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School of Engineering and Engineering Technology,
The Federal University of Technology, Akure, Nigeria





Appraisal of Risk Identification and Response Techniques adopted on Building Projects in Rivers State, Nigeria

Awodele, O. A.

Department of Quantity Surveying, Federal University of Technology, Akure, Ondo State, Nigeria.

A B S T R A C T

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risk identification,
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Performance.

The performance of the construction industry in terms of meeting its objectives or goal has been invariably affected by risks, thereby leading to time and cost overruns. This research therefore assessed the risk identification and response techniques adopted on building projects in Rivers State, Nigeria with a view to enhancing projects performance in the study area. In achieving the aim of the study, primary data were collected through administration of questionnaires to 284 key construction stakeholders comprising the clients, consultants and contractors on completed public building projects in Rivers State, Nigeria. Out of the 284 questionnaires that were distributed, 158 were returned and found suitable for the analysis. Percentile was used for analyzing demographics of the respondents while mean item score was used for ranking of identified techniques. Kruskal Wallis H test was used for examining the differences in the sample means of different groups of respondents. The study revealed good level of awareness of the existing risk identification and response techniques. It was revealed from the study that utilization of past experience, brainstorming and study of project documents were the most used risk identification techniques while the risk transfer, risk reduction and risk sharing were the most utilized response techniques in building projects. The study recommended that stakeholders should visit locations, consult experts and make reference to databases, and historical data from similar projects during risk identification in order to complement the existing utilized techniques while diligently responding to construction risks in the order of transfer, reduction and avoidance were recommended consequent upon the effectiveness of these strategies.

1. Introduction

The construction industry is not excluded when it comes to the issue of risk, (Odeyinka, 2000; Adedokun, 2012; Adafin et al., 2016), and understanding the techniques of risk identification and response tells if the construction project will perform to expectations in terms of cost, time, quality and sustainability. When compared to other industries, the construction industry is subject to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Adedokun, 2012; Awodele, 2012; Awodele et al., 2007).

Consequent upon the unique nature of the construction projects, risks can arise from a number of different sources (Oyegoke, 2006; Pheng and Chuan, 2006). Some of these risks can arise from the complex and dynamic nature of the industry (Uher

and Loosemore, 2004). Risks can also arise from the many participants – individuals and organisations who are actively involved in the construction project, whose interests may positively or negatively be affected by the project execution or project completion (Project Management Institute, 2008). These participants also have different experience, skills, expectations and interests (Dey and Ogunlana, 2004), which can naturally create problems and confusion for even the most experienced project managers and contractors (Banaitiene and Banaitis, 2012).

In order to guide against problems or the negative consequences of cost and time overrun as occasioned by the risks inherent in construction projects, there is need to properly understand the techniques employed in the identification of risks in building projects which is the thrust behind this survey. Therefore, the importance of the construction industry, as well as its significant exposure to risks occasioned this study and the aim is to assess the stakeholders understanding of the subject matter not

Correspondence:

E-mail address: deledayo4christ@yahoo.com; oaawodele@futa.edu.ng

only in terms of the level of awareness of risk identification and response techniques but also the utilization to building projects among the construction key stakeholders in the study area.

2. Literature Review

2.1 Risk in construction

There are a lot of definitions of risk in literature. For instance, risk is defined as the possible occurrence of negative or adverse effects that lead exclusively to damage or loss, whereas other authors define it as the possibility of occurrence of either negative or positive effects (PMI, 2004; Adedokun, 2002; Zou et al., 2007).

The study also considered risk as related to an event that has adverse effects on building projects because of the usual trend of cost and time overrun usually experience during the course of any construction projects consequent upon risks (Valeriano, 2001). In this study, risk is defined as being the possible occurrence of an undesirable outcome as a result of any event. However, this study is not intended to nullify the other definitions; however it is arguably that the concern of everyone is on the negative side of risk and not the positive side of it. Thus in this study, risk in construction is seen as those occurrence that can have undesirable outcome on the successful completion of any construction projects.

