



LEVEL OF RISK MANAGEMENT PRACTICE IN NIGERIA CONSTRUCTION INDUSTRY- FROM A KNOWLEDGE BASED APPROACH

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Keywords

Nigeria, risk management, knowledge, best practices, comparative effectiveness, evaluation.

ABSTRACT

This paper discourses the problems associated with risk management practice in Nigeria construction projects with the use of knowledge-based approach, and proposes a methodology based on a one-fold arrangement which includes the modelling function of the risk management, its evaluation, comparative effectiveness, desired quality and the availability of a best practices model. One-fold approach is part of a research effort that is still in progress. A major preliminary conclusion of this research is the fact that risk management in construction projects is still ineffective and low practices in developing countries like Nigeria as a case study. The main cause of this research is the lack of knowledge. It is expected that the application of the proposed approach will allow clients, contractors and consultants to develop a project's risk management function based on best practices, and also to improve the performance of this function. In order to improve effectiveness of construction project, it should become part of a strategic plan of the organization.

JEL Classification

G30, D80, L70

1. INTRODUCTION

Management of risk is an important role a project manager must undertake. However, project manager duty is predominantly difficult and wasteful if good risk management has not been put to practice from the beginning of the project. Efficient and effective risk management approach entails proper systematic methodology and, importantly from the aspect of experience and knowledge. Previous research results in Nigeria have shown that, owners, contractors and consultant do not systematically apply risk management practices in Nigeria construction industries which on a long-run result to negative penalties of the projects' performance. Most of the previous literature shows that risk management in construction projects is full of limitations that affect its usefulness as a project management function and at the end affect projects' performance. Risk management in construction projects has been approached using a reductionist approach for so many years which produces poor results and reduce the quality of project management. For an instance, risk is handled through the application of contingencies (in terms of money or time) that are not determined based on a complete analysis of the risks that can terminate a particular project, and many cases are obviously enough to cover the

consequences of risks that do occur during the project realization. Then, in most of cases projects result to costs overrun and schedule overrun (Baloi and Price, 2003)

To make an efficient and effective risk management it is essential to have a proper and systematic methodology and, more importantly, knowledge and experience of various types of project that has been handled before. For example, it requires knowledge of the unforeseen circumstances that may occur during the project execution, on the actions that work well or not when one of these events occurs, on methods to evaluate a risk or estimate the probability that it will occur as soon as possible. Lack of an effective project risk management function has a lot of bad consequences for participants in a project due to lack of plan against the risks and uncertainty that any project may leads to. For an instance, lack of prevention against the risk of defining the scope of a project, or environmental hazards or communication risks, poor site management, slow decision making between others, leads to delays, significant increases in costs and contractual disputes and litigation among others.

Previous research results in Nigeria have shown that industries that employ construction services on a periodic basis do not systematically apply risk management practices in projects, which has resulted in negative consequences for the performance of projects. For example total abandonment of project (Aibinu and Jagboro, 2002). Also, research carried out by Ojo, (2010) on claims and contract disputes in a number of construction projects, had reflected the event of risks occurrence that were not well analyzed or integrated by either clients, contractors and consultants as one of the main causes of claims and disputes in the construction projects. The major research statement that comes up here shows that risk management precautions in Nigeria construction project has been carried out in a very limited and ineffective way and that the main cause of this situation is the lack of knowledge for its realization and the loss of the knowledge caused during the performance of each project that would be useful for new projects. That is, the research statement is that, knowledge is a key factor in realizing and improving risk management in construction projects, from the perspective of the client, contractor and consultant.

