitoring (%RII= 80.533%) was ranked third. risk acceptance or doing nothing (%RII= 54.533%) was ranked least in the table; also the mean Percentage Relative Important Index (%RII) score for all the risk allocation tools tested was 75.840% which reveals that there is a spontaneous use of most of the tools in the study area. Furthermore, a good knowledge of risk management and proper review of risk factors associated with construction projects which lengthens project duration needs to be done.

Table 7: Insurance firms Risk Allocation as it Affects performance of building Infrastructural Projects

S/no	RISK TYPE	N	MS	RII	% RII (%)
1	Replacement cost for plant and equipment	150	673	4.487	89.733
2	Need for research and development	150	628	4.187	83.733
3	Health and safety policy	150	604	4.027	80.533
4	Review of law and policies	150	593	3.953	79.067
5	Insolvency of contractors	150	570	3.800	76.000
6	Exchange rate fluctuation	150	563	3.753	75.067
7	Tax policy	150	537	3.580	71.600
8	Insurance policy	150	523	3.487	69.733
9	Cost of testing of samples	150	478	3.187	63.733
	Mean		**574.33**	**3.829**	**76.578**
	Standard deviation		**58.417**	**0.380**	**7.789**

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Table 8: Risk Allocation Tools/ Models used to Enhanced building Infrastructural Project Performance

s/no	RISK Allocation tools	N	MS	RII	% RII (%)
1.0	Risk elimination by management	150	672	4.480	89.600
2.0	Risk Avoidance/reduction	150	641	4.273	85.467
3.0	Risk monitoring	150	605	4.033	80.667
4.0	Risk transfer	150	517	3.447	68.933
5.0	Risk acceptance/ doing nothing	150	409	2.727	54.533
	Mean		**568.80**	**3.792**	**75.840**
	Standard deviation		**106.528**	**0.710**	**14.204**

Cronbach's Alpha Reliability of Risk Allocation and Risk Factors

The study examines the reliability and internal consistency of the measurement items in the study as shown in Table 9. The Cronbach's alpha values were above the acceptable threshold of 0.5 except for the stakeholders risk allocated to insurance firms which has a threshold of 0.439. This indicates that the items were reliable in measuring risk allocation and risk factors of building infrastructural project performance. Furthermore, the study examined the convergent validity of the items to determine the extent to which multiple items to measure the same construct affect the study. In doing this, risk allocation to clients, consultants, contractors and sub- contractors and insurance firms were examined using the natural/environmental risk factors, financial risk factors, technical risk factors, political risk factors and contractual /organizational risk factor. Table 10 shows the item loading for the convergent validity test of the items and their composite reliability. As shown in Table 10, most of the loaded items were greater than 0.5 and significant at 0.05 (95% level of acceptance) except for financial factors affecting contractors and sub- contractors risk allocation (0.492) which were below the threshold of 0.5. This was retained because of its t- value which meets the minimum value of 1.00. This implies that there is no significant difference in risk allocation and the performance of building infrastructural projects.

Table 9: Cronbach's Alpha Reliability of the Measures

Constructs	Measurement item	Alpha Value
Stakeholders risk allocation	1. Clients	0.643
	2.Consultants	0.676
	3.Contractors and sub- contractors	0.688
	4.Insurance firms	**0.439**
Risk factors	1.Natural and environmental	0.639
	2.Financial	0.567
	3.Technical	0.557
	4.Political	0.617
	5.Contractual /Organizational	0.668

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Table 10: Loading of Risk Types Against Risk Allocation using Cronbach's Alpha Reliability Test.

Risk factors	Risk allocation			
	Clients	Consultants	Contractors and sub- contractors	Insurance firm
1.Natural/ Environmental	0.861	0.671	0.534	0.949
2.Financial	0.811	0.655	**0.492**	0.957
3.Technical	0.917	0.896	0.547	0.934
4.Political	0.847	0.650	0.494	0.979
5.Contractual /Organizational	0.959	0.868	0.655	0.955

Correlation Coefficient and T-Test of Stakeholder Risk Allocation against Project Performance

It was also pertinent to establish the relationship between risk allocation and building infrastructural project performance among stakeholders in Nigeria. The relationship will create awareness among client, contractors, consultants and insurance companies of the risk in construction projects and serve as a tool to check other project performance set by clients and consultants at the feasibility and planning stage. The result of the analysis in Table 11 shows the Spearman's rho correlation coefficient of stakeholder risk allocation against project performance. An average Spearman's rho correlation coefficient of 0.6912 shows that stakeholder's risk allocation correlates with project performance. The findings indicated that risk allocation among stakeholders was significantly and directly related to project performance at 0.05 level of confidence. However, the relationship between technical risk factors and technical cause of project extension was not significant as the Spearman's rho correlation value was 0.498 which fell below the threshold of 0.50. Furthermore, the result of the Paired samples T –test between the two set of samples shows that there was no significant difference in risk allocation and performance of building infrastructural projects.

