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Analyzing the Project Delay Causes in the South African Construction Industry

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Abstract:- Construction projects have experienced major delays in the past decades. Project setback is a big burden in setting up projects. Professionals have established that delay in a project can only be controlled if its symptom is detected and acknowledged. A project has been described as a one-time undertaking that is established for a purpose. A questionnaire was designed and used to obtain the stakeholders' perceptions regarding the causes of project setbacks. The objectives of this study are to establish and assess the project delay sources in the construction industry in South Africa, detect the mitigation measures in the construction industry in South Africa, and ascertain different views among stakeholders concerning project setbacks. This study tends to address the following two questions: 'What are the major causes of project delays in the South African construction industry? And what are the mitigation measures against project delays in the South African construction industry? 54 causes of project delays were established through the literature review. Mitigation strategies against project delays were identified. Mitigation strategies will help construction professionals to improve the successful delivery of projects. The study has proved that every project setback has a remedy. The three major stakeholders collectively contribute to the factors causing project delays. The study revealed that delays in one country may be different from another country. This study discovered that all the stakeholders are experienced and knowledgeable in terms of recognition of the factors creating project delays. The study gives a clear indication of the major contributors to project delays for the benefit of the clients and contractors. This will serve as a guideline for the client and the contractor toward completing the projects within time, quality, and budget. It will also eliminate the issue of unnecessary disputes among the parties to the project. However, this extensive literature review will save future researchers enough time when conducting studies on similar topics. The outcome of this study will assist both professionals and academicians to understand the fundamental sources of project setbacks and their relief strategies. This study will help the risk planners of construction projects when dealing with the issue of project analysis, monitoring, and controlling, as these are the critical factors for the successful delivery of projects. The study will also benefit future college and university graduates whose intentions are to proceed to the working field after graduation. The client policymakers who can revise or create policies based on the findings of this study will also benefit.

Keywords:- *Construction, South Africa, Delay, Mitigation, Ethics.*

I. INTRODUCTION

Project setback has become a nightmare in the establishment of a project. Projects have been regarded as one-off development. According to Aziz (2013), a project is a once-off unique undertaking that is constructed on a certain site under unrepeatable conditions. The study further discloses that the construction project is a composite venture that is executed through human efforts and the availability of equipment and materials. The study regards construction projects as a one-time venture in a specific area that remains unchangeable. A project can be successful only completed within budget, time, quality, and owner's satisfaction. The study uses the relative importance index to rank the various groups. The study advises that efficient communication should be established to minimize the issue of delay in project execution. Agyekum-Mensah and Knight (2017) reveal that criticisms of project setbacks have negatively affected many construction projects in every country. According to the report, several studies on project delays detected in the literature relied on ratings done by the participants. Hamzah et al (2011) maintain that the inability to finish projects within schedule has negative impacts on those projects. The study maintains that once a project is behind schedule, there is a possibility of incurring extra costs to the project. Banobi and Jung (2019) reveal that any delay caused by the contractor may hinder the contractor's future opportunity in securing business opportunities. Panova and Hilletofth (2018) reveal that since construction projects are unavoidable, it is problematic to forecast the results of their execution in the future. Its success depends on how accurately the amount of equipment and materials and related flows are predicted. Akaranga and Makau (2016) insist that researchers must maintain a good attitude in investigating and circulating discoveries in all academic writings. However, this study shows full consideration of ethical principles in research work. To deal with the aforementioned issues, the study tends to eliminate this awareness deficiency by treating the following fundamental questions:

- Identify the major sources of project delays affecting the construction industry in South Africa?
- Identify mitigation measures against these delays?

The construction industry contributes immensely to improving the South African economy but this has been affected by project delays that manifest due to one reason or the other. This enormous economic contribution can only be maintained through continuous addressing of this issue on

an everyday basis (Jongo1 et al. 2019). Many problems experienced by projects are greatly affecting the successful completion of those projects. This issue has created a big setback for those projects in terms of project duration and budget overruns (Serdar1, Maksat2, and Syuhaida3 (2017). Many studies have pointed out major sources of project setbacks within various countries, but projects are still being delayed now and then. However, the delay in any project leads to an increase in overhead expenses, and generally affects the cash flow, and creates the risk of insolvency (Chen et al. 2019). Previous studies indicate that what causes project delays in one country may be different in another country (Jongo1 et al. 2019). Therefore, this study specifically addresses the project delays in the South African context. The study gives a clear indication of the major contributors to project delays for the benefit of the clients and contractors. The outcome of this study will serve as an eye-opener to the parties involved in the project. This will serve as a guideline for the client and the contractor toward completing the projects within time, quality, and budget. It will also eliminate the issue of unnecessary disputes among the parties to the project. This study establishes numerous project delay factors. However, this extensive literature review will save future researchers enough time when conducting studies on similar topics. The outcome of this study will assist both professionals and academicians to understand the fundamental sources of project setbacks and their relief strategies in the South African construction industry (Zidane and Andersen 2017). This study will help the risk planners of construction projects when dealing with the issue of project analysis, monitoring, and controlling, as these are the critical factors for the successful delivery of projects (Sweis et al. 2019). The study will also benefit future college and university graduates whose intentions are to proceed to the working field after graduation. The client policymakers who can revise or create policies based on the findings of this study will also benefit. Finally, this research will be of benefit to all project managers, engineers, contractors, and other technical personnel whose practical experiences will be enhanced by these discoveries.

