

An Assessment of Types of Risks in the Nigerian Construction Industry: Project Managers' and Contractors' Perspectives.

Olalekan Mumuni Ogunbayo

Abstract: risk is permanent in all construction activities as in other areas of human endeavour. However, Project managers, contractors and other stakeholders need to be familiar with different categories of risks so as to treat the risks before it affects the projects. Different type of risks exists, but placing them in their real category reduces the Project managers' burden to achieve project objectives. The Project manager and the nominated project team must realign the project objectives with associated risks to reduce the negative impact of project success. This study assesses types of risks in the construction industry and the frequency of occurrence so that the exposed factors are available for the stakeholders and policy makers. The returned questionnaires were inferentially and relationally analysed to have the discussion on the statistical findings and recommendations. The result indicates that construction risks are the most occurring followed by financial risks, design risks, managerial related risks, management risks and logistic risks. Other risks in descending order are contractual risks, administrative risk, political risks, physical risks and disaster risks. The result suggests that the three most occurring risks construction risk, financial risk and design risks need urgent attention of all stakeholders to reduce the impact of those risks. Furthermore, to formulate a dynamic process to reduce the risks before the silent ones become too intense to ameliorate.

Keywords: risk types, Project managers, local contractors, foreign contractors,

1 INTRODUCTION

Risk as claimed by [2], is in all activities of the project and the difference is that the degree of its presence varies. The construction industry has become complicated as there are unending demands for technological advancement to satisfy the growing needs of stakeholders. The complexity nature of the construction industry has compelled different inputs from various experts and professionals so many diverse risks prevail. (Ehsan, Alam, Mirza, & Ishaque, 2010) [2], included many external factors entrenched in the industry as a major contributor to the complexity of the industry. The record overtime acknowledged that the construction industry is poor in terms of coping with the risk that has led to the failure of many projects like time overrun, cost overrun poor quality management and project abandonment. (Ng & Loosemore, 2006) [13], the stock of public infrastructure is an enormous asset, which when effectively managed, plays a critical role in attracting foreign investment and supporting nation's social, cultural and economic stability, productivity, development and prosperity. In addition, [2], claimed that the consequences of not achieving the preceding statement is that investors suffer and unemployed rife. Hence, the government does not enjoy benefits of investments in tax and National development.

Project managers are aware that there are no risk-free projects as the uniqueness of each project has relative degree of uncertainty [14]. Hence, the degree of uncertainty amounts to factors that are accurate in Project manager's response to solving the associated risk in the project.

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The case of risk management in Nigeria is not different from other countries except that some situations are too extreme to quantify in the context of what is happening in developed countries. Many projects owned by public, and private organisations have suffered irreparable losses due to inadequate risk analysis before the commencement of the project. Nevertheless, knowledge base in risk management is crucial in upgrading the construction industry. Hence, this will fulfil all the necessary stakes in people-oriented projects in the country. Risk management is an inherent division of project management, and its tools and knowledge base of Project managers is to accentuate its importance to satisfy all stakeholders. Therefore, the study seeks to identify various risks categories applicable to the construction industry; confirm the frequency of occurrence of these risks and determine the most occurring risks through ranking.

Risk in the construction industry involves many activities, which has an adverse effect on the four broad constraint of project management namely: time, cost, scope and quality. It is easy to identify and predict some risks in construction while some are entirely elusive. (Ehsan, Alam, Mirza, & Ishaque, 2010) [2], explained that critical effects of risk on projects are: failure to finish operational requirements and expected quality standard, time overrun and cost overrun, which are generic in the construction industry. This study seeks analytical approach to the local contractors, foreign construction firms and project managers of different background in the building sector, types of risks and their weaknesses and management approach to solving the problems. (Siang & Ali, 2012) [15], and [1], confirmed that business interests, procedures, environments and organisation afflict the construction activities more than other industries as such more risk prone. This degree of uncertainty amounts to factors that are unique to Project manager's response to solving the associated risks in the projects.

2 LITERATURE REVIEW

(Lessard & Miller, 2001) [10], claimed that significant engineering projects involve high commitments, interest, stake characterised by veritable irreversible commitments or pledged skewed (perpendicular, not parallel) structures and a high likelihood of failure. (Lessard & Miller, 2001) [10], further analysed that structures built with the original intention in mind it is always difficult to redeem. Financial implication of projects at feasibility stage is enough to guide to the project success, but realistically this may not be possible in actual financing the project. The financial institutions giving out loans need to take the risk involved seriously so that the stakeholders can be magnanimous and happy. (Ijigah, Ajayi, Ade, & Adakole, 2013) [6], were able to establish a risk management index of 0.5304, for Nigeria, which suggests that the construction industry in Nigeria are exposed to 53.04 % risk. Hence, (Ijigah, Ajayi, Ade, & Adakole, 2013) [6] index needs regular updating to justify the index usefulness. (Thuyet, Ogunlana, & Dey, 2007) [16], divided risk into two categories: internal risk also called endogenous risk namely financial, design, contractual, construction, personal, involved parties and operational risk. Furthermore, external risks are economic, social, political, legal, public, logistics and environmental risks. Risk unambiguously affect cost, schedule, and quality of projects, therefore, risk management should be recognized as an integral part of project management.