In this case, this proposal aims to discourse the problems of risk management in construction projects from a knowledge-based approach and through a system perspective. Therefore, a research effort whose main purpose is to develop a risk management system based on knowledge, to support risk management in construction projects for industries and organizations in Nigeria is still in progress. The idea is to provide a methodology based on best practices to be used, and an assessment tool of risk management based on this methodology, the ability to propose improvements for risk management based on the gaps detected during evaluation, and the availability of a knowledge-base that supports the risk management and has the ability to gain knowledge from experiences obtained in the implementation of construction projects. The outcomes of this research will allow a client, contractor or consultant first, to develop a risk management function based on best practices, and second to improve the performance of this function along the realization of new projects to be executed. The quality of this approach lies in that it discourses the risk management function from a knowledge-based perspective which never exist in most of the organizations and industries; in the best

practices model that it will be developed and used as a benchmark for evaluation and continuous improvement (optimized process), and finally it will provide an instrument for evaluating the current risk management functions by applying a maturity model that will fit the projects accomplished by Nigerian organizations and industries. Furthermore, the risk management system prototype developed during this research effort will be the base for the development of an efficient and effective risk management system in organizations and industries that implement this approach. Also, the knowledge gained and structured during this research will help industries that already have a formalized risk management function, to evaluate and improve it by using the model as a manual of risk management based on best practice (one-fold) that was mentioned earlier. The following sections discuss the literature on the main issues associated with the approach developed for this research, particularly risk management, maturity models and knowledge management. Next, the research effort and its objectives are described and finally, the main initial results are discussed and shown.

2. RISK MANAGEMENT

Nigeria has failed to place more emphasis on risks during construction and such risks when not properly managed have added to project failure (Ijaola, 2012). Risk management is one of the nine knowledge areas (i.e., scope management, integration management, cost management, time management, resource management, human management, procurement management and risk management) propagated by the Project Management Institute (PMI, 2000). Furthermore, risk management in the construction project management context is a broad and systematic ways of identifying, analyzing, and responding to risks for the achievement of project goals. The goals of the risk management process include identifying risks, and improvement of construction project management processes and efficient and effective use of the resources. Risk may also stand as opportunities, but the fact that most of the risk usually has negative results has made most of the people to only think about the negative side of risk (Baloi and Price, 2003).

As of today, risk management is an essential part of project management (Olsson, 2007; del Caño and de la Cruz, 2002), where one of the most difficult activities is planning and identifying the project risk and how they should be grouped (Olsson, 2007). This is important process and most of project managers know that risk management is vital for good project management (Baloi and Price, 2003; Perera and Holsomback, 2005). Also, risk management process comprises of the following main steps: (1) Risk planning; (2) Risk identification; (3) Risk assessment (qualitative and quantitative); (4) Risk analysis; (5) Risk response; (6) Risk monitoring, and (7) Recording the risk management process (ISO 31.000, 2009; Baloi and Price, 2003).

Furthermore, for the last four decades the risk management research has developed extensively in the construction industry (Forbes et al., 2008) assumed that construction projects are visible to risk at the time of their coming into existence (Schieg, 2006) and are observed to have more essential risk due to the involvement of many contracting parties such as owners, contractors and designers, among others (El-Sayegh, 2008). It is possible to analyze the project risk from three different perspectives.

On one side we have the client, a key stakeholder and decision maker in construction projects (Aibinu and Jagboro, 2002), consultants who must provide complete drawing and good communication between the workers, and on the other side we have contractors. Contractors use high mark-ups to cover for risk but as their margins have become smaller this approach is no longer effective (Baloi and Price, 2003). These three groups have different behaviors fronting project risk and different possibilities to transfer them to the party that is in the best position to deal with the risk management (Kartam and Kartam, 2001).

According to Forbes *et al.*, (2008) highlighted that over time and all over countries, the construction industries tends to use only a partial number of risk management techniques even though not all techniques are suitable for every situation. For instance, Lyons and Skitmore (2004) found that brainstorming is the most common risk identification techniques used in the construction industry, while Bajaj *et al.*, (1997) concluded that the top-down approach is the most frequently used method of identifying risk techniques, where project are analyzed from the general point of view while the bottom-up risk identification techniques are not common unless the questionnaire and checklist approach. Also, the qualitative methods of risk assessment are used most frequently, more than quantitative and semi-qualitative methods. Forbes *et al.*, (2008) developed a matrix that is used for selection of appropriate risk management techniques in the built environment for each stage of risk management. These techniques include sensitivity analysis, probabilistic analysis, artificial intelligence, decomposition, and decision trees, compare to other techniques.