A. Objectives

- This study focuses on:
- Establish and assess the project delay sources.
- Detect mitigation measures against these project setbacks.
- Ascertain different views among stakeholders concerning project setbacks.

II. LITERATURE REVIEW

Delays in project delivery have been generating major problems in the construction industry. These delays have caused major budget and time overruns within the construction industry. It is discovered that a construction project is a compound undertaking that needs the collaboration of people and resources. According to Zidane and Andersen (2017), the successful delivery of a project is evidence of efficiency. As a result, many researchers have shown much attention to finding the fundamental sources of project delays. However, this study will concentrate on identifying and analyzing the fundamental sources of project setbacks and their relief strategies in the construction industry in South Africa. Abdullah1 et al. (2018) reported that the major factors delaying palm oil refinery projects in Malaysia are poor time management and wrong costing. The study reveals that the three major contributors to project delays are engaging unskilled sub-contractors, poor planning/scheduling, and delays in subcontracted works. Agyekum-Mensah and Knight (2017) conduct research on project delay factors and identify 32 factors causing project delays and grouped them into 9 sections: insufficient planning, design problems, poor information flow and communication, poor coordination, lack of knowledge, health and safety restrictions, wrong application of construction methods, poor space and logistics management, and scope creep. Akaranga and Makau (2016) in their survey report emphasize that human beings experience certain challenges when making ethical decisions in life. The researchers caution that it is mandatory that every research work must adhere to the 15% or less plagiarized material rule before it can be approved and included in the research repository. Amoatey and Ankrah (2017) conduct research on delay factors in Ghanaian road projects and observe that 70% of road projects in Ghana experience delays, while 52% of the projects are subject to cost overruns. Banobi and Jung* (2019) focus on studying the delay factors and their relief measures in the power projects. According to the study, many construction projects experience critical delays that generate a lot of losses. Chen et al. (2019) conduct an investigation on delay factors in the Chinese grain bin projects. After careful reviewing of existing literature, it is found that little effort has been shown in identifying the causes of grain bin project delays in China. Abdullah1 et al. (2018) report that project delays could be minimized if quality practices are maintained throughout the project lifecycle until the project objective is achieved. According to Alzara et al. (2016), the use of experienced and knowledgeable contractors and consulting engineers can minimize project delays. Amoatey and Ankrah (2017) conduct research on the factors creating project setbacks in Ghana. The study reports that project delays can be mitigated if there is effective planning and costing in the early stage of the project. Banobi and Jung (2019) focus on studying project delay factors and their relief strategies. Research suggests that three major factors that will help to minimize project delays are a strong commitment from the top management, creating realistic project objectives, and good project scheduling. Durdyev and Hosseini (2018) focus on the comprehensive list of project delay factors and discover that contractual relationships, project delivery systems, and culture must not be overlooked in order to reduce project setbacks. Famiyeh et al. (2017) indicate that delays can be minimized if competent personnel is used in the project. Summarily, a literature review has indicated that project delay is a universal occurrence that does happen in every country and that the magnitude of this occurrence differs in many places. These project delay factors can be attributed to the clients, consultants, and contractors as a whole. Literature also confirms that the financial constraint and late payment for work done pose a bigger risk to the overall project lifecycle and that this issue is unique in developing countries. The

construction industry has experienced a series of project delay challenges. The study maintains that the causes of project setbacks and their relief strategies differ depending on project progress.

III. RESEARCH METHOD

This study used a quantitative research method to gather primary data. Literature reviews and questionnaires are used to explore the factors creating project delays. Any data collected through personal delivery was kept in a sealed envelope. All envelopes were kept together in a safe box until the end of the data collection period before they can be opened. No names or contact details were allowed on the envelopes. However, this study did not permit cost implications for the participants. Free envelopes were provided for the hard copy questionnaires. The literature review enabled the gathering of existing data on the topic, while the information gathered through surveys was used to verify the contents of the existing literature on the issue of project delays. The quantitative data were collected based on possible ideas from the construction projects. To maintain quality, this study mostly considered only the research in peer-reviewed books, journals, and articles (Panova and Hilletofth 2018). Due to the unforeseen circumstance of the Covid-19 Pandemic, research data were collected using only a quantitative research method. In data collection, several sources of evidence were used to collect the primary data. This study considered only 65 peer-reviewed papers. The research used a literature review and questionnaires to compare current and past factors that might result in project setbacks all around the project lifecycle. The primary data was collected using a literature review of published journals, books, and articles. Google search engine was also used for fast and direct collection of data (Jongo1 et al. 2019). Primary data was also collected through questionnaires. The questionnaire was designed and distributed personally and through emails to the construction companies. Data was gathered from the engineering consultants, clients, and contractors using questionnaires. The data collection focused mainly on the professionals working on the building projects, road and stormwater projects, and water and sewer projects. Respondents answered the questions on their own time. This approach looked more relaxed than in face-to-face interviews. The participants would have enough time to think and take decisions. Questionnaires were designed to consist of open-ended and closed questions. Participants were opportune to express personal views regarding the study. Closed and open-ended questions were used to gather the clear opinions of the respondents. Data was gathered for five weeks starting from 21st September to 25th October 2020. The 5-point Likert scale factor below was used to rate data collected from the participants.