In the financial market according to [10], fluctuations make for decision situations that are modelled with a sophisticated craft. By contrast, risks in real-life projects emerge over time are indeterminate and often endogenous. (Lessard & Miller, 2001) [10], defined risk as the prospect that an event, effect and changeable interactions may turn out differently from what is anticipated. While risk can be described in statistical terms, sometimes uncertainty applies to situations in which potential outcomes and causal forces are not entirely understood [10]. Risks are multidimensional and thus need to be unbundled for clear understanding of causes, outcomes and drivers; nevertheless, since their impacts depend on how they combine and interact, reductionism must be avoided. (John & John, 1991), defined project financing by a surety concern is where the cash flows of a particular project set aside as a source of capital from which loan refunded to finance the project. However, (Farrell, 2003) [3], considers sponsors' failure to provide the necessary information to the lender early causes delay in construction, lack of lease-up and lack of sales. Hence, this indicates that the project surety is holding back information. The situation may not be favourable but may empower the lender to divert project capital to assist in accelerating the project .In the construction industry projects, forecast of demand of end users is extremely difficult because most customers or end users have alternatives to the proposed project [10]. Financial markets are hard to reach unless all risks are addressed by the project sponsors. If a project offers are adequate prospective returns, it is often unable to go forward because of the parties' inability to work out acceptable risk sharing arrangement. Supply risks are similar to market risks both involve price and access uncertainties [10]; it is secured through contracts, open purchase or ownership.

Completion risks- projects face technical risks according to [10] that reflect the engineering difficulties and novelty; some of these risks are inherent in designs or technologies employed. Construction risks refer to the difficulties that sponsors, and prime contractors and contractors may face in the actual building of the project. Operational risk refers to the possibility of future income flows will not materialize; reduction of such risks by the selection of an operator with an economic interest in enhancing revenues and controlling costs. Institutional risk- the ability of projects to repay debts and investments depends on law and regulations that govern the appropriate ability of returns, property rights and contracts [10]

Summary of previous studies on causes of project delay in the Nigeria construction industry [5] is on table 1. The emphasis is now on the update of the elements stated or new ones emerging; as a result improved technology and project management practice. However, the corresponding factors of primary causes of delay are indicated in table 1. Delay in projects is a risk, which in the end affects project objectives like cost, time, and quality and project scope.

TABLE 1.
MAJOR CAUSES OF DELAY ON PROJECTS DURATION IN THE NIGERIAN CONSTRUCTION INDUSTRY

Researcher	Country	Major causes of delay
Okpala and Anieku (1988)	Nigeria	Shortages of materials Failure to pay for completed work Poor contract management
Diakwa and Culpin (1990)	Nigeria	Delay in payment by agencies to contractors Fluctuations in materials, labour and plant costs
Mansfield et al (1994)	Nigeria	Improper financial and payment arrangement. Poor contract management Shortages of materials Inaccurate cost estimates Fluctuations in cost

Source:(Hossen, 2014).

Technical risk according to [4], is the uncertainty of achieving the performance requirements and operation ability within the planned cost and schedule. Technical risks are linked with competence or skill of the system required fulfilling the operational requirements of the project [4]. Failure not to satisfy sufficiently treat technical risks, consequently result in incapability of accomplishing cost and schedule constraint while achieving technical requirements. (Kindinger & Darby, 2000) [9], described technical risk as incidence or situations connected to project scope definition, research and development, design, construction, and operation that impacts the exact level of accomplishment. Hence, this is compared to that defined in the project mission and performance requirement documents like the bill of quantities and other contract documents [9]. (Kindinger & Darby, 2000) [9], further explained that technical risks comprise the novel and changing technology and changing regulatory requirements. (Mecca & Masera, 1999) [12], stress the need for comprehensive analysis of all construction quality activities in order to identify all risks associated with quality and reduce and prevent failure. Furthermore, to create conformable organisational strategies to augment the operator's responsiveness to failure as project and contractual, organizational and functional failure are technical failure in any risk analysis view [12]. (Mecca & Masera, 1999) [12], technical risk analysis procedure is subjective; therefore it is imperative to create a logical and reasonable methods or approach. A methodological analysis of the building components of the needed technical distinguishing features is aimed at mitigating and preventing the risks of failure. Consequently, increases operators' responsiveness to determine the most efficacious organisational schemes. (Farrell, 2003), described technical risk as when the reliability or dependability of the technology used to develop the final output is compromised. Project technology risk can be gauged from a Market-Product Technology, MPT index (Farrell, 2003). The MPT index will increase as the "newness" of the technology and the product increase [3]. (Farrell, 2003) [3], this may hinder output production in cross-border projects. Host government regulations, including restrictions on and inconvertibility of currency, high taxes and royalties, and demands for participation, expropriation and nationalization, or an outbreak of war, are factors that contribute to political risks.(Farrell, 2003) [3], claimed that market risk come up from the risk that the project may lose its competitive position in the output market. Market risk is the timing of market introduction of the output. A 4 or 5 month delay in market introduction will have significant strategic and financial implications in output markets like automobiles. Availability of sufficient transportation facilities is the managerial strategy of reducing risks associated with construction plants and equipments. Project manager makes available to resources particularly construction equipment spare parts, fuel and labour to increase productivity.

