African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

INVESTIGATING THE DRIVERS OF COST AND SCHEDULE PERFORMANCE IN GHANA'S ROAD CONSTRUCTION

Coffie, G. H.[1], Abeka, H. K.[2], Adzivor, E. K.[3] and Afetorgbor, E. K.[4]
[1&3]Department of Building Technology, Faculty of Built & Natural Environment, Ho Technical University, Ho, Volta Region, Ghana.
[2]Department of Civil Engineering, Faculty of Engineering, Sunyani Technical University, Sunyani, Ghana.
[4] Department of Civil Engineering, Faculty of Engineering, Ho Technical University, Ho, Volta Region, Ghana.
[1]hcoffie@htu.edu.gh

ABSTRACT

Purpose: This study investigates the extent of contract cost and timeline overruns in Ghana's road construction sector by analysing historical data from feeder road projects. It seeks to determine whether project type, size, and duration influence cost and schedule overruns.

Design/Methodology/Approach: The study employs a quantitative research approach using archival data. A census sampling technique was used to select 156 feeder road projects in Northern Ghana based on the availability of reliable data. Projects from 2019 to 2020 were chosen due to consistent documentation and to avoid political bias, ensuring a sufficient sample for statistical analysis. This approach enhanced the study's reliability and the applicability of its findings on cost and time overruns.

Findings: The findings confirm that cost and schedule overruns vary significantly across project types, sizes, and durations. Routine maintenance projects exhibited minimal overruns, whereas bitumen surfacing and rehabilitation projects experienced substantial cost and timeline overruns. Larger and longer-duration projects had higher overruns compared to smaller and shorter-term projects.

Research Limitation: The study focuses on feeder road projects within a specific geographic region and timeframe, limiting the generalizability of its findings to other construction sectors. Future research should examine a broader range of projects and include qualitative insights into the causes of overruns.

Practical Implication: The study provides empirical evidence that can guide policymakers, contractors, and project managers in implementing measures to reduce cost and timeline overruns.

Social Implication: Addressing cost and time overruns can lead to better resource allocation and timely project completion, benefiting local communities and stakeholders.

Originality/Value: The introduction of project typology as a performance factor, along with the suggestion of contractor classification as a future variable, adds originality and depth.

Keywords: *Construction. cost overrun. delay. projects. road*

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

INTRODUCTION

Many parameters are responsible for the success of construction projects, such as completing and executing projects within the financial plan, avoiding cost overruns, delays, and maintaining quality (Wyke et al., 2024). A single solution cannot address all these parameters, necessitating the involvement of multidisciplinary researchers and practitioners in studies on construction cost overruns and their minimisation. In addition, the stakeholders' participation is the primary key factor in improving construction project delivery.

Maintaining construction projects within predicted budgets and timelines takes excellent planning, ethical behaviour, and prudent judgment. To the dismay of investors, contractors, and professionals, numerous projects do, nevertheless, experience substantial delays and subsequently exceed initial time and budget projections. This problem is particularly evident in conventional or competitive contracts, which are utilised for the majority of government initiatives in nations that are developing, like those in the territory of Gaza, wherein the bidder with the lowest price is picked for the job. The building industry is the primary driver of physical expansion in the economy of any country (Krishnamurthy & Mahesh, 2024; Xie et al., 2022; Kumaraswamy, 2006). The level of self-reliance increases as resources, engineering expertise, labour, supplies, machinery, money, and market transactions are made available inside the national economy. Given the intricate nature of building projects and the context in which they are developed, construction professionals are under greater burden than ever to finish projects on time, within budgetary constraints, and to meet the highest standards. (Gómez-Cabrera, et al., 2024; Vrchota et al., 2020; Enshassi et. al., 2003; 2009).

The Ghanaian construction industry experienced gradual development after 1992. Numerous infrastructure, roads, feeder roads, and residential and governmental projects were carried out despite a paucity of resources and technologies. (Coffie & Aigbavboa, 2020). As a result, increasing building efficiency through cost-effectiveness and punctuality will undoubtedly result in cost savings for the entire nation. In Ghana, the first roads were narrow walkways that were subsequently extended, and hammocks were used as the road surface. Ghana can now claim a road network of 72,381 km, which has improved and expanded throughout the years. As of 2020, 75% of their paved road networks and 75% of their unpaved road networks are in good condition.

One of the three organisations in charge of building roads in Ghana is the Department of Feeder Roads. The other two organisations are the Department of Urban Roads and the Ghana Highway Authority. Construction of rural roads and provision of connectivity between rural neighbourhoods and centres of socioeconomic activity, such as markets and healthcare facilities, fall under the purview of the Agency of Feeder Roads. The Agency of Feeder Roads in Ghana conducts numerous different sorts of road interventions, and this section outlines the interventions used by

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

this organisation. They consist of surface, upgrading, re-gravelling, spot enhancement, and rehabilitation.