Scale factor	Weightage
Strongly agree	5
agree	4
Neutral	3
disagree	2
Strongly disagree	1

Table 1: Likert scale factor

IV. DATA COLLECTED FROM STAKEHOLDERS

	● FROM CLIENTS' PERSPECTIVE					
S/No	Causes of project delays	1	2	3	4	5
1	A wrong costing of the bill of quantities	0	0	0	13	2
2	Bad economic situations	0	0	1	11	3
3	Poor communication system	0	1	0	1	13
4	Financial problems	0	0	0	5	10
5	Unclear project objectives/scope	0	1	0	2	12
6	Late payment to contractors	0	1	0	2	12
7	Neglecting some parties to the project	0	1	1	3	10
8	Using unqualified subcontractors	0	1	1	4	9
9	Shortage of manpower	0	1	1	1	12
10	Unforeseen circumstances	2	8	1	4	0
11	Poor salaries for workers	0	12	1	2	0
12	Vandalism of materials and equipment	0	4	0	11	0
13	Work overloading on the contractors	1	3	0	7	4
14	Engaging inexperience engineers	0	3	1	2	9
15	Change of government	4	2	0	6	3
16	Complete abandonment of the project	0	0	0	11	4
17	Reworking of the completed job	0	0	3	8	4
18	Suspension of work	0	0	0	15	0
19	Unexpected variation orders	2	7	4	1	1
20	Underestimation of quantities of work	1	4	3	0	7
21	Use of lowest bidder system	4	8	0	3	0

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22	Market inflation	13	1	1	0	0
23	Uncontrolled accident and injuries	10	5	0	0	0
24	Engaging unskilled sub-contractors	0	0	0	9	6
25	Lateness in land acquisition	4	2	2	5	2
26	Community unrest	0	2	0	10	3
27	Conflicts among the team members	1	10	1	3	0
28	Lateness in delivery of materials and equipment	2	0	0	11	2
29	Poor planning/scheduling	0	0	2	8	5
30	Unrealistic project period imposed by the client	3	9	0	3	0
31	Poor monitoring and control	0	0	0	10	5
32	Legal disputes between parties	0	4	0	9	2
33	Use of weak competitors	2	12	0	1	0
34	Health and safety restrictions	11	4	0	0	0
35	Delays in subcontracted works	0	2	0	12	1
36	Lateness in approving design Documents by the client	2	3	0	10	0
37	Lack of government full commitment to the projects	3	3	0	7	2
38	Lateness in issuing permits to start work	0	0	0	9	6
39	Delay in performing inspections and approval by the consultant	0	0	0	10	5
40	Design errors/changes	0	0	0	6	9
41	Consistent construction errors and defective works	0	0	0	11	4
42	Late relocation of existing services	2	5	0	6	2
43	Lack of safety measures on-site	3	12	0	0	0
44	Government complicated policy	4	11	0	0	0
45	Using sub-standard equipment and materials	0	2	0	11	2
46	Contractors delays in paying salaries to their workers	0	3	1	9	2
47	Poor coordination of the work by parties on the project	1	5	0	6	3
48	Inaccurate construction details	0	0	0	11	4
49	Poor project management	0	0	0	11	4
50	Frequent equipment breakdown	0	12	0	3	0
51	Lack of direction on the project	0	6	6	2	1
52	Negligence of industrial relations	1	5	0	7	2
53	Lack of sufficient materials and equipment on-site	0	2	0	10	3
54	Slow in decision making	4	9	1	1	0
	● FROM CONSULTANTS' PERSPECTIVE					
1	A wrong costing of the bill of quantities	0	0	0	12	6
2	Bad economic situations	0	2	1	12	3
3	Poor communication system	0	9	0		
4	Financial problems	0	0	0	15	3
5	Unclear project objectives/scope	0	0	0	12	4
6	Late payment to contractors	0	0	0	15	3
7	Neglecting some parties to the project	0	6	0	8	4
8	Using unqualified subcontractors	0	0	0	18	0
9	Shortage of manpower	0	0	0	18	0
10	Unforeseen circumstances	0	9	0	7	2
11	Poor salaries for workers	3	2	0	7	6
12	Vandalism of materials and equipment	2	7	0	5	4
13	Work overloading on the contractors	0	2	0	13	3
14	Engaging inexperience engineers	3	3	1	11	0
15	Change of government	3	12	1	2	0
16	Complete abandonment of the project	0	0	1	17	0
17	Reworking of the completed job	0	0	0	13	5
18	Suspension of work	0	0	0	18	0
19	Unexpected variation orders	5	10	0	3	0
20	Underestimation of quantities of work	3	5	0	9	1
21	Use of lowest bidder system	0	12	3	0	3
22	Market inflation	5	7	0	4	2
23	Uncontrolled accident and injuries	4	12	2	0	0