2.2 Risk Identification Techniques

Risk identification is described according to Adedokun (2012) as the preceding step in risk management and involves the discovery of sources from which risk may occur. Risk identification stage is observed by some authors as the period within which risks that can damage an organization and its projects is determined together with the recognition of their characteristics (Project Management Institute (PMI), 2008). It can also be explained as “the process of determining what will happen, and how it will occur” (Baccarini, 2001). However, some other authors are of the opinion that risk identification phase is either one of the most crucial stages within the risk management process, (Martins, 2006) or even the most intriguing and pertinent phase in this process (Kloss-Grote and Moss, 2008). As it provides a better understanding of the project risk and their general impact and it is generally most successful when carried out in group using different techniques (Adeniyi, 2010; Awodele, 2012).

Risk identification phase can be divided into three categories (Chapman, 1998; Chapman, 2001). One of the risk identification carried out by a risk analyst alone and exclusively based on his practice, knowledge and capacity, the revision of the project life cycle, as well as the organization historical data will be taken into account by this expert; Two, the Risk identification carried out through the interview of the risk analyst with one or

many members of the project staff in a bid to analyze the reviewed data and the project life cycle that is based on the knowledge and expert of the people interviewed; and three the Risk identification carried out in a way that requires the risk analyst to guide one or many work groups that are applying the risk identification techniques. The various risk identification techniques identified by Authors from different literatures are described below;

2.2.1 Brainstorming

This is described as an idea generation group technique and is divided in two phases. The first phase is called the idea generation phase, which involves the generation of as many ideas as possible by participants. The second phase is called the idea selection phase, in which each participant supports his/her idea so that the others will be convinced. In the second phase, all the ideas generated are filtered, so that only those approved by the entire group are remaining. This technique has four basic rules: “(i) Criticism is ruled out – evaluation of ideas must be withheld until later; (ii) 'Free-wheeling' is encouraged; (iii) Quantity is wanted – the greater the number of ideas, the more likely is the chance of having useful ones; (iv) Combination and improvement” (Morano, Martins and Ferreira, 2006).

2.2.2 Interview/Expert Judgment

This is an unstructured, semi-structured or structured interviews individually or collectively carried out with a set of experienced project members, specialists or project stakeholders (Morano et al., 2006). During a structured interview, interviewees are asked a set of prepared questions to encourage the interviewee to present their own perspective and thus identify risks. Structured interviews are frequently used during consultation with key stakeholders when designing the risk management framework (InConsult Property Limited, 2013). As an example, structured interviews are good to gauge risk appetite and tolerance when developing risk appetite statements (InConsult Property Limited, 2013).

2.2.3 Questionnaire

A risk questionnaire that includes a series of questions on both internal and external events can also be used effectively to identify risks (Dinu, 2012). For the external area, questions might be directed at political and social risk, regulatory risk, industry risk, economic risk, environmental risk, competition risk, and so forth (Dinu, 2012). Questions on the internal perspective might address risk relating to customers, creditors/investors, suppliers, operations, products, production processes, facilities, information systems, and so on. Questionnaires are valuable because they can help a company think through its own risks by providing a list of

questions around certain risks. The disadvantage of questionnaires is that they are not usually linked to strategy (Morano et al., 2006; Dinu, 2012).

2.2.3 Benchmarking

Benchmarking according to Dinu (2012) is a set of the possible processes, inputs and outputs that organizations might expect to see incorporated into items used in the assessment and management of information risk.

2.2.4 Past Experience

The past experience of the project team, project experience within the company, and experts in the industry can be valuable resources for identifying potential risk on a project. Identifying the sources of risk by category is another method for exploring potential risk on a project. Some examples of categories for potential risks include the following: technical, cost, schedule, client, contractual, weather, financial, political, environmental and people. Gabel (2010) opined that the selection of the right technique often depends on past experience, expertise, and recently depends on the available computer software.

2.2.5 Other strategies

Aside the aforementioned strategies, other techniques that could as well be used in identification of construction risks, which were taken into consideration in this study, included visit to construction site locations, study expert literature, consulting expert, study project documents (plans, files, etc) and the use of databases, and historical data from similar projects.

