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Assessment of Risk Management Skills of Construction Professionals in Edo State, Nigeria

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Abstract

This paper investigated the project risk management attributes of construction professionals with a view to evaluating their ability to function as project risk managers. The study adopted a survey design and used a structured questionnaire as an instrument for data collection. Mean score, one sample t- test and factor analysis were used to analyse the data. It was revealed that the professionals' knowledge of and involvement in risk management is high. The study found that the domains of skills expected of construction project risk managers are basic skills in project risk management, organisational, interpersonal and communication skills. Construction clients should ensure that only consultants with skills in these areas are engaged in the procurement of projects.

1. Introduction

The nature of construction and the needs of clients have been evolving over time; hence the roles and responsibilities of project risk managers have increasingly come under the spotlight. This calls for improvements in the skills and competencies of the professionals that manage construction projects. In the present-day construction industry, the significance of project risk management is increasing [1]. Project risk managers make use of various techniques, knowledge and skills to analyse, monitor and control risks in construction projects. Typically, a risk manager is trained to implement the overall risk management programme of a project [2]. The management of risks requires different approaches [3]. Project success is measured by the criteria pre-agreed between the contracting parties and usually includes time, quality and cost expectations, as well as client satisfaction. Construction risks undermine the attainment of these measures of performance. Jaselskis and Ashley [4] observed that, successful project execution with minimal risk incidences depends on the skills of project risk managers. In the construction industry of these days, the emerging specialty of project risk management has not gained sufficient grounds [5]. Likewise, extant literature is yet to clarify the set of skills for the profession. Usually, architects and engineers or some other professionals are appointed by the client to oversee the execution of the construction clients' projects. It is not generally agreed that these professionals possess the requisite skills for the effective management of construction risks. This study, therefore, assesses the exhibited project management skills of construction consultants with a view to revealing their project risk management skills towards a better management of construction risks.

1.1. Skills of construction project risk manager

A skill may be regarded as the ability to carry out some specific task or the ability to perform some cognitive process that is related to a task [6]. A skill can also be seen as an ability or proficiency acquired through training or experience [7]. Dada and Jagboro [7] investigated the skills and competencies of quantity surveyors (see Table 1). The study concluded that the important skills required of quantity surveyors are computer literacy, building engineering, information technology, economics, measurement and knowledge of civil and heavy engineering works. Moss [8] opined that quantity surveyors are skilled in every ramification of construction work. He found that the skills of quantity surveyors include: being able to manage cost effectively and equating quality and value with individual client's needs. The study concluded that the most important quantity surveying skills are financial, analytical, interpretive and teamwork skills. Malan's [2] study showed the personal skills required of a project risk manager. The skills were divided into six including: management skills, communication skills, organizational skill, curiosity and scepticism, ability to manage stress, and culture and awareness of what is at stake (see Table 1). According to [9], a project risk manager must have organizational, leadership, team building, communication, adaptability, and technological skills. Jaafari [10] opined that project risk management skills could be grouped into three, which are human, conceptual and technical skills. It is yet to be ascertained whether the professionals usually engaged in the management of construction projects possess the specific skills that are relevant to construction risk management.

Table 1. Skill Attributes of Construction Project Risk Managers

Authors	Skills
Dada and Jagboro [7]	Computer literacy, building engineering, information technology, economics, measurement and quantification, knowledge of civil and heavy engineering, professional practice, construction law, interpersonal skill, mapping and surveying, actual science, knowledge of mechanical and electrical services engineering, financial skill and leadership skill, communication skill, managerial skill, marketing/business skill, knowledge about international trading, investment analysis, gas/petrochemical engineering and solid mineral engineering
Malan [2]	Management skills, communication skills, organization skill, Curiosity and Scepticism, Ability to manage stress, and Culture and awareness of what is at stake, Ability to organize and support work, Ability to provide instruction to subordinates, Ability to have a clear vision for organizational growth, Ability to build workers trust and confidence, Ability to define and share duties clearly, ability to challenge assumptions or ideas, Ability to remain objective, ability to keep an open mind, Ability to analyze situation with an objective mind, Ability to accept criticism, ability to question personal judgement, Ability to understand what is at stake and ability to develop the insight into the culture of where one operates
Birkhead [9]	Organizational skills, leadership skills, team building, communication skill, adaptability and technological skills, Ability to behave and speak appropriately, Ability to promote transparency in information dissemination, possess good negotiation power, Ability to develop clear and precise action plan and objectives, Ability to monitor the execution of work and ability to make effective decision

