5th African International Conference on Industrial Engineering and Operations Management, Johannesburg/Pretoria, South Africa, April 23 - 25, 2024
Publisher: IEOM Society International, USA
Published: April 23, 2024 DOI: 10.46254/AF05.20240101

The Impact of Failed Infrastructure Projects in Municipalities

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Abstract

The inadequacy of infrastructure projects in the municipal sector across South Africa has escalated because of various factors. This study aims to uncover the underlying causes of infrastructure project failures in municipalities, the critical success factors for addressing these failures, and the consequences of these failures. A quantitative research approach was employed, which utilized survey questionnaires developed through a literature review as the foundation. The questionnaires were administered using Microsoft Forms (Internet Survey), and participants were requested to complete the survey online to offer their perspectives on project failures within the municipal environment, with a focus on the local municipalities in Gauteng Province. The results indicated that contractors were the primary cause of project failure in municipalities, and that cash flows and inaccurate costing during the tender stage were the primary factors leading to contractor failure to execute projects. This was also linked to client failures, where awarding the project to the lowest bidder resulted in project failure. Municipalities must ensure that comprehensive due diligence and screening of contractors' financial viability are conducted before tenders are awarded. The analysis revealed that the contractor's ability to deliver quality work is the most critical success factor, followed by the development of a realistic project budget. It was also identified that cost overrun, loss of grant funds, and time overrun were the top three consequences of project failure.

Keywords
Root Cause, Project Failure, Critical Success Factors, Failure Impact and Municipality.

1. Introduction
Infrastructure development is the backbone of any developmental economy, including that of South Africa. Municipalities are required to contribute to a country Gross Domestic Product (GDP) through infrastructure development. The challenges of failed infrastructure projects in local governments have become persistent to the detriment of communities' social well-being and economic development, leading to a disproportionate allocation of fiscal resources. Municipalities have been negatively affected by failure to complete construction projects on time, budget, and required quality. Numerous factors contribute to the failure of municipalities' projects, including project managers' incompetence, inefficient tender processes, and a lack of community support (Ngubane and Nephawe 2017).

In a report published by KPMG International, the results highlighted a global problem, including South Africa, of public sector projects failing to perform because of cost or schedule overruns (KPMG International 2015). Municipalities depend on funding provided through grants for the implementation of infrastructure projects, but municipalities are failing to spend the allocated funds resulting in R3,5 billion being returned to the fiscal (Auditor-General South Africa 2019). Between 2016 and 2020, projects failing to meet their deadlines increased from 10% to 60% (Auditor-General South Africa 2021). The failure of infrastructure projects in the municipal environment across

South Africa has increased, as highlighted by the AGSA, due to various factors. However, it is necessary to understand what affects the performance of infrastructure projects at the municipal level, which leads to their failure in South Africa. The dynamics of implementing projects at the municipal level are different from projects implemented by the private sector, provincial, and national governments because of issues related to community involvement through subcontracting, among others.

1.1 Objectives

The primary goal of this study is to uncover the underlying causes of infrastructure project failures in the local municipalities of Gauteng Province. Second, this study aimed to identify critical success factors that could be implemented to address these failures. Finally, the study sought to understand the impact of failed infrastructure projects on stakeholders, including the beneficiaries of these projects, and to identify potential solutions to mitigate this impact.

2. Literature Review

Project failure has been researched by many scholars to understand what leads to it. Therefore, it is imperative to determine criteria for classifying a project as a failure. Shahhosseini et al. (2018) define project failure as a project that experiences time and cost overruns such that it loses its economic justification or is abandoned or not completed. A project is regarded as a failure if it exceeds the scheduled time, experiences cost overrun, and does not meet the expectations of the organization and stakeholders (El-Sokhn and Othman 2014). Akande et al. (2018) suggested that failing to meet the client's expectations with time, cost, and quality is considered a project failure.