3 METHODOLOGY

The research looked into different types of risks experienced by both local and foreign construction firms and Project managers whose work experience spans over twenty years. The questionnaire was derived from various literature on risk management determines the respondents understanding of risk. The respondents were randomly selected through the professionals' register and contractors lists to have adequate responses. The question were arranged in Likert scale that has frequently occurring as 5 down to rarely occurring as 1.

Relative index was achieved through the use of the formula

$$\frac{5n + 4n + 3n + 2n + 1n}{5n}$$

Weighted average is the average in which each quantity to be averaged is allotted a weight [7]. The weight of each result ascertains the relative importance of individual quantity on the average [7].

In order, to determine the relationship between opinions of all respondents on frequently occurring risks Spearman rank correlation coefficient application becomes relevant and the weighted average applied determines the overall judgment.

$$r_s = 1 - 6 \sum d^2 / (n^2 - n)$$

1. t-test at 95% confidence level of the null (H_0) and alternative (H_1) was used to test the rank correlation coefficient.
2. $t = r_s \sqrt{n-2} / \sqrt{1-r^2}$

hypothesis tested

H_0 : there is no statistical significant relationship between the opinion of local contractors and foreign contractors on frequently occurring risks in the Nigerian construction industry.

H_0 : there is no statistical significant relationship between the opinion of local contractors and Project managers on frequently occurring risks in the Nigerian construction industry.

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Table 2. BREAKDOWN OF RESPONSES

The total numbers of questionnaire sent out to the local contractors were ninety-eight, and forty-four were returned, which amount to forty-five percent of the total. The foreign contractors obtained thirty-seven questionnaires, and sixteen were returned, which is forty-three percent. Lastly, fifty-three questionnaires were sent to the Project managers and thirty-five were returned, which is sixty-five percent. On the overall, fifty percent of the questionnaires sent out were returned

TABLE 2.

RESULT OF QUESTIONNAIRE RESPONSE

Profession	Local contractors	Foreign contractors	Project Managers
No of participating contractors and Project managers	98	37	54
No of contractors and Project managers that responded	44	16	35
Response rate (%)	45%	43%	65%

4.1 DISCUSSION OF FINDINGS ON TECHNICAL RISKS.

The result on table 2 on the weighted average shows that design changes are the most frequent risk in the construction industry followed by inadequate site investigation. Thus, this suggests a direct link between the two risks as inadequate site investigation can lead to design changes. The third on the weighted average is the shortfall of skilled workers is a major concern in the construction industry as the old, skilled workers are not being replaced by the young ones. Hence, the situation prevails as a result of urgent needs of educational growth for nation's development at the expense of technical training. The fourth on the weighted average suggest incomplete design, which indicate the inappropriate underutilization of design professionals according to their professional ethics. Three of the first four frequently occurring risks are attributed to design of the service and looking at the industry perspective the professionals involved bare much on the client's resolve to own and use the facility. There is an obvious lack of knowledge of most clients and the mode of engagement

with the design team that is inadequate professional fee and resultant attribute of the economic situation of the country. The fifth on the weighted average is the material shortage, which is also the risk that needs more involvement of experts in the area of concern. Others in descending order are appropriateness of the specification; obsolescence of building equipment; equipment failure; shortage in supply of water, gas, and electricity and errors in design drawings. The technical risks factors bear much of the design of the facility, which indicate a concern to the clients' briefs and the design team professional ethics and regulation.