2.3 Risk Response Strategies

Risk response is described by Smith, Merna and Jobbling (2006) as the third step in the risk management process. Adedokun (2012) opined it as a process of controlling risks associated with a given construction project. It involves taking action against the identified risks. After the identification and analysis of the project risks, the project managers and the project teams must take the necessary steps against the identified project risks, focusing on the risks with the most significance, so as to shift the odds towards the success of the project (Gabel, 2010). Thus the initial steps of risk identification and risk analysis earlier described were done in order to arrive at a suitable response in managing the risk event.

According to Winch (2002), the response strategy and approach employed depends on the type of risks being dealt with. He further stated that the lower the effect of the risks, the better it can be managed. Project Management Institute (2004) asserted

that there is also need for a supervisor, whose duty is to monitor the development of the risk response that will be agreed by all the actors in the risk management process. Gabel (2010) opined that in order to maximize the benefits of project risk management, it should be incorporated into our project management plan and work activities, meaning risk management activities should be built into our Work Breakdown Structure.

David (2001) asserted that the generally accepted as strategies for dealing with risks is considered in the order of avoid-transfer-mitigate-accept. It was further stated that for each risk, the first question is if the risk can be avoided, secondly is to consider possible transfers; thirdly consider mitigation, while acceptance should be considered only as a last resort for the residual risks. The common strategies adopted in responding to risks as identified by Dinu (2012) are described below;

2.3.1 Avoid

Project Management Institute (2004) described this as action taken to insure the probability or impact of a threat is eliminated. The avoidance actions to include: change project management plan to eliminate a threat, to isolate project objectives from the risk's impact, or to relax the project objective that is in jeopardy, such as extending schedule or reducing scope. Some risks that arise early in the project can be avoided by clarifying requirements, obtaining information, improving communication, or acquiring expertise (Project Management Institute, 2004).

Two types of action were proposed according to Gabel (2010). The first is to remove the cause of the risk, i.e. the risk trigger, and the second is to execute the project in a different way while still aiming to achieve project objectives. While noting that not all risks can be avoided or eliminated, it was stated that in comparison to others, this approach may be too expensive or time-consuming, but went further to suggest that it should be the first strategy considered for each risk (David, 2001).

2.3.2 Exploit

Opposite of avoid: Project Management Institute (2004) stated that this strategy is to insure a positive impact, in which an opportunity is realized. It involves taking action to ensure the opportunity is realized, and such response actions includes assigning more talented resources to a project either to reduce time to completion, and/or to provide better quality than originally planned. An opportunity is defined as a risk event that if it occurs will have a positive effect on achievement of project objectives (Gabel, 2010). Dinu (2012) opined avoid and exploit as the most aggressive of the response strategies, and that they should be reserved for those "golden opportunities" with high probability and impacts.

2.3.2 *Transfer*

David (2001) opined that transferring a threat does not eliminate it; stating that the threat still exists, though it is owned and managed by another party. According to Project Management Institute (2004), transferring project risk usually involve payment of a risk premium to the party taking the risk, examples of such risk premium includes; insurance, performance bonds, warranties, etc. It was noted that contracts may also be used to transfer specified risks to another party (Project Management Institute, 2004). Transferring risk involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. The aim of this is to ensure that the risk is owned and managed by a party who is best able to deal with it effectively. Since risk transfer usually involve payment of a premium, it is essential to consider the cost-effectiveness of this when deciding to adopt a transfer strategy (Kloss-Grote and Moss, 2008).

2.3.3 *Share*

Project Management Institute (2004) described sharing a positive risk to involve allocating ownership to a third party who is best able to capture the opportunity for the benefit of the project. Examples of sharing actions to include forming risk-sharing partnerships, teams, or joint ventures, which might be established with the ultimate purpose of managing opportunities (Project Management Institute, 2004). According to PMI, allocating risk ownership is to grant another party who is best able to handle it the opportunity, in terms of maximizing probability of occurrence and increasing potential benefits if it does occur (PMI, 2004; PMI, 2008). PMI (2008) asserted that transferring threats and sharing opportunities are similar in the sense that a third party is used. Gabel (2010) further stated that those, to whom threats are transferred, will take on the liability, while those to whom opportunities are allocated, should also be allowed to share in the potential benefits.

