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Chapter 3

Approaches to analyzing project delays in Nigeria's oil and gas industry

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3.1 Introduction

The research problem of project delays in the Nigerian oil and gas industry as well as the causes of schedule overrun were discussed in the Introduction chapter; and the following research aims were highlighted as – determining the correlation that exists between projects and Nigerian oil and gas assets efficiency, Identify and reexamine the leading causes of project delays in the Nigerian Oil and Gas sector, examine the impact of these delays to the project efficiency, determine the techniques to arrest and mitigate the delays and their effects. This chapter discusses the methods applied to arrive at a logical conclusion on the subject matter, given that Kothari, (2004) views research methodology as a systematic approach towards resolving a problem by taking the logic behind the method choice into consideration while giving reasons for adopting a particular approach, in other words, it answers the question of why the method was adopted and how it was utilised. This research commenced with a review of the existing literature on construction project delay causes in the industry and they were broadly divided into stakeholder categories, namely – Clients, Contractors, Government and Host Communities. Thereafter, a sequential explanatory mixed approach was employed in addressing the research questions. Firstly, the questions of leading causes of project delays and its impact on oil and gas assets efficiency were addressed through quantitative methods where online survey questionnaires were sent to 60 participants and then the results of the survey were utilised in conducting interviews with 10 oil and gas industry experts, thereby addressing the research question of the mitigation and preventive measured toward project delays. The rest of this chapter discusses the research philosophy of choice, being positivist at the initial stage and then interpretivist at the latter stage of this research. The approaches used tends to align with the philosophy with quantitative and qualitative applied for positivist and interpretivist paradigm respectively. The chapter further discusses the sampling strategy which were partly random initially and non-probabilistic at the latter phase. In

the data collection section, both qualitatively and quantitatively assisted in providing -as close as possible- solutions to the research problems, aims and objectives.

3.2 Research Strategy

While a set of philosophy exist, the positivism, interpretivism and pragmatism are the ones of concern in this research as quantitative and qualitative data were used at certain stages of this research.

The positivist mindset is first used to determine the effectiveness and validity of a priority model – the Pareto Principles which agrees that 20% of the causes of system failures are responsible for 80% of the system's overall downtime (Ab Talib, et al., 2015). Consequently, it could be said that if 20% of identified project delay causes are addressed, then this could solve 80% of the delays encountered in projects. Since the positivist approach would require evidences in form of numerical percentages (Biedenbach & Müller, 2011), this translated into survey questionnaires where the 11 identified causes (13 from the standpoint of all key stakeholders) were narrowed to the ones of high severity. The positivism paradigm where events can be interpreted inform of numerical data such as in this study using questionnaires to determine the most significant to the subject matter although this approach has been largely criticised as a non-standalone approach, with its results requiring re-evaluation (Hughes & Sharrock, 1997). This positivism approach is aimed to address the first two research aims – determining the correlation that exists between projects and Nigerian oil and gas assets efficiency, Identify and reexamine the leading causes of project delays in the Nigerian Oil and Gas sector. The next stage of the research strategy involved the analysis that narrowed the identified causes. This section which is quite subjective applied the interpretivism approach (Trainor & Graue, 2012), where discussions were held through face-to-face and video conferencing interviews with selected industry experts. This allowed for qualitative evaluation of the causes of high significance (Trainor & Graue, 2012), due to the variability of mitigation and prevention strategies recommended. This phase of the research addresses the third and fourth research aims being - examine the impact of these delays to the project efficiency, determine the techniques to arrest and mitigate the delays and their effects. These text-based information were coded after the interviews and the key words were loaded on the bowtie framework but this was first through open-ended questions as investigations on the appropriate recovery plan were implemented. The figure below illustrates the research workflow from the exploratory literature review, down to the final output being the risk bowtie model.

Consequently, the blend of positivist and interpretivist approach gives a form of pragmatic problem-solving technique as the weakness of one approach is compensated by the strength of the other (Trainor & Graue, 2012).