Errors in design, insufficient capacity, adverse climate, changes, and miscalculating the required resources to execute the project are a few of the many causes of contract cost and duration overruns in projects (Xie et al., 2022). Due to a not well-defined scope or design flaws, items frequently left out of the estimated cost of the project result in change orders, which raise costs and lengthen delivery times. A significant bid opening could be postponed until the existing project is finished if the construction time is underestimated. Many public projects are extensions of earlier initiatives, and inaccurate cost and time estimates can cause the sequencing or phasing of linked projects to be off, postponing much-needed improvements.

The necessity for renovations to an existing facility or the building of a new facility remains a need; hence, the estimated contract cost and duration of flawed projects are used to determine which projects should be put out for bids.

The public is best served by accurately estimating a project's time and cost in the right way, particularly in a city where the latest population increase in the country's northern area has been significant. In order to take the necessary action to avert these overruns in future projects, this study quantified the size of feeder roadway building overruns in both money and time as well as the size of possible interest on delayed payments in feeder road infrastructure projects in the northern part of Ghana.

While prior studies (Krishnamurthy & Mahesh, 2024; Xie et al., 2022; Kumaraswamy, 2006) have acknowledged that the magnitude of contract cost and duration overruns as well as interest accrued from delayed payments varies by project type and scale, there remains a paucity of empirical evidence that systematically disaggregates these overruns across diverse categories of government infrastructure projects. This study addresses this gap by (1) providing updated and context-specific insights into the extent of cost and time overruns in public works, and (2) examining how these overruns vary significantly according to project type, size, and duration. This investigation will look at feeder road projects undertaken by the feeder road department in the Northern region of Ghana between 2019 and 2020. The variances between the stated and the final cost and timeline are displayed using the budget and duration overruns as percentage increases emerging from the awarded cost and duration. The initial goal of the work is to establish the extent of contract cost and timeline overruns in the road building business, particularly feeder roads in Ghana's northern area. The results of this investigation will then be compared to those found in the literature.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

THEORIES UNDERPINNING THE STUDY

Contemporary analyses of project performance in infrastructure development are often anchored in theoretical constructs that explain how project success is influenced by time, cost, and scope dynamics. The Project Management Triangle, or Iron Triangle, continues to serve as a foundational framework, emphasising that deviations in cost and time often reflect scope complexity and inadequate alignment of constraints (Mirza, Pourzolfaghar, & Shahnazari, 2020). Recent evidence from Sub-Saharan African construction projects suggests that large-scale or technically demanding projects are more vulnerable to such misalignments, particularly where institutional oversight is weak (Irankunda et al., 2025; Abdelalim et al., 2024). This is consistent with the findings of this study, which shows that bitumen surfacing and rehabilitation projects experience the highest cost and time overruns due to expanded technical scope.

Further, the study is framed within the lens of Contingency Theory, which posits that effective management practices are context-dependent rather than universal (Umar & Egbu, 2021). Projects of varying sizes, scopes, and durations demand differentiated governance mechanisms and adaptive resource allocation strategies. Empirical studies have shown that project size and duration significantly influence risk exposure and control needs (Alrasheed et al., 2023; Durdyev & Hosseini, 2020). The findings from this Ghanaian feeder road analysis reinforce this theory, highlighting how mid-sized and long-duration projects are particularly susceptible to inefficiencies in planning and resource deployment.

In addition, the Resource-Based View (RBV) has become increasingly prominent in construction project literature. This theory emphasises that project outcomes are primarily determined by the availability and strategic deployment of key resources—financial, technical, and human (Gómez-Cabrera, Gutierrez-Bucheli, & Muñoz, 2024). When these resources are scarce or poorly mobilised, project efficiency declines sharply. Studies by Ahmed, Philbin, and Cheema (2021) and Amini et al. (2023) confirm that inadequate resource planning is a primary cause of cost escalation in public infrastructure projects. The present study supports this view, illustrating that resource-constrained mid-scale projects in Northern Ghana experienced the most significant performance inefficiencies. Together, these theoretical lenses offer a multidimensional understanding of project performance. Their convergence in this study not only provides a robust analytical framework but also substantiates the empirical findings with globally relevant conceptual models.

Although problems such as cost overruns and delays occur on the majority of construction projects, the degree of these issues inevitably differs from project to project. It is critical to pinpoint the root causes of overruns in expenses and time in every construction project in order to control them. Construction costs have been high for years in many nations due to delays and cost overruns (Krishnamurthy & Mahesh, 2024; Xie et al., 2022; Abdul-Rahman et al., 2008; Kumaraswamy, 2006; Jahren & Ashe, 1990; Okpala & Aniekwu, 1988; Kraiem & Diekmann, 1987). The building

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

industry has a substantial impact on the growth of many countries. Delay will cause the national economy to grow unfavourably and cause greater financial loss. (Krishnamurthy & Mahesh, 2024; Xie et al., 2022; Enshassi et al., 2009; Kumaraswamy, 2006; Lo et al., 2006; Mezher & Tawil, 1998; Arditi et al., 1985). According to studies by Abdullah et al. (2009) and Enshassi et al. (2009), delays can lead to conflicts, binding arbitration, budget and time overruns, and even the total discontinuation of a project.