In construction projects, risk could strictly restrict the major objectives: cost, time, scope, and quality in a project; it might mean extra cost and hence a lower return on investment to the client; and a decrease in revenue for the contractor and consultant, (Visser and Joubert, 2008). Tah and Carr (2011) shows that communication in construction project risk is very poor, incomplete, and inconsistency throughout the construction supply chain. Also, Aibinu and Jagboro, (2002) stated that project participants do not have a shared understanding of the project risk and consequently are unable to implement effective mitigating and measures strategies to adequately solve problems of Nigeria construction project. Therefore, management of the information and knowledge of a construction project is essential part of a successful project risk management edge. So, a knowledge management approach might be an interesting and useful framework to improve the deficiencies of the risk management process in project construction. More so, it is important to know how the development of the risk management process in construction industries is; risk maturity model is the tools that help to identify its weaknesses and to propose actions to reduce the risks.

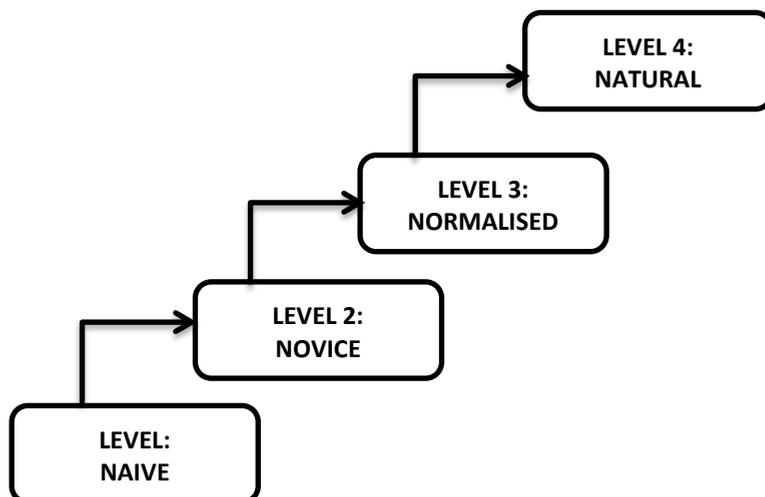
3. MATURITY MODELS

The Project risk maturity model (RMM) was first developed by HVR Consulting Services in 1999. Its four level capability structure, illustrated in Figure 1 below is derived directly from the structure developed by David Hillson (1997) who used it to establish a generic Risk Maturity Model framework which is used to carry out comparative evaluation.

A maturity model is of evolutionary nature, which means, it consist of number of stages in which the complexity level is increased from one stage to another in the searching for perfection (Serna, 2012). In general, a risk maturity model is a tool designed to assess the risk management capability of an organization (Hopkinson, 2011). In the area of project management maturity models research shows that organization that improve their project management maturity, are experiencing increased schedule predictability, cost savings, and improved quality (Korbel and Benedict, 2007).

Moreover, there are several known risk management maturity models that have been proposed over the previous years (Yeo and Ren, 2009). One of them is the model proposed by Hillson (1997). In his research, the author summaries the maturity model as a way for organizations to implement a formal approach to risk management and to check the level practices held by the industry. The model comprises of four maturity levels (Naive, Novice, Normalized, and Natural) that are measured with culture, process, experience and application as an attribute (Yeo and Ren, 2009). Group of researchers in 2002, among them was Hillson, added the points made in previous research, expressing the Risk Management Maturity Model (RMMM). The structure of the model did not change (Ad Hoc, Initial, Repeatable and Managed) are the four levels of evaluation, and the author stretched the initial definitions of each level and completed the characteristics of the attributes to be evaluated (culture, experience, application and process). According to Heijden 2006, modified the model proposed in 2002 by Hillson and others researchers, without any changes to the structure of four levels of evaluation, but instead added the fifth attribute which is, "structure", that based on the way risk management is applied within the organization and how the industry organize their processes and responsibilities (Heijden, 2006). This are the models tools that allow an organization to implement formal risk processes, and to identify their priorities for process improvement, to determine whether risk processes are suitable for the organization, and to create an action plans for increasing or enhancing the organization risk management process maturity level (Hopkinson, 2011).