2.1 Root Causes of Project Failure

The literature review below focuses on the root causes of project failures that have resulted in the classification of projects as failed. Nweze (2016) evaluated the factors responsible for infrastructure failures in Nigeria through a qualitative research method and concluded that delays in payments by the government to contractors, corruption by contractors, and officials during the bidding stage, including inaccurate cost estimates, poor monitoring during implementation, poor design due to lack of proper site investigation, community interference through demands, and poor communication among project stakeholders leading to contract termination, were some of the factors responsible for government project failures. Mugumbate and Kruger (2021) conducted a study on construction project failures in South African municipalities and identified poor planning, corruption, and delay in payments as the top three ranked internal causes, while political interference, employee strikes, and weather conditions were the top three ranked external causes of municipal project failures.

Corruption within government institutions resulting from political cultures and partisan politics has negatively affected infrastructure projects, leading to abandonment, budget overruns, time overruns, and/or quality deficiencies (Akwei, et al. 2017). Mahamid (2017) investigated the main factors affecting schedule deviation in road construction projects through literature review and interviews. The author identified approximately 20 factors that affect road construction projects, including politics, payment delays, lack of communication, geotechnical conditions, scope change, contractor financials, project size, rework, design mistakes, late design work, weather conditions, and project location. Sinesilassie et al. (2017) argued that schedule performance should form part of the Iron Triangle because its failure undermines investment efforts in public construction projects. The authors collected their data through survey questionnaires from construction professionals to analyze the factors for the success and failure of schedule performance in Ethiopian public construction projects. The project failure factors identified by the authors included conflict among project participants, indecisiveness of project participants, project manager ignorance and lack of knowledge, unfavorable socioeconomic and climatic conditions, project-specific factors, and poor human resource management (Sinesilassie et al. 2017). In attempting to address project failure factors, clients, including governments, assume certain aspects that inform decision-making, including addressing cost and time overruns, by setting fixed costs and timelines, and assuming the execution of projects in a perfect or stable environment (Summers 2015). Summer (2015) argued that this approach does not receive the perceived outcome of resolving project failures.

2.2 Effects of infrastructure project failure

Project failures have a negative impact on the stakeholders involved in the project, including the intended users of infrastructure. Eja and Ramegowda (2020) identified multiple effects of failed projects, including loss of revenue by the state from initial investment that cannot be recovered, project cost overruns, and honor commitments and rework.

The loss of revenue by citizens was another effect when the project failed, along with low empowerment of the community and substandard infrastructure emanating from incomplete work. They also identified the loss of grants from investors such as the national government, which resulted in tougher donor regulations. From a political perspective, it was perceived that the loss of elections to incumbent leadership would be the effect of project failure, along with the community's lack of confidence in the state (Eja and Ramegowda 2020). This view is consistent with a study conducted on abandoned construction projects in Nigeria, which concluded that the disappointment of beneficiaries and low living standards would have direct effects on users, along with reduced employment opportunities. From the government's perspective, abandoned projects would lead to a decrease in revenue and difficulty in attracting foreign loans (Ayodele 2011). Akwei et al. (2017) argued that corruption within government institutions leads to project failure, and Kenny (2012) suggested that the impact of corruption by government officials and private firms results in infrastructure price increases through bribes paid by firms before awards of contracts and during project implementation, reduced quality and lifespan of infrastructure by substandard works being accepted by clients, and reduced economic infrastructure investment returns requiring funders to add more funds for maintenance and rehabilitation before the expected period.

2.3 Critical Success Factors (CSF) of Infrastructure Projects

The determination of project success criteria requires that all stakeholders (client, contractor, consultant, funder, users, etc.) agree on how success is measured. Bullen and Rockart (1981) define critical success factors as "the few key areas of activity in which favourable results are absolutely necessary for a particular manager to reach his goals". An investigation into the CSF of project management for sustainability projects conducted in the Czech Republic identified human resource factors linked to achieving project success, including the ability of the project team to develop plans and meet deadlines, access to finance, ability to deliver quality work, ability to provide leadership, and requisite prior experience to deliver projects (Vrchota et al. 2020). Al-Ageeli and Alzobaee (2016) conducted a quantitative study into the CSF in construction projects, and they identified 12 CSFs including the contractor's cash flow, political environment, economic stability, project manager's experience, contractor experience, top management support, delays in producing design documents, site and work management, decision making by the client, awarding bids to capable contractor, design team experience, project manager's ability and authority to take decisions, and resource availability.