ISSN No:-2456-2165

24	Engaging unskilled sub-contractors	0	3	0	8	7
25	Lateness in land acquisition	0	3	7	8	0
26	Community unrest	0	0	0	10	8
27	Conflicts among the team members	2	12	0	4	0
28	Lateness in delivery of materials and equipment	0	0	0	12	6
29	Poor planning/scheduling	3	3	1	11	0
30	Unrealistic project period imposed by the client	0	13	0	5	0
31	Poor monitoring and control	1	2	0	10	5
32	Legal disputes between parties	0	0	0	15	3
33	Use of weak competitors	4	8	2	4	0
34	Health and safety restrictions	1	14	0	1	2
35	Delays in subcontracted works	0	0	0	15	3
36	Lateness in approving design Documents by the client	1	7	0	10	0
37	Lack of government full commitment to the projects	0	3	0	10	5
38	Lateness in issuing permits to start work	2	11	0	5	0
39	Delay in performing inspections and approval by the consultant	1	2	0	12	3
40	Design errors/changes	1	3	0	11	3
41	Consistent construction errors and defective works	0	0	0	11	7
42	Late relocation of existing services	3	10	2	3	0
43	Lack of safety measures on-site	3	14	1	0	0
44	Government complicated policy	2	13	0	3	0
45	Using sub-standard equipment and materials	3	1	0	12	2
46	Contractor’s delays in paying salaries to their workers	0	0	0	17	1
47	Poor coordination of the work by parties on the project	0	1	3	12	2
48	Inaccurate construction details	0	0	0	12	6
49	Poor project management	1	5	0	10	2
50	Frequent equipment breakdown	1	1	0	10	6
51	Lack of direction on the project	0	4	6	8	0
52	Negligence of industrial relations	2	5	0	8	3
53	Lack of sufficient materials and equipment on-site	0	0	0	16	2
54	Slow in decision making	1	2	0	12	3
	● FROM CONTRACTORS’ PERSPECTIVE					
1	A wrong costing of the bill of quantities	0	0	0	17	5
2	Bad economic situations	0	3	4	10	5
3	Poor communication system	2	5	5	9	1
4	Financial problems	0	0	0	8	14
5	Unclear project objectives/scope	0	0	3	12	7
6	Late payment to contractors	0	0	0	2	20
7	Neglecting some parties to the project	0	6	7	5	4
8	Using unqualified subcontractors	2	8	4	6	2
9	Shortage of manpower	0	1	0	15	6
10	Unforeseen circumstances	4	9	2	5	2
11	Poor salaries for workers	4	13	3	2	0
12	Vandalism of materials and equipment	0	3	0	16	3
13	Work overloading on the contractors	4	13	2	3	0
14	Engaging inexperience engineers	0	3	4	12	3
15	Change of government	5	14	2	1	0
16	Complete abandonment of the project	0	0	0	12	10
17	Reworking of the completed job	0	0	3	10	9
18	Suspension of work	0	0	0	20	2
19	Unexpected variation orders	0	3	1	10	8
20	Underestimation of quantities of work	0	0	4	13	5
21	Use of lowest bidder system	5	11	0	4	2
22	Market inflation	4	1	0	10	7
23	Uncontrolled accident and injuries	2	17	0	3	0
24	Engaging unskilled sub-contractors	0	3	10	5	4
25	Lateness in land acquisition	0	5	8	9	0
26	Community unrest	0	0	0	17	5
27	Conflicts among the team members	2	3	6	7	4

ISSN No:-2456-2165

28	Lateness in delivery of materials and equipment	0	0	0	14	8
29	Poor planning/scheduling	0	0	1	11	10
30	Unrealistic project period imposed by the client	0	4	0	16	2
31	Poor monitoring and control	0	0	3	16	3
32	Legal disputes between parties	0	0	3	19	0
33	Use of weak competitors	3	2	12	5	0
34	Health and safety restrictions	0	14	6	2	0
35	Delays in subcontracted works	0	0	3	12	7
36	Lateness in approving design documents by the client	0	0	2	20	0
37	Lack of government full commitment to the projects	1	1	9	11	0
38	Lateness in issuing permits to start work	0	0	3	15	4
39	Delay in performing inspections and approval by the consultant	0	0	0	18	4
40	Design errors/changes	0	2	0	15	5
41	Consistent construction errors and defective works	0	1	2	15	4
42	Late relocation of existing services	0	6	14	2	0
43	Lack of safety measures on-site	4	12	4	2	0
44	Government complicated policy	4	6	12	0	0
45	Using sub-standard equipment and materials	2	8	1	11	0
46	Contractor's delays in paying salaries to their workers	0	3	9	10	0
47	Poor coordination of the work by parties on the project	0	8	6	4	4
48	Inaccurate construction details	0	0	0	10	12
49	Poor project management	0	2	1	12	7
50	Frequent equipment breakdown	3	3	4	12	0
51	Lack of direction on the project	0	0	12	10	0
52	Negligence of industrial relations	0	0	5	13	4
53	Lack of sufficient materials and equipment on-site	0	0	0	17	5
54	Slow in decision making	1	2	2	14	3