A duration overrun is a delay that goes beyond the scheduled completion dates, and it can also be the contractors' fault (Durdyev & Hosseini, 2020). It is conceivable to consider delays as " incidents " affecting a project's development and pushing back project activity. Terrible weather, a lack of resources, a delay in the design process, etc., can cause project delays. According to Amini (2023), project delays typically come from actions that have both internal and external cause-and-effect links. The words "cost overrun," "cost escalation," "cost increase," and "budget overrun" have also been used to refer to the excess of actual cost beyond the budget (Mavasa, 2017). The degree of cost overruns can be compared by dividing the modified contract value by the initial contract award sum (Oluwajana et al., 2022). You can convert this calculation to a percentage. Al Amri & Marey-Perez (2021), aiming for ease of comparison, commonly use expense overruns and project delays. Ahmed et al. (2021) claim that whether the contractor is compensated or held accountable for costs and additional project completion time shows accountability for the delay. Odeh & Battaineh (2002); Abdullah et al.(2009); Chimwaso (2001); El-Sayegh et al.(2020); Sepasgozar et al. (2019) have examined all variables that occasioned contract cost and duration overruns.

When looking into the growing problem of construction duration delays, Rashid (2020) looked at how delays affected execution and project completion. They uncovered and evaluated the effect of duration delays on project execution using quantitative methods on selected projects. Zidane & Andersen (2018) also looked at methods for shortening the time needed to complete different construction works. They offer critical discoveries in 3) separate surveys examining factors crucial to Hong Kong's construction processes, moving more quickly. The latter section of the report makes specific technological and administrative suggestions for cutting down construction times.

Durdyev & Hossein (2020) used a questionnaire survey to investigate the reasons for construction delays in conventional Jordanian contracts. According to the survey, labour productivity was viewed by contractors as the leading cause of delays (Bamfo-Agyei et al., 2021). However, experts claim that the main reason for the delay was a lack of contractor experience. All parties broadly agreed regarding the relative significance of the various delay issues. They agreed that poor contractor experience, owner involvement, and funding of the work were among the top five most important factors.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

According to Ahmed et al. (2021), excusable compensatable delays (48%) are the most frequent type of delay, followed by unjustifiable (44%) and justifiable (8%) non-compensable delays. By definition, a delay brought on by a contractor is not acceptable, but when the owner or consultant is at fault, a delay is overlooked and compensable. Depending on the contract risk allocation, the delay may be justified even if the government (or a third party) is at fault. However, some unanticipated event-related delays might be disregarded and not reimbursed. Alrawagh et al. (2024) researched Palestine's construction delays. They found that, according to the three parties, the "environment" and "financing" groupings of delay causes obtained the highest ranks.

In the nation of Kuwait, the development of privately owned dwellings was evaluated for delays and cost hikes by Alrasheed et al. (2023). There were further schedule delays and expense hikes as a residential project's overall cost grew. One of the main reasons for the time lag and cost rise was the inadequate amount of resources provided to the design phase. The three leading causes of time difficulties in that transaction were the number of modification orders, monetary constraints, and the owners' lack of building expertise. On the other side, the three primary sources of cost overruns, given in that order, were contractor-Elide, material-related difficulties, and, again, owners' financial restrictions.

According to Durdyev & Hosseini (2020), all respondent groups within Hong Kong preferred to admit that they contributed to delays. Uncertain ground conditions, inadequate site management and oversight by consultants, environmental restrictions, exceptionally low bids, and customer variances made the survey respondents list the ten most important causes of construction delays. In line with the findings of previous studies by Chimwaso (2001) and Durdyev and Hosseini (2020), four elements contributing to cost overruns have been identified. These include modifications to the design, poor planning, the unpredictability of the weather, and variations in the price of building supplies.

Amoatey et al. (2015) reported on delay factors in Ghana. The study identified 26 factors that increase groundwater construction costs. While contractors and consultants pointed to issues with periodic payments as the main reason for overruns in costs, clients viewed poor contractor management as the most serious issue. The three groups all rate the criteria with a high degree of agreement despite modest variances in their opinions. The overall ranking results demonstrate that the three groups thought poor contractor management, monthly payments, material procurement problems, inadequate technical performance, and rising material prices primarily caused excessive groundwater project cost overruns in developing nations. For the State of Florida's Department of Transportation's 708 road projects that were finished from 1999 to 2001 and had a total initial value of more than 1.9 billion United States dollars, Vidalis & Najafi (2002) investigated the causes of time and cost overruns. Cost overruns were determined by comparing the completion costs to the contract's offer costs as a percentage of the total. A time overrun is a discrepancy

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

between the construction project's bid duration and completion time, given as a percentage of the bid duration. These projects have total cost overruns of $200 million and time overruns running to 17% of the award timelines. The outcomes also revealed a reduction in overruns of costs and time compared to the preceding five years. Incentives/disincentives, lane leasing, and A+B contracting are novel and inventive ways to achieve this.