3. Methods

The approach used for this study was a quantitative method that followed the non-experimental category (Kothari, 2004). This study used exploratory research by reviewing the existing literature to determine what other scholars have discovered about the root causes of infrastructure project failure, the critical success factors of projects, and the impact of failed infrastructure projects. The literature review process was used as a baseline for developing the survey questionnaire. This study used the snowball sampling method because of limited access to the full population list representing the local municipalities under consideration, the national and provincial departments, and current and previous construction and consulting companies operating in those municipalities. In conducting the study, ethics were considered in line with the University of Johannesburg's policies in terms of autonomy by excluding the need for personal or company information from the questionnaire to maintain anonymity and benefit by providing access to the study results if desired to improve their project implementation processes; non-maleficence by maintaining complete confidentiality with no submission of personal information to protect participants against lawsuits and reputational damage; and justice by non-discrimination based on color or ethnic group and gender.

4. Data Collection

The research targeted responses from various stakeholders involved in the execution of projects in the local government sphere, which include infrastructure project funders, project managers, clients, consultants, and contractors focusing on local municipalities in Gauteng Province. The instrument used for the research was the survey questionnaire as a data collection tool. The research was administered using Microsoft Forms (Internet Survey), where participants were requested to complete the questionnaires online to provide their opinions on project failures within the municipalities. The data collection period was limited to approximately 3 weeks before the closure of the survey (September 28, 2023, to October 22 2023).

5. Results and Discussion

The study employed a questionnaire data collection approach, which was divided into four sections: background information, root causes of project failures, critical success factors of infrastructure projects, and the impact of failed infrastructure projects in municipalities. The background information section asked participants to provide their age group, role played in municipal infrastructure projects, discipline, years of experience, and level of education, as presented in Table 1. The distribution of respondents' age groups indicated that there were 21% each from three age groups: 31–35, 36–40, and 41–45 years. In terms of roles in municipal infrastructure projects, most respondents (38%) were consultants, project sponsors represented 17% were project managers represented 14%. Contractors and clients represented 10% and 7% of respondents, respectively. In terms of the practice discipline, 72% were civil engineering practitioners, 21% project management, 3% finance, and 3% built environment. In terms of years of experience in municipal projects, 35% had 6-10 years and 34% had 11-15 years. 52% of respondents indicated that they obtained a B-Tech degree, 24% a master's degree, 17% a national diploma, and 7% a bachelor's degree as their highest level of qualification.

Table 1. Respondent Profile

Variables	**Proportions**
Age Group (N = 29)	
26 years - 30 year	7%
31 years - 35 year	21%
36 years - 40 year	21%
41 years - 45 year	21%
46 years - 50 year	10%
51 years - 55 year	10%
56 years - 60 year	7%
61 years or older	3%
Cumulative	**100%**
Role in Municipal Infrastructure Projects (N = 29	
Project Manager	14%
Client	7%
Contractor	10%
Consultant	38%
Project Sponsor	17%
Assurance	3%
Programme Manager	3%
Technical Support	3%
Technician	3%
Cumulative	**100%**
Practice Discipline (N = 29)	
Civil Engineering	72%
Project Management	21%
Finance	3%
Built Environment	3%
Cumulative	**100%**
Duration of involvement in municipal projects (N = 29)	
1 - 5 years	17%
6 - 10 years	35%
11- 15 years	24%
16 - 20 years	10%
21 years or more	14%
Cumulative	**100%**
Education Level (N = 29)	
National Diploma	17%
B-Tech Degree	52%
Bachelor's Degree	7%
Master's Degree	24%
Cumulative	**100%**

5.1 Numerical Results

Below is a presentation of the numerical findings of the research, including an analysis of the findings. Data were analyzed using SPSS 29's descriptive statistics analysis and Microsoft Excel. This section presents detailed findings related to the descriptive statistics of the root causes of infrastructure project failure, critical success factors (CSF) of infrastructure projects, and the impact of failed infrastructure projects in municipalities.

5.1.1 Descriptive Statistics of the Root Causes of Infrastructure Project Failure

The first level of analysis focused on the root causes of failure impacting the five categories of failure identified in the literature review (project manager, client, consultant, contractor, and external factors). The analysis of failure factors related to the project manager yielded a Cronbach's alpha (α) of 0.930, representing an excellent classification in terms of internal consistency.