Table 1

V. RESULTS AND DISCUSSION

The research result section is where the report of the findings of the study is recorded. It is regarded as the completeness of outcomes, instead of the conclusions or recommendations drawn from them. Publishing results of research is very important to provide instructions for future studies. The result section indicates the results of the quantitative research methodology conducted. It also contains a discussion of how the analysis confines the research questions. As this study has primarily embraced an interpretative technique, the only statistical analysis in this study is to give descriptive or illustrative statistics that assist to discover preferences amongst the research population. However, this created a suitable platform from which to begin the quantitative questions which assist to simplify the responses from the stakeholders. The present study is an endeavor to have knowledge about the level of understanding of the clients, contractors, and consultants regarding the project setbacks. 96 participants were selected. The scheduled questionnaire contained information such as job title and type of stakeholder, awareness level using a Likert point scale of 1 to 5 as well as open-ended questions. Out of these 96 questionnaires distributed, 55 filled responses were returned to the researcher. 15 responses were collected from the clients. 18 responses were collected from the consultants. 22 responses were collected from the contractors. All the respondents were linked to the construction industry. The results acquired from the study were put through statistical analysis. It was observed from the quantitative data analysis that the main issue facing projects is a delay. 54 causes of project delays were identified in the study and ranked in line with their relative importance as indicated in table 4 on page 7. Ranking number 1 signifies the most critical cause of delays. Ranking decreases according to relative importance. The least rank signifies the least critical cause of project delays. In addition to 54 identified project delay factors, during the investigation, consulting engineers reported that misunderstanding the scope of work, client issuing instructions directly to the contractors, and the use of quantity surveyors to decide on design standards should also be considered. Contractors also maintained that project managers' poor relationship with the subcontractors and inspectors should also be considered as a critical cause of project delays. The relief strategies were detected from the existing literature. Cronbach initiation was used to establish the authenticity of research questionnaires. The result reveals that the response from the client has the alpha value of 0.75, the consultant has the alpha value of 0.80, and the contractor has the alpha value of 0.70 as indicated in table 6 on page 11. Since the minimum acceptable alpha is 0.70, this means that the 55 returned research questionnaires fall within the minimum acceptable value. However, this shows that the research instrument is reliable. From data collection and analysis, it is quite clear to say that conflict is like a cough, if you do not treat the root cause, it will appear again. In other words, delay in a project is a disease. If the root cause of this delay is not identified and tackled, it will keep on appearing every now and then.

A. Numerical results

ID	Type of participant	No. of respondents	Percentage %
1	Client	15	27
2	Consultant	18	33
3	Contractor	22	40
	Total	**55**	**100**

Table 3: Profile of participants and related details

Table 3 above shows the details of the returned questionnaires. The roots of project setbacks were analyzed and ranked according to their significance level. The RII for three stakeholders, namely, client, consultant, and contractor were computed and tabulated in table 4 below. This was used to ascertain the major project delay factors differently. The RII was quantified using the formula below:

$$\textbf{RII} = \frac{\sum W}{A \times N} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where;
RII = Relative importance index
W = Value assigned to individual delay factor
A – Maximum value, that is 5
N - Overall number of participants.
n – Number of responses under a particular rating (e.g., n5 is the number of partakers rating strongly agree).

For example, from clients' perspective in table 4 below,

For delay factor ID: 1, $\textbf{RII} = \frac{5x2 + 4x13 + 3x0 + 2x0 + 1x0}{5x15} = \frac{10+52+0+0+0}{75} = \textbf{0.83}$

The same procedure was used to calculate RII for the rest of the ratings. Using weighted means, the results were summed up and weighted by 3 (number of stakeholders) as tabulated in Table 4 below to simplify the analysis. This is used to compare the degree of awareness between the stakeholders regarding the major project sources. According to Tareq and Yasser (2018) and Hatkar and Hedaoo (2016), to determine the degree of effect by each delay factor, five Likert scales are classified by the uniform intervals:

00.0 ≤ strongly disagree effect (**SDE**) ≤ 20.0
20.0 ≤ disagree effect (**DE**) ≤ 40.0
40.0 ≤ neutral effect (**NE**) ≤ 60.0
60.0 ≤ agree effect (**AE**) ≤ 80.0
80.0 ≤ strongly agree effect (**SAE**) ≤ 100

ID	Delay factor	Client	Consultant	Contractor	Overall		Degree of effect
		RII	**RII**	**RII**	**Mean RII**	**Rank**	
1	A wrong costing of the bill of quantities	0.83	0.87	0.85	0.85	**6**	**SAE**
2	Bad economic situations	0.83	0.78	0.75	0.78	**12**	**AE**
3	Poor communication system	0.79	0.64	0.62	0.68	**21**	**AE**
4	Financial problems	0.93	0.93	0.93	0.93	**2**	**SAE**
5	Unclear project objectives/scope	0.67	0.76	0.84	0.75	**15**	**AE**
6	Late payment to contractors	0.93	0.83	0.91	0.89	**3**	**SAE**
7	Neglecting some parties to the project	0.81	0.71	0.70	0.74	**16**	**AE**
8	Using unqualified subcontractors	0.88	0.80	0.69	0.79	**12**	**AE**
9	Shortage of manpower	0.92	0.80	0.84	0.85	**6**	**SAE**
10	Unforeseen circumstances	0.49	0.62	0.53	0.54	**28**	**NE**
11	Poor salaries for workers	0.47	0.72	0.43	0.54	**28**	**NE**
12	Vandalism of materials and equipment	0.69	0.62	0.77	0.69	**20**	**AE**
13	Work overloading on the contractors	0.73	0.79	0.44	0.65	**24**	**AE**
14	Engaging inexperience engineers	0.83	0.62	0.74	0.73	**17**	**AE**
15	Change of government	0.63	0.42	0.39	0.48	**30**	**NE**
16	Complete abandonment of the project	0.93	0.99	0.99	0.97	**1**	**SAE**
17	Reworking of the completed job	0.87	0.86	0.92	0.88	**4**	**SAE**
18	Suspension of work	0.93	0.99	0.99	0.97	**1**	**SAE**