TABLE 3. ANALYSIS OF RESPONSE ON OF TECHNICAL RISKS

Technical risk	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Inadequate site investigation	0.859	2	0.875	2	0.886	1	0.874	2
Incomplete design	0.814	6	0.750	9	0.851	3	0.807	4
Appropriateness of specification	0.841	4	0.763	7	0.754	7	0.777	6
Uncertainty over the source and availability of materials	0.391	20	0.825	5	0.623	10	0.664	12
Accidents on sites	0.759	11	0.688	12	0.543	12	0.675	11
Design changes	0.764	10	0.963	1	0.800	5	0.882	1
Equipment failure	0.782	8	0.800	6	0.709	9	0.765	8
Errors in design drawings	0.818	5	0.650	15	0.543	13	0.690	10
Hazards of environmental regulations	0.345	22	0.325	3	0.509	14	0.412	20
Incompetence of transportation facilities								
Increase in site overheads	0.427	16	0.450	19	0.446	15	0.441	19
Local firm's incompetence and low credibility	0.400	19	0.775	8	0.429	16	0.589	16
Materials shortage	0.409	18	0.688	13	0.394	18	0.533	18
Obsolescence of building equipment	0.850	3	0.725	10	0.811	4	0.799	5
Poor quality of procured accessory facilities	0.864	1	0.675	14	0.737	8	0.767	7
Poor quality of procured materials	0.727	12	0.575	16	0.463	17	0.607	13
Problems due to partners' different practice	0.809	7	0.325	24	0.343	20	0.595	15
Shortage in accessory facilities	0.700	13	0.538	17	0.337	21	0.567	17
Shortage in skilful workers	0.445	15	0.363	21	0.331	22	0.386	21
Shortage in supply of water, gas, and electricity	0.773	9	0.838	4	0.869	2	0.829	3
Subcontractor's low credibility	0.473	14	0.850	3	0.794	6	0.747	9
Unknown site physical conditions	0.418	17	0.700	11	0.600	11	0.597	14
Unusual weather and force majeure	0.382	21	0.463	18	0.200	24	0.383	22
Industrial disputes	0.282	23	0.450	20	0.308	23	0.362	23
Average	0.200	24	0.363	22	0.371	19	0.331	24
Average	0.597		0.642		0.569		0.628	

4.2 RESULT OF FINDINGS ON THE MANAGERIAL RELATED RISKS

The result of table 3 shows the project delay as the most frequently occurring risk followed by improper project feasibility study and improper project planning and budgeting. The first three results in the weighted average suggest interaction inefficiency among the parties involved in the project and correction of this undertaking is through the correlated communication. The fourth on the table is incompetence of the project management team that may culminate from insufficient professional training of the project team. The fifth is weak relationship with Government departments, which suggest lack of an information, Government bureaucracy and inter-governmental agency ineptness due to the type of policies in place. Others are increasing in project management overheads; inadequate choice of project partner; incomplete contract terms with the partner; poor relation and disputes with partner and uncertain productivity of resources.

TABLE 4.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON MANAGERIAL RELATED RISKS

Managerial Related risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Uncertain productivity of resources	0.655	9	0.388	15	0.486	5	0.534	10
Industrial relation problems	0.564	10	0.525	10	0.463	6	0.521	11
Change of organisation within local partner	0.409	15	0.500	11	0.389	8	0.439	15
Improper project feasibility study	0.864	2	0.875	1	0.903	2	0.882	2
Improper project planning and budgeting	0.795	4	0.838	3	0.891	3	0.843	3
Improper selection of project location	0.514	11	0.588	8	0.240	15	0.498	12
Improper selection of project type	0.459	13	0.575	9	0.234	16	0.469	13
Inadequate choice of project partner	0.691	8	0.725	6	0.400	7	0.640	7
Inadequate project organisation structure	0.541	14	0.475	12	0.326	10	0.465	14
Incomplete contract terms with partner	0.486	12	0.700	7	0.303	12	0.550	8
Incompetence of the project management team.	0.817	3	0.825	4	0.269	14	0.743	4
Increase in project management overheads	0.723	7	0.750	5	0.311	11	0.662	6
Poor relation and disputes with partner	0.732	6	0.263	16	0.377	9	0.545	9
Poor relation with government departments	0.791	5	0.450	14	0.691	4	0.676	5
Problems associated with culture differences	0.401	16	0.463	13	0.286	13	0.397	16
Project delay	0.891	1	0.863	2	0.949	1	0.902	1
Average	0.646		0.563		0.470		0.610	

4.3 RESULT OF FINDINGS ON ADMINISTRATIVE RISKS

The result in table 5 indicate troubles encountered with different public services as the most frequent administrative risks followed by maintaining the flow of traffic during construction and access to the site. Others are delay in the possession of the site and late hire of wayleaves. Procession of the project site is risk bound especially where the property documentation is crucial to the project execution. Access to site hinders project success as the project planning team need access to the site during the planning stage and project execution. Furthermore, ineffective bureaucratic procedure needs to be considered by the contractors and the Project managers during project initiation and planning as the stake is high in project success. Project site layout is part of contractors, administrative responsibility as this will allow free flow of movement during the construction phase. Hitherto, obstructed site amount to risk that must be identified, analysed and treated.

