

PROJECT RISK AVOIDANCE AND PROJECT EXECUTION IN NIGERIA OIL AND GAS INDUSTRY

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Abstract

This study sought to examine the relationship between project risk avoidance and project execution in the Nigerian oil and gas industry. Specifically, the study examined the relationship between project risk avoidance and four components of project execution (budget, quality, schedule and scope) among 51 oil and gas companies operating in Rivers State, Nigeria. To achieve this objective, 102 managing executives were given questionnaires, with 82 questionnaires correctly filled and returned. Data obtained were analysed using mean scores and Spearman's rank order correlation analysis. The study found that projects risk avoidance was positively and significantly related to all four components of project execution. The main implication of this finding is that oil and gas companies need to invest heavily in innovative technologies and processes that will enhance their ability to avoid risk, thus improving the quality of projects they execute.

Keywords: project risk avoidance, project execution, budget, quality, scope, schedule

Abstrak

Studi ini berusaha untuk menguji hubungan antara proyek penghindaran risiko dan eksekusi proyek di industri minyak dan gas Nigeria. Secara spesifik, studi tersebut meneliti hubungan antara proyek penghindaran risiko dan empat komponen eksekusi proyek (anggaran, kualitas, jadwal dan ruang lingkup) di antara 51 perusahaan minyak dan gas yang beroperasi di Negara Bagian Rivers, Nigeria. Untuk mencapai tujuan ini, 102 eksekutif pelaksana diberikan kuesioner, dengan 82 kuesioner diisi dan dikembalikan dengan benar. Data yang diperoleh dianalisis menggunakan skor rata-rata dan analisis korelasi urutan peringkat Spearman. Studi tersebut menemukan bahwa penghindaran risiko proyek berhubungan positif dan signifikan dengan keempat komponen pelaksanaan proyek. Implikasi utama dari temuan ini adalah bahwa perusahaan minyak dan gas perlu berinvestasi besar-besaran dalam teknologi dan proses inovatif yang akan meningkatkan kemampuan mereka untuk menghindari risiko, sehingga meningkatkan kualitas proyek yang mereka jalankan.

Kata Kunci: proyek penghindaran risiko, eksekusi proyek, budget, kualitas, scope, jadwal

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1. Introduction

In 2019, the global oil and gas industry was estimated to be valued at \$86 trillion, representing about 3.8% of global gross domestic product. This industry is undoubtedly one of the most important in the world as it produces one of the world's most important energy sources, petroleum, which also in high demand in other industries such as chemical, plastic and paints; a world without the oil and gas industry is almost impossible to fathom (Al-Khori *et al.*, 2020). For all aspects of the oil and gas industry to run smoothly and safely, highly complex and financially-intensive infrastructures need to be built and maintained (Oduro Appiah *et al.*, 2020). Examples of these critical infrastructures include “exploration submersibles and oil production platforms to refineries, depots, and transportation pipelines” (Gorkowienko, 2019). Constructing these infrastructure involve project risks which can be catastrophic to the economy and the environment if they occur (Vilaro *et al.*, 2020). For example in 2020 alone, there have been several oil spills caused by infrastructure damage and collapse in Mauritius, Canada, Russia and the United States with thousands of tonnes of oil being deposited into various water bodies with potential devastating effects for the economy and the environment (Bankes *et al.*, 2020).

It can thus be argued that one of the most important tasks for the top management of oil and gas companies is ensuring that their organizations invest in the best risk avoidance strategies available to ensure that infrastructure projects being developed are of the highest quality possible, with a close to zero chance of infrastructure failure (Yan *et al.*, 2020). These strategies typically revolve around ensuring the safety of employees at all times, developing holistic and robust quality control

systems, investing in the latest and most efficient technology for project execution, and hiring the most competent employees available in the industry (Jennings, 2020).

This study investigates the relationship between project risk avoidance strategies and successful project execution as perceived by managing executives of oil and gas companies in Nigeria. It is important to understand the relationship between these two variables because of the central role that oil and gas companies play in the socio-economic development of the country. Nigeria heavily relies on crude oil exports as it represents “95% of its foreign exchange earnings and 80% of its budgetary revenues” (Global Edge, 2020). It is thus of crucial important that oil and gas companies in the country make the necessary investments in risk avoidance strategies to ensure that all crucial infrastructure projects are successfully completed.