RESEARCH METHODOLOGY

This study's methodology included steps that were also present in the majority of earlier quantitative investigations. These investigations often used a technique that included data collecting, data mining, statistical testing, and concluding the outcomes of those tests. In their research on project cost and schedule overruns (Irankunda et al., 2025; Abdel alim et al., 2024; Daoud et al., 2023; Adam et al., 2017). All adopted similar techniques. Below is a description of the procedures employed in this investigation.

Research Design

This study adopted a quantitative research design, consistent with prior empirical investigations into project performance (Irankunda et al., 2025; Abdelalim et al., 2024; Daoud et al., 2023; Adam et al., 2017). The approach followed a structured sequence: data collection, data description, statistical analysis, and interpretation of results. The focus was to assess cost and duration overruns across public feeder road projects, emphasising variability based on project type, size, and construction duration.

Population

The study targeted 156 government-executed feeder road projects in the Northern Region of Ghana that were completed between 2019 and 2020. These projects represent the full scope of routine road construction activities handled by the relevant government agency during the defined timeframe.

Sampling Method

A purposive sampling technique was employed to ensure that only projects with complete and accessible documentation were included. The sampling focused on projects that reflected the agency’s primary operational categories, bitumen surfacing, rehabilitation, and routine maintenance, ensuring comparability and data reliability.

Sample Size

A census of 156 completed feeder road projects was used for this study. These projects were categorised as follows: 40 bitumen surfacing projects, 63 rehabilitation projects, and 53 routine

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

maintenance projects. The sample size was deemed adequate for statistical analysis using one-way analysis of variance (ANOVA).

Research Instrument

The primary data source consisted of archival records retrieved from the implementing agency, including project files maintained by engineers, quantity surveyors, and project managers. These records provided information on award costs and durations, final costs, and actual completion times. Secondary literature was referenced to contextualise and compare the findings with existing studies.

Data from 156 road projects were sufficient for this analysis. The projects employed for this study were divided into three categories: bitumen surfacing (40), rehabilitation (63), and routine maintenance(53), and they spanned 2 years. The aforementioned groups included various types of projects, covering a range of work scopes and costs, which were representative of the job the agency did. Based on project kinds, the size of the project (measured by construction cost and time), and completion time years, the magnitudes of cost and duration overruns were compared. The project kinds and sizes taken into consideration for this study are shown below, along with the outcomes of previous research.

The three categories of projects, bitumen surfacing, rehabilitation, and routine maintenance, reflect the main types of construction work that the feeder road agency typically undertakes. Previous research indicated that cost overruns were associated with different project categories (Irankunda et al., 2025; Abdelalim et al., 2024; Daoud et al., 2023; Adam et al., 2017). Furthermore, it was noted that the two elements are unrelated to one another.

The final construction cost determined the size of the project. The project sizes were divided into three categories: small projects, which had a budget of under GH1 million; medium projects, which had a budget of between GH1 million and GH10 million; and large projects, which had a budget of over GH10 million. The cost overrun was discovered to be inversely associated with project size by Olaniran et al. (2015); Odeck (2004); Odeh & Battaineh (2002). However, Ashe's (1990) findings were the opposite.

Based on the length of construction, the projects were split into three groups. One group of projects was completed in <6 months (group 1), another group was completed in more than six months and up to one year, and the last group was completed in more than one year. Odeck (2004) discovered that cost overruns increased until a certain point as completion duration increased before beginning to decrease.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Statistical Evaluation. The study looked at the construction cost and schedule overrun as performance criteria. Accordingly, construction costs and duration overruns were determined using Equation (1).

project cost overrun = Final cost of project – Award cost of project - (1)
Delay duration of construction = Final construction duration – Award construction duration – (2)

Data Analysis
Construction cost and time overruns were computed using the following formulas:

- Cost Overrun (%) = Final Cost – Awarded Cost
- Time Overrun (months) = Final Duration – Awarded Duration

The data were processed and analysed using IBM SPSS. Given the categorical nature of the independent variables (project type, size, and duration), one-way ANOVA tests were conducted to examine whether the differences in mean cost and duration overruns across groups were statistically significant. A 95% confidence interval was applied, and significance was determined at a p-value threshold of ≤ 0.05. If the p-value was below this threshold, the null hypothesis that group means were equal was rejected, indicating that project characteristics had a statistically significant impact on cost or duration performance (Gravel et al., 2019).

