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Determinants Of Delay In Tetfund-Funded Building Projects In Nigerian Tertiary Educational Institutions: Evidence From Oyo State, Nigeria

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ABSTRACT

Construction delays continue to be one of the most persistent problems to the successful delivery of public infrastructure projects in developing countries. Projects funded through the Tertiary Education Trust Fund (TETFund) in Nigeria have achieved a lot in terms of physical infrastructure development in tertiary institutions. However, a lot of these projects are still faced with delays that affect project performance and the attainment of educational development objectives. Although there are huge investments by TETFund, empirical studies on the determinants of delay in TETFund funded building projects are limited. The study evaluated the causes of delay in TETFund building projects carried out in selected tertiary institutions in Oyo State, Nigeria. Structured questionnaire was used to collect primary data from consultants, contractors, client representatives and project financiers involved in TETFund projects. Data were analysed by one way ANOVA and Principal Component Analysis (PCA) on ninety-two valid responses. The findings showed that the main sources of delay were operational policy on grouped fund release, bureaucratic bottleneck in TETFund, delay in paying by owners, cash flow problems of contractors, lack of access to credit, delay in paying progress by clients and poor site management. Further, factor analysis reduced the forty-one delay variables into eight primary components namely external, technical, incompetent, cash-flow, internal, operational, scope and administrative factors accounting for around 76% of the overall variance. Unlike earlier research which mostly focused on contractor related shortcomings, this study finds that institutional funding methods and administrative processes are the main causes of delay in publicly funded educational infrastructure. Study advises reform in TETFund fund release method, reduction of administrative bottleneck, improvement in project financial management, enhancement of contractor selection procedure and strengthening of project planning practices. The findings contribute to the expanding body of information on building project performance in developing nations and provide practical recommendations for policy makers responsible for delivering public infrastructure.

Keywords: TETFund; Construction Delay; Educational Infrastructure; Building Projects; Public Procurement; Project Management; Nigeria; Factor Analysis

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1. INTRODUCTION

One of the most accepted markers of project success in construction management is still the timely completion of construction projects within the agreed budget and the defined quality requirements. One of the most significant performance criteria is timely completion since it guarantees optimal use of resources, limits contractual disagreements, improves client satisfaction, and helps in building sustainable infrastructure (PMI, 2000; Kerzner, 2025). However, delays remain one of the most persistent challenges facing the global construction industry, despite ongoing improvements in project management techniques and procurement practices. Projects in both developed and developing economies continue to endure completion times beyond the contractual timetables, compromising project performance and diminishing value for money (Al Saeedi, et al., 2022; Doloi, 2023; Selcuk, et al., 2024).

A construction delay is typically seen as the extension of the project completion time beyond the contractually stipulated completion date or beyond the duration mutually acknowledged by the project stakeholders (Assaf & Al-Hejji, 2006). Depending on their causes and the terms of the contract, delays may be excusable, compensable, concurrent or non-excusable. Long project durations, regardless of their classification, are often linked to cost overruns, productivity losses, claims and disputes, litigation, reduced contractor profitability, inefficient resource utilisation and, in extreme cases, project abandonment (Arantes & Ferreira, 2020; Amoah et al., 2024). Therefore, construction delay has been repeatedly identified as one of the most critical threats to project delivery performance globally.

The problem of construction delays is particularly acute in developing countries where institutional weaknesses, poor project planning, macroeconomic instability, poor governance, inflationary pressures, procurement inefficiencies and limited technical capacity often hinder project implementation (Selcuk, et al., 2024; Iroha, et al., 2024). In many African nations, these obstacles are compounded by irregular funding, bureaucratic hurdles, political involvement, fluctuating exchange rates, and poor project monitoring systems, all of which negatively impact project completion times (Ogbeifun & Pretorius, 2022; Falaye, 2024). Poor educational infrastructure has continued to be a key hindrance to effective tertiary education delivery in Nigeria. Several universities, polytechnics and colleges of education still suffer shortage of lecture theatres, laboratories, libraries, workshops, administrative buildings, hostels, health facilities and research infrastructure. These shortcomings have significantly affected the effectiveness of teaching, research output, institutional accreditation, student learning experiences and global competitiveness (Ji, 2024).

To address this infrastructural shortfall, the Federal Government set up the Tertiary Education Trust Fund (TETFund) in 1993 and restructured through the Tertiary Education Trust Fund (Establishment, Etc.) Act, 2011. TETFund is a federal government agency that funds the development of physical infrastructure, training of academic staff, research, library development and institutional capacity building based on education tax contributions from registered companies operating in Nigeria. Since its establishment, the Fund has been one of the largest public sector financiers of tertiary educational infrastructure spending several billion naira annually on the construction of lecture theatres, laboratories, engineering workshops, medical facilities, libraries, students' hostels, administrative complexes and other capital projects in federal and state-owned tertiary institutions.

These investments have contributed immensely to the physical learning environment in tertiary institutions in Nigeria. However, despite continued government commitment and increased funding, a considerable number of building projects sponsored by TETFund incur major delays before completion. Such delays delay the realisation of educational gains, increase building costs through inflation and price escalation, lower value for public investment and limit institutions' capacity to satisfy expanding demands for teaching, learning, research and innovation. The impact of delayed educational infrastructure projects is more than just financial. Delayed completion of classrooms, labs, libraries, dormitories and health facilities adversely impacts student enrolment capacity, learning outcomes, research output, institutional accreditation and the overall quality of education. The length of time to complete projects can cause cash-flow problems for contractors, and consultants and clients have additional costs for monitoring and administration. Further, governments are typically need to make additional financial provisions due to inflation and fluctuations in the cost of construction materials, which increases the entire life-cycle cost of infrastructure delivery.

The problem of building delays has been the subject of much scholarly research in the last three decades. Earlier studies in Asia, Europe, Africa, and the Middle East have revealed many causative factors such as poor project planning, late payment, insufficient contractor experience, design changes, poor communication among project participants, shortage of construction materials, labour constraints, equipment breakdown, adverse weather conditions, and weak project supervision (Al Saeedi, et al., 2022; Selcuk, et al., 2024; Zagia, et al., 2026). Similar findings have been reported in Nigerian studies, where contractor financial difficulties, delayed interim payments, poor contract administration, inflation, corruption, inadequate planning and procurement inefficiencies have consistently emerged as major contributors to project delays (Kelechi & Chinemerem, 2025; Abdulraheem et al., 2026).