The rest of the paper proceeds as follows: First a literature review of studies that explored project risk avoidance and project execution in the oil and gas industry is presented. This is followed by a discussion of the research method adopted by this study, and then the results are presented along with a discussion of their implications. The study then ends with a conclusion.

2. Literature Review

This section of the study provides a review of prior studies that investigated project risk management in the context of the global oil and gas industry.

2.1 Employee safety and security

AlNabhani *et al.*, (2016) revealed that oil and gas production produces technologically enhanced naturally occurring radioactive materials (TENORM) which are harmful to employees as well as the general public.

The study advocates for public participation in the formation of legislation that will ensure that oil and gas companies integrate holistic policies to reduce the amount of TENORM produced to the barest minimum.

Bjerga and Aven (2016) used the In Amenas gas hostage situation that occurred in 2013 where at least 67 people lost their lives as a case study. The objective of the study was to learn from the security lapses that allowed such a tragedy to happen so that recommendations on risk avoidance strategies could be provided to ensure that such an event never occurred again. The primary recommendation for oil and gas companies was that managers had to adopt a 'prevention is better than cure' approach to ensure that all safety protocols and technologies were integrated into every sector of the company's operations with regular updates and advancements regularly adopted; the health and safety of all workers must be the most important priority for all oil and gas companies.

Lambrechts and Blomquist (2017) highlighted the fact that oil and gas companies have increasingly been faced with security challenges by terrorists and pirates since the early 1990s. Like Bjerja and Aven (2016), this study also utilized the In Amegas gas hostage situation in Algeria. The study found that oil and gas companies globally have learnt from this sad situation by investing in more holistic security measures to ensure that the vulnerability of their infrastructures to the risk of terrorist attacks is reduced to the barest minimum.

Kabyl *et al.*, (2020) developed a risk management model that they argued would enable oil and gas companies manage the environmental risk of produced water. Produced water is a by-product of oil and gas production that contains many chemicals that are harmful

to the environment. This water is a big environmental risk as it is produced in large volumes. The model allows top management to identify and reduce the most harmful chemicals in managing the environmental risk of produced water, and the efficacy of the model was verified in a case study involving the Thunder Horse Oil Field located in the Gulf of Mexico, 150 miles away from New Orleans, Louisiana.

The studies reviewed in this section highlighted the fact that in order to ensure employee safety and security in the oil and gas industry, the first step must be from policy makers who with the help of the general public can come up with legislation mandating all oil (AlNabhany *et al.*, 2016). The next step is for these oil and gas companies to increase the robustness of their security protocol to ensure that the possibility of terrorist attacks on their employees and facilities are reduced to the barest minimum (Berja & Aven, 2016; Lambrecht & Blomquist, 2017)

a. Equipment safety and security

Khadem *et al.*, (2018) adopted a case study design to investigate the extent to which an oil and gas company in Oman integrated risk avoidance strategies into its daily operations. Field visits and interviews with management executives revealed that the risk avoidance strategies adopted by the company were not as robust as was required to enable them to deliver projects on time and within budget. This was confirmed via a project simulation which indicated that the company's relatively weak risk avoidance and mitigation strategy meant that the simulated project would have been completed two years behind schedule, and with an 8% chance of exceeding the budget. Al Mhdwai (2020) "developed an integrated decision support methodology for

managing the risk factors in oil and gas construction projects in Iraq". The methodology is supposed to enable decision makers in oil and gas industries to make the optimal decisions when executing projects so as to ensure value for money as well as a high quality standard.

Hameed and Ali (2020) introduced a more advanced method of ensuring the integrity of petroleum pipelines to minimize the risk of oil spills due to weakened and faulty pipelines. This new Risk-Based Inspection (RIB) methodology is argued to provide oil and gas companies a better ability to monitor and inspect steel and flexible pipelines.