Building costs and time overruns were computed and treated, exploiting the IBM Statistical Package for Social Sciences (SPSS). Because the variables studied were categorised, the ANOVA test was used to estimate the impact of each factor. The degree of confidence of the study was 95% because statistical evaluation within this range is acceptable in the construction sector. The data were analysed using one-factor analysis of variance (ANOVA) tests in order to compare the sample averages and identify the key factors affecting construction timeline and cost overruns. The means of the various project groups were equal (1 = 2 = 3 =), which was the null assumption for the ANOVA. The P value must be less than or equal to 0.05 in order to be significant. The P value must be less than or equal to 0.05 in order to be significant. The value of P under the null assumption represented the likelihood of observing a random sample that was at least as big as the observed sample. The difference between the means would be considered significant if the P value was less than 0.05. (Gravel et al., 2019).

RESULTS
The statistical tests identified the related variables' descriptive statistics and demonstrated whether the trial means of distinct sets differed significantly. The descriptions of the tests' findings are as follows:

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Table 1: Project factors: Mean and median for cost overrun

Factors	**Groups**	**Projects**	**Cost Overrun (%)**		
			Mean Value	**Median Value**	**Standard deviation Value**
Project type	Bitumen Surfacing	40	14.29	14.15	7.57
	Rehabilitation works	63	18.80	17	7.23
	Routine Maintenance	53	0	0	0
Project Size	< 1 million	75	4.56	0	7.56
	1-10 million	59	19.27	18.00	7.68
	>10 million	22	12.60	9.67	7.88
Project duration	<6 months	53	0	0	0
	6 months - 1 year	13	13.62	13	1.26
	> 1 year	90	17.55	17	8.06
Total projects		156	11.25	13.14	10.24

Descriptive statistics. The explanatory statistics of project-related building cost overruns are shown in Table 1. The studied projects' average construction cost overrun was 11.25%. For each project, the standard deviation was relatively small. The investigation showed that the usual building cost overrun related to rehabilitation works was 18.80%, followed by bitumen surfacing at 14.29% and routine maintenance recording at 0. Projects that fall within the 1 million Ghana cedis to 10 million Ghana cedis range had 19,27% overruns, those projects that had a contract sum of >10 million recorded 12.60% while those < 1 million Ghana cedis as contract sum had 4.56%. According to a classification of the projects based on their time to complete, the cost overrun was higher (17.55%) for those requiring longer than one working year than those not (between 6 months - 1 year recorded 13.62% while <6 months had 0%). The standard deviations were not very high for the last two categories of initiatives.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Table 2 displays the statistics of project factor-related timeline overruns. All projects' average and median timeline overruns were 21.20% and 25%, respectively. The standard deviation was high for the projects. Cost overruns followed a similar trend in the categories of timeline overruns.

Table 2: Project factors: Mean and median for timeline overrun

Factors	**Groups**	**Projects (Nr)**	**Delay (%)**		
			Mean Value	**Median**	**Standard deviation**
Type of project	Bitumen Surfacing	40	32.92	33.33	8.77
	Rehabilitation works	63	31.59	33.33	9.39
	Routine Maintenance	53	0	0	0
Size of project	< 1 million	75	9.33	0	15.44
	1-10 million	59	32.32	33.33	8.92
	>10 million	22	31.83	33.33	9.73
Duration of project	<6 months	53	0	0	0
	6 months - 1 year	13	29.87	30	10.51
	> 1 year	90	32.43	33.33	8.94
Total projects		156	21.20	25	16.96

According to the statistics, bitumen surfacing projects had mean construction cost overruns that were larger than those of rehabilitation projects and preventative maintenance work, which were 32.92%, 31.59%, and 0%, respectively. Considering the size and costs, this project had a lesser timeline overrun than the other project size groups. For projects costing between GH1 million and GH10 million, the average construction schedule overrun was the most significant (32.32%), and for projects costing more than GH10 million, the average cost overrun was 31.83%. Projects were classified based on their contracts' length at the time of award. <6 months, 6 months - 1 year, and > 1-year projects all experienced more minor schedule overruns than those with more time to finish them (respectively, 32.43%, 29.87%, and 0%). The deviations across groups were significant.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Conclusions from the ANOVA results of Cost and Timeline Overruns. The main factors affecting building expenses and time delays were determined using an ANOVA test. To utilise the ANOVA test, three prerequisites must be met: Interval or ratio-scaled dependent variables, randomly selected samples from the population, and properly distributed dependent variables across all groups are required.

Project type: Outlook for costs and time delays.