Although these researches have contributed significantly to the body of knowledge on building delays, there are still a number of critical gaps. First, most of the prior studies have focused on public building projects in general, roadways, housing complexes, or construction projects in the private sector without explicitly looking at projects funded by specialised intervention agencies such as TETFund. Consequently, the distinctive operational features of TETFund funding schemes have received relatively limited empirical attention. Unlike the traditional government funded construction projects, the TETFund funded projects are subjected to particular institutional arrangements which include phased disbursement of funds, centralised project approvals, strict adherence to procurement regulations, institutional monitoring procedures, periodic performances evaluations and accountability. These institutional characteristics generate additional administrative processes that can have a major impact on project delivery schedules. It is therefore not proper to presume that the delay causes impacting conventional public projects satisfactorily explain the delays experienced under the TETFund funding mechanism.

Secondly, although most of the Nigerian studies have focused mainly on the deficiencies of contractors and consultants, fewer studies have examined the role of the institutional funding procedures, administrative approvals, regulatory compliance, and project governance in the occurrence of construction delays in intervention-funded educational projects (Kelechi & Chinemerem, 2025; Abdulraheem et al., 2026). Grasping these institutional dimensions is important for improving policy formulation and efficient infrastructure delivery.

Third, most of the prior studies have been predominantly confined to descriptive statistical methods such as mean ranking and relative importance indices for the determination of delay factors. Although these techniques are useful in ranking individual variables, they provide little information about the relationships among multiple delay factors. Advanced multivariate statistical approaches such as Principal Component Analysis (PCA) provide opportunities to reduce a large number of correlated variables to a few broader latent dimensions that better explain the structural causes of project delays (Hair et al., 2010; Rodionova, et al., 2021). This type of dimensional reduction allows for more targeted policy interventions, as decision-makers can address groups of related issues rather than individual variables.

Against this background, this study investigated the causes of delays in TETFund-funded building projects undertaken in some tertiary educational institutions in Oyo State, Nigeria. The purpose of this research is to identify the most significant delay factors from the perspective of construction professionals and then to group such factors into main components through the application of factor analysis. The study uses descriptive statistics and Principal Component Analysis to give a more detailed understanding of the multidimensional nature of construction delays within the specialised institutional framework of TETFund-funded educational infrastructure.

The results of this study are expected to have theoretical and practical value. The study contributes to the burgeoning literature on construction delay by providing empirical evidence from a specialised public-sector infrastructure funding framework that has received little scholarly attention. Methodologically, the use of Principal Component Analysis allows for a better analytical understanding of the determinants of delay through the identification of broader latent constructs underlying many observed variables. Practically, the findings provide evidence-based guidance for the management of TETFund, policy makers, institutional administrators, consultants, contractors and other project stakeholders with interest in improving project planning, funding administration, procurement efficiency and project management practices. Ultimately, the study will contribute to policy reforms that will reduce delays, improve performance of infrastructure delivery and value for money of publicly funded tertiary educational infrastructure projects in Nigeria.

2. OVERVIEW OF CONSTRUCTION PROJECT DELAYS

The construction industry, a key component of national economic development, provides the physical infrastructure needed to support education, health care, transportation, business, and industrial growth. It is of vital importance in employment creation, capital accumulation and in overall economic efficiency. In general, construction projects are assessed based on three major success factors, which are usually called the “iron triangle” (Atkinson, 1999; Atkinson, et al., 2006; Zid, et al., 2020; Kerzner, 2025): time, cost, and quality. Timely Project Completion is one of the most critical criteria. Delays can lead to budget overruns, contract disputes, reduced productivity, inefficient resource allocation, and a decrease in stakeholder confidence. Therefore, construction delays have attracted considerable academic interest due to their severe implications on project performance and national socio-economic development (Selçuk et al., 2024; Zagia, et al., 2026). Construction delay is the failure to perform a project within the time limit provided in the contract or any approved extension thereof.

It occurs when the real progress of the project is behind the scheduled plan, because of foreseen or unforeseen events that affect the execution of the project. Delays can be classified as excusable or non-excusable, compensable or non-compensable, and concurrent or non-concurrent by contractual duties (Assaf & Al-Hejji, 2006; FIDIC, 2017). Regardless of their classification, delays adversely affect project objectives by extending the timeframes, increasing construction costs, reducing labour productivity, disrupting the cash flow, and causing conflicts between the clients, contractors, consultants, and other parties involved (Assaf & Al-Hejji, 2006; Zagia, et al., 2026).

Construction project delays are a worldwide problem that both advanced and emerging countries face. Although there have been substantial advances in project management approaches, digital construction innovations, procurement frameworks and contract management procedures, delays are still a pervasive issue in the construction sector. Recent comprehensive analyses suggest the most common causes of project delays globally (Purushothaman et al., 2024; Zagia, et al., 2026) are lack of planning, budget constraints, changes in design, poor communication, poor project management, shortages of labour and construction resources, and regulatory impediments. Moreover, recent studies have progressively shown that delay factors rarely occur in isolation but interact across the project life cycle, thus increasing their cumulative effect on project performance.

Recent findings suggest that the importance of delay factors depends on project characteristics, procurement approaches, financing arrangements, institutional setups and geographical locations. Orya and Calahorra-Jimenez (2025) found that 80% of the reasons for delay happening during the construction phase in their extensive examination of infrastructure projects, while the rest are during the planning, design and procurement stages. Purushothaman et al., (2024) also found that financial, managerial, technical, contractual and external factors are highly interrelated and thus, effective delay reduction needs a coherent management approach rather than a fragmented approach. The findings point to the importance of exploring the reasons of delay in certain project contexts to develop effective and context-specific remedies.