Figure1: Risk maturity model levels, (David Hillson, 1997).



4. KNOWLEDGE MANAGEMENT

According to literature written by (Darroch, 2003; Lee and Yang, 2000; Lee et al., 2001; Nonaka, 1994), there are many definitions regarding knowledge management (KM). It is essential to have broad definition of what knowledge are all about before having a better understanding of KM. According to Nonaka (1994), defined knowledge as a broad concept with thoughtful meanings, which increase the ability of an organization's for effectual action. Knowledge is further divided into two, which are, tacit knowledge and explicit knowledge (Nonaka, 1994 and Gupta et al., 2000). Tacit knowledge can be seen as one been inherent inside an individual and according to Nonaka, (1994); Lin and Lee (2004) established it through imitation and practice, while explicit knowledge can be seen as academic, technical data expressions or a formal language information (Smith, 2001; Ooi et al., 2009). Moreover, explicit knowledge are also expressed in form of principles, rules and guidelines (Nonaka,1994), the author further mentioned four different forms of knowledge conversion which are, externalization, combination, internalization and socialization, which model clearly states the transformation of knowledge from a spiral and constant process between the interactions of explicit and tacit knowledge.

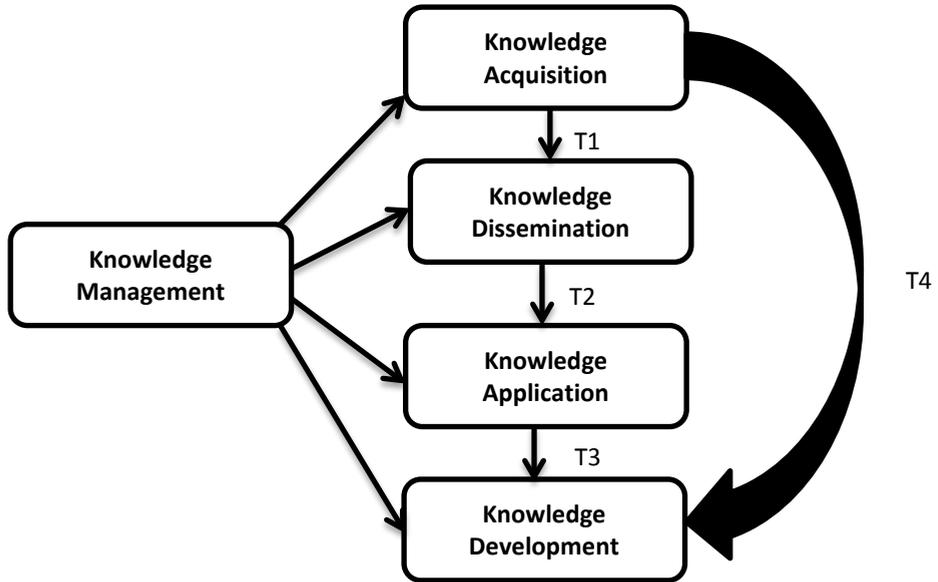
KM improve the capability of an industry as a methodological method which are used to organize, assemble and improve the knowledge when it comes to decision making ability and business strategy design process (Hsu and Shen, 2005; Ooi et al., 2009). Darroch (2003), relate KM as a method of creating, managing and distribution of the knowledge within the organization. The Darroch's KM definitions shows that KM are coined out from three segments, which are knowledge acquisition, knowledge dissemination and knowledge responsiveness; while Lee et al. (2001), said KM consists of two sections, viz. knowledge dissemination and knowledge acquisition. Out of the process point of view, KM comprises of knowledge creation, knowledge retrieval, knowledge sharing and knowledge application (Nonaka and Takeuchi, 1995). According to the above statement, KM behaviors include acquirement of the knowledge, dissemination of it and also the application part of it but all this knowledge areas are not complete without knowledge development because it's the base-line of knowledge that is development will add more experience to the knowledge. These are the major concepts of KM which are derived from the three constructs of knowledge; however each concept of KM is dependent to other components.