The average construction costs, timetable delays, and F-value, P-value, and F-critical values are shown in Table 3 for all project categories. Statistics show that Bitumen surfacing, rehabilitation, and routine maintenance projects all have equal costs and time overrun prevention strategies. P values were less than 0.05 for these two measurements. It was impossible to draw the statistical inference that the sample means varied. In truth, the data for this sample tended to reveal that the bitumen surfacing project had a bigger timeline for cost overrun than the rehabilitation and routine maintenance projects. However, the cost overruns for these projects were comparable.

Table 3: Duration for project types ANOVA results: cost and timeline overrun

Type of projects	Unit	Mean	F-value	P-value	F-critical
Cost overruns					
Bitumen surfacing	%	32.92	149.15	1.156E-36	3.06
Rehabilitation	%	31.59			
Routine Maintenance	%	0			
Delay					
Bitumen surfacing	%	32.92	326.35	6.40133E-56	3.06
Rehabilitation	%	31.59			
Routine Maintenance	%	0			

Project size: Outlook cost and time overruns.

Table 4 displays the typical expenses and timeline delays for projects of various sizes, together with the corresponding F-, P-, and F-critical values. A significance test was performed on cost and timeline overruns, and the findings showed that the P value was less than 0.05. The null assumption could then be statistically confidently rejected, and the difference in sample means

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

could be confirmed. One can conclude that, in this sample, one of these project sizes experienced construction cost and timeline overruns that differed from those for the other project sizes.

Table 4: Project size ANOVA results: cost and timeline overruns

Size of projects	Unit	Mean	F-value	P-value	F-critical
Cost overruns					
< 1 million	%	4.56	61.37	2.69805E-20	3.06
1-10 million	%	19.27			
> 10 million	%	12.60			
Delay					
< 1 million	%	9.33	64.19	5.72081E-21	3.06
1-10 million	%	32.32			
> 10 million	%	31.83			

Project duration: Outlook of cost and Time overruns.

Table 5 displays the typical cost and timeline delays for projects of various lengths, along with the corresponding F-values, P-values, and F-critical values. A significance test was performed on cost and timeline overruns, and the findings showed that the P value was less than 0.05. The null assumption could then be statistically confidently disallowed, and the difference in sample means could be established. It is possible to conclude that in this sample, one of these project durations experienced construction overruns in costs and timelines that were unique from those for the other project durations.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Table 5 Project duration ANOVA results, cost and timeline overruns

Duration of projects	Unit	Mean	F-value	P-value	F-critical
Cost overruns					
<6 months	%	0	136.56	9.32083E-35	3.06
6 months - 1 year	%	13.62			
> 1 year	%	17.55			
Delay					
<6 months	%	0	327.87	4.80471E-56	3.06
6 months - 1 year	%	29.87			
> 1 year	%	32.43			

As shown in Tables 6, 7, and 8, Post-hoc analysis was employed to determine variances in group means.

Table 6: Project type's Post hoc analysis cost and timeline overruns

Type of projects	Bitumen surfacing		Rehabilitation		Routine Maintenance	
Item	Mean difference	P-value	Mean difference	P-value	Mean difference	P-value
Cost overruns						
Bitumen surfacing	-	-	4.51*	.001	-14.29*	.000
Rehabilitation	-4.51*	.001	-	-	-18.80*	.000
Routine Maintenance	14.29*	.000	18.80*	.000	-	-
Delay						
Bitumen surfacing	-	-	-1.32	.655	-32.92	.000
Rehabilitation	1.32	.655	-	-	-31.59	.000
Routine Maintenance	32.92	.000	31.59*	.000	-	-

*At the 0.05 level, the mean difference is significant.

ISSN: 2408-7920

Arca Academic Publisher

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Table 7: Project size's Post hoc analysis cost and timeline overruns

Size of projects	**< 1 million**		**1-10 million**		**> 10 million**	
	Mean difference	**P-value**	**Mean difference**	**P-value**	**Mean difference**	**P-value**
Cost overruns						
< 1 million	-	-	14.70*	.000	8.03*	.000
1-10 million	-14.71*	0.000	-	-	-6.67*	.002
> 10 million	-8.04*	.000	6.67*	.002	-	-
Delay						
< 1 million	-	-	22.99*	.000	22.49*	.000
1-10 million	-22.99*	.000	-	-	-.49	.986
> 10 million	-22.49*	.000	-.49*	.986	-	-

Table 8: Project duration's Post hoc analysis cost and timeline overruns

Duration of projects	**< 6 Months**		**6 months - 1 year**		**> 1 year**	
	Mean difference	**P-value**	**Mean difference**	**P-value**	**Mean difference**	**P-value**
Cost overruns						
< 6 Months	-	-	-13.62*	.000	17.55*	.000
6 months - 1 year	-13.62*	.000	-	-	3.93	.083
> 1 year	-17.55*	.000	-3.93*	.083	-	-
Delay						
< 6 Months	-	-	2.692*	.000	4.444*	.000
6 months - 1 year	-2.692*	.000	-	-	1.752*	.000
> 1 year	-4.444	.000	-1.752*	.000	-	-