The studies in this section highlighted the importance of oil and gas companies integrating robust risk avoidance strategies into their operations (Khadem et al., 2018) to ensure that managers are able to make the best decisions regarding the integrity and quality of the equipment which are crucial for successful project execution (Al Mhdawi, 2020); An example of such a strategy being the regular inspection and monitoring of pipelines to ensure their structural integrity (Hamed & Ali, 2020).

b. Financial stability

Choi and Kim (2018) evaluated the likelihood of oil and gas companies involving in hedging as a means of insuring themselves against the volatility of oil and gas prices. An assessment of 328 loans made to oil and gas projects over the years 1996-2011 revealed that recent instances of price variability determined the extent of hedging engaged by oil and gas companies.

Savas and Kapusuzoglu (2020) investigated the impact of hedging activities on the performance of oil and gas companies. Findings of the

regression analyses revealed that investment in speculative hedging activities had a negative correlation with firm value. The implication of this finding for oil and gas companies is that hedging might not be the best approach to secure the financial assets of the company.

The two studies in this section (Choi & Kim, 2018; Savas & Kapusuzoglu, 2020) both identified hedging as a strategy utilized by oil and gas companies to protect their assets from the volatility of oil prices in the global market.

c. Quality improvements via technology

Meidell and Kaarboe (2017) conducted a historical case study of a large international oil and gas company in order to understand the increased importance the company placed on investing in risk avoidance technology over time. The investigation revealed that over time, the company became more and more willing to invest in technology that would improve its ability to avoid risks and consequently improve the quality of projects it executed over time.

Jagoda and Wojcik (2019) conducted case studies of several Canadian oil and gas companies in order to determine to what extent these companies were embracing innovative technologies to help reduce their environmental risk in terms of carbon footprint when executing projects. These case studies revealed that oil and gas companies are very willing to integrate technologies that will make their operations more environmentally friendly, particularly in light of increasing pressure from the government, media and public. Oil and gas companies are more willing these days to invest in innovative technologies that will enhance the quality of projects they execute

(Meidell & Kaarboe, 2017) while reducing their carbon footprint on the environment (Jagoda & Wojcik, 2019).

3. Research Method

This study utilized a survey design in order to establish the relationship between project risk avoidance and project execution among oil and gas companies operating in Rivers State, Nigeria. 102 management executives from 51 oil and gas companies were given questionnaires in which they had to rate several statements using a five-point Likert scale, with 5 being strongly agree and 1 being strongly disagree.

The questionnaire was a combination of two instruments; the first instrument was developed by Raftery (2004), and contained four items dealing with the extent to which oil and gas companies practiced risk avoidance strategies. The second instrument was developed by Sylvester and Rani (2011) and contained four items four components of project execution: budget, quality, schedule and scope. Each component of project execution was measured with four items. Of the 102 questionnaires distributed, 85 were returned, but only 82 were properly completed thus serving as the final sample for this study. Mean scores were used to assess the collective perception of the management executives for each variable, while the relationship between the project risk avoidance and project execution was determined using Spearman's Rank Correlation Coefficient. The mean scores of the management executives for project risk avoidance and each of the four components of project execution were interpreted as follows:

1. Mean scores of 4.51 to 5.00 meant that the executives 'strongly agreed' with that statement.
2. Mean scores of 4.01 to 4.50 meant that the executives 'agreed' with that statement.
3. Mean scores of 3.00-3.99 meant that the executives were 'neutral' or 'noncommittal' regarding that statement.
4. Mean scores of 2.00-2.99 meant that the executives 'disagreed' with that statement.
5. Mean scores of 1.00-1.99 meant that the executives 'strongly disagreed' with that statement.

As for Spearman's Rank Correlation Coefficient, SPSS was used to calculate it, with the results interpreted as follows:

1. A p value of less than 0.05 would mean that the relationship between the two variables was significant.
2. The sign (plus or minus) behind the Spearman Rho would indicate whether the relationship between the variables were positive or negative respectively.
3. The strength of the relationship between the variables would be determined based on the value of Spearman Rho (1 being a perfect correlation between the two variables; the closer the value to 1, the stronger the relationship).

4. Results and Discussion

4.1 Project Risk Avoidance

Table 1 presents the collective perceptions of the 82 management executives regarding the extent to which their companies practiced risk avoidance strategies.