Construction delays are generally more costly in underdeveloped countries as infrastructure provision is often limited by lack of funds, weak institutional structures, bureaucratic bottlenecks, inflationary pressures, currency volatility and governance problems. The projects to upgrade educational infrastructure are particularly vulnerable because delays only worsen the shortages of lecture halls, labs, libraries, administrative buildings, dormitories, research centres and other important educational facilities. Such deficiencies significantly impact instructional effectiveness, research productivity, student learning experiences, institutional accreditation, and international competitiveness. Delays in government-sponsored construction projects have continued to lead to escalating project costs, abandoned projects and poor utilisation of limited public resources in several African countries including Nigeria (Aibinu & Jagboro, 2002; Osei-Kyei & Chan, 2017; Selçuk et al., 2024).

Despite several procurement changes and progress in professional procedures, delays in construction projects remain a challenge to a considerable proportion of public-sector building projects in Nigeria. Late payment for completed work, poor funding of contractors, poor organisation and timing of projects, changes in design, lack of skilled labour, poor site supervision and management, problems in procuring materials, inflationary pressures and bureaucratic approval processes are often highlighted as the main causes of project delays in previous empirical studies

(Mansfield et al., 1994; Aibinu & Jagboro, 2002; Aibinu & Odeyinka, 2006; Sambasivan & Soon, 2007; Ojoko, et al., 2016; Egwim, et al., 2023). Recent studies have suggested that much research has treated building projects as homogeneous, ignoring important distinctions in procurement approaches, financial regimes, governance structures and operational requirements particular to different industries. Therefore, the absence of a uniform classification system for construction delay factors underscores the importance of empirical research relevant to individual projects (Zagia, et al., 2026).

Projects supported by Nigeria's Tertiary Education Trust Fund (TETFund) are a unique class of public infrastructure projects that deserve detailed analysis. While TETFund has done a lot to ameliorate infrastructure gaps in the Nigerian higher education institutions, there is no empirical study that specifically examines the reasons that lead to the delays in TETFund-financed construction projects. The existing literature on construction delays in Nigeria has focused mainly on general public buildings, roads, housing and private sector construction, with little attention given to special intervention agencies' sponsored educational infrastructure. This is a clear indication of a serious lack of understanding as the procedures for funding, procurement, oversight and authorisation of TETFund projects are far apart from those used in conventional public-sector building projects.

Therefore, it is important to understand the factors leading to delays in TETFund project context so as to improve efficiency in project execution, optimise public investment returns and ensure timely availability of educational infrastructure required for promoting quality education, research and innovation. The study seeks to investigate the causes of delays in TETFund funded construction projects executed in selected tertiary institutions in Oyo State, Nigeria. The study aims at identifying the critical factors responsible for project delays and providing empirically supported recommendations for the timely completion of educational facilities.

3. RESEARCH METHODOLOGY

The study used a quantitative survey research design, supplemented by archive data from projects. The approach facilitated the analysis of reasons of delays in TETFund sponsored building projects and their effect on project cost and time performance and the identification of appropriate mitigation methods.The research population consisted of key stakeholders involved in the procurement and execution of the TETFund sponsored building projects in selected tertiary institutions in Oyo State, Nigeria. The responders were consultant architects, consulting engineers, consulting quantity surveyors, client representatives, contractors and the financier of the project. A purposive sample strategy was used to choose respondents who have firsthand knowledge and experience of TETFund projects.

Approximately 50% of the identified professionals in each stakeholder group were selected to ensure adequate representation, with a total sample size of 118 responses. The study employed primary and secondary data. The primary data was collected by a standardised close-ended questionnaire presented to the identified stakeholders. The questionnaire was divided into two parts. The first part was on the demographic and professional characteristics of the respondents and the second part was on the occurrence and impact of delay factors and possible mitigation techniques. Respondents rated each item on a six-point Likert scale from 0 (no occurrence/no impact) to 5 (very high occurrence/very high impact).

Secondary data were collected from the project records and archive materials pertinent to the selected TETFund projects. These included contract sum, final account value, planned construction length and actual period of completion. The historical data was utilised to assess project cost and schedule performance and to develop the relationship between the identified delay reasons and project performance. Data analysis was performed using descriptive and multivariate statistical approaches. The mean score analysis was performed to rank the severity of identified delay reasons and mitigation strategies. To determine the latent dimensions of the delay factors and mitigation techniques, an Exploratory Factor Analysis (EFA) was conducted. Project cost and schedule performance were evaluated by comparing contract sums to final account values and expected durations to actual completion times. The analysis offered empirical information on the major sources of delay, their effect on the project performance and the most effective measures to minimise delay in TETFund sponsored building projects. The next section shows the result of data analysis and discussion of findings.

4. FINDINGS AND DISCUSSION

Background Information of the Respondents

Table 1 presents the profiles of the respondents of this survey. The Table reveals that the modal years of experience of the respondents is 12.5 while the average years of experience of the respondents is 13 years. In terms of academic and professional qualifications, 46.3% of the respondents had first degree, 36.6% (Master's degree) and 7.3% (Doctorate degree). Similarly, 94.1% of the respondents are also professionally registered with the proper regulating organisations of their professions. Consultant Civil Engineers 27.2%, consultant Quantity Surveyors 27.2%, consultant Architects 11.1%, project financiers 3.7%, contractors 23.5% and client organisation 7.4%. The table further demonstrated that on the average, none of the respondents has handled less than 11 projects in the recent 10 years. 38.4 % of the respondents handled eight projects, 19.2 % handled 13 projects and 3 projects correspondingly and 12.3 % handled 18 projects in the last 10 years. Table 4.1 displays the missing replies of the respondents since the respondents who did not answer the questions on their demographic information all answered the questions required to achieve the research objectives.

Also, removal of the missing responses for the demographic information of the respondents will have led to the variables having different totals which will not allow for a good presentation. The missing responses were excluded from the following analysis such as the one-way ANOVA which needed the categorisation based on the designation of the respondents. From the above, it can be stated that the majority of the respondents are skilled enough on the subject topic of this study. Thus, the analysis conclusions of the data they provided can be generalised.