Table 2. Project Manager Related Failures

Variable	No.	Cronbach's alpha (α)	Mean (M)	Standard Deviation	Ranking
Poor planning	9	0.930	2,7	1,004	1
Poor monitoring			2,6	0,875	2
Poor project management			2,5	0,871	3
Poor scope tracking			2,5	0,911	4
Delay in approving Variation Orders			2,5	0,871	5
The indecisiveness of the project manager			2,5	0,949	6
Poor communication with the project team			2,3	0,769	7
Project manager's incompetence			2,2	0,872	8
Project manager's ignorance			2,2	0,902	9

Table 2 shows that poor planning by the project manager was the highest-ranked infrastructure project failure factor (M = 2.7, SD = 1.004). Poor monitoring was ranked second (M = 2.6, SD = 0.875).

The analysis of failure factors related to the client yielded a Cronbach's alpha (α) of 0.868, representing a good classification in terms of internal consistency. The top three factors of project failures related to clients, as indicated in Table 3, were awarding the project to the lowest bidder (M = 3.2; SD = 0.805), delay in processing progress payments (M = 3.1; SD = 0.593), and political interference (M = 3.1; SD = 0.860).

Table 3. Client Related Failures

Variable	No.	Cronbach's alpha (α)	Mean (M)	Standard Deviation	Ranking
Awarding the project to the lowest bidder	13	0.868	3,2	0,805	1
Delay in processing progress payments			3,1	0,593	2
Political interference			3,1	0,860	3
Delay in approving Variation Orders			2,8	0,830	4
Poor procurement processes			2,8	0,928	5
Corruption			2,7	1,032	6
Lack of project management processes			2,6	0,946	7
Poor contract conditions			2,6	0,775	8
Delay in site-handover to the contractor			2,5	0,986	9
Wayleaves not in place during construction			2,5	0,829	10
Insufficient project funding			2,5	0,922	11
Poor communication with project team			2,2	0,726	12
Change in scope of work by client			2,2	0,602	13

The analysis of the failure factors related to the consultant yielded a Cronbach's alpha (α) of 0.932, representing an excellent classification in terms of internal consistency measurement. The top three factors of project failure related to the consultant, as indicated in Table 4, are late design work (M = 2.5, SD = 0.911), incomplete design documentation (M = 2.4; SD = 0.912), and poor site supervision (M = 2.4; SD = 0.869).

Table 4. Consultant Related Failures

Variable	No.	Cronbach's alpha (α)	Mean (M)	Standard Deviation	Ranking
Late design work	6	0.932	2,5	0,911	1
Incomplete design documentation			2,4	0,912	2
Poor site supervision			2,4	0,869	3
Poor communication with project team			2,4	0,824	4
Poor design work			2,3	0,967	5
Unclear instruction issued to the contractor			2,3	0,797	6

The analysis of the failure factors related to the contractor yielded a Cronbach's alpha (α) of 0.880, representing a good classification in terms of internal consistency measurement. The top three factors of project failure related to the consultant, as indicated in Table 5, are cash flow difficulties (M = 3.2; SD = 0.786), inaccurate costing at the tender stage (M = 3.2; SD = 0.786), and ineffective planning and scheduling of the project (M = 3.0; SD = 0.778).

Table 5. Contractor Related Failures

Variable	No.	Cronbach's alpha (α)	Mean (M)	Standard Deviation	Ranking
Cash flow difficulties	9	0.880	3,2	0,786	1
Inaccurate costing at the tender stage			3,2	0,786	2
Ineffective planning and scheduling of project			3	0,778	3
Delays in Subcontractors activities			3	0,906	4
The incompetence of contractor's technical team			2,9	0,799	5
Rework due to errors during construction			2,8	0,759	6
Poor labour productivity			2,8	0,805	7
Project size above contractor's capabilities			2,7	0,841	8
Poor communication with the project team			2,6	0,825	9

The study's findings regarding the external factors causing project failure revealed an acceptable level of internal consistency, as demonstrated by a Cronbach's alpha (α) of 0.694. The top three factors, as outlined in Table 6, were assessed to be local contractors demanding subcontracting on the project (M = 3.6, SD = 0.568), community strikes (M = 3.3; SD = 0.604), and political interference (M = 3.0; SD = 0.865).