TABLE 5.
ANALYSIS OF QUESTIONNAIRE REPOSE ON ADMINISTRATIVE RISKS

Administrative risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Delay in possession of site	0.491	3	0.400	4	0.314	4	0.415	4
Late hire of wayleaves (a right to cross land)	0.427	4	0.388	5	0.309	5	0.381	5
Access to the site	0.727	1	0.538	3	0.371	3	0.584	3
Troubles encountered with different public services	0.395	5	0.725	2	0.789	1	0.683	1
Maintaining flow of the traffic during construction	0.645	2	0.738	1	0.411	2	0.630	2
Average	0.535		0.558		0.439		0.539	

4.4 DISCUSSION OF FINDINGS ON LOGISTIC RISKS

The result in the table(6) suggests shortage and/or late supply of different resources and the most occurring risk followed by site remoteness problem

and lastly communication. Scarcity or late supply of materials hinders project from achieving a set objectives, which amount to risks, if the Project manager or contractors would not forestall the situation. Furthermore, remoteness of site hinders project commencement as a contractor has to provide everything needed to finish the project within the estimated cost and duration. Hence, remoteness amount to risk as it bears on cost and time. Communication is crucial in any project execution as it links all parties to the project and help in the achievement of the project objective throughout the project phases.

TABLE 6.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON LOGISTIC RISKS

Logistical Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Shortage and/or late supply of different resources	0.723	1	0.675	1	0.383	3	0.632	1
Site remoteness problem	0.573	2	0.500	2	0.543	1	0.540	2
Communication	0.545	3	0.463	3	0.526	2	0.514	3
Average	0.614		0.546		0.484		0.562	

4.5 DISCUSSION OF FINDINGS ON CONSTRUCTION RISKS

The result of table 7 suggests construction method as the most occurring risk followed by ground problem and capability of professional staff. Others are equipment breakdown; mistakes and failure to construct to program of works. The local and foreign contractors rank ground problem as the most occurring risk, which suggests a lack of soil investigation in most executed projects. Project managers have construction method as the most occurring risk, thus suggesting lack of trained professionals in the field. The second on the classification of the local contractors is the suitability of different resources, but the ranking of the foreign firms is construction methods. Furthermore, the two classifications still suggest lack of professional ethics of the project consultants. The choice of Project managers in the second classification is the capability of professional staff, which indicates inadequate training of the consultants. The third ranking for the local contractors is equipment breakdown that indicate that most equipment are old and cannot be quickly replaced. Also the capable auto mechanics to handle most equipment are scares. The third on the classification of the Project managers is mistakes and failure to construct to program of works, and this indicate a lack of professional training as a result is from the leader of the team working as a consultant. The result shows a lack of profession ethics as construction industry is not into much professional development. Hence, this can be achieved through sincere relationship among the contractors and consultants.

TABLE 7.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON CONSTRUCTION RISKS

Construction Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Ground problem	0.832	1	0.686	1	0.657	5	0.732	2
Suitability of different resources	0.800	2	0.638	3	0.337	11	0.654	6
Achieving productivity of different resources	0.755	6	0.613	5	0.383	10	0.625	7
Weather and seasonal variations	0.682	9	0.625	4	0.400	9	0.595	9
Limited working space	0.486		0.525	6	0.429	8	0.479	11
Strikes and wage increase	0.691	8	0.450	7	0.474	7	0.560	10
Construction method	0.750	7	0.675	2	0.829	1	0.757	1
Equipment breakdown	0.791	3	0.325	9	0.714	4	0.701	4
Mistakes and failure to construct to program of works	0.768	4	0.363	8	0.749	3	0.682	5
Subcontractors performance	0.673	10	0.288	11	0.657	6	0.598	8
Capability of professional staff	0.764	5	0.300	10	0.829	2	0.719	3
Average	0.657		0.499		0.587		0.646	

4.6 DISCUSSION OF FINDINGS ON PHYSICAL RISK

The result in the table(8) indicate no work in high tides is the highest occurring risks followed by placing fill in dry seasons; diverting a river in time of low flow and driving a tunnel from one end. All these risk are remote to happening as the contractors and project managers rarely experience the risks. Government agencies own most projects that involve

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these physical risks; therefore the issues of diverting a river and driving a tunnel from one end are very remote at the moment. However, such risks may evolve in the nearest future there is a high probability that it will be taken care off. Placing fill in the dry season is also remote, but some of the respondents are aware of the impacts it has on projects. According to the Project managers no work in high tides is high and the resultant effect may be expensive.