3.3 Research Design

In the research design, prior to the quantitative data on causes of high significance, the literature review addressed the relationship that exists between delays and their causes in a correlational research manner through experimental research approach where causal relationships were established (Srinagesh, 2006), with delay being one variable and the

causes being the other. The quantitative research design used a largely descriptive pattern by examining the established causes and determining the score in terms of percentages in other to decide on the high significant and high consequence delay causes. These data were interpreted without any adjustment of the variables to get the exact condition of the subject matter from the understanding of the respondents (Saunders, et al., 2019), being that these data are readily analysed by the research instrument in use – Survey Monkey.

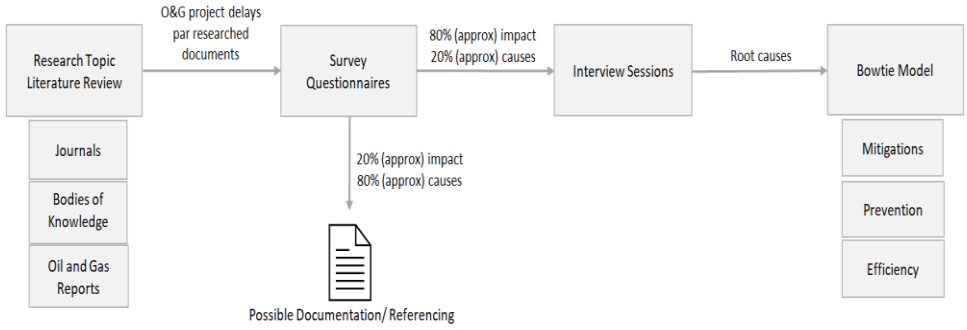

Figure 12: Research Workflow

The phenomenological design formed part of the qualitative interviews with industry experts in a bid to understand their perception (Gill, 2014). And while this approach allowed for open-ended questions on the subject matter, some guiding principles were applied to ensure that the research remained within the area of focus with the highly significant delay causes and the role that theories and techniques such as kraljic matrix, contracts agreements with economic price adjustments, PERT, Risk assessment in the mitigation and prevention plans regarding project delays; thus, tending towards a case-study research design. Due to the relatively small sample size in this phase of the research,

the grounded theory design was not deemed practicable given the time constraints and specific nature of the industry being researched (Hussein, et al., 2014). These data were then employed in the development of a risk bowtie tie response approach to major project delays such that it forms the basis for use in the industry in Nigeria.

3.4 Research Process

This section discusses the resampling approach that was adopted in this research, having identified some of the factors that lead to project delays in the Nigerian oil and gas industry in the Literature Review section from project management journals, engineering journals, conferences and proceedings, and discovered some which are applicable on the global scene, these factors were further investigated to find out their root causes and mitigation strategies.

In line with the initial quantitative approach of identifying the leading causes of delays, the probability sampling method was used here, particularly the stratified random sampling approach addressed the research aim from the standpoint of a sub-section of professionals with appreciable knowledge and experience of oil and gas projects as a client, government representative, host community or as a contractor (Latpate, et al., 2021). The stratified approach ensures that the samples are not completely random in order to avoid the lack of generalisability that the simple random approach is prone to (Latpate, et al., 2021).

In the same vein, the latter part of this research relied on the purposive sampling method, a sub-section of non-probability sampling. This approach being well aligned with qualitative strategy, paid particular attention to oil and gas industry experts who were purposefully selected in line with their level of experience (minimum 5years), and knowledge of the field. Although this approach may lack some level of generalisability (Kothari, 2004). it compensated for that by providing a deep dive into the response and recovery strategies towards project delays in the industry. Also, it may not be as prone to research bias when compared with convenience sampling method where participants are selected mainly based on ease of reach (Kothari, 2004).

The high significance delay causes, being uncertainties and therefore regarded as risks (PMI, 2021), were further investigated through interview sessions, where a root cause analysis with ten oil and gas industry professionals determined the results.