Construction industry is a knowledge-based industry (Egbu et al., 2004; Carrillo et al., 2004) because the implementation of construction activities needs the knowledge of specialized expert and their problem-solving expertise (Al-Ghassani et al., 2005). Given this, the execution of knowledge management is mainly interesting for the construction industry (Carrillo and Chinowsky, 2006), and implementation of this approach will innovate and improve performance of the industry (Kamara et al., 2002) (Egbu et al., 2004), and to better their behavior.

According to Darroch (2003), Nonaka and Takeuchi (1995) that said KM behaviors are coined from three segments that is knowledge acquisition, knowledge dissemination and knowledge application, According to Lee et al., (2001), said its coined from two segments which are knowledge acquisition and knowledge dissemination, before Ooi (2009) now proposed model of knowledge management behaviors which comprises of (1) knowledge

acquisition (2) knowledge dissemination (3) knowledge application, but they all failed to look into knowledge development which is added by this paper, as the base-line of other KM behaviors because without developing the knowledge it will lack experience and fail as time goes on.

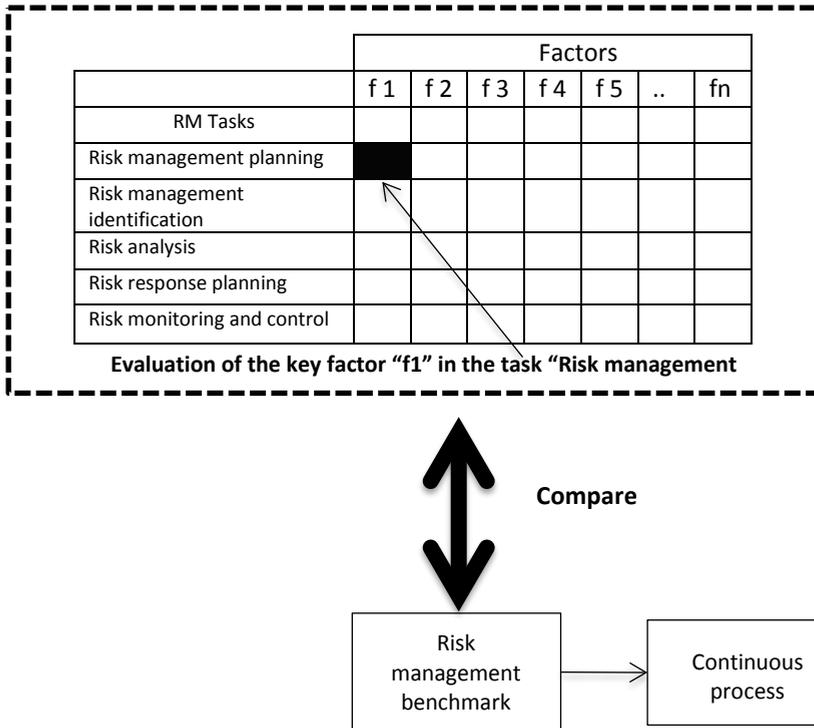
Figure 2: Model of knowledge management behaviors