TABLE 8.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON PHYSICAL RISKS

PHYSICAL RISKS	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Placing fill in dry seasons	0.218	1	0.275	2	0.440	2	0.340	2
Diverting a river in time of low flow	0.205	3	0.325	1	0.394	3	0.325	3
Driving a tunnel from one end	0.200	4	0.200	4	0.200	4	0.200	4
No work in high tides	0.209	2	0.225	3	0.760	1	0.563	1
Average	0.208		0.256		0.449		0.357	

4.7 DISCUSSION OF FINDINGS ON DESIGN RISKS

The result of table 9 indicates design changes as the most frequently occurring risk followed by errors resulting from inadequate surveys or site investigation and appropriateness of specification and interaction of design with method of construction. Others are new technology, incompleteness and suitability of design. The appointment of the Project manager and his team has a resultant effect on the design and the subsequent project component interface. The client's role in projects may be unclear during project initiation, which the Project manager has to comprehend and escalate to the advantage of the client and other stakeholders.

TABLE 9.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON DESIGN RISKS

Design Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Incompleteness	0.709	6	0.325	5	0.531	3	0.568	5
Suitability of design	0.727	5	0.288	6	0.486	4	0.564	6
Design changes	0.877	1	0.388	4	0.686	1	0.712	1
New technology	0.836	3	0.400	3	0.394	6	0.622	4
Errors resulting from poor surveys or site investigations	0.791	4	0.650	1	0.657	2	0.705	2
Appropriateness of specifications and interaction of design with method of construction	0.868	2	0.438	2	0.463	5	0.655	3
Average	0.801		0.415		0.536		0.638	

4.8 DISCUSSION OF FINDINGS ON FINANCIAL RISKS

The result indicates delay in payment by the client is a frequently occurring risk followed by exchange rate fluctuation and availability of funds. Others are in descending order, inflation and shortfall in reimbursing cost escalation; inadequate payment for variations; loss due to default of the contractor; taxes; early high investment in plants. The local contractors' response is that clients delay payment base on this projections project

TABLE 10
ANALYSIS OF QUESTIONNAIRE RESPONSE ON FINANCIAL RISKS

Financial Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Inflation and shortfall in reimbursing cost escalation	0.709	5	0.725	2	0.406	7	0.649	4
Exchange rate fluctuation	0.714	4	0.700	3	0.577	3	0.669	2
Loss due to default of contractor	0.727	3	0.538	6	0.543	5	0.615	6
Availability of funds	0.682	6	0.688	4	0.600	2	0.659	3
Inadequate payment for variations	0.741	2	0.613	5	0.549	4	0.644	5
Taxes	0.600	7	0.425	7	0.400	8	0.491	7
Early high investment in plant	0.545	8	0.375	8	0.411	6	0.456	8
Delay in payment by client	0.927	1	0.950	1	0.943	1	0.940	1
Average	0.706		0.627		0.553		0.640	

4.9 DISCUSSION OF FINDINGS MANAGERIAL RISKS

The result of the table shows that scheduling error is the most occurring risk followed by estimating data and errors in the bill of quantities on the

weighted average. The local contractors and foreign contractors have the error in the bill of quantities of the most occurring risks, and this suggest professional inefficiency and inadequate information dissemination at the planning stage. However, the Project manager takes scheduling errors as the most occurring risk. The Project managers and foreign contractors align on the estimating data as the second most occurring risk although this is the third for the local contractors. The Project managers and foreign contractors have the same opinion on space congestion as the third most occurring risk, which is also the fourth for the local contractors. Managerial risks are applicable to the contractor's organisation, and the Project managers' concern is out of experience and knowledge of the industry's basic requirements.

TABLE 11.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON MANAGERIAL RISKS

Management Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Space congestion	0.564	4	0.450	3	0.497	3	0.508	4
Effect of learning curve	0.518	5	0.438	4	0.469	4	0.477	5
Scheduling errors	0.653	2	0.425	5	0.743	1	0.636	1
Estimating data	0.586	3	0.463	2	0.720	2	0.608	2
Errors in bill of quantities	0.741	1	0.525	1	0.377	5	0.589	3
Average	0.612		0.460		0.561		0.564	

4.10 DISCUSSION OF FINDINGS ON CONTRACTUAL RISKS.

The weighted average of table 12 indicates that suitability of contract type condition of contract is a factor with the highest probability of occurring. The second on the table is co-ordination of work while the third is liability to others. The local contractors', foreign contractors' response is not far from the weighted average, so all the risks occur in a moderate amount.

TABLE 12.
ANALYSIS OF QUESTIONNAIRE RESPONSE ON CONTRACTUAL RISKS

Contractual Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Suitability of contract type-condition of contract	0.723	1	0.463	3	0.566	1	0.603	1
Liability to others	0.573	2	0.513	2	0.434	2	0.513	3
Co-ordination of work	0.545	3	0.575	1	0.371	3	0.515	2
Average	0.614		0.517		0.457		0.544	

4.11 DISCUSSION OF FINDINGS ON POLITICAL RISKS

Inconsistent regulation within the country is a risk with the highest probability of happening on the weighted average followed by changes in local law and import restrictions. Other in descending order are complex requirements for permits; necessity to use local resources, and the least is war or revolution. Local contractors have changes in domestic law as the most occurring; the foreign contractors have import restrictions on the risk with the highest probability of occurring. The Project managers' response is inconsistent regulation within the country as the most occurring risk which is the second for the local contractors and sixth for the foreign construction firms. The third for the local contractors is import restrictions that are also the third for the Project managers and first for the foreign contractors.