The result of the qualitative interview session consequently led to the formation of a risk bowtie that graphically represented the identified delays, the root causes and the response and recovery strategies. The bowtie is capable of providing information on the layers of

protection against the identified risks, before they cascade into an uncontrollable event. Embedding this framework into the monitoring and control phase of project management can be beneficial in keeping projects on track throughout its lifecycle. The causal factors were be leveraged to create survey questionnaires and interview questions with industry professionals and other stakeholders, to get qualitative real time data into the happenings in the Nigerian oil and gas sector. The questionnaires were utilised because of its ease of use, covers a wide range of the topic and could provide data that might not necessary be found in the literature (Pandey & Pandey, 2015).

3.4.1 Research Data Analysis

This research has two types of data which were employed at certain stages as the research progressed. The approaches namely – quantitative and qualitative are expanded on below as they applied to this dissertation.

3.4.1.1 Quantitative Data Analysis

The results of the survey questionnaires which was sent online to participants assisted in determining the high consequence delay causes through measurable data (Saunders, et al., 2019). The online survey tool had its in-built data analysis feature which guided the use of a pareto principle to determine the vital few that can critically impact project success (Ab Talib, et al., 2015), i.e., the ~20% percent of delay causal factors that negatively impacts ~80% of projects. The questionnaire was structured in the ordinal data scale with their corresponding points as follows:

- Not Significance - NS 1
- Slightly Significant - SS 2
- Averagely Significant - AS 3
- Very Significant - VS 4
- Highly Significant - HS 5

This also followed the pattern of continuous data quantitative analysis, where the mode and frequency of occurrence of the highly significant delay causes were determined.

3.4.1.2 Qualitative Data Analysis

The results were used to determine interview session where the main culprits capable of causing a schedule overrun, where further discussed to determine the response and mitigative strategy towards project delays, utilizing the bowtie risk model. This method which employed one-on-one interview sessions following the thematic analysis approach, the inductive style in particular. This language-based data did go through the sessions and determined patterns between project delay causes and their proposed mitigative plans without determining the qualitative coding beforehand (Kothari, 2004). This inductive approach provided the flexibility of code changes and reviews, tailored to the exact requirements of this research. The deductive principle was not deemed appropriate because the interview responses could reveal concerns beyond the scope of predetermined codes (Vogt, et al., 2014). In the qualitative interview sessions, the respondent's category with the highest impact (in terms of project delays) were singled out and 10 participants partook in the session where the root causes and bowtie model were developed for major delay concerns that could stall projects for twelve months or more. The recovery and response framework adopted is the risk bowtie model, where preventive safeguards and mitigative strategies are identified and infused in the model. This approach does provide layers of protection against unwanted outcomes as shown in the figure below. This concept visually represents the event, consequence, and controls by clearly showing the relationship between them (Acfield & Weaver, 2012).

The interview questions were structure such that the preventive measures were first approached and then the mitigative measures followed. The transcribed interview responses when the coded and applied on the safeguards represented by the blue discs in the figure below. This approach was employed, principally to prevent *fd2* from occurring, however if *fd2* occurs, mitigative mechanisms are implemented so that *fd2* does not cascade into *fd1* as shown in the figure below.

