Project Risk Mitigation and Project Execution in the Nigeria Oil and Gas Industry

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Abstract: The focus of this study is to examine the relationship between project risk mitigation and project execution in the Nigeria oil and gas industry. Specifically, the study examines the extent of contribution of project risk mitigation in realising project budget, quality, schedule and scope during execution. In pursuit of these objectives, survey research design was used. 102 questionnaires were administered to the Managing Directors or Chief Operating Officers and project or operations managers of the selected companies. Eighty-two questionnaires were validly retrieved and used for data analysis. Data obtained were analysed mean and Spearman’s rank order correlation analysis. The study found that projects risk mitigation was significantly and positively related to project execution in terms of budget, quality, schedule and scope. The study therefore recommends that there should be a holistic integration and constant improvement of project risk mitigation strategies which will help improve the quality of projects executed in the Nigerian oil and gas industry.

Keywords: project risk mitigation; project execution; quality; budget; schedule; scope

INTRODUCTION

Infrastructural development has been identified as one of the key activities that contribute significantly to economic growth in all nations, developed or developing (Ke et al., 2020). It involves the execution of projects which are usually complex, capital-intensive as well as risky but play a pivotal role in improving the socioeconomic condition of a country’s citizens (Nair et al., 2020). Infrastructural projects usually involve many stakeholders and require a long gestation period (from initiation to closing), large funding, complex procurement methods and a dynamic organizational and management structure to ensure successful execution (Dwiatmoko et al., 2020).

Any potential condition, element, event or factor arising during project execution which inhibits or negates the achievement of any of the project objectives of function, scope, cost, schedule, or quality goals is a risk to the project (Zhu et al., 2020). Also, any uncertainty with either a high probability of occurrence or high impact upon occurrence is considered risky. Thus, before commencing the execution of any risky project, it is important that all the associated risks are identified and the strategies for managing them developed (Lin & Huang, 2020). The level of acceptable risk varies from one organisation to the other and the nature of project in line with their risk appetite and risk tolerance (Qadan & Idilbi-Bayaa, 2020).

According to a study by Price Waterhouse Coopers (2014), 50% of infrastructural projects exceed time (schedule) and cost budgets, 25% fail outright while only 25% are executed successfully. Managing these risks is, therefore critical and involves a systematic process of identifying, evaluating and then acting to avoid, mitigate or eliminate the risks which could threaten the successful execution of the project as well as the realization of its objectives (Wang et al.,
According to Curado et al. (2020), an effective risk management will greatly minimize the possibility of disputes, conflicts as well as uncertainties which may arise from inadequate scope/specifications and quality definition which could lead to schedule and budget overruns. Effect project risk mitigation has been found to positively contribute to the construction of large transportation infrastructure (Sarkar, 2012; Zailani et al., 2016), information technology infrastructure (Maruping et al., 2019) and building construction (Carbonari et al., 2019; Guan et al., 2020).

From a Nigerian perspective, successful infrastructural development in the oil and gas industry is crucial for the achievement of sustained socioeconomic development of the country as the exportation of crude oil represents about 95% of export earnings and 70% of total revenue for the government (Lagoke et al., 2020). Unfortunately, many projects in the Nigerian oil and gas industry have failed to deliver on one or more of the four measures upon which project success or failure is assessed namely scope, schedule, budget and quality (Mas’ud et al., 2020). Some of these failures have stemmed from schedule and budget overruns leading to project abandonment or inability to deliver pre-determined scope/specifications and quality leading to an unacceptable outcome (Mpuon et al., 2020). These failures have led to huge financial losses and these losses are due to poor or non-existent risk management practices associated with the Nigerian oil and gas industry (Ya’u et al., 2020).

These losses associated with project failures in the Nigerian oil and gas industry make it important to understand how effective project risk mitigation strategies are in contributing to the success of project execution. This study sought to achieve this objective by focusing on the oil and gas industry in Rivers State, one of the most oil-rich states in Nigeria and thus the location for a relatively large number of oil and gas-related infrastructure projects in the country. Specifically, this study had four specific objectives: 1) To ascertain the extent of contribution of project risk mitigation to realizing project budgets, 2) To investigate the extent of contribution of project risk mitigation to achieving project quality, 3) To ascertain the extent to which project risk mitigation contributes to the attainment of project schedule and 4) To investigate the extent to which project risk mitigation contributes to the actualization of project scope. To achieve these four objectives, this study adopted a survey research design by distribution questionnaires to different management executives involved in infrastructural project execution in the Rivers State oil and gas industry in Nigeria.