2.3.4 *Mitigate or reduce*

This is a reduction in the probability and/or impact of an adverse risk event to an acceptable threshold. Taking early action is often more effective to repair than trying to repair the damage after the risk has occurred. Gabel (2010) cited examples of mitigation strategies to include: adopting less complex processes, conducting more tests and/or field investigations, developing a prototype; also stated that measures taken to address the impact includes targeting linkages that determine the severity, such as designing redundancy into a subsystem, stating that this may reduce the impact from a failure of the original component (Project Management Institute, 2004). Ehsan et al. (2015) opined mitigation or acceptance as the strategies most often used due to the fact that the numbers of threats

that can be addressed by avoidance or transfer are limited. Dinu (2012) also opined that preventive responses are better than curative responses, because preventive responses are more proactive and if successful can lead to risk avoidance. Gabel (2010) asserted that preventive responses tackle the causes of the risk and also proposed that in a situation where it is impossible to reduce probability, a mitigation response should be employed to address the adverse impact of risk, by targeting the drivers that determine the extent of the severity.

2.3.2 *Enhance*

Project Management Institute (2004) asserted that this response modifies the “size” of an opportunity by increasing probability and/or impact while also described this method to involve seeking to facilitate or strengthen the cause of the opportunity, and proactively targeting and reinforcing its trigger conditions. The impact drivers can also be targeted, while seeking to increase the project's susceptibility to the opportunity (Project Management Institute, 2004). This response aims to modify the “size” of the positive risk. Stating that the opportunity is enhanced by increasing the probability and/or impact of the opportunity, which as a result maximizes the benefits realized for the project (Morano et al., 2011).

2.3.3 *Accept*

This is the action in which risks that remain after response actions and/or for which response is not cost effective are accepted; this action also depicts the acceptance of risks that are uncontrollable, for which no response actions are practical (Ehsan et al., 2015). Project Management Institute (2004) identified two types of acceptance, the passive and the active acceptance. The passive acceptance was described as the action taken to document threats that cannot be eliminated or opportunities that cannot be exploited, so as to provide awareness that these exist and have been identified. The active acceptance was described as the action that involves establishing a contingency reserve to deal with the aggregate residual risk that has been accepted.

3.0 **Research Methods**

This study adopted the use of questionnaire survey administered on key construction stakeholders. The population for this work included the professionals in the construction industry within the study area, which comprised the clients' representatives, consultants and the contractors' representatives totalling seven hundred and sixty two (762) as indicated in table 1. The adequacy of a sample is assessed by how well such sample represent the whole population of participants from which the sample is drawn (Kothari, 2009). In order to achieve this, the lists of relevant construction professionals as at December, 2014 were collected

Table 1: Total Population of the target Respondents

S/N	Respondents	Population	Sample size
1.	Clients' representatives	51	34
2.	Contractors' representatives	156	61
3.	Consultants	555	189
	Total	762	284

Table 2: Test of Reliability for Measuring Scale

Scale of measure	Cronbach α - value
level of awareness of risk identification techniques	0.855
Level of utilization of risk identification techniques	0.849
Level of utilization of risk response strategies	0.661

from their respective professional bodies in Rivers State. The list of contractors registered in category A to C was sourced from the state ministry of works while the clients are the various ministries, department and agencies as well as higher educational institutions in Rivers state that had commissioned construction projects within the last 5 years (2010 – 2014). Having ascertained a population of 762, it was reduced scientifically using Yamane's 1967 to sample size of 284 (table 1). The analysis of the collected data was carried out using the following descriptive and analytical scientific methods: percentile, mean item score, factor analysis and Kruskal-Wallis H test. Also the reliability of the research instrument, for questions posed on a 5-point likert scale, was carried out using Cronbach alpha test.

3.1 Test of reliability for measuring scale

The research instrument is reliable the more the Cronbach's α value tends towards 1.0 (Kothari, 2009; Bell, 2005, Creswell, 2012). From Table 2, the Cronbach's α value for scale of measure of the research instruments ranges between 0.661 – 0.855. Consequent upon these values, the instrument used for this study is significantly reliable.