Table 1: Background of Respondents

Profiles	Frequency	Percent	Valid Percent	Cumulative Percent
Highest educational qualification				
HND	2	2.2	2.4	2.4
B.Sc./B.Tech./B.Engr.	38	41.3	46.3	48.8
M.Sc./M.Tech./MBA	30	32.6	36.6	85.4
Ph.D.	6	6.5	7.3	92.7

Profiles	Frequency	Percent	Valid Percent	Cumulative Percent
Others	6	6.5	7.3	100.0
No response	10	10.9		
Total	**92**	**100.0**		
Professional qualification				
MNSE/FNSE	24	26.1	28.2	28.2
MNIQS/FNIQS	32	34.8	37.6	65.9
MNIA/FNIA	14	15.2	16.5	82.4
MNIS/FNIS	3	3.3	3.5	85.9
MNIOB/FNIOB	7	7.6	8.2	94.1
Others	5	5.4	5.9	100.0
No response	7	7.6		
Total	**92**	**100.0**		
Designation of respondents				
Consultant Civil Engineers	22	23.9	27.2	27.2
Consultant Quantity Surveyors	22	23.9	27.2	54.3
Consultant Architects	9	9.8	11.1	65.4
Project Financier	3	3.3	3.7	69.1
Contractors	19	20.7	23.5	92.6
Client Organisation	6	6.5	7.4	100.0
No response	11	12.0		
Total	**92**	**100.0**		
Working experience	**Frequency**	**Percentage**	**Midpoint (x)**	**Fx**
1-5	7	8.3	2.5	17.5
6-10	20	23.8	7.5	150
11-15	34	40.5	12.5	425
16-20	8	9.5	17.5	140
Above	15	17.9	22.5	337.5
No response	8			
Total	**92**	**100.0**		**1070**
	Mean= $\sum fx/\sum f$ = 1070/84 = 12.74 ≈ 13 years			
Number of TETFund projects undertaken in the last 10 years				
1-5	14	19.2	3	42
6-10	28	38.4	8	224
11-15	14	19.2	13	182
16-20	9	12.3	18	162
21 and above	8	11.0	23	184
No response	19			
Total	**92**	**100.0**		**794**
	Mean= $\sum fx/\sum f$ = 794/73 = 10.88 ≈ 11 years			

Identification and Ranking of Causes of delay in TeTFund Building Projects in selected Tertiary Educvational Institutions in Oyo State.

Table 2 revealed 41 identified causes of delay in TETFund building projects in selected tertiary educational institutions in Oyo State, Nigeria. This objective was achieved using primary data elicited from respondents via a questionnaire survey. Respondents were requested to tick their preferred option from a five-point likert-like scale set against a list of 41 causes of delay synthesized from Literature. The assessment scale comprised: very low (1), low (2), average (3), high (4), and very high (5). The Table showed that seven out of the 41 causes of delay investigated are high in occurrence in the study area. This means that these causes are mostly responsible for delay in TETFund building projects executed in educational institutions in Oyo State, Nigeria.

The other 34 causes have average rate of occurrence on TETFund building projects in the study area. Top on the seven highest occurring causes of delay is operational policy of TETFund which lumps projects in groups for fund release with a mean score (MS) of 3.73. It is followed by bureaucratic bottle-neck in TETFund (MS=3.62), payment delay by owners (MS=3.62), contractor's cash flow problem (MS=3.57), problem with credit accessibility (MS=3.50), delay in payment by client (MS=3.46) and poor site management and coordination problem (MS=3.35).

Furthermore, One-way ANOVA was conducted to compare the perceptions of the respondents on the ranking of the causes of delay based on their designations. It was observed that there was no statistically significant difference in the perception of the respondents for majority of the causes of delay on TETFund projects ($p > 0.05$). However, there was statistically significant difference in their perceptions for shortage of construction equipment ($p < 0.05$), lack of attention to contract requirements ($p < 0.05$) and defective design, error and rework ($p < 0.05$).

The above findings are partly in agreement with the findings of Alaghbari et al. (2007), Sunjka & Jacob (2013) and Johnson & Babu (2020). Their findings showed that the main causes of delay in the execution of public projects were related to designers, economic conditions, user changes, weather, site conditions, late deliveries and increases in quantity of the work. The findings of this study revealed that while causes relating to finance and planning are high in occurence, causes such as weather and change in design are however low in occurrence.

Moreover, the findings of this study partly agreed with those of Sunjka and Jacob (2013). Sunjka and Jacob (2013) reported that lack of proper planning and poor contract management were some of the most common causes of delay. This study revealed that poor contract management and inadequate planning were very common causes of delay on TETFund projects. Some other common causes highlighted by Sunjka and Jacob (2013) like youth commotion and communal catastrophes, were found to be insignificant from the findings of this study. Alaghbari et al. (2007), revealed that financial problems were the main causes of delay in construction works, followed by the role of stakeholders such as clients, contractors, consultants and coordination problems. This study revealed that financial problems and management problems were the most predominant causes of delay in TETFund projects.

The findings were in agreement with Alaghbari et al. (2018), Fugar and Agyakwah-Baah (2010), Frimpong et al. (2003), (Lo et al., 2006) and Seliudi, 2019. Alaghbari et al. (2018) found out that the most important causes of delay were; contractor‘s improper planning, contractors‘ poor site management, client‘s inadequate financial resources and poor payments pattern for completed work. Other causes like shortage of skilled labourers, shortage of construction equipment and lack of resources were considered not important by the findings of this study.

In Ghana, the study by Fugar and Agyakwah-Baah (2010) revealed that the important causes of delay were inadequate or poor supervision, problem with credit accessibility especially with banks, delay in honouring payment certificates for work done, poor management by professionals and site management problems. These causes were also ranked significant in this study. Furthermore, the findings of this work revealed that poor payment to contractors and poor contract management were important causes of delay which agrees with the findings of Frimpong et al. (2003). However, two significant causes that also ranked very important were operational policy of TETFund which lumps projects in groups for fund release and bureaucratic bottle-neck in TETFund. Lo et al. (2006) and Arante & Ferreira (2020) in a study in Hong Kong, also revealed that major causes of delay were poor consultants’ supervision and choice of inexperienced contractors.