5. THE RESEARCH PROBLEM

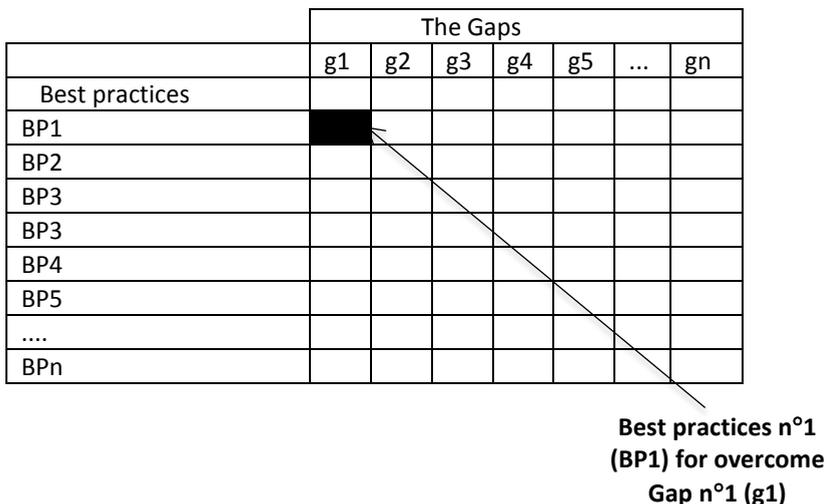
The following questions are discussed by this research: 1) What are the best worldwide practices currently applied in risk management on construction projects and how they compare with current practices in Nigerian?, 2) How can risk management practices in construction projects be assessed?, 3) What knowledge is needed for an effective and efficient management of risk in construction projects?, and 4) How can needed risk management knowledge be obtained, organized and made available in a systematic and useful way?. The research methodology comprises of literature reviews both general and specific for construction projects that will help in constructing a framework of risk management as a benchmark that leads to continuous improvement, to assess the situation in an organization that performs construction projects as showed in figure 3 below. More so, an assessment model and tool for risk management is being developed from what has been reviewed from the literature. Both, the model and the tool will be validated by three experts on risk management and be applied initially in three industries; owner, contractor and consultant useful for checking accuracy.

Figure 3: Approach for the assessment of the risk management and desired quality function of an organization and comparison with the risk management benchmark.



Likewise, the application of the tool is used to propose a set of best practices to fill out the major gaps found in the risk management function of each industry as shown in figure.

Figure 4: diagram to assign the best practices based to gaps identified.