4.0 Data presentation, analysis and results

4.1 Background information of the respondents

Out of the 284 questionnaires that were administered, 158 were returned and found suitable for the analysis. The analyzed questionnaires represent 55.63% of the total questionnaire sent out which is considered sufficient for the study based on the assertion of Moser and Kalton (1999) that the result of a survey could be considered as biased and of little significance if the return rate was lower than 20-30%. As for the years of working experience possessed by the respondents, it can be seen that 14.6% falls within 1 - 5, 59.5% of the respondents are within 6 – 15

years of experience, while 13.9% falls within 16 - 20. The last category of 21 and above accounted for 12.0%. On the average, the respondents had approximately 11 years of working experience. Information supplied by this category of professionals is considered to be adequate and reliable. These set of respondents have executed 25 construction projects on the average. Analysis according to Table 3 reveals that majority of the respondents are BSc/ BTech holder. Table 3 shows that 24.1% of the respondents are working within client organisation while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively. From Table 3, it can be seen that majority of the respondents in this case are Engineers with 45.6% and was closely followed by 33.5% quota, represented by the Quantity Surveyors and the least was Architects with 20.9%. The professional membership status of the respondents shows that 55 are graduate members, 97 are corporate/ associate members while 6 of them are fellow of their respective professional bodies with 34.8%, 61.4% and 3.8% respectively. In terms of the sectors or firms where the respondents are, Table 3 shows that 24.1% of the respondents are working within client organisation while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively.

4.2 Risk identification techniques in building projects

Table 4 shows that in terms of awareness, the respondents are aware of the various risk identification techniques. Brainstorming, past experience and visit locations are the most highly rated with mean scores of 4.006, 3.905 and 3.728 respectively. The least based on the ratings of the respondents are study specialist literature (Mean Score = 3.139), benchmarking (Mean Score = 2.918) and questionnaires (Mean Score = 2.753) respectively. Regarding the level of utilization of the afore-stated risk identification techniques, past experience ranked first (Mean score = 3.817), followed by brainstorming placing 2nd (Mean Score = 3.772) and the 3rd

technique utilized is study project documents (plan, files, etc). Study specialist literature (Mean Score = 3.361), benchmarking (Mean Score = 2.646) and questionnaires (Mean Score = 2.595) are seldom utilized in building projects in Rivers State.

4.3 Significance test on the awareness of risk identification techniques

From Table 5, Kruskal Wallis test carried out shows that the p value is > 0.05 , being 0.440, then null hypothesis, which says that there is

no significant agreement in the opinions of the respondents, is accepted and the alternate hypothesis is rejected that there is statistically significant agreement in the opinions of the respondents. Based on the aforementioned, it is evident that the respondents have divergent opinions in relation their awareness of risk identification techniques in building projects. The disparity in opinions is not unconnected to the uniqueness of construction projects. The technique for risk identification that is applicable to one project may not be applicable to another similar project.

Table 3: Demographics of the respondents

<i>Background Information</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Cum. Percentage</i>
<i>Profession of respondents</i>			
Quantity Surveyors	53	33.5	33.5
Architects	33	20.9	54.4
Engineers	72	45.6	100.0
Total	158	100.0	
<i>Years of experience</i>			
1 – 5	23	14.6	14.6
6 – 10	75	47.5	62.0
11 – 15	19	12.0	74.1
16 – 20	22	13.9	88.0
21 and Above	19	12.0	100.0
Mean	10.8		
Total	158	100.0	
<i>Highest Qualifications</i>			
HND	26	16.5	16.5
BSc/BTech	68	43.0	59.5
PGD	12	7.6	67.1
MSc/MTech	51	32.3	99.4
PhD	1	0.6	100.0
Total	158	100.0	
<i>Type of firm/ Sector</i>			
Client organization	38	24.1	24.1
Contracting firm	61	38.6	62.7
Consulting firm	59	37.3	100.0
Total	158	100.0	
<i>Membership grade</i>			
Graduate	55	34.8	34.8
Corporate/ Associate	97	61.4	96.2
Fellow	6	3.8	100.0
Total	158	100.0	
<i>Professional body of affiliation</i>			
NIQS	53	33.5	42.5
NIA	33	20.9	66.6
NSE	72	45.6	94.2
Total	158	100.0	
<i>Number of projects executed</i>			
1 – 20	94	59.5	59.5
21 – 40	33	20.9	80.4
41 – 60	19	12.0	92.4
61 – 80	3	1.9	94.3
81 and Above	9	5.7	100.0
Mean	24.6		
Total	158	100.0	