Jaafari [10]	Human, conceptual skill and technical skills, Ability to understand the need for confidentiality in an organization, Ability to perform duties efficiently and Ability to meet organizational goals and needs. Ability to listen to the argument of others.
Construction Industry Council [11]	Analytical skills, Decision making, Listening, Reflection, Communication, Leadership, Lateral thinking, Cost and planning skills, Negotiation, Assist decision making, Ability to formulate Strategic project schedule, organisation, Presentation, Reviewing, Checking, Identifying needs, Reflecting back the short comings and offering solutions, Technical skills, Imagination, Skills to seek gap, Attention to details, Identifying Interface, Lateral thinking, Organisation problem solving, Dealing with people, Time management, Identifying key issues. Ability to ask questions
Project Management Institute [12]	Evaluating, Reviewing, Consulting, Presenting Information, Decision Making, Monitoring, Communicating, Influencing and Persuading, Facilitating, Providing Leadership, Prioritising, Planning, Scenario Building, Managing Information, Involving others, Thinking Systematically, Advising.

Source: various authors

2. Methodology

This study assessed the skills expected of construction project risk managers in Nigeria. The target population comprised registered construction professionals in Edo State, Nigeria, namely: Architects, Quantity Surveyors, Builders and Civil/Structural Engineers as obtained from their various professional bodies. The research instrument used was a structured questionnaire designed based on information gathered from the review of related literature. The questionnaire was designed in sections. The first section gathered information on the respondents' background and level of knowledge of project risk management. The respondents were asked to rate the importance of literature-obtained skills to project risk management using a 5-point Likert scale, with 5=very high, 4=high, 3=average, 2=low and 1=very low. The questionnaire was self-administered through the help of field assistants and by emails. One hundred and ninety-two (192) copies of the questionnaire were distributed while one hundred and sixty (160) were returned and deemed fit for analysis. The others were either not retrieved or were incorrectly filled. Cronbach's alpha test was used to test the reliability of the research instrument. According to [13], Cronbach's alpha measures the internal consistency of a scale. Humaidi and Said [14] stated that the closer the alpha coefficient is to 1.0, the better the reliability of the instrument. The alpha value for the analysis was 0.844, which implies that the data collection instrument was reliable. Mean item score was used to rank the importance of the skills and one sample t-test was used to test if significant differences exist and their associated levels of significance. By factor analysis, the original set of project risk management attributes were reduced to a more parsimonious set of variables, and categorised. Factors with eigen values of 1 and above were selected. Only variables with loading of ≥ 0.3 were considered to be significant. For a good factor analysis, the Kaiser–Meyer–Olkin (KMO) test should give ≥ 0.6, while Barlett's test of sphericity should be significant at $\alpha=0.05$ ($p < 0.05$) [13]. Pallant [15] recommended the use of larger samples for factor analysis. Hence, the 24 variables used in this study coupled with the 160 validly filled questionnaire are considered adequate for the analysis.

3. Results

3.1 Characteristics of the respondents

Table 2 shows the background information of the respondents. It shows that 33.8% of the respondents are engineers, 29.4% are architects, and 23.8% of the respondents are quantity surveyors, while 13.1% are builders. In terms of experience, 37.5% of the respondents have less than 6 years construction industry work experience, 23.8% have between 6 and 10 years' experience, 16.9% have above 20 years' experience, 14.4% have 16 to 20 years' experience while 7.5% have 11 to 15 years' experience. The background of the respondents signify that they have been exposed to risk management in the construction field, and are quite knowledgeable of the skills expected of construction project risk managers.

Table 2: Background information of respondents

Respondents Characteristics	**Frequency**	**Percentage (%)**
Designation		
Quantity Surveyor	38	23.8
Architect	47	29.4
Engineer	54	33.8
Builder	21	13.1
Total	**160**	**100**
Construction Industry Work Experience		
0-5	60	37.5
06-10	38	23.8
11-15	12	7.5
16-20	23	14.4
Above 20	27	16.9
Total	**160**	**100**

3.2 Importance of skills of construction project risk managers

The respondents were given a list of skills of project risk managers identified from literature and were asked to rank them based on their importance to construction project risk managers. One sample t-test was then used to ascertain the significance of each of the identified skill including its associated standard deviation and standard error. The mean item score for each of the items in Table 3 is ≥ 3.00. Based on a 5-point Likert scale, a 2.50 score is considered as average but an item with a score ≥3.00 is considered important to project risk management.