Table 1: Mean Scores for Project Risk Avoidance

	N	Mean	Std. Deviation
Project Risk Avoidance	82	4.1341	1.02755
There is a projects risk management department	82	4.1098	1.01842
(x = 4.0854; S = 0.87066) Policies and procedures exist to help in avoiding project risks	82	4.0976	.96366
Risk management training and education is done regularly to create risk awareness	82	4.0000	.83148
Normally seeks and adopts new technologies for risk management	82		
Valid N (listwise)	82		

Source: Data analysis (2020)

Mean scores of four and above for each component of project risk avoidance indicates that the management executives surveyed collectively agreed that their companies regularly practiced strategies to try to ensure that project risks were avoided during execution of projects. Specifically, the executives agreed that their companies had a department saddled with the responsibility of designing and implementing risk avoidance strategies. Additionally, they agreed that their companies had established policies and procedures that would guide the project managers in implementing risk avoidance

strategies. Furthermore, employees were kept up-to-date regarding the risk avoidance strategies introduced and implemented by the companies through regular trainings. Finally, all executives agreed that their companies were proactive in identifying and adopting new technologies that will enable them to better avoid all project risks.

4.2 Project Execution

Table 2 presents the management executives' mean scores for all four components of project execution: budget, quality, scope and schedule.

Table 2: Mean Scores for Project Execution

		N	Mean	Std. Deviation
Budget (x = 4.0640; S = 0.83038)	There is always a project budget prior to commencement of projects execution	82	4.0976	.92443
	=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 (x = 4.1128; S = 0.89508)	Expected project quality is always clearly defined	82	4.0976	.84048
	=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 (x = 3.4055; S = 0.64514)	There is always a Scope Management Plan prior to the commencement of any project	82	3.0418	.61432
	=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 (x = 3.8967; S = 0.84727)	There is always a Schedule Management Plan prior to commencement of any project	82	3.8704	.79317
	=Project activities are properly identified, clearly defined and sequenced prior to project start	82	3.9004	.80317
	Work Schedule is always developed and clearly documented as a guide to project execution timelines	82	4.1526	1.10483
	There are properly defined procedures for schedule control to avoid time overrun during projects execution	82	3.6635	.68791
	Valid N (listwise)	82		

Source: Data Analysis (2020)

An overall mean score of 4.0640 indicates that the budget was an important part of the project execution process among the 51 oil and gas companies surveyed for this study. The management executives all agreed that a budget was always prepared before a project was started, and that the budget always tried to optimize cost benefits through proper allocation of resources. Additionally, the results indicate that the executives agreed

that during the project execution process, the budget was continually used to guide actual expenses. At the end of the project, total actual expenses were compared with budgeted expenses to determine how well the company was able to adhere to the initial budget.

Relative to the budget, a higher mean score of 4.1128 indicated that the management executives surveyed felt that the issue of quality was even a higher

priority for their companies. These executives agreed that a desired level of quality was predetermined before the project began, and that a plan was always developed to ensure that these quality requirements were adhered to during the execution phase. At the end of the project, the executives agreed that an quality performance appraisal was conducted to determine how well the company was able to deliver on the actual quality requirements established prior to execution.

Contrary to the optimism the executives had regarding budget and quality, an overall mean score of 3.4055 indicates that these executives were

unsure to what extent their companies were able to stay within the predetermined scope of an intended project. This neutrality was also present regarding the ability of their companies to finish projects on schedule with an overall mean score of 3.8967.

4.3 Relationship between Project Risk Avoidance and Project Execution

Table 3 presents the results of Spearman's Rank Correlation Coefficient analysis indicating the relationship between project risk avoidance and each of the four components of project execution.

Table 3: Relationship between Project Risk Avoidance and Project Execution

		Budget	Quality	Scope	Schedule
Spearman's Rho	Correlation Coefficient	0.670*	0.740*	0.970*	0.974*
	N	82			

* Correlation is significant at 0.05 level (2-tailed)

Source: Authors' data analysis (2020)

The major observation from Table 3 is the fact that project risk avoidance was positively and significantly related with all four components of project execution, with the strongest relationship being with schedule, followed by scope, then quality and then budget. Overall, there was a significant positive relationship between project risk avoidance and project execution.