TABLE 13.
ANALYSIS OF QUESTIONNAIRE RESPONSES ON POLITICAL RISKS

POLITICAL RISKS	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Changes in local law	0.377	1	0.375	4	0.600	2	0.475	2
Import restrictions	0.332	3	0.463	1	0.423	3	0.413	3
Complex requirements for permits	0.300	4	0.325	5	0.417	4	0.354	4
Necessity to use local resources	0.282	5	0.425	3	0.297	5	0.347	5
War or revolution	0.232	6	0.450	2	0.263	6	0.344	6
Inconsistency of regulations within the country	0.373	2	0.325	6	0.960	1	0.575	1
Average	0.316		0.394		0.493		0.418	

4.12 DISCUSSION OF FINDINGS ON DISASTER RISKS

The result of table 14 shows that accidents are the most occurring risk followed by fire, stormy wind, and diseases. Others like floods, lighting, landslip and sinkhole rarely happens, so the risks attached to these factors

are not crucial. The probability of most the disaster risks happening are very remote at the moment, but that is subject to future analysis and consideration. The onus of disaster risk occurring bears on the future development and preparedness of the stakeholder to handle such uncertainty.

TABLE 14.
ANALYSIS OF QUESTIONNAIRE RESPONSES ON DISASTER RISKS

Disaster Risks	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Floods	0.254	6	0.328	2	0.411	3	0.343	5
Landslip	0.245	7	0.325	3	0.251	6	0.279	7
Fire	0.291	5	0.275	4	0.514	2	0.393	2
Earthquakes	0.200	9	0.208	8	0.200	9	0.203	9
Accidents	0.391	2	0.263	5	0.688	1	0.519	1
Diseases	0.364	3	0.375	1	0.228	8	0.345	4
Stormy winds	0.441	1	0.200	9	0.314	4	0.349	3
Lightning	0.341	4	0.225	6	0.248	7	0.281	6
Sinkholes	0.205	8	0.213	7	0.290	5	0.242	8
Average	0.304		0.268		0.349		0.328	

4.13 DISCUSSION OF FINDINGS ON ALL RISK TYPES

The result of table 15 shows that construction risks are the most occurring in the weighted average of 0.646, which is also the most occurring according to the Project managers. On the average for the local contractors, it is the third while it is the seventh on the foreign construction firms. Financial risk is the second on the weighted average which suggest a crucial success factor to all stakeholders, and it is the same for local and foreign contractors. The Project managers' response is the fourth on the scale, thus the outcome of evaluated knowledge base and experience. The third on the weighted average is design risk, which is the first on the local contractors ranking as most designs are risk bound. Thus, the local contractors cannot cope with additional expert to check the design inadequacies. The foreign construction firms have design on the ninth of the rank as most of the foreign contractors can afford to have design departments to discover design inadequacies and redesign accordingly. The Project managers' ranking of design risk is on the fifth; therefore, this suggests that project management practice becoming more efficient. The fourth on the ranking of the weighted average is the technical risks which are the uncertainty of achieving the performance requirements and operation ability within the planned cost and schedule. Thus, technical risks are linked with competence or skill of the firms in executing the projects. The foreign firms ranking is the first as a local technical input may not be sufficient to meet the international standard. The local contractors rank technical risk fifth as such requirements are not in high demand on most projects executed by the local contractors. The Project managers ranked technical risk second to suggest a requirement that is in high demand to develop the construction industry. Managerial related risks are the fifth in the ranking order of the weighted average which is the fourth on the classification of the local contractors. Hence, third on the foreign construction firms' ranking and the eighth position on the Project managers' ranking.

Others are management risks; logistics risk contractual risks, administrative risks, political risks, physical risks and disaster risks in descending order. The probability of these risks happening is very low, but that is not to suggest that they can happen. The construction industry needs to be proactive in preparing for unknown risks for the successful completion of the projects.