Table 6. External Factors Related Failures

Variable	No.	Cronbach's alpha (α)	Mean (M)	Standard Deviation	Ranking
Local contractors demanding to be subcontracted on the project	7	0.694	3,6	0,568	1
Community strikes			3,3	0,604	2
Political Interference			3	0,865	3
Country's economic conditions			2,6	0,775	4
Unforeseen Geotechnical conditions			2,4	0,677	5
Extreme weather conditions			2,2	0,602	6
Project location			1,9	0,618	7

The second level of analysis was conducted to determine the leading causes of infrastructure project failures in municipalities, among the five main variables. Five factors were identified and ranked. According to the respondents, contractors (N = 9, α = 0.880, M = 2.911, SD = 0.209) were ranked as the primary factor causing infrastructure project failures in municipalities. The analysis indicated that the internal consistency (Cronbach's alpha) was 0.880, indicating a good internal consistency. The top four factors identified as causing project failures attributed to contractors were cash flow difficulties, inaccurate costing at the tender stage, ineffective planning and scheduling of the project, and delays in subcontractor activities. External factors were ranked second in terms of causes of infrastructure project failure in municipalities (N = 7, α = 0.694, M = 2.714, SD = 0.612). Cronbach's alpha was 0.694, which is acceptable in terms of internal consistency. Local contractors demanding to be subcontracted on the project and community strikes were the two leading factors contributing to municipal project failures, with a weighted average of 3.6 and 3.3, respectively.

Clients (N=13, α=0.864, M=2.677, SD=0.319) ranked third in terms of the significance of infrastructure project failure causes in municipalities, with a mean of 2.677. The analysis revealed a Cronbach's alpha of 0.864, indicating a good classification in terms of internal consistency. Awarding the project to the lowest bidder, political interference, and delay in processing progress payments by the client were the top three leading factors for project failure in municipalities.

The project manager (N=9, α=0.929, M=2.444, SD=0.174) ranked fourth in terms of the significance factor causing infrastructure project failures in municipalities. Internal consistency was excellent, with a Cronbach's alpha of 0.929. The top two ranked factors attributed to the project manager were poor planning and poor monitoring with a weighted average of 2.7 and 2.6, respectively.

According to respondents, consultants (N=6, α=0.932, M=2.383, SD=0.075) were ranked fifth in terms of the significant factors causing infrastructure project failures in municipalities. The analysis indicated that the Cronbach's alpha was 0.932, indicating excellent classification in terms of internal consistency. Project failures in municipalities attributed to consultants because of late design work were the leading factor, followed by poor site supervision.

Table 7. Descriptive statistics of the root causes

Variables	**No.**	**Cronbach's alpha (α)**	**Standard Deviation (SD)**	**Mean (M)**	**Ranking**
Contractor Related Failures	9	0.880	0.209	2.911	1
External Factors Related Failures	7	0.694	0.612	2.714	2
Client Related Failures	13	0.864	0.319	2.677	3
Project Manager-Related Failures	9	0.929	0.174	2.444	4
Consultant Related Failures	6	0.932	0.075	2.383	5

5.1.2 Critical Success Factors (CSF) of Infrastructure Projects

The analysis indicated that Cronbach's alpha (α) was 0.909, indicating excellent classification in terms of internal consistency. The results revealed that the top three critical success factors are the contractor's ability to deliver quality work (M = 4,863 and SD = 0,441) which is the number one success factor, followed by the development of a realistic project budget (M = 4,778 and SD = 0,506), and top management support required from inception to closure of a project (M = 4,715 and SD = 0,600). Table 8 provides a detailed analysis of the CSFs according to their ranking in the order of importance.