Table 3: Importance of the skills attribute of project risk managers

Variables	**Mean**	**Std. Dev**	**T**	**Mean difference** (test value=3)	**Sig. p-value**
Ability to monitor the execution of work (SK14)	4.86	.345	68.197	1.862	.000
Ability to perform duties efficiently (SK12)	4.79	.410	55.099	1.787	.000
Possess good negotiation power (SK10)	4.75	.434	50.961	1.031	.000

Ability to behave and speak appropriately (SK5)	4.74	.455	48.260	1.737	.000
Ability to understand the need for confidentiality in an organization (SK9)	4.65	.478	43.621	1.650	.000
Ability to build workers trust and confidence (SK4)	4.59	.541	37.240	1.594	.000
Ability to organize and support work (SK1)	4.58	.589	33.843	1.575	.000
Ability to meet organizational goals and needs (SK6)	4.55	.547	35.833	1.550	.000
Ability to provide instruction to subordinates (SK2)	4.48	.560	33.304	1.475	.000
Ability to ask question (SK15)	4.43	.630	28.613	1.425	.000
Ability to develop clear and precise action plan and objectives (SK13)	4.40	.504	35.131	1.400	.000
Ability to make effective decision (SK20)	4.39	.605	29.141	1.394	.000
Ability to remain objective (SK17)	4.38	.707	24.597	1.375	.000
Ability to promote transparency in information dissemination (SK8)	4.35	.478	35.590	1350	.000
Ability to analyze situation with an objective mind (SK19)	4.34	.708	23.885	1.338	.000
Ability to challenge assumptions or ideas (SK16)	4.26	.564	28.198	1.256	.000
Ability to define and share duties clearly (SK11)	4.24	.716	21.975	1.244	.000
Ability to accept criticism (SK21)	4.21	.674	22.644	1.206	.000
Ability to listen to the argument of others (SK7)	4.18	.578	25.719	1.175	.000
Ability to question personal judgment (SK22)	4.11	.839	16.769	1.112	.000
Ability to understand what is at stake (SK23)	4.11	.682	20.631	1.112	.000
Ability to keep an open mind (SK18)	4.06	.694	19.262	1.056	.000
Ability to develop the insight into the culture of where one operate (SK24)	4.04	.582	22.566	1.037	.000
Ability to have a clear vision for organizational growth (SK3)	4.03	.677	19.272	1.031	.000
Mean	**4.40**	**0.251**			

3.3 Factor analysis

Table 4 shows that the KMO measure of sampling adequacy gave a value of 0.813, exceeding the recommended minimum value of 0.6. The Bartlett's test of sphericity was also statistically significant at p=0.000 (less than 0.05). The use of factor analysis was, therefore, considered appropriate in this case.

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.813
Bartlett's Test of Sphericity	Approx. Chi-Square	5629.201
	Df	154
	Sig.	.000

Principal component analysis (PCA) with varimax rotation was used in the analysis. Four (4) components with eigenvalues ≥1.0 were extracted. Variables with loadings of ≥ 0.30 we considered to have loaded significantly as suggested by [15].

The factors respectively explain 24.902, 17.071, 14.85 and 8.773% of the variance in the original data set. Cumulatively, they explain 65.230% of the variance in the data, which highlights their significance to the original 24 skills.
To aid the interpretation of these four factors, varimax rotation was performed which produced the pattern matrix shown in Table 5. The obtained factors were named based on the variables that loaded significantly under each factor.

Table 5: Pattern Matrix

		Factor			
CODE	SKILLS	1	2	3	4
SK1	Ability to organize and support work	0.625			
SK2	Ability to provide instruction to subordinates	0.783			
SK3	Ability to have a clear vision for organizational growth	0.49			
SK4	Ability to build workers trust and confidence	0.366			
SK5	Ability to behave and speak appropriately		0.739		
SK6	Ability to meet organizational goals and needs			0.62	
SK7	Ability to listen to the argument of others				0.65
SK8	Ability to promote transparency in information dissemination		0.634		
SK9	Ability to understand the need for confidentiality in an organization			0.727	
SK10	Possess good negotiation power		0.806		
SK11	Ability to define and share duties clearly	0.659			
SK12	Ability to perform duties efficiently			0.719	
SK13	Ability to develop clear and precise action plan and objectives		-0.472		
SK14	Ability to monitor the execution of work		0.661		
SK15	Ability to ask question				0.74
SK16	Ability to challenge assumptions or ideas	0.473			
SK17	Ability to remain objective	0.697			
SK18	Ability to keep an open mind	0.472			
SK19	Ability to analyse situation with an objective mind	0.728			
SK20	Ability to make effective decision		0.542		
SK21	Ability to accept criticism	0.788			
SK22	Ability to question personal Judgments	0.727			
SK23	Ability to understand what is at stake	0.472			
SK24	Ability to develop the insight into the culture of where one operates	0.752			

Extraction Method: Principal Component Analysis

FACTOR 1 – Basic skills in project risk management

SK1 Ability to organize and support work
SK2 Ability to provide instruction to subordinates
SK3 Ability to have a clear vision for organizational growth
SK4 Ability to build workers trust and confidence
SK 11 Ability to define and share duties clearly
SK16 Ability to challenge assumptions or ideas
SK17 Ability to remain objective
SK18 Ability to keep an open mind
SK19 Ability to analyze situation with an objective mind