4.4 Discussion of findings

The findings of this study indicate that management executives of oil and gas companies in Rivers State, Nigeria were convinced that their companies took project avoidance seriously and they expected this proactive behaviour to translate into excellent project execution as determine by staying within the budget and providing high quality projects. However, they were not convinced that their companies took enough

consideration of ensuring that projects were completed within the predetermined scope and time frame and herein lies areas where these companies need to improve upon. However, holistically, the results indicated the extent to which oil and gas companies in Rivers State integrate the latest risk avoidance strategies into their operations is positively related to how well they will be able to execute important projects which are essential for the development of the region specifically and the country as a whole. These findings are in line with prior carried out in oil and gas industries in order climes (Meidell & Kaarboe, 2017; Rolstadås & Schiefloe, 2017; Ketabchi & Ghaeli, 2019)

The key takeaways for these findings are as follows: First and foremost, the adoption of project risk avoidance strategies is crucial for any oil and gas company seeking to remain

competitive and sustainable in the modern business landscape where the pressure from government, media and the public is intense (Kraidī *et al.*, 2019). Employee health and safety must be a priority when developing these strategies as they represent the most important resource of the organization (Hallowell *et al.*, 2020). Beyond employee safety, public and environmental safety must also be a top priority (Leva *et al.*, 2017).

Another important area of focus for oil and gas companies is the adoption of innovative technologies to increase the efficiency and effectiveness of their operations particularly in the adoption of green and environmentally friendly solutions (Kireeva & Kireev, 2019). This is because for many years, the oil and gas industry has been identified as one of the biggest polluters and contributors the present global warming crisis (Korenak *et al.*, 2019). For policy makers, the results of this study indicate that oil and gas companies cannot be completely relied upon to be proactive regarding the adoption of risk avoidance strategies that will improve the quality of their operations. It is thus incumbent that legislation be put into place to ensure that a minimum standard of risk avoidance strategy is mandated for all oil and gas companies, with strict enforcement to ensure compliance (Musina *et al.*, 2020). Additionally, innovative companies who come with new innovations that mitigate risk to the public and the environment should be lauded and encouraged (Eder *et al.*, 2017).

5. Conclusion

This study sought to determine the relationship between project risk avoidance and project execution among oil and gas companies in Rivers State, Nigeria. The study found that the extent to which these companies practiced risk avoidance strategies was significantly and

positively related with successful project execution as perceived by management executives. This study was not without its limitations which provide opportunities for future research. The first limitation was the fact that only companies in one state were surveyed which limits the generalizability of the results. Future studies should include more oil-producing states in order to obtain more robust results. Another limitation was the reliance on only questionnaires; future studies should utilize interviews in order to obtain a different perspective on the relationship between risk avoidance and project execution.

The oil and gas industry has been a controversial one for the last few decades. On the one hand, it contributes a lot to global GDP and provides a very important energy source for the global economy. On the other hand, its activities have had significant negative impact on the environment and the general public. It is thus incumbent that oil and gas companies wholeheartedly embrace risk avoidance strategies to significantly minimize the negative impact of its activities whilst enhancing the positive impacts.

5.1 Managerial Implication

This study's findings have shown that management executives of oil and gas companies in Nigeria perceive that the extent in which their companies develop, integrate and implement project risk avoidance strategies is strongly related with their ability to execute important projects successfully without going above the pre-determined budget while still maintaining high quality standard and finishing on time. Based on these findings the managerial implications are as follows: Oil and gas companies in Nigeria and beyond must prioritize the continual development of project risk avoidance strategies in their operations.

These strategies will also involve investment in cutting-edge technologies that will ensure the safety and protection of employees tasked with executing projects. Additionally, these strategies should involve regularly enhancing the competencies of employees in terms of being able to utilize the latest technologies to deliver projects faster, better and more effectively.

Furthermore, these strategies must improve the company's ability to produce quality projects that will withstand the rigour of the environment for an extended

period of time to prevent errors and accidents such as oil spills that can be detrimental to the society and the environment. Above all, oil and gas companies must adopt a 'prevention is better than cure' organizational culture where all employees understand that the first priority of the company is safety and quality at all costs. This culture is reward employees with excellent safety and quality records as the standard required for all employees.

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