Table 8. Descriptive statistics of the CSFs

Variables	**No.**	**Cronbach's alpha (α)**	**Standard Deviation (SD)**	**Mean (M)**	**Ranking**
Contractor's ability to deliver quality work	11	0.909	0,441	4,863	1
Developing a realistic project budget			0,506	4,778	2
Top management support is required from inception to closure of a project			0,600	4,715	3
Developing realistic project timelines			0,659	4,713	4
Developing and managing an effective and efficient risk management plan			0,541	4,691	5
Developing adequate plans and specifications			0,548	4,678	6
Contractor's ability to access finances			0,670	4,657	7
The project team must be experienced and be experts in the type of project being implemented			0,622	4,621	8
Awarding bids to the right contractor without relying on low-price offer as a key determining factor in awarding bids			0,870	4,555	9
Requisite prior experience to deliver project type and size by contractor and consultant			0,632	4,552	10
The project manager's authority to make day-to-day decisions without interference from top management is important to the success of a project			0,830	4,242	11

The second objective of this study is to determine the critical success factors that can be implemented to address project failures. The study results, as presented in Table 8, suggest that all the identified factors are important for the successful implementation of municipal projects.

5.1.3 The Impact of Failed Infrastructure Projects in Municipalities

The analysis indicated that Cronbach's alpha (α) was 0.821, indicating good classification in terms of internal consistency. Table 9 presents an overview of the impact of the failure of the municipal infrastructure projects. The results indicate that the top three consequences of project failure are the project experiencing cost overrun as the leading effect (M = 4,518 and SD = 0,574), the second is loss of grant funding (M = 4,449 and SD = 0,783), and the third is the project experiencing time overrun (M = 4,415 and SD = 0,780). The results revealed that the loss of elections to political leadership was the least ranked effect in the order of significance (M = 3,518 and SD = 0,829). The third objective of this study was to understand the impact of failed infrastructure projects on projects and stakeholders. The study results suggest that cost overruns and time overruns are the leading effects on projects, but the leading effect on stakeholders is that municipalities lose public trust in terms of infrastructure delivery.

Table 9. Descriptive statistics of project failure impact

Variable	No.	Cronbach's alpha (α)	Standard Deviation (SD)	Mean (M)	Ranking
Project experiences cost overrun	10	0.821	0,574	4,518	1
Loss of grant funding			0,783	4,449	2
The project experiences time overrun			0,780	4,415	3
Lack of confidence in municipalities' ability to deliver infrastructure projects			0,780	4,414	4
Substandard infrastructure is delivered			0,867	4,414	5
Slow economic growth within the beneficiary community			0,761	4,311	6
Loss of employment revenue by citizens			0,726	4,207	7
Tougher donor regulations			0,875	4,139	8
Low empowerment in the community			0,789	4,138	9
Loss of elections to the political leadership			0,829	3,518	10

5.2 Proposed Improvements

Project teams implementing projects in municipalities must be aware of the potential pitfalls that could render a project a failure. It is therefore recommended that during the planning stage of any project in the municipal environment, the project manager analyzes the risks against the identified root causes and more, which would inform the mitigation strategies to be implemented (Crawford 2004).

The study results indicated that contractors are the leading cause of project failure, and it is evident that cash flows and inaccurate costing during the tender stage are the main factors leading contractors to fail to implement projects. Municipalities must ensure that the due diligence and screening of contractors' financial viability are conducted before awarding tenders. This was also linked to the client's failures, where awarding the project to the lowest bidder was the leading cause of project failure.

The success factors from this study are important to the project outcome and should be used as a planning baseline, with others being added as and when identified. The impact of failed infrastructure projects can be visible in cases where the project is abandoned or incomplete; however, in most cases, the impact is not visible. The project team needs to conduct an impact analysis, especially on elements such as loss of employment revenue, loss of grant funds, and lack of confidence in municipalities by communities, which should form part of the stakeholder analysis to determine the impact index (Olander 2007).

5.3 Validation

This study used a literature review process as a validation tool. Facial validation was implemented by requesting two employees from Emfuleni Local Municipality to participate in the practice pilot to improve the language and eliminate ambiguity within the structure of the questionnaire. Cronbach's alpha was used to measure the internal consistency of the questionnaire. Cronbach's alpha was measured using Microsoft Excel and SPSS 29.