Table 2: Extent of Occurrence of Causes of Delay on TETFund Building Projects

S/N	Causes of Delay	Overall		Consultants		Contractors		Client Organization		Project Financiers		One-way ANOVA	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	F	Sig.
1	Operational policy of TETFund which lumps projects in groups for fund release	3.73	1	3.96	1	3.19	13	3.50	15	4.00	22	1.408	0.247
2	Bureaucratic bottle-neck in TETFund	3.62	2	3.83	3	3.25	10	3.67	10	3.67	31	0.838	0.478
3	Payment delays by owners	3.62	3	3.74	5	3.47	1	2.83	33	4.67	2	1.292	0.283
4	Contractor's cash flow problem	3.57	4	3.92	2	3.32	5	3.33	20	3.33	39	1.318	0.275
5	Unrealistic contract duration	3.54	5	3.74	5	3.13	17	3.33	20	4.67	2	1.620	0.192
6	Problem with credit accessibility	3.50	6	3.79	4	2.95	26	3.83	5	4.00	22	1.903	0.136
7	Delay in progress payment by the client	3.46	7	3.57	8	3.16	14	3.83	5	4.67	2	1.122	0.345
8	Mode of fund release in tranches (in stages) by TETFund	3.42	8	3.47	11	2.75	33	4.17	2	4.33	11	1.869	0.142
9	Inadequate planning	3.36	9	3.42	12	3.21	11	3.83	5	4.00	22	0.458	0.713
10	Poor site management and coordination problem	3.35	10	3.34	19	3.16	14	3.67	10	4.33	11	0.943	0.424

S/N	Causes of Delay	Overall		Consultants		Contractors		Client Organization		Project Financiers		One-way ANOVA	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	F	Sig.
11	Non-utilization of professionals in contractual arrangement	3.35	11	3.55	10	3.11	18	3.50	15	3.33	39	0.423	0.737
12	Low performance of the lowest bidder contractor	3.34	12	3.60	7	3.32	5	2.83	33	4.67	2	1.540	0.211
13	Cost underestimation	3.33	13	3.42	12	2.95	26	3.00	29	4.00	22	0.708	0.550
14	Quality assurance and control	3.32	14	3.36	18	2.68	37	3.50	15	4.00	22	1.354	0.263
15	Skills and experience of the contractor's technical staff	3.30	15	3.40	14	3.42	2	2.50	38	4.33	11	1.072	0.366
16	Poor contract management	3.25	16	3.38	17	3.26	8	3.00	29	3.67	31	0.250	0.861
17	Change in the scope of work	3.24	17	3.13	27	3.37	3	3.83	5	3.67	31	0.585	0.627
18	Change in government	3.22	18	3.04	33	3.32	5	3.67	10	4.33	11	0.932	0.429
19	Lack of attention to contract requirements	3.20	19	3.57	8	2.47	40	3.50	15	4.67	2	**5.428**	**0.002**
20	High maintenance cost	3.20	20	3.15	26	3.11	18	3.67	10	5.00	1	1.724	0.169
21	Subcontractor's and contractor's financial incapacity	3.18	21	3.40	14	2.95	26	3.17	28	4.33	11	1.241	0.301
22	Lack of commitment and communication	3.17	22	3.30	21	2.95	26	4.00	3	4.00	22	1.497	0.222
23	Shortage of skilled labourers	3.15	23	3.02	34	3.37	3	3.33	20	4.00	22	0.711	0.548
24	Subcontractor's incompetence	3.14	24	3.09	30	3.00	24	3.67	10	4.33	11	1.663	0.182
25	Shortage of construction equipment	3.14	25	3.17	24	2.95	26	4.33	1	4.67	2	**2.934**	**0.039**
26	Unforeseen adverse ground condition	3.13	26	3.17	24	3.16	14	2.83	33	4.00	22	0.584	0.627
27	Slowness in decision making by all concerned	3.12	27	3.08	31	2.75	33	4.00	3	4.67	2	1.644	0.187
28	Delay in availability of design details	3.09	28	3.40	14	2.84	32	2.17	40	3.67	31	2.015	0.119
29	Change in design	3.08	29	3.19	22	3.05	23	2.67	37	4.33	11	1.039	0.380
30	Public opposition to projects	3.07	30	3.12	29	3.11	18	3.33	20	3.67	31	0.178	0.911
31	Lack of commitment between parties	3.07	30	3.19	22	3.26	8	3.00	29	3.67	31	0.165	0.920
32	Poor relationship with community	3.05	32	2.98	36	3.21	11	3.50	15	4.33	11	1.149	0.335

S/N	Causes of Delay	Overall		Consultants		Contractors		Client Organization		Project Financiers		One-way ANOVA	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	F	Sig.
33	Defective design, error and rework	3.01	33	3.34	19	2.47	40	2.17	40	4.67	2	**4.485**	**0.006**
34	Lack of resources (labour and material)	3.00	34	3.13	27	2.74	35	3.00	29	4.67	2	1.724	0.169
35	Labour unrest	2.96	35	2.85	38	3.11	18	3.83	5	3.67	31	1.094	0.357
36	Inclement weather	2.92	36	3.06	32	2.63	38	3.33	20	3.33	39	0.587	0.625
37	Contractor's inexperience	2.90	37	2.98	36	2.63	38	2.83	33	4.33	11	1.659	0.183
38	Unclear project scope	2.83	38	3.00	35	3.00	24	2.50	38	3.67	31	0.446	0.720
39	Communal catastrophes	2.78	39	2.75	40	3.11	18	3.33	20	4.33	11	1.285	0.286
40	Substandard contracts format	2.76	40	2.81	39	2.74	35	3.33	20	4.33	11	1.147	0.336
41	Flood	2.73	41	2.57	41	2.89	31	3.33	20	4.00	22	1.155	0.332

KMO and Bartlett's Test

Factor analysis was conducted to further classify and group related causes of delay into a lesser number of more significant causes of delay. As shown in Table 3, a KMO value greater than 0.60 suggests that the data are adequate for factor analysis to be conducted. Also a significant Bartlett's test of Sphericity ($p<0.05$) also suggests that factor analysis can be conducted.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.861
Bartlett's Test of Sphericity	Approx. Chi-Square	3084.915
	Df	820
	Sig.	.000

A total of eight categories was derived into which the 41 causes of delay were redistributed. The eight categories accounted for a total variance of 76% of all the items. According to Hair et al., 2010, a solution that accounts for about 60% of the total variance can be considered. This suggests that the eight categories sufficiently account and determines the variation that occurs on the scale and can be used as further categorization of the items. A category is valid only if the eigenvalue is greater than 1 as shown in Table 3.