METHOD

The study adopted a survey research design aimed at examining the relationship between project risk mitigation and project execution in the oil and gas industry in Nigeria. The unit of analysis was at the organizational level and the population of this study was 278 oil and gas companies executing projects in Rivers state as listed in the Rivers state yellow pages directory. The criteria for choosing these firms included: 1) the company must be located in Rivers state and must have executed or is currently executing oil and gas projects in Rivers state and 2) the project(s) must have been executed in the past seven years.

From the population of 278 companies, the companies were classified into five (5) different clusters based on their services as follows: construction (mechanical and civil) = 55; services (drilling, production and exploration) = 58, supplies (equipment, tools, materials and labour) =116, logistics (transportation, shipping, communications) = 25, others (not related to any of the above) = 24. Based on the second criteria, the fifty-five (55) construction (mechanical and civil) companies were selected for the study; however, four (4) of the companies had closed down and only 51 could be located which were used as the sample size.
In order to measure the study’s variables, a questionnaire was developed based on established measures utilized by prior scholars. Project risk mitigation was measured using an instrument developed by Raftery (2004). This instrument contains four items which respondents were required to rate using a five-point Likert scale with 1 being strongly disagree and 5 being strongly agree.

The study’s second variable, project execution, was measured using an instrument developed by Sylvester and Rani (2011) which included project budget, project quality, project schedule and project scope. Each component of project execution had four items which respondents were required to rate on a five-points Likert scale with 1 being strongly disagree and 5 being strongly agree.

102 questionnaires were distributed to management executives of the 51 companies; 85 questionnaires were returned with three incompletely filled. This meant that 82 completed questionnaires were utilized for this study’s analysis.

The mean scores of the 82 respondents were used to determine their collective perceptions toward the practice of project risk mitigation strategies in their organizations as well as the quality of project execution in terms of budget, quality, scope and schedule. Spearman’s Rank Order Correlation was used to determine the relationship between project risk mitigation and project execution.

RESULTS

Project Risk Mitigation

Table 1 presents the mean scores of the respondents for the items used to measure the extent to which oil and gas companies in Rivers State practice project risk mitigation strategies when executing infrastructural projects.

| Project Risk Mitigation | N  | Mean  | Std. Deviation |
|-------------------------|----|-------|----------------|
| Valid N (listwise)      | 82 |       |                |
| Regular health and safety inspections are carried out | 82 | 4.1098 | .96872 |
| There are quality assurance processes in place | 82 | 4.0976 | .93769 |
| Projects are often broken down into smaller deliverables to reduce execution risks | 82 | 4.1220 | 1.01093 |
| Some aspects of projects are often subcontracted to reduce execution risks | 82 | 4.0732 | .96584 |

It can be observed that the 82 respondents generally agreed with the notion that their organizations carried out project risk mitigation strategies when executing infrastructural projects, specifically in terms of conducting regular health and safety inspections, ensuring that quality assurance processes were in place, minimizing execution risks by breaking down the project into smaller deliverables and subcontracting some aspects of the projects to more competent companies when needed. An overall mean score of 4.1006 indicated that the respondents agreed
that project risk mitigation strategies were a priority for their companies when executing infrastructural projects in the Rivers State oil and gas industry.

**Project Execution**

Table 2 provides the respondents’ mean scores for the items measuring the four components of project execution: budget, quality, scope and schedule.