6. Conclusion

Project failure in municipalities has become an obstacle to the economic development of communities. Determining the causes of project failures in the context of municipalities and their impact is key to improving the success rate of projects in municipalities, which can potentially unlock economic development. The study confirmed that there are root causes of project failure in municipalities (Gauteng). However, the failures were due to the different stakeholders and circumstances within the project setting. Contractors were identified as the main root cause, followed by external factors and clients. This suggests that the project team at the planning stage must address most of the causes identified in the study before implementation. The CSFs were confirmed to be important for successful project implementation, with all identified CSFs viewed as necessary by the respondents. The triple constraint factors were ranked in the top four, along with the top management support. The study also confirms that project failures have an impact on stakeholders and projects. Cost overrun, loss of funds, and time overrun were the top three effects of failure. Therefore, a project would have failed two of the triple constraints, rendering the project less desirable as it loses its financial justification, as alluded to by Shahhosseini et al. (2018).

Reference

Akande, O.K., Olagunju, R.E., Obiora, O.C., Nsofor, C., Edem-Nse, Y.G., Lawal, A., Yisa, D. & Kolo, W. Evaluation of failures in public project management practices in minna, nigeria. 2018.

Akwei, C., Damoah, I.S. & Amoako, I. Assessing the impact of corruption on the management of ghanaian government educational infrastructure projects, *Development and innovation,* 2017.

Al-Ageeli, H.K. & Alzobaee, A.S.J.A. Critical success factors in construction projects (governmental projects as a case study), *Journal of engineering,* vol. 22, no. 3, 2016.

Auditor-General South Africa *Consolidated general report on the local government audit outcomes: MFMA 2019-2020,* Pretoria, Auditor-General, 2021.

Auditor-General South Africa *Consolidated general report on the local government audit outcomes: MFMA 2017-2018,* Pretoria, Auditor-General, 2019.

Ayodele, E.O. Abandonment of construction projects in nigeria: Causes and effects, *Journal of emerging trends in economics and management sciences,* vol. 2, no. 2, 2011.

Bullen, C.V. & Rockart, J.F. A primer on critical success factors, 1981.

Crawford, J.K. Project management roles and responsibilities, *Center for business practices, havertown PA, USA,* 2004.

Eja, K.M. & Ramegowda, M. Government project failure in developing countries: A review with particular reference to nigeria, *Global journal of social sciences,* vol. 19, 2020.

El-Sokhn,N.H. & Othman,A. (2014). *The International Conference on Civil and Architecture Engineering.* Conference proceedings of the Xth conference held in Y.

Kenny,C. *Infrastructure governance and corruption: where next?*World Bank Publications, 2012.

Kothari,C.R. *Research Methodology: Methods and Techniques*2nd ed. New Delhi,New Age International Publisher, 2004.

KPMG International *Global construction survey 2015,* KPMG International, 2015.

Mahamid, I. Analysis of schedule deviations in road construction projects and the effects of project physical characteristics, *Journal of financial management of property and construction,* vol. 22, no. 2, 2017.

Mugumbate, T. & Kruger, D. Investigation into south african municipal construction project failures, *Civil engineering= siviele ingenieurswese,* vol. 29, no. 9, 2021.

Ngubane, L.A. & Nephawe, K.A. Investigating factors affecting rural electrification project management within a south african municipality, *International journal of research in management & business studies (IJRMBS 2017,* vol. 4, no. 1, 2017.

Nweze, N. Failure of public infrastructure projects in nigeria: Causes, effects and solutions, *Texila international journal of management,* vol. 2, no. 2, 2016.

Olander, S. Stakeholder impact analysis in construction project management, *Construction management and economics,* vol. 25, no. 3, 2007.

Shahhosseini, V., Afshar, M.R. & Amiri, O. The root causes of construction project failure, *Scientia iranica,* vol. 25, no. 1, 2018.

Sinesilassie, E.G., Tabish, S.Z.S. & Jha, K.N. Critical factors affecting schedule performance: A case of ethiopian public construction projects–engineers' perspective, *Engineering, construction and architectural management,* vol. 24, no. 5, 2017.

Summers, P. 2015, "98.8%! Is project failure acceptable and inevitable?" in *IRNOP2015, 22-24 June, UCL Bartlett School of Construction and Project Management.*, pp. 1-36.

Vrchota, J., Řehoř, P., Maříková, M. & Pech, M. Critical success factors of the project management in relation to industry 4.0 for sustainability of projects, *Sustainability,* vol. 13, no. 1, 2020.

Biography

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