Table 11: Correlation Coefficient and T-Test of Stakeholder Risk Allocation against Project Performance

Model path of risk against project duration	Pair Sample Mean	Standard deviation	Standard error mean	T-statistics	Spearman's rho correlation value(2-tailed)	decision
1. Natural/ Environmental	0.32883	0.3251	0.13272	2.478	0.958	High
2. Financial	-0.04286	0.17707	0.06693	-0.640	0.964	High
3. Technical	-0.13886	0.49561	0.13246	-1.048	**0.498**	Low
4. Political	-0.04286	0.64647	0.24434	-0.175	0.500	Weak
5. Contractual /Organizational	-0.17809	0.35983	0.10849	-1.641	0.536	Weak
	Mean				**0.6912**	

ISSN 2055-6578(Print), ISSN 2055-6586(online)

CONCLUSION

The research was aimed at aassessing the relationship between risk allocation and the performance of building infrastructural projects in Nigeria. This study concludes that the most important clients risk allocation which affects the performance of building infrastructural projects are inadequate cash flow, inappropriate choice of contractor and consultants and change in scope. The consultants risk allocation which affects the performance of building infrastructural project are adaptation to new technology, need for research and development and visibility of construction method (buildability). Furthermore, contractors risk allocation which affects the performance of building infrastructural project are visibility of construction method (buildability), availability of equipment and engineering and design change. Furthermore, insurance firms risk allocation which affects the performance of building infrastructural project are replacement cost for plant and equipment, need for research and development and health and safety policy. These findings are in consonance with the works by Pejman (2012), Tembo et al., (2014), Micheal et al., (2014) and Peter et al., (2014) which submitted that project performance can be improved by appropriate identification and allocation of risk factors on building infrastructural projects.

Lastly, clients, consultants, contractors and insurance firms risk allocation affect project performance; risk elimination by management is an important tool that can be used to minimize construction project risk and enhance project performance; and a relationship exists between building infrastructure project risk allocation and project performance.

RECOMMENDATION

Based on the findings from this research, the following recommendations are proposed:

i. An assessment should be carried out on building infrastructural projects during the planning stage, by simulation of identified risk factors to enhance the performance of the projects.

ii. Clients, Consultant, contractor, and insurance firms should allocate building infrastructural project risk factors and work as a team to improve performance of building infrastructural projects.

iii. Project stakeholders should use multiple models for estimating construction project cost and duration rather than relying on past experience and cost data from consultants

iv. Lastly, building infrastructural project stakeholders should improve on performance of projects by introducing a risk management models in each projects executed.

CONTRIBUTION TO KNOWLEDGE

The study assessed the relationship between risk allocation and the performance of building infrastructural projects. From the study, there was a relationship between risk allocation and building infrastructural project performance which was not recorded in the previous researches carried out by (Kunya, 2006), 0tti, (2012) Ijigah *et al*., (2012) (a&b) and Otali and Adewuyi, (2015) on construction and building infrastructure project executed in Nigeria. The research

ISSN 2055-6578(Print), ISSN 2055-6586(online)

also put into consideration the unique, complexity and multi-dynamic nature of building infrastructural projects by groping the risk into natural, environmental, financial, technical, political, contractual and organizational risk from the pilot study before the final assessment of risk allocation on building infrastructural projects. The research will help the Nigerian government (Federal, State and Local Government) policy makers, public and private procurement teams, project monitoring teams, academicians, professionals and researchers in the built environment in evaluating uncertainties related to the management of building projects and enable them provide a better response risk at the planning stage of projects to avoid pitfall during the construction stage. Further studies should be conducted on the impact of risk allocation on project scope, quality management, project schedule, cost management, human resources management, procurement management, information management and integration management to assess the validity of the study.

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