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19	Unexpected variation orders	0.49	0.41	0.81	0.57	**26**	**NE**
20	Underestimation of quantities of work	0.71	0.60	0.81	0.70	**19**	**AE**
21	Use of lowest bidder system	0.43	0.53	0.48	0.48	**30**	**NE**
22	Market inflation	0.24	0.50	0.74	0.49	**29**	**NE**
23	Uncontrolled accident and injuries	0.27	0.38	0.44	0.36	**34**	**DE**
24	Engaging unskilled sub-contractors	0.88	0.81	0.69	0.79	**12**	**AE**
25	Lateness in land acquisition	0.59	0.66	0.64	0.63	**25**	**AE**
26	Community unrest	0.79	0.89	0.85	0.84	**7**	**SAE**
27	Conflicts among the team members	0.48	0.47	0.67	0.54	**28**	**NE**
28	Lateness in delivery of materials and equipment	0.75	0.87	0.87	0.83	**8**	**SAE**
29	Poor planning/scheduling	0.77	0.62	0.88	0.75	**15**	**AE**
30	Unrealistic project period imposed by the client	0.44	0.51	0.75	0.56	**27**	**NE**
31	Poor monitoring and control	0.87	0.74	0.80	0.80	**11**	**SAE**
32	Legal disputes between parties	0.72	0.83	0.77	0.77	**14**	**AE**
33	Use of weak competitors	0.40	0.47	0.57	0.48	**30**	**NE**
34	Health and safety restrictions	0.25	0.48	0.49	0.40	**32**	**NE**
35	Delays in subcontracted works	0.76	0.83	0.84	0.81	**10**	**SAE**
36	Lateness in approving design documents by the client	0.64	0.61	0.78	0.67	**22**	**AE**
37	Lack of government full commitment to the projects	0.63	0.79	0.75	0.72	**18**	**AE**
38	Lateness in issuing permits to start work	0.88	0.49	0.81	0.72	**18**	**AE**
39	Delay in performing inspections and approval by the consultant	0.87	0.73	0.84	0.81	**10**	**SAE**
40	Design errors/changes	0.92	0.73	0.81	0.82	**9**	**SAE**
41	Consistent construction errors and defective works	0.85	0.88	0.80	0.84	**7**	**SAE**
42	Late relocation of existing services	0.61	0.46	0.56	0.54	**28**	**NE**
43	Lack of safety measures on-site	0.36	0.38	0.44	0.39	**33**	**DE**
44	Government complicated policy	0.35	0.44	0.47	0.42	**31**	**NE**
45	Using sub-standard equipment and materials	0.77	0.70	0.75	0.74	**16**	**AE**
46	Contractor's delays in paying salaries to their workers	0.73	0.81	0.66	0.73	**17**	**AE**
47	Poor coordination of the work by parties on the project	0.67	0.77	0.64	0.69	**20**	**AE**
48	Inaccurate construction details	0.85	0.87	0.91	0.87	**5**	**SAE**
49	Poor project management	0.85	0.68	0.82	0.78	**13**	**AE**
50	Frequent equipment breakdown	0.48	0.81	0.70	0.66	**23**	**AE**
51	Lack of direction on the project	0.57	0.64	0.69	0.63	**25**	**AE**
52	Negligence of industrial relations	0.65	0.66	0.79	0.70	**19**	**AE**
53	Lack of sufficient materials and equipment on-site	0.79	0.82	0.85	0.82	**9**	**SAE**
54	Slow in decision making	0.39	0.76	0.75	0.63	**25**	**AE**

Table 4: Ranking stakeholders' responses based on the weighted RII

The above outcome shows that stakeholders have different views regarding delay factors. This case refers me to a usual proverb that says "a man's meat may be another man's toxin'. This means that problem to a stakeholder may be different from other stakeholders. The top 16 factors ranking strongly agree effects (SAE) are the most influential factors affecting project performance (Tareq and Yasser 2018). These factors may create a crucial budget and time overruns if they eventually happen to occur. When the RII of all the stakeholders is summed up, the three give an equal value of 36.86 each. This is evidence that the research instrument is stable and reliable.