**Table 2: Respondents’ Mean Scores for Project Execution**

| Component  | Statement                                                                 | N  | Mean   | Std. Deviation |
|------------|---------------------------------------------------------------------------|----|--------|----------------|
| **Budget** | There is always a project budget prior to commencement of projects execution | 82 | 4.0976 | .92443         |
|            | (x = 4.0640; S = 0.83038)                                                |    |        |                |
|            | Resource scheduling and allocation is undertaken to optimise cost benefits | 82 | 4.0976 | .92443         |
|            | Budgets are monitored and controlled during projects execution            | 82 | 4.0366 | .90874         |
|            | Budget performance appraisal is done at end of project to compare budget to actual | 82 | 4.0244 | .90234         |
| **Quality**| Expected project quality is always clearly defined                        | 82 | 4.0976 | .84048         |
|            | (x = 4.1128; S = 0.89508)                                                |    |        |                |
|            | Company has a quality management plan in place                            | 82 | 4.1341 | 1.02755        |
|            | There is a clearly defined quality control process in place               | 82 | 4.0976 | 1.04951        |
|            | There is a quality performance appraisal at the end of every project     | 82 | 4.1220 | 1.01093        |
| **Scope**  | There is always a Scope Management Plan prior to the commencement of any project | 82 | 3.0418 | .61432         |
|            | (x = 3.4055; S = 0.64514)                                                |    |        |                |
|            | Detailed project requirements are collected and scope defined and agreed prior to project start | 82 | 3.7402 | .68310         |
|            | Work breakdown (WBS) is always developed to guide projects execution      | 82 | 3.5142 | .66264         |
|            | Company has procedures for scope validation and control during projects execution | 82 | 3.3257 | .62051         |
| **Schedule**| There is always a Schedule Management Plan prior to commencement of any project | 82 | 3.8704 | .79317         |
|            | (x = 3.8967; S = 0.84727)                                                |    |        |                |
|            | Project activities are properly identified, clearly defined and sequenced prior to project start | 82 | 3.9004 | .80317         |
An overall mean score of 4.0640 for the budget component of project execution intimates that the management executives surveyed in this study collectively agreed that their organizations ensured that budgets were always prepared prior to the commencement of the implementation of a project. Additionally, these executives believed that their organizations sought to optimise cost benefits by ensuring that resources were effectively allocated during the budget preparation process. The mean scores also indicate that the management executives were confident that the prepared budgets were monitored and controlled during the process of executing the project, and that actual costs were compared with budgeted costs after completion of the project in order to evaluate budget performance.

Similarly, an overall mean score of 4.1128 for the quality component of project execution indicates that the management executives were even more confident that their organizations ensured that quality specifications of projects were adhered to relative to the budget component of project execution. Their responses indicated that they felt that their organizations always had clearly defined quality parameters prior to the execution of projects, and that these parameters were outlined in a quality management plan. The results also indicate that these parameters were used throughout the execution process to ensure that quality was maintained throughout, and that an overall quality appraisal was conducted after the conclusion of the project.

An overall mean score of 3.4055 indicates that the management executives were noncomittal regarding the extent to which their organizations integrated the scope component of project execution. This indicates that these organizations did not always ensure that they had a clear understanding of the scope of the project they were about to embark, nor did they always ensure that they had a clear breakdown of all the steps of the project prior to execution. Finally, the executives could not confirm that their organizations always ensured that project specifications were adhered to during project execution.

Finally, an overall mean score of 3.8967 for the schedule component of project execution shows that the management executives could not guarantee that their organizations made the necessary effort to ensure that projects were completed on time. Specifically, the executives could not confirm that their organizations developed a schedule management plan prior to the commencement of the project, nor could they confirm that even if such plans were developed, they were followed judiciously during the execution process.

Relationship between Project Risk Mitigation and Project Execution

Table 3 presents the results of Spearman’s Rho analysis indicating the relationship between project risk mitigation and each of the four components of project execution.
It can be observed from Table 3 that project risk mitigation was significantly and positively related with all four components of project execution, with the strongest correlation being with scope (0.962), followed by schedule (0.949), then quality (0.711) and finally budget (0.674).

Discussion of Findings

The results of this study indicate that the management executives of oil and gas organizations in Rivers State, Nigeria agreed with the notion that their organizations took project risk mitigation seriously, and they expected this to translate into superior project performance in terms of staying within budget as much as possible and ensuring that a high quality of projects were always maintained. The results also indicated that these executives could not guarantee that their organizations would always ensure that projects were completed in line with predetermined specifications as well as within an agreed upon time frame. These findings are similar to Olaniran et al. (2015), Kenny (2018), Vilardo and La Rovere (2018), Kim and Choi (2019) and Barghi and Sikari (2020) who all found that proper implementation of project risk management strategies were strongly related to successful project execution in the oil and gas industry.