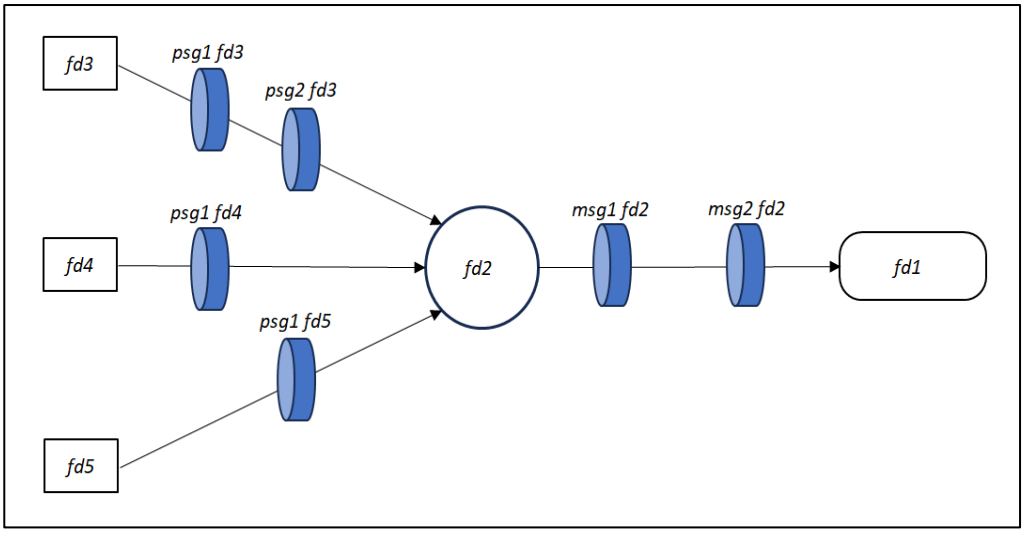

Figure 13 : Response/ Recovery Strategy - Adapted from Bowtie Model

Where:

- *d* = identified project delay
- *code 1: fd1* = established cause of *d*
- *code 2: fd2* = established cause of *fd1*
- *code 3: fd3* = established cause of *fd2*
- *code 4: fd4* = established cause of *fd2*
- *code 5: fd5* = established cause of *fd2*
- *code 6: psg1 fd3, preventive safeguard1 for fd3*
- *code 7: psg2 fd3, preventive safeguard2 for fd3*
- *code 8: psg1 fd4, preventive safeguard1 for fd4*
- *code 9: psg1 fd5, preventive safeguard1 for fd5*
- *code 10: msg1 fd2, mitigative safeguard1 for fd2*
- *code 11: msg2 fd2, mitigative safeguard1 for fd2*

3.5 Research Validity and Trustworthiness

The validity of this research was factored during the survey questionnaires with the idea of making the questions as straight forward and clear as possible, such that the respondents have a definite idea of what is being asked. This approach did ensure that the results of this research from the quantitative side can be repeated with the same result at a later time (Cohen, et al., 2002).

On the qualitative side, the trustworthiness of the interview sessions was applied through triangulation, where questions were asked from different project stakeholder class (e.g., clients, contractors) to determine their view of project delay causes from different perspectives while checking for concurrence and disparities (Saunders, et al., 2019).

3.6 Ethical Considerations

A number of ethical considerations were applied in obtaining the research data, including maintaining anonymity of the interview participants and obtaining the required consents prior to conducting the exercise (Cohen, et al., 2002).

The participants were not coerced as they voluntarily engaged in the process. They were also assured of the confidentiality of the exercise with the assurance that they can choose not to respond to a question and even ask for the entire interview to be halted, even midway into proceedings.

3.7 Limitations

This research has some limitations from the biases of both the researcher and the respondents. From the researchers, there is an early assumption that delays are not beneficial to projects, however, it is quite possible that delay becomes an advantage, for example companies could get more value by delaying projects till a more favourable market climate exists like high global crude oil prices.

The approach that delays are negative in terms of project delivery formed most of the basis of the research questions leading to a bias from the participants.

Another issue is the interview sample size of 10 with not much coverage per key stakeholder category. This impacts the generalisability of the latter stage of this process (Eichhorn, 2022). However, this is compensated for by applying thematic approach, allowing for a deep dive into the subject matter.

3.8 Conclusion

This methodology chapter covered the research design, literature behind project delays and their causes, going further into quantitative research questions. The sample size and stakeholder categories were also highlighted as one of the following – client

company employees, project contractors, government officials and host community. A description of the workflow was carried out from the literature to the questionnaires and then the interview sessions leading to the output of this research, being a robust bowtie model.