Table 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	19.097	46.579	46.579	19.097	46.579	46.579	5.904	14.400	14.400
2	3.292	8.029	54.608	3.292	8.029	54.608	5.011	12.221	26.621
3	2.154	5.254	59.862	2.154	5.254	59.862	4.123	10.055	36.676
4	1.777	4.334	64.196	1.777	4.334	64.196	4.083	9.959	46.635
5	1.454	3.547	67.742	1.454	3.547	67.742	3.845	9.378	56.013
6	1.236	3.014	70.756	1.236	3.014	70.756	3.591	8.760	64.773
7	1.139	2.777	73.533	1.139	2.777	73.533	2.779	6.779	71.552
8	1.018	2.482	76.015	1.018	2.482	76.015	1.830	4.463	76.015
9	.852	2.078	78.094						
10	.784	1.911	80.005						
11	.747	1.821	81.826						
12	.714	1.741	83.567						
13	.608	1.483	85.050						
14	.565	1.379	86.429						
15	.528	1.288	87.717						
16	.485	1.183	88.900						
17	.467	1.138	90.038						
18	.379	.923	90.961						
19	.363	.885	91.846						
20	.360	.878	92.724						
21	.315	.769	93.493						
22	.294	.718	94.212						
23	.274	.668	94.880						
24	.243	.593	95.473						
25	.235	.573	96.046						
26	.216	.528	96.574						
27	.172	.419	96.993						
28	.165	.402	97.395						
29	.158	.384	97.779						
30	.141	.344	98.123						
31	.138	.337	98.460						
32	.123	.299	98.760						
33	.096	.235	98.994						
34	.085	.207	99.201						
35	.063	.154	99.356						
36	.061	.150	99.506						
38	.048	.117	99.752						
39	.043	.104	99.856						
40	.035	.087	99.942						
41	.024	.058	100.000						

Extraction Method: Principal Component Analysis.

In addition, scree plot was conducted to confirm the number of factors to be reserved. As indicated in Figure 1, the point at which the curve seems to be parallel to the component axis, the curve recommended that only 8 categories are above the 1 eigenvalue mark should be considered. Hence, the scree plot confirmed the eight (8) categories considered in this study.

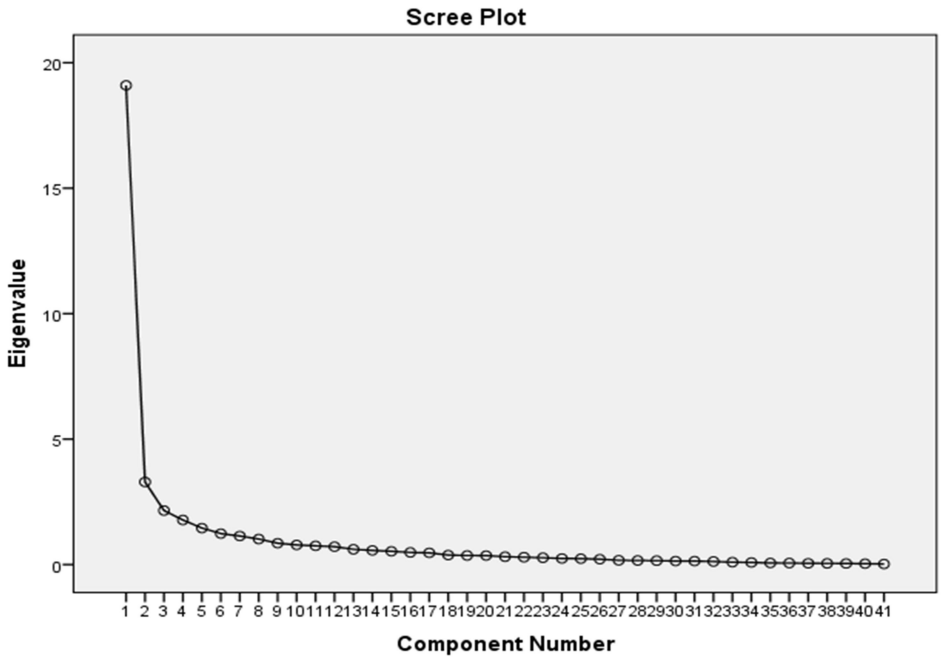


Figure 1: Scree Plot level of significance of Causes of Delay in TETFund Building Projects

Table 4 showed the redistribution of all the causes of delay identified into the eight significant categories derived above. The rotated factor matrix shows how the variables were weighted for each component and also the correlation between the items and the component. Because these are correlations, possible values range between -1 to +1. Every item categorized under any component has a fairly strong correlation with that component. The summary of the categories is shown in Table 5.

External Factors

This component accounted for the highest singular variance in the causes of delay (46.579%). This category consists of seven factors all having strong positive individual correlation with the components ($r > 0.50$). The highest weighted cause of delay in this category was poor relationship with community (r=0.809). It was followed by labour unrest (r=0.780) and public opposition to projects. The other factors in this category were inclement weather, flood, shortage of construction equipment and high maintenance cost.

Technical Factors

This component accounted for 8.029% of the variance explained by the factor analysis model. The cause of delay having the highest weighting factor and correlation with the component was shortage of skilled labourers (r=0.762), change in the scope of work had the second highest contributing factor in the category (r=0.760) and then subcontractor's incompetence (r=0.611). Other causes of delay in this category are skills and experience of the contractor's technical staff, communal catastrophes, poor contract management, unforeseen adverse ground conditions, lack of commitment between parties and lack of resources (labour and material).

Incompetence Factors

This category accounts for only a 5.254% change in the model. The causes of delay in this category are: delay in availability of design details (r=0.703), low performance of the lowest bidder contractor (r=0.620), payment delays by owner (r=0.607), change in design (r=0.582), defective design, error and rework (r=0.549) and non-utilization of professionals in contractual arrangement (r=0.442).

Cash Flow Factors

This category accounts for 4.334% of the variance in the factor analysis model. Five factors are in this group and the most significant of them is problem with credit accessibility (r=0.815). It was followed by quality assurance and control (r=0.691), cost underestimation (r=0.634), contractor cash flow problem (r=0.533) and operational policy of TETFund (r=0.531).