DISCUSSION

Table 3 outlines the analysis of variance (ANOVA) findings comparing three project categories: Bitumen surfacing, Rehabilitation, and Routine maintenance. The focal points are differences in cost overruns and delays.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Cost Overruns:

- For cost overruns, the mean percentage for Bitumen surfacing projects is 32.92%; for Rehabilitation projects, it is 31.59%; and for Routine maintenance projects, it is 0%. This indicates that, on average, Routine maintenance projects do not exhibit any cost overruns, whereas the other two project categories do have substantial overruns.
- The f-value for the cost overruns stands at 149.15. When compared to the f-critical value of 3.06, it is evident that the observed difference among the groups is statistically meaningful. The p-value, 0.000, further supports this by being way below the standard 0.05 threshold, suggesting significant differences in cost overruns among the project types.

Delays:

- Concerning delays, Bitumen surfacing projects average a delay of 32.92%, Rehabilitation projects register a delay of 31.59%, and Routine maintenance projects have a delay percentage of 0%. This reveals that Routine maintenance projects, on average, do not experience any delays, while the other two project types do.
- The f-value concerning delays is a staggering 326.35. This value, much higher than the f-critical value of 3.06, indicates a statistically significant variation in delays among the project types. The p-value of 0.000 further affirms this finding.

The disparities in cost overruns and delays among the three project categories are statistically significant. The data suggests that Routine maintenance projects have managed to maintain their timelines and budgets effectively, while Bitumen surfacing and Rehabilitation projects face considerable challenges. The importance of robust project management becomes evident for the latter two types to curtail such overruns and delays.

Table 6 presents post-hoc test results for different projects, specifically, the Bitumen surfacing, Rehabilitation, and Routine maintenance projects. This test examines the differences in cost overruns and delays among these types of projects.

Cost Overruns:

- Bitumen surfacing vs. rehabilitation: The average cost overruns for these two projects varied by 4.51. This difference is statistically significant at the 0.05 level, according to the p-value of 0.001. As a result, rehabilitation projects typically have a 4.51 unit cost overrun over bitumen surfacing projects.
- The average cost overrun difference between bitumen surfacing and routine maintenance is -14.29. This difference is very statistically significant, with a p-value of 0.000. This suggests that, on average, routine maintenance projects have a 14.29 unit smaller cost overrun than bitumen surfacing projects.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

- Cost overruns for rehabilitation versus routine maintenance are, on average, -18.80, with a p-value of 0.000. The fact that routine maintenance projects have cost overruns that are, on average, 18.80 units lower than rehabilitation programs shows a considerable difference.

Delay:

- The mean difference in time between bitumen surfacing and rehabilitation projects is -1.32. This difference, however, is not statistically significant at the 0.05 level, with a p-value of 0.655. More research is required to establish a significant delay difference between these two types of projects.
- The mean difference in delays between routine maintenance and bitumen surfacing is -32.92. A difference that is very statistically significant is shown by the p-value of 0.000. This implies that Bitumen surfacing projects generally have delays that are 32.92 units longer than routine maintenance projects.
- The mean delay difference between rehabilitation and routine maintenance is 31.59, and the corresponding p-value is 0.000. Routine maintenance projects experience delays that are, on average, 31.59 units longer than Rehabilitation projects, indicating a considerable delay disparity.

Overall, the findings suggest significant differences in cost overruns and delays among the different types of projects. While Routine maintenance projects have more controlled cost overruns than the other two project types, they experience longer delays. Rehabilitation projects have significant cost overruns compared to Bitumen surfacing and Routine maintenance projects.

Table 4 outlines the analysis of variance (ANOVA) findings comparing three project Sizes: <1 million, 1-10 million, and > 10 million. The focal points are differences in cost overruns and delays.

Cost Overruns:

- For cost overruns, the mean percentage for < 1 million is 4.56%; for 1 - 10 million projects, it is 19.27%; and for > 10 million projects, it is 12.60%. This indicates that, on average, < 10 million projects do not exhibit any cost overruns, whereas the other two project categories do have substantial overruns.
- The f-value for the cost overruns stands at 61.37. When compared to the f-critical value of 3.06, it is evident that the observed difference among the groups is statistically meaningful. The p-value, 0.000, further supports this by being way below the standard 0.05 threshold, suggesting significant differences in cost overruns among the project types.

Delays:

- Concerning delays, < 1 million projects have an average uncertainty of 9.33%, less than 1 - 10 million projects register a delay of 32.32%, and > 10 million projects have a delay

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

percentage of 31.83%. This reveals that > 1 million projects, on average, experience delays, less than the other two project types.

- The f-value concerning delays is 64.19. This value, much higher than the f-critical value of 3.06, indicates a statistically significant variation in delays among the project types. The p-value of 0.000 further affirms this finding.