TABLE 15.
AVERAGE OF ALL RISKS RANKED ACCORDING TO THE RELATIVE INDEX

Type of risk	Local contractors		Foreign contractors		Project managers		Weighted average	
	Mean	R	Mean	R	Mean	R	Mean	R
Construction risks	0.657	3	0.499	7	0.587	1	0.646	1
Financial risks	0.706	2	0.627	2	0.553	4	0.640	2
Design risks	0.801	1	0.415	9	0.536	5	0.638	3

Technical risks	0.597	5	0.642	1	0.569	2	0.628	4
Managerial related risks	0.646	4	0.563	3	0.470	8	0.610	5
Management risks	0.612	8	0.460	8	0.561	3	0.564	6
Logistic risks	0.614	6	0.546	5	0.484	7	0.562	7
Contractual risks	0.614	7	0.517	6	0.457	9	0.544	8
Administrative risks	0.535	9	0.558	4	0.439	11	0.539	9
Political risks	0.316	10	0.394	10	0.493	6	0.418	10
Physical risks	0.208	12	0.256	12	0.449	10	0.357	11
Disaster risks	0.304	11	0.268	11	0.349	12	0.328	12

4.14 CONSIDERATION OF LOCAL CONTRACTORS AND FOREIGN CONTRACTORS ON FREQUENCY OF RISK OCCURRING IN THE NIGERIAN CONSTRUCTION INDUSTRY.

$$Rho = 1 - 6 \sum d^2 / n(n^2 - 1)$$

=0.566 suggest that the correlation be positive and moderate as it is above average. It shows that the local contractors and foreign construction firms' opinions on the frequency of risk occurring in most of their construction projects are related. H₀: there is no significant difference between the opinion of local contractors and foreign contractors on the frequency of risks occurring in the Nigerian construction industry. Student's t distribution with degree of freedom n-2 were used $t = rs\sqrt{n-2}/r_2$ T-Calculated is 2.63 which is higher than t-tabulated 2.22. The observation suggests that the relationship between local contractors' opinion and that of foreign contractors is statistically significant on frequency of risks occurring in the Nigerian construction industry. Therefore, we fail to accept H₀ the null hypothesis

4.15 CONSIDERATION OF FOREIGN CONTRACTORS AND PROJECT MANAGERS ON FREQUENCY OF RISKS OCCURRING IN THE NIGERIAN CONSTRUCTION INDUSTRY

$$Rho = 1 - 6 \sum d^2 / n(n^2 - 1)$$

=0.636 suggest that the correlation be positive and strong as it is above average. It shows that the foreign construction firms' opinions and that of project managers on the frequency of risks occurring in most of their construction projects are related. H₀: there is no significant difference between the opinion of foreign contractors and project managers on the frequency of risks occurring in the Nigerian construction industry. Student's t distribution with degree of freedom n-2 were used $t = rs\sqrt{n-2}/r_2$ T-Calculated is 3.35, which is higher than t-tabulated 2.22. The observation suggests that the relationship between foreign contractors' opinion and project managers is statistically significant on the frequency of risks occurring in the Nigerian construction industry. Therefore, we fail to accept H₀ the null hypothesis

4.16 CONSIDERATION OF LOCAL CONTRACTORS AND PROJECT MANAGERS ON RISK IDENTIFICATION FACTORS

$$Rho = p = 1 - 6 \sum d^2 / n(n^2 - 1)$$

=0.388 suggest a positive correlation that shows that the local construction firms' opinions and that of project managers on the frequency of risks occurring in most of their construction projects are related. H₀: there is no significant difference between the opinion of local contractors and project managers on the frequency of risks occurring in the Nigerian construction industry. Student's t distribution with degree of freedom n-2 was used $t = rs\sqrt{n-2}/r_2$ T-Calculated is 1.44, which is higher than t-tabulated 2.22. The observation suggests that the relationship between local contractors' opinion and that of project managers is statistically significant on the frequency of risks occurring in construction projects in the Nigerian construction industry. Therefore, H₀ the null hypothesis rejected.

TABLE 16

RESULTS ON HYPOTHESE TESTED

parameters	r_s	t-cal	t-tab	p-value	Reject H_0
Local contractors and foreign contractors	0.566	2.63	2.22	0.05	Yes
Foreign contractors and project managers	0.636	3.35	2.22	0.05	Yes
Local contractors and project managers	0.388	1.44	2.22	0.05	Yes

5 CONCLUSION AND RECOMMENDATION

The research conducted reveals the position of risk types as those that most occur were identified and related to the respondent involvement in the construction industry. The study shows the need for the contractors and Project managers to acknowledge the probability of most risks for further analysis. Thus preparation for uncertainty in respect of disaster risks physical risks and political risks., which is the least on the table. It is crucial to perceive these risks as they have more impact than other known risks. However, most occurring risk (construction risk) should be seen as internal risk that reflects more of the managerial skills and strategy of the organisation. The financial risks is both internal and external, therefore, the sharing formula between the parties involved is crucial to the construction industry development. Design risk is external to the construction industry but internal to the Project managers and project team if the design consultants are outside the organisation. Thus in the case of where the design and project execution is under the same organisation the risks are internal.

The stakeholders in the construction industry need updating of existing knowledge and information so that improved positive input can prevail in the industry. The stakeholders should be proactive to take care of emergence of disaster, physical and political risks. The prominent risks need more research so that stakeholder can be ready to take proper control of their existence.

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