Internal Factors

These factors consist of causes of delay that relate to the input and operation of the involved parties in TETFund projects. This factor accounts for 3.547% of the variance of the items. The causes of delay in this category are inadequate planning (r=0.777), delay in progress payment by the client (r=0.694) and poor site management and coordination problem (r=0.660).

Operational Factors

This category consists of six causes of delay relating to the operational quality of the stakeholders in TETFund projects. The causes of delay in this category are subcontractor's and contractor's financial incapacity (r=0.795), substandard contract format (r=0.651), lack of commitment and communication (r=0.558), contractor's inexperience (r=0.489), lack of attention to contract requirements (r=0.477) and unclear project scope (r=0.476).

Scope Factors

The causes of delay in this category are bureaucratic bottle-neck in TETFund and unrealistic contract duration and mode of fund release in stages by TETFund.

Administrative Factors

Two causes of delay are in this category: change in government (r=0.830) and slowness in decision making by all concerned (r=0.503).

Table 4: Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Poor relationship with community	.809							
Labour unrest	.780							
Public opposition to projects	.730							
Inclement weather	.683							
Flood	.680							
Shortage of construction equipment	.588							
High maintenance cost	.577							
Shortage of skilled labourers		.762						
Change in the scope of work		.760						
Subcontractor's incompetence		.611						
Skills and experience of the contractor's technical staff		.585						
Communal catastrophes		.576						
Poor contract management		.475						
Unforeseen adverse ground condition		.428						
Lack of commitment between parties		.422						
Lack of resources (labour and material)		.410						
Delay in availability of design details			.703					
Low performance of the lowest bidder contractor			.620					
Payment delays by owners			.607					
Change in design			.582					
Defective design, error and rework			.549					
Non-utilization of professionals in contractual arrangement			.442					
Problem with credit accessibility				.815				
Quality assurance and control				.691				
Table 4: Rotated Component Matrix[a] Cont'd								
Cost underestimation				.634				
Contractor's cash flow problem				.533				
Operational policy of TETFund which lumps projects in groups for fund release				.531				
Inadequate planning					.777			
Delay in progress payment by the client					.694			
Poor site management and coordination problem					.660			
Subcontractor's and contractor's financial incapacity						.795		
Substandard contracts format						.651		
Lack of commitment and communication						.558		
Contractor's inexperience						.489		
Lack of attention to contract requirements						.477		
Unclear project scope						.406		
Bureaucratic bottle-neck in TETFund							.671	
Unrealistic contract duration							.664	
Mode of fund release in tranches (in stages) by TETFund							.643	
Change in government								.830
Slowness in decision making by all concerned								.503

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 12 iterations.

Table 5: Details of Components of Causes of Delay

Components	Title	Variance	Cumulative variance
1	External factors	46.579%	46.579%
2	Technical factors	8.029%	54.608%
3	Incompetence factors	5.254%	59.862%
4	Cash flow factors	4.334%	64.196%
5	Internal factors	3.547%	67.742%
6	Operational factors	3.014%	70.756%
7	Scope factors	2.777%	73.533%
8	Administrative factors	2.482%	76.015%

5. CONCLUSION AND RECOMMENDATION

The findings showed that institutional, financial and project management related factors are the major causes of delay in TETFund sponsored building projects. The mean score ranking of the most important delay factors were: operational policy of TETFund especially the grouping of projects for phased fund disbursement; bureaucratic bottlenecks in fund administration and approval processes; delayed payment by project owners; cash flow constraints of contractors; limited access to credit facilities; and poor site management and coordination. The findings show that the major reasons of delay are beyond the traditional construction management problems and are heavily influenced by the peculiar funding and administrative structure regulating TETFund projects. In particular, the process of institutional finance and administrative inefficiencies further aggravate contractors' financial woes leading to disrupted cash flow on projects, reduced productivity and extended durations of project completion. The outcomes of this study suggest that the identified major sources of delay should be addressed proactively by the project stakeholders which include TETFund, clients, consultants and contractors.

The study therefore recommends that the focus should be on simplifying the processes of project funding and approval by TETFund, prompt payment for work done, improved access to finance for contractors, and strengthening site management and project coordination standards. Continuous capacity-building programmes should also be organised for the construction stakeholders to develop their grasp of good project planning, financial management, contract administration and delay mitigation techniques. Moreover, engaging qualified and experienced people in the project planning, supervision and decision making would enhance project governance and reduce administrative bottlenecks. Finally, stakeholders should institutionalise the execution and constant monitoring of evidence-based delay mitigation techniques to enhance the cost and schedule performance of TETFund-funded building projects in Nigeria for timely and efficient delivery.

6. SUGGESTIONS FOR FURTHER RESEARCH

The study was delimited to TETFund financed building projects in some selected tertiary educational institutions in Oyo State, Nigeria, therefore limiting the generalisation of the findings to other geographies and funding circumstances. Therefore, future studies should replicate similar investigations to other geopolitical zones in Nigeria and compare TETFund funded projects with infrastructure projects funded through other public funding mechanisms, such as federal and state

budgetary allocations, Public-Private Partnerships (PPPs) and international donor agencies. Further research should also apply sophisticated analytical tools such as Structural Equation Modelling (SEM), Partial Least Squares-SEM (PLS-SEM) and System Dynamics Modelling to study the interrelationships among delay factors. Further research is needed to study the impact of procurement strategies, governance arrangements, contract administration practices, regulatory compliance and digital project management tools on project delivery performance and to assess the long-term operational outcomes, value for money and sustainability of completed projects. Finally, future studies should be directed towards building and verifying predictive decision-support models that can identify risks of delay during the project planning phase for proactive risk management and timely delivery of educational infrastructure projects.

REFERENCES

Abdulraheem, A. A., Abdulazeez, A. S., Bello, A. O., Faruq, M. Y., Musa, A. K., & Shabi, M. O. (2026). Exploring the factors affecting quality of project delivery in the Nigerian construction industry. *The TQM Journal, 38*(5), 1156–1174.

Aibinu, A. A., & Jagboro, G. O. (2002). The effects of construction delays on project delivery in the Nigerian construction industry. *International Journal of Project Management, 20*(8), 593–599.

Aibinu, A. A., & Odeyinka, H. A. (2006). Construction delays and their causative factors in Nigeria. *Journal of Construction Engineering and Management, 132*(7), 667–677.