Table 4: Risk identification techniques in building projects

	Awareness		Utilization	
	Mean	Rank	Mean	Rank
Brainstorming	4.006	1	3.772	2
Past experience	3.905	2	3.817	1
Visit locations	3.728	3	3.709	4
Consulting experts	3.720	4	3.601	5
Study project documents (plans, files, etc)	3.582	5	3.766	3
Databases, historical data from similar projects	3.475	6	3.361	6
Interviews	3.342	7	3.177	8
Study specialist literature	3.139	8	3.361	6
Benchmarking	2.918	9	2.646	9
Questionnaires	2.753	10	2.595	10

Table 5: Significance test on the risk identification techniques

	Profession	Group	Awareness Mean
Chi-square	1.643	Quantity Surveyors	17.50
Df	2	Architects	17.00
Asymp. Sig	0.440	Engineers	13.15

Table 6: Significance test on the utilization of risk identification techniques

	Profession	Group	Utilization Mean
Chi-square	1.643	Quantity Surveyors	18.300
Df	2	Architects	15.43
Asymp. Sig	0.414	Engineers	13.38

4.4 Significance test on the utilization of risk identification techniques

From Table 6, Kruskal Wallis test carried out shows that the p value is > 0.05 , being 0.414, then null hypothesis, which says that there is no significant agreement in the opinions of the respondents, is accepted and the alternate hypothesis is rejected that there is statistically significant agreement in the opinions of the respondents. Based on the aforementioned, it is evident that the respondents have divergent opinions in relation their utilization of risk identification techniques in building projects. The disparity in opinions is also not unconnected to the peculiarity of construction projects. The technique for risk identification that is applicable to one project may not be applicable to others and bears on the utilization of risk identification techniques for construction projects.

4.5 Risk response strategies in building projects

The account of table 7 indicates that the respondents are aware of the existing risk response strategies in place. The order of awareness include risk transfer (Mean Score = 4.108) being ranked 1st, risk sharing placed 2nd with mean score of 3.867.

The respondents utilized risk response strategies in the order of risk transfer, risk reduction and risk sharing. The mean values of 3.747, 3.652 and 2.785 predisposed them to be the most highly rated among other ones.

4.6 Significance test on the awareness of risk response strategies

From Table 8, Kruskal Wallis test carried out shows that the p value is > 0.05 , being 0.664, then null hypothesis, which says that there is no significant agreement in the opinions of the respondents, is accepted and the alternate hypothesis is rejected that there is statistically significant agreement in the opinions of the respondents on their level of awareness of risk response strategies. Based on the aforementioned, it is evident that the respondents have divergent opinions in relation to their awareness of risk response strategies in building projects. The adjudged reason to this is that risk response strategies is project specific.

4.7 Significance test on the utilization of risk response strategies

From Table 9, Kruskal Wallis test carried out shows that the p value

is > 0.05 , being 0.264, then null hypothesis, which says that there is no significant agreement in the opinions of the respondents, is accepted and the alternate hypothesis is rejected that there is statistically significant agreement in the opinions of the respondents on their level of utilization of risk response strategies. Sequel to this, it is evident that the respondents have divergent opinions in relation to their level of utilization of risk response strategies in building projects. It can also be adduced that risk response strategies is project specific.

4.8 Effectiveness of risk response strategies

Based on Table 10, the respondents are of the opinion that risk transfer is the most effective risk response strategies (Mean Score = 4.133) followed by risk reduction (Mean Score =

3.741) in building projects in Rivers state. While noting that all response strategies are significant in effectiveness, yet risk retention ranked last (Mean Score = 2.627).