These study’s findings have several implications for organizations in the oil and gas industry as well as policy makers tasked with ensuring that these organizations successfully execute infrastructure projects that will improve the socio-economic conditions of the countries where they operate. The first implication is that the importance of integrating scientific and robust risk mitigation strategies in oil and gas companies cannot be overestimated. This is perhaps the most important task for management executives so as to ensure that infrastructural projects are given the best possible chance of being successfully implemented.

The health and safety of oil and gas employees is paramount for management executives when developing project risk mitigation strategies for their organizations. This is because the world is currently in the Knowledge Worker Age where employees are the most important resource for any company looking to be successful for an extended period of time.

Another important element of project risk mitigation strategy development is integrating quality into every aspect of the project execution process, from planning to execution. The Japanese management concept of ‘Kaizen’ or ‘continuous improvement’ is one that all oil and gas organizations should embrace. This is because ensuring that mega infrastructural projects are developed based on the highest quality standard ensures that value for money is obtained from the huge financial resources invested in the project and that the project is able to provide the maximum amount of benefit for all intended beneficiaries.

A further implication of this study’s findings is the importance of breaking down infrastructure projects into several manageable parts with constant evaluation all through the execution project so that potential errors can be detected quickly and regular progress reports can be provided in real time. This helps the organization to ensure that each part of the organization has clear responsibilities and people can be held accountable for areas of the project they are responsible for.
A final implication for the management executives of oil and gas organizations is regarding the issue of cooperation and synergy with other complementary organizations in the industry. It is important for an organization to be able to determine what its strengths and weaknesses are, and to be humble enough to know when to ask for help from other companies who have more expertise in certain areas of the execution of particular projects. The ‘cut-throat’ philosophy (Jane et al., 2018) that characterizes the oil and gas industry is one that progressive managers must abandon so as to ensure that high quality projects are always delivered in this industry.

From the point of view of policy makers in the oil and gas industry, mandating and enforcing project risk mitigation strategies is important for the overall health of the industry as well as the quality of projects executed. A ‘stick and carrot’ approach must be adopted whereby organizations that comply and even go above and beyond minimum project risk mitigation requirements are recognized, incentivized and applauded on one hand, while organizations that fail to meet the minimum risk mitigation requirements are publicly penalized on the other hand. This approach will send a strong message to all organizations in the oil and gas industry of the importance of integrating project risk mitigation strategies in all their operations.

CONCLUSION

This study provided insight into the relationship between project risk management and project execution in the oil and gas industry in Rivers State, Nigeria. The study found that management executives of these organizations all perceived that project risk mitigation was strongly correlated with project execution in terms of budget, quality, scope and schedule.

However, despite the importance of the findings of this study as discussed in the previous subsection, the study had some limitations. First, data was only collected from organizations in one oil-producing state in Nigeria. This thus limits the generalizability of the study’s findings, although the findings were similar to other studies done in different parts of the world. To overcome this limitation, future studies should include all oil-producing states in their inquiry so as to provide a more holistic picture of the relationship between project risk mitigation and project execution in the Nigerian oil and gas industry. Additionally, future studies can conduct an inter-country comparison of this relationship.

Another limitation of this study is the fact that it only investigated the relationship between the project risk mitigation and project execution. As is well known, correlation does not equate causation. Future studies should thus explore to what extent project risk mitigation is able to predict project execution.

A third limitation of this study is the reliance on the perceptions of management executives to determine the project risk mitigation strategies as well as project execution policies of their organizations. Reliance on such self-reported measures is vulnerable to social desirability. Although this problem was mitigated by making the questionnaires anonymous and by not disclosing actual organization names, future studies can utilize other data collection methods such as document analysis as well as secondary data to provide a different perspective to the relationship between project risk management and project execution.

The reality is that risk in inevitable when executing infrastructure projects in the oil and gas industry globally. The task of prudent and progressive managers is to do their best to mitigate these risks by developing and constantly updating holistic risk mitigation strategies that will give the organizations the best chance of delivering high quality projects each and every time and thus contributing not only to the continued success of their organizations, but to the socio-economic developments of the countries where they operate in.
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