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S/No	Delay factor	Mitigation measures
1	Suspension of work	All parties on the project must stick to the contractual agreement especially in terms of time, money, and quality
2	Complete abandonment of the project	The client must ensure consistent payment of work done. Late payment or non-payment of work done may give rise to total abandonment of the project due to lack of finance.
3	Financial problems	The client and contractor should ensure that adequate funding is available before embarking on a project
4	Late payment to contractors	The client should prioritize early payment of work done to contractors. The client must maintain consistent payment work done to contractors to minimize the financial crisis
5	Reworking of the completed job	A competent and experienced project manager must be engaged to oversee the project implementation to reworking exercise.
6	Inaccurate construction details	A competent and experienced engineer must be engaged to oversee the project implementation. The engineer must ensure construction drawings are clear and precise
7	A wrong costing of the bill of quantities	Stakeholders should engage an experienced quantity surveyor to handle the costing of the bill of quantities to avoid underestimation of the bill of quantities, which will affect the project performance at the later stage.
8	Shortage of manpower	The contractor must ensure enough manpower on site. The early arrangement should be done prior to commencement of job activities
9	Community unrest	The community must be notified of the project in the initial stage. Local communities need to be engaged in areas they are suitable for.
10	Consistent construction errors and defective works	Effective quality control must be in place. It is the sole responsibility of everyone to avoid defects. Hence, it is a collaborative effort to ensure there are no defects on the job.
11	Lateness in delivery of materials and equipment	The contractor should place an order for materials and equipment on time to ensure early delivery to the site.
12	Design errors/changes	The competent design engineer must be engaged to handle the design work. The engineer must proofread the drawings after designing them before sending them for approval.
13	Lack of sufficient materials and equipment on-site	An early arrangement for the procurement of enough materials and equipment must be in place to avoid sudden shortage.
14	Delays in subcontracted works	Engaging unqualified subcontractors should be discouraged. Select contractors based on knowledge and experience.
15	Delay in performing inspections and approval by the consultant	Consulting engineer should create a favourable time table for early project inspection. Inspection should be done as soon as the job activity is ready for that. The competent engineer must be engaged to carry out inspection activities
16	Poor monitoring and control	Close project monitoring and controlling are encouraged. As a project manager, you need to maintain traces of the commitments of all stakeholders in the project

Table 5: Mitigation measures against the top 16 project delay factors

Table 5 above shows the relief strategies against the top 16 project delay factors according to the literature review. This proves that every risk affecting the successful delivery of a project has different means of resolving it. However, this study shows that any problem affecting the successful project delivery has a solution.

B. Graphical Results

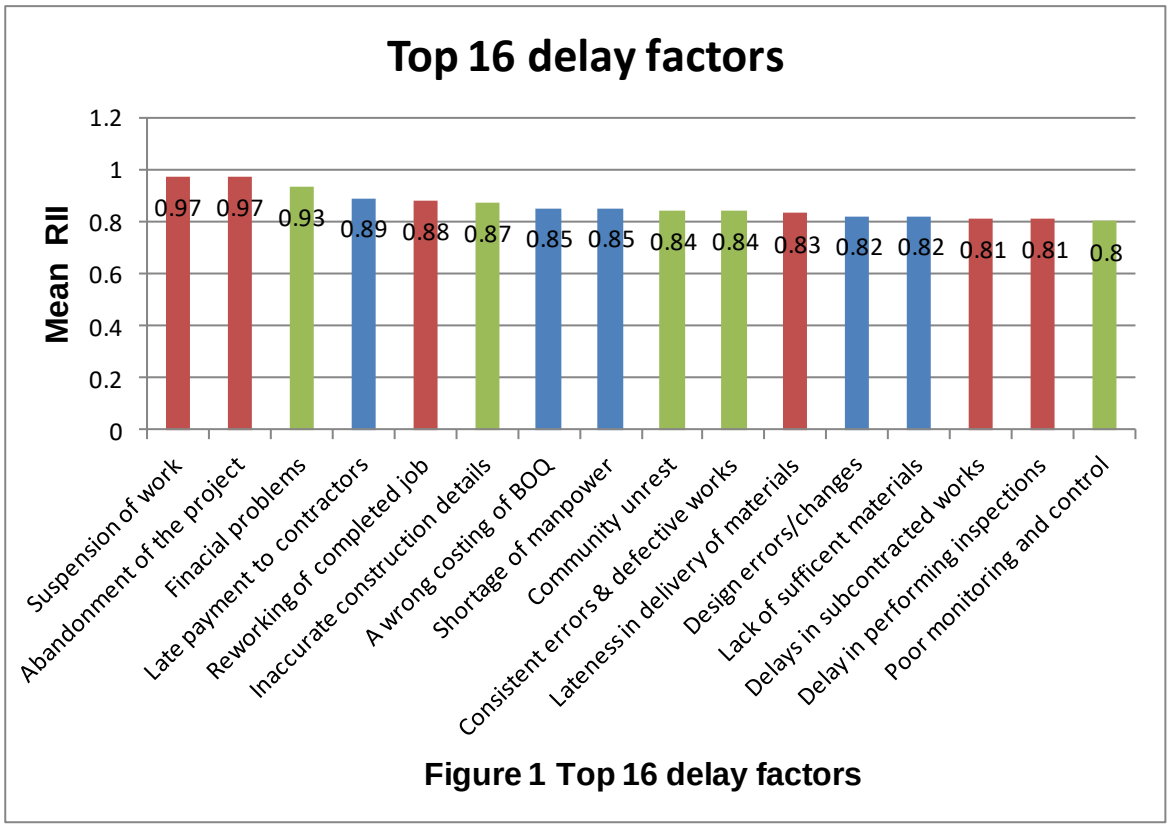

Fig. 1: Chart representation of top 16 delay factors

From figure 1 above, it is noticed that the suspension of work and the abandonment of the project are the most critical issues among the 16 delay factors affecting the successful delivery of a project. Both of them are of equal importance. The least factor among the 16 critical delay factors in figure 1 above is poor monitoring and control. This chart is used to simplify this analysis.