4.9 Significance test on the effectiveness of risk response strategies

From Table 11, Kruskal Wallis test carried out shows that the p value is > 0.05 , being 0.412, then null hypothesis, which says that there is no significant agreement in the opinions of the respondents, is accepted and the alternate hypothesis is rejected that there is statistically significant agreement in the opinions of the respondents. Based on the aforementioned, it is evident that the respondents have divergent opinions in relation effectiveness of risk response strategies in building projects.

Table 7: Risk response strategies in building projects

	Awareness		Utilization	
	Mean	Rank	Mean	Rank
Risk transfer	4.108	1	3.747	1
Risk sharing	3.867	2	2.785	3
Risk avoidance	3.006	3	2.646	4
Risk reduction	2.975	4	3.652	2
Risk retention	2.810	5	2.525	5

Table 8: Significance test on the awareness of risk response strategies

	Profession	Group	Mean
Chi-square	0.819	Quantity Surveyors	8.94
Df	2	Architects	6.25
Asymp. Sig	0.664	Engineers	7.20

Table 9: Significance test on the utilization of risk response strategies

	Profession	Group	Mean
Chi-square	2.660	Quantity Surveyors	9.25
Df	2	Architects	3.50
Asymp. Sig	0.264	Engineers	7.80

Table 10: Effectiveness of risk response strategies

	Mean	Rank
Risk transfer	4.133	1
Risk reduction	3.741	2
Risk avoidance	2.930	3
Risk sharing	2.823	4
Risk retention	2.627	5

Table 11: Significance test on the effectiveness of risk response strategies

	Profession	Group	Mean
Chi-square	1.771	Quantity Surveyors	9.13
Df	2	Architects	4.50
Asymp. Sig	0.412	Engineers	7.60

The reason adduced to this is that the effectiveness of risk response strategies is project specific. Risk response strategy that is effective for one project may not be effective on another project.

5.0 Discussion of findings

5.1 Risk identification techniques

It is evident that the respondents are aware of the risk identification techniques such as brainstorming, past experience and visit locations with the most utilized of all being past experience. This is against Adedokun (2012) that brainstorming is the most utilized in selected large construction companies in Nigeria and also Tadayon et al. (2012) that brain-storming sessions were the most significant method that contributed to identifying the risks of a project. Other risk identification techniques being used in Rivers State based on the study include brainstorming and study project documents.

5.2 Risk response strategies

The findings from this study shows that the respondents are aware of the existing risk response strategies in the order of risk transfer and risks sharing among others while the most utilized risk response strategy being risk transfer. This risk transfer is in line with Adedokun (2012) and Ehsan et al. (2015) as the most adopted risk response strategies. Risk reduction and risk sharing are other risk response strategies that are at variance with risk transfer and avoidance in Adedokun (2012). On the issue of effectiveness of risk response strategies, risk transfer is the most effective risk response strategies followed by risk reduction and avoidance in Rivers State

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6.0 Conclusion and recommendations

6.1 Conclusion

Consequent to the forgoing analysis carried out, it is evident that building projects in Rivers State are culpable of being predisposed to risks just like construction works in other parts of Nigeria and beyond. It is hereby concluded that;

1. Respondents are aware of the existing risk identification techniques, as occasioned by the high level of utilization in past experience, brainstorming and study of project documents (plans, files etc.); and
2. Risk transfer, risk reduction and risk sharing were the most utilized strategies in building projects despite the appreciation of the various risk response strategies.

6.2 Recommendations

In order to accomplish the purpose for which this research was carried out, bearing in mind the magnitude of fund committed into construction projects, the following recommendations are proposed so as to achieve hitch free construction process that ensures value for money that;

1. Stakeholders should visit locations, consult experts and make reference to databases, and historical data from similar projects during risk identification in order to complement the existing utilized risk identification techniques;
2. Project participants are advised to adopt risk transfer, risk reduction and risk avoidance in the order, consequent upon the effectiveness of these risk response strategies.

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