Al Saeedi, A. S., & Karim, A. M. (2022). Major factors of delay in developing countries' construction projects: A critical review. *Sciences, 12*(5), 797–809.

Alaghbari, W., Kadir, M. R. A., Salim, A., & Ernawati. (2007). The significant factors causing delay of building construction projects in Malaysia. *Engineering, Construction and Architectural Management, 14*(2), 192–206.

Alaghbari, W., Saadan, R. S. N., Alaswadi, W., & Sultan, B. (2018). Delay factors impacting construction projects in Sana'a, Yemen. *Engineering, Construction and Architectural Management.*

Amoah, K. B., Okere, G., & Deshpande, A. (2024). Construction delay analysis: Causes, impacts, and mitigation strategies. Journal of Civil Engineering Research, 14(1), 1–9.

Arantes, A., & Ferreira, L. M. D. (2020). Underlying causes and mitigation measures of delays in construction projects: An empirical study. Journal of Financial Management of Property and Construction, 25(2), 165–181.

Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. International Journal of Project Management, 24(4), 349–357.

Atkinson, R. (1999). Project management: Cost, time and quality, two best guesses and a phenomenon: It's time to accept other success criteria. International Journal of Project Management, 17(6), 337–342.

Atkinson, R., Crawford, L., & Ward, S. (2006). Fundamental uncertainties in projects and the scope of project management. *International Journal of Project Management, 24(8),* 687–698.

Doloi, H. (2023). Construction project management: Theory and practice (2nd ed.). Routledge.

Doloi, H., Sawhney, A., & Iyer, K. C. (2012). Structural equation model for investigating factors affecting delay in Indian construction projects. Construction Management and Economics, 30(10), 869–884.

Doloi, H., Sawhney, A., Iyer, K. C., & Rentala, S. (2012). Analysing factors affecting delays in Indian construction projects. International Journal of Project Management, 30(4), 479–489.

Egwim, C. N., Alaka, H., Toriola-Coker, L. O., Balogun, H., Ajayi, S., & Oseghale, R. (2023). Extraction of underlying factors causing construction project delays in Nigeria. Journal of Engineering, Design and Technology, 21(5), 1323–1342.

Falaye, T. E. (2024). Project management challenges in developing economies: A case study of infrastructure projects in Nigeria. ScienceOpen Preprints.

Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). Causes of delay and cost overruns in construction of groundwater projects in a developing country: Ghana as a case study. International Journal of Project Management, 21(5), 321–326.

Fugar, F. D. K., & Agyakwah-Baah, A. B. (2010). Delays in building construction projects in Ghana. Australasian Journal of Construction Economics and Building, 10(1/2), 103–116.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis: A global perspective (7th ed.). Pearson Education.

International Federation of Consulting Engineers. (2017). FIDIC conditions of contract for construction: For building and engineering works designed by the employer (2nd ed.). FIDIC.

Iroha, E. V., Watanabe, T., & Satoshi, T. (2024). Flawed institutional structures: Project managers underutilized in Nigeria's construction industry. Buildings, 14(3), Article 807.

Ji, G. X., Chan, P. W. K., McCormick, A., Won, M., Ali, S., Jimmy, M., ... Gurung, D. (2024). Scholarly responses to UNESCO Global Education Monitoring Report 2024: Pacific technology in education: A tool on whose terms? International Education Journal: Comparative Perspectives, 23(2), 154–170.

Johnson, R. M., & Babu, R. I. I. (2020). Time and cost overruns in the UAE construction industry: a critical analysis. International Journal of Construction Management, 20(5), 402-411.

Kelechi, G., & Chinemerem, N. P. (2025). Analysis of factors contributing to the failure and abandonment of construction project delivery in Nigeria.

Kerzner, H. (2025). Project management: A systems approach to planning, scheduling, and controlling. John Wiley & Sons.

Lo, T. Y., Fung, I. W. H., & Tung, K. C. F. (2006). Construction delays in Hong Kong civil engineering projects. Journal of Construction Engineering and Management, 132(6), 636–649.

Ogbeifun, E., & Pretorius, J. H. C. (2022). Investigation of factors responsible for delays in the execution of adequately funded construction projects. Engineering Management in Production and Services, 14(1), 93–102.

Ojoko, E. O., Tanko, B. L., Jibrin, M., & Enegbuma, W. L. (2016). Project delay causes and effects in the construction industry. In Proceedings of the 6th International Graduate Conference on Engineering, Science and Humanities (IGCESH) (pp. 221–223).

Orya, F., & Calahorra-Jimenez, M. (2025). Delays in infrastructure projects: Main reasons in the design, procurement, and construction phases. Public Works Management & Policy, 30(2), 261–280.

Project Management Institute. (2000). A guide to the project management body of knowledge

Purushothaman, R., et al. (2024). Interrelationships among delay factors in construction projects: A systematic literature review. Engineering, Construction and Architectural Management.

Rodionova, O., Kucheryavskiy, S., & Pomerantsev, A. (2021). Efficient tools for principal component analysis of complex data-A tutorial. Chemometrics and Intelligent Laboratory Systems, 213, 104304.

Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in the Malaysian construction industry. International Journal of Project Management, 25(5), 517–526.

Selçuk, O., Türkoğlu, H., Polat, G., & Hajdu, M. (2024). An integrative literature review on the causes of delays in construction projects: Evidence from developing countries. International Journal of Construction Management, 24(6), 610–622.

Seliudi, M. (2019). "Assessing Factors Causing Delay and Cost Overruns in Construction of Ground Water Project in Dar es salaam (Doctoral dissertation, The Open University of Tanzania).

Sunjka, B. P., & Jacob, U. (2013). Significant causes and effects of project delays in the Niger Delta region, Nigeria. In SAIIE25 Proceedings.

Zagia, F., Kajewski, S., Omrani, S., & Motamedisedeh, O. (2026). Prioritizing the key causes of construction project delay in different countries: A cross-sectional analysis of different project types. International Journal of Construction Management, 26(9), 1879–1904.

Zid, C., Kasim, N., & Soomro, A. R. (2020). Effective project management approach to attain project success based on cost, time, and quality. International Journal of Project Organisation and Management, 12(2), 149-163.