C. Proposed Improvements

a) Recommendations for future studies
Further studies on factors creating project setbacks are required within privately funded projects to ascertain the difference in factors creating project setbacks in government-funded projects and that of privately funded projects.

b) Recommendations to minimize future project delays
The clients should ensure early payment of all debts and installments to circumvent or minimize delays. Consulting engineers should ensure that all design works are well perused prior to final submission for approval. There is a need to have an experienced permanent engineer representative on-site in order to monitor and control the work activities to ensure quality is maintained. The contractor should ensure the scope of work is clear and precise before proceeding to work.

c) Validation
Taherdoost, (2016) defines validity as the level of accuracy of an idea in a quantitative study. It simply means computing what is intended to be computed. Implementation of the findings is an evidence-based practice. Consideration must be accorded to the rigor of the research and not just the outcome of the study. Rigour indicates the degree of quality maintained in the study. In this case, Rigour means the extent to which the researchers have worked to strengthen the quality of studies. This can only be attained through the computation of reliability and validity. **Reliability** measure the quality of work in a quantitative study. It shows the correctness of the questionnaires. Reliability links to the consistency of a measure. Cronbach's α measures inner consistency. It has ranged from 0 to 1 and the agreed reliability is 0.70 and above. Cronbach's Alpha with the rate of 0.70 and over stipulates that all the variable indicators measurements denote allowable internal consistency (Olaniyi 2019). An alpha value of 0.00 indicates no uniformity in estimation while a rate of 1.00 shows faultless consistency in estimation. Cronbach's Alpha (α) was calculated using the formula below:

$$\alpha = 1 - \frac{kr}{(1 + (k-1)\,r}$$

Where;
k = Overall number of participants from each stakeholder, which are 15, 18, 22 in this case.

r = mean inter-indicator correlation or average of correlation coefficients

$$\text{Pearson correlation (r)} = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x^2)^2][n\sum y^2 - (\sum y^2)^2]}}$$

Where;
n = number of respondents from stakeholders, which is 15, 18, and 22 in this case
x = number of questionnaires
y = number of responses from each stakeholder, which is 15, 18, 22

The values of Pearson correlation (*r*) lie between -1.00 and 1.00. An indication of 1.00 means an absolute optimistic relationship. An indication of -1.00 means an absolute pessimistic relationship. An indication larger than 1.00 or less than -1.00 shows that there is an error in the correlation estimation. Values range between a calculated figure higher than 1.00 or smaller than -1.00 indicates the existence of an error in relationship quantification. A relationship of 0.00 indicates no direct connection between the movements of the variables.

No. of participants (K)	Correlation coefficients (r)	Cronbach's Alpha (α)
15	0.02	0.75
18	0.02	0.80
22	0.03	0.70

Table 6: Tabulating the Cronbach's Alpha values

The rate that is acquired for an alpha normally stipulates the percentage of the authenticity of the questionnaire. For instance, the rate of 0.70 indicates 70% of the scores are authentic, while 30% indicates an error score. It must be noted that Cronbach's initiation does not furnish authentic measurements of an individual or independent participants. It gives reliable estimates for summed scales or subscales. If it happens to be used for individual or independent units, the reliability of those units may remain unspecified. However, it must be understood that this formula is only appropriate in social and behavioural studies that deal with characters, personalities, perceptions, views, feelings, and interpretations of people's environment.

VI. CONCLUSION

The conclusion is the final chapter of the study that intends to assist the readers to understand why this research should matter to them after they have completed reading the research paper. This part of the research study is not merely a summary of the research points. This study identified and analyzed major factors creating project setbacks and their relief strategies. It measured the difference in the view of perceptions among stakeholders regarding factors creating project setbacks. 54 factors were detected and compiled for further assessment. Data gathering in this study focused only on government-funded projects. The result indicated that all three stakeholders in the project generally agreed to 54 causes of project delays in South Africa. The result of this examination showed that the project delay awareness level of the three stakeholders was deemed to be almost the same. The three stakeholders proved to be equally experienced and knowledgeable on the issue of delays. Relief strategies developed in this study can be regarded as a record of good exercise that may assist in controlling and improving successful project delivery in South Africa. Successful project delivery relies on the efforts invested by the three stakeholders in the project planning and delivery, as they contribute to project delays in different ways. The study discussed the necessity for ethical consideration in research work. Cronbach Alpha ascertains the reliability of research questionnaires. The study has proved that every project delay has a remedy. The correlation coefficient (r) determines whether the linear relationship in the sample data is strong enough to use to model the relationship in the selected population.

BIOGRAPHY

Anthony Obododike Ekwuno is the managing member of the Tobeko Consulting Engineers Pty Ltd. South Africa. He has acquired over 25 years of experience in civil engineering. Mr. Ekwuno holds a higher national diploma in civil engineering from the Federal Polytechnic, Bida in Nigeria. Mr. Ekwuno also acquired a master of science in civil engineering from the University of East London, United Kingdom. He gained a Master of Philosophy in Engineering Management from the University of Johannesburg, South Africa. Mr. Ekwuno has been recognized as a Professional Engineering Technologist by the Engineering Council of South Africa. He is also a professional member of Project Management, South Africa. Mr. Ekwuno is a member of an Institution of Professional Engineering Technologists, South Africa. Mr. Ekwuno has been recognized as an Associate Member of the American Society of Civil Engineers.

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