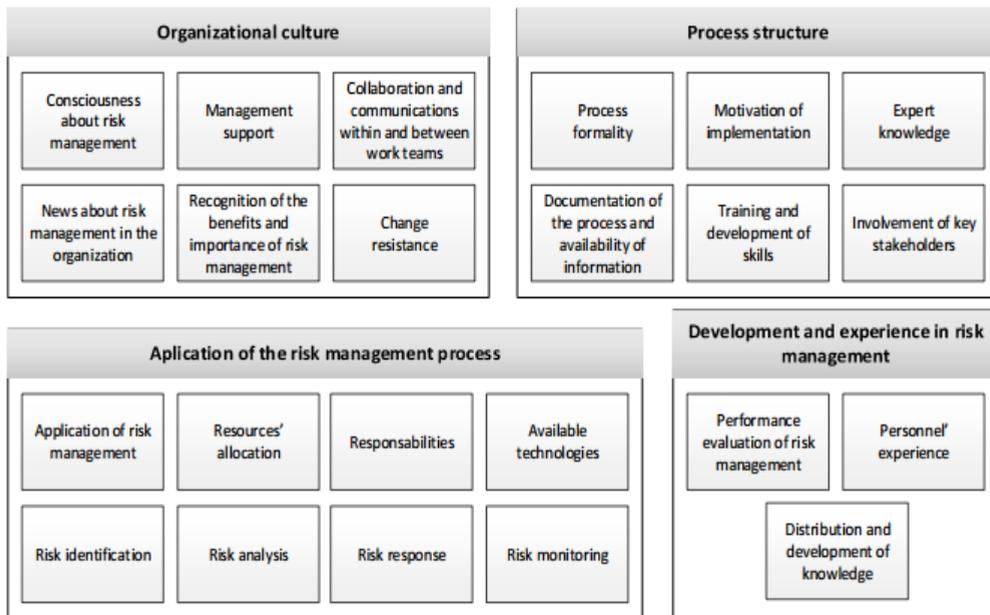


The best practice that was discovered will also be validated by experts' panels. As time goes on, a prototype of a risk management support system will be developed and applied to industries to test the prototype. It would allow: (1) the storage of historical information, (2) to serve as a guide to develop the project risk management function in owner, contractor and consultant industries, according to the established standard, (3) conducting the assessment and monitoring of the maturity of the risk management function in the industries, (4) to have lessons that will be able to educate about risk management depending on the hierarchical level and responsibility of employees, (5) to have a storage and backup system using case-based cognitive, (6) to establish the administrative structure for the system and the necessary feedback, and (7) to develop supporting and operation procedures for the prototype to be able to handle the industries operations.

6. PRELIMINARY RESULTS

At this level of the study, a first preliminary maturity model has been defined. This model is based on two main elements: 1) the factors that can evaluate and comprises of set of dimensions for each of them as shown in figure 5, and 4) dimension and level of risk management evaluation factors as shown in table 5 below.

Figure 5: The key evaluation factors and their dimensions (Howard, 2012).



The information for the evaluation levels were gathered from the literature review. Including the maturity model and the evaluation levels will be tested by means of pilot studies that will be carried out in one owner, one contractor and one consultant industries.

The method is to share a questionnaire to a group of professionals that work in the area of risk management in each organization based on the factors and dimensions that are important to measure. Furthermore, to create a web-based prototype that can be accessed by industries through the use of internet and by doing this, the management of industries will be able to answer the questionnaire and to find out the level of maturity their organization belongs to. More so, data of previous evaluations that was evaluated will be provided so that the management will be able to compare their current performance with historical performance, and this will help the implementation of improvement practices. As figure 4 implies, knowledge and experience will be combined together by showing the improvement or best practices that was related to the type of gaps detected during the evaluation through the questionnaire of the risk management function of the industry. Finally, knowledge base is expected to serve as new experiences learnt from the project.

7. CONCLUSION

This study addresses a brief description of a research effort which is still in progress, at this moment with the purpose of creating a knowledge-based approach to risk management in construction projects. The advantage of this research shows that there is very limited application of risk management in Nigeria construction projects and based on the previous research work that called for urgent need to improve knowledge-based approach in, client, contractors and consultants. The expected outcome of this research will help clients, contractors and consultants to make use of their own knowledge and experience as well as worldwide best practices, and to have a more systematic and formal approach to risk management.

In the same vein, the classifications and definition of each level of risk management used for this research evaluation are as follows; the level 1, are those organizations that find there self in this level are not aware of risk management and they lack a structured approach to face risk and uncertainty. Success of this kind of organization depends on their individual characteristics and mostly the organizations are weak in terms of project management knowledge. More so, the organization react to problems after it occur without no actions taken. The organizations never care to develop any mitigation plans to identify project risk or learn from the previous mistake made from the project and prepare for any uncertainty. While the level 2 are those organizations that are conscious to some extent about the advantages of RM, but they never implement it effectively in most of their project. The organization knows they can realize their mistakes from the past but the knowledge to apply this are limited and there is no way to share their experience of what they have learnt from the organization project. In line with that, the level 3 are the organization that has developed and used a formal RM system. Also, the use of previous experiences on project, especially for risk identification and experience of previous project can be used for further project. They also employs people with needed RM skills and adequate resources to develop a project. The level 4 shows that the organization understand the advantages of RM in every level and they follow a standard process for RM which comprises of proactive approach on project. The level 5, which is the last level depicts that organization are able to adapt itself, empower teams and organize according to the protocols of the industry to reduce system risks and initial risks.

Continuous improvement which is also known as optimized process are found in this level. However, it is used to evaluate the organization information gained through benchmarking and then decides whether or not the information will enhance with new methodology. Also, the organization has the aims to use both qualitative and quantitative measurements to establish an integral RM plan.

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