SK21 Ability to accept criticism
SK22 Ability to question personal Judgments
SK23 Ability to understand what is at stake
SK24 Ability to develop the insight into the culture of where one operates

FACTOR 2 – Interpersonal skills in project management

SK5 Ability to behave and speak appropriately
SK8 Ability to promote transparency in information dissemination
SK10 Possess good negotiation power
SK13 Ability to develop clear and precise action plan and objectives
SK14 Ability to monitor the execution of work
SK20 Ability to make effective decision

FACTOR 3 – Organizational skills

SK9 Ability to understand the need for confidentiality in an organization
SK12 Ability to perform duties efficiently
SK6 Ability to meet organizational goals and needs

FACTOR 4 – Communication skills

SK7 Ability to listen to the argument of others
SK15 Ability to ask questions

4. Discussion of Findings

The skills of construction project managers were ranked to determine their importance to project risk management. The results revealed that the identified skills are significantly important to construction project risk managers. This agrees with [2] who grouped the ability to monitor the execution of work as management skill, the ability to perform duties efficiently as organizational skill and possession of good negotiation power as communication skill of project risk managers. This result is also in tandem with [16], that monitoring and communication of all risks are important in project risk management. The results further show that the project risk management skills found in literature are applicable in practice.

FACTOR 1 – Basic skills in project risk management

Thirteen skills loaded significantly under factor 1 and they relate to the core skills of project risk managers. These skills include: *ability to organize and support work, ability to provide instruction to subordinates, ability to have a clear vision for organizational growth, ability to build workers' trust and confidence, ability to define and share duties clearly, ability to challenge assumptions or ideas, ability to remain objective, ability to keep an open mind, ability to analyze a situation with an objective mind, ability to accept criticism, ability to question personal judgements, ability to understand what is at stake and ability to develop insight into the culture of where one operates.* Thus, they are labeled as the basic skills in project risk management and have a total variance of 24.902%. Hassal, et al. [17] opined that project managers must possess basic skills for meeting the satisfaction of clients.

FACTOR 2 – Interpersonal skills in project management

Factor 2 has 6 important skills to project risk management. These skills include*; ability to behave and speak appropriately, ability to promote transparency in information dissemination, possession*

of good negotiation power, ability to develop clear and precise action plan and objectives, ability to monitor the execution of work and ability to make effective decisions. This set of skills was labeled interpersonal skills in project risk management. It explains a total of 17.071 % of the variance in the original data. Findings from [2] revealed that the skills of project risk managers are high in teamwork skills, interpersonal skill and analytical skill, which is in agreement with this study.

FACTOR 3 – Organizational skills

Factor 3 has 3 skills relating to project risk management including: *ability to understand the need for confidentiality in an organization, ability to perform duties efficiently and ability to meet organizational goals and needs*. Factor 3 was christened organizational skills factor. It explains a total of 14.85% of the variance in the original data set. Dikmen and Birgonul [18] found that specialization skills, international network and partnership skills, organizational skills and technology skills are important to risk management, which is in tandem with this study.

FACTOR 4 – Communication skills

Factor 4 has two significant skills namely: *ability to listen to the argument of others and ability to ask questions*. These attributes are classified as communication skill attributes and have a total variance of 8.773%. Cooper et al. [16] noted that monitoring and communication of all risks are important in project risk management as communication is very important in construction work. This is because professionals need to understand and interpret information being passed across at any given time.

5. Conclusion

The study assessed the importance of skills of construction project risk managers in Edo State Nigeria using survey design. It also determined the domains of the skills expected of construction project risk managers. It was found that most of the skills are actually applied to varying degrees by construction project managers in the study area. Among the important skills to construction project risk managers are the ability to monitor the execution of work, the ability to perform duties efficiently and the possession a good negotiation power. The least important skill attributes are *ability to understand what is at stake, ability to keep an open mind, ability to develop insight into the culture of where one operates* and *ability to have a clear vision for organisational growth.* In any case, since these variables have means of ≥4.0, the professionals should not neglect them. Findings from this study further indicate that the skills may be generalized as *basic skills in project risk management, interpersonal skills in project management, organizational skills* and *communication skills*. In addition to helping to reduce the numerous skill attributes of project risk managers to a more easily understood few variables, this study has highlighted the level of importance attached to the various attributes by construction professionals. For policy formulation, clients should device means of checking consultants' levels of possession of the various skills prior to engaging them. This will help to ensure that only professionals who can manage risks are employed to manage construction projects.

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