The disparities in cost overruns and delays among the three categories of project sizes are statistically significant. The data suggests that < 1 million projects have managed to maintain their timelines and budgets effectively, while 1 - 10 million and >10 million projects face considerable challenges. The importance of robust project management becomes evident for the latter two types to curtail such overruns and delays.

Table 7 presents post-hoc test results for different sizes of projects, specifically, the < 1 million, 1 - 10 million, and >10 million projects. This test examines the differences in cost overruns and delays among these types of projects.

Cost Overruns:

- < 1 million vs. 1 - 10 million: There is a mean difference of 14.7 in cost overruns between these two types of projects. The p-value of 0.000 indicates this difference is statistically significant at the 0.05 level. Hence, on average, 1-10 million projects have a cost overrun of 14.7 units higher than < 1 million.
- < 1 million vs > 10 million**:** The mean difference in cost overruns between these projects is 8.3. With a p-value of 0.000, this difference is highly statistically significant. This implies that > 10 million projects, on average, have a cost overrun that is 8.03 units lower than < 1 million projects.
- 1 - 10 million vs. > 10 million**:** The mean difference in cost overruns is -6.67, with a p-value of 0.000. This indicates a significant difference, with > 10 million projects having, on average, cost overruns that are 6.67 units lower than 1- 10 million projects.

Delay:

- <1 million vs. 1 - 10 Million: The mean difference in delays between these projects is 22.99. However, with a p-value of 0.000, this difference is statistically significant at the 0.05 level. Therefore, sufficient evidence suggests a substantial difference in delays between these two sizes of projects. This implies that > 10 million projects, on average, have a cost overrun of 22,99 units longer than < 1 million projects.
- < 1 million vs. > 10 Million**:** There is a mean difference of 22.49 in delays. The p-value of 0.000 indicates a highly statistically significant difference. This suggests that Routine maintenance projects experience, on average, delays that are 22.49 units longer than Bitumen surfacing projects.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

- 1 - 10 million vs. > 10 million**:** The mean delay difference is -0.49, and the associated p-value is 0.986. This implies that the difference is not statistically significant at the 0.05 level. Therefore, there needs to be more evidence to suggest a substantial difference in delays between these two sizes of projects.

Overall, the findings suggest significant differences in cost overruns and delays among the different sizes of projects. While > 10 million projects have more controlled cost overruns than the other two project sizes, they experience longer delays. 1- 10 million size projects have significant cost overruns compared to < 1 million and > 10 million projects.

Table 5 outlines the analysis of variance (ANOVA) findings comparing three project duration categories: <6 months, six months to 1 year, and more than a year. The focal points are differences in cost overruns and delays.

Cost Overruns:

- For cost overruns, the mean percentage for <6 months projects is 0%; for 6 months - 1 year projects, it is 13.62%; and for More than a year, it stands at 17.55%. This indicates that, on average, less than 6-month projects do not exhibit any cost overruns, whereas the other two project duration categories do have substantial overruns.
- The f-value for the cost overruns stands at 136.56. When compared to the f-critical value of 3.06, it is evident that the observed difference among the groups is statistically meaningful. The p-value, 0.000, further supports this by being way below the standard 0.05 threshold, suggesting significant differences in cost overruns among the project types.

Delays:

- Concerning delays, <6 months average a delay of 0%, 6 months - 1 year projects register a delay of 29.87%, and > 1 year projects have a delay percentage of 032.43. This reveals that, on average, less than 6-month projects do not experience any delays, while the other two project duration types do.
- The f-value concerning delays is a staggering 327.87. This value, much higher than the f-critical value of 3.06, indicates a statistically significant variation in delays among the project types. The p-value of 0.000 further affirms this finding.

The disparities in cost overruns and delays among the three project duration categories are statistically significant. The data suggests that projects <6 months have effectively maintained their timelines and budgets. In comparison, projects with durations of six months to 1 year and greater than 1 year face considerable challenges. The importance of robust project management becomes evident for the latter two types to curtail such overruns and delays.

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Table 8 presents post-hoc test results for different projects—specifically, projects <6 months, six months to 1 year, and > 1 year duration projects. This test examines the differences in cost overruns and delays among these types of projects.

Cost Overruns:

- <6 months vs. six months to 1 year: There is a mean difference of -13.62 in cost overruns between these two types of projects. The p-value of 0.000 indicates this difference is statistically significant at the 0.05 level. Hence, on average, 6-month to 1-year duration projects have a cost overrun of 13.62 lower than less than 6-month duration projects.
- <6 months vs. More than one year**:** The mean difference in cost overruns between these projects is 17.55. With a p-value of 0.000, this difference is highly statistically significant. This implies that more than one year of duration projects, on average, have a cost overrun of 17.55 units higher than <6 months.
- 6 months - 1 year vs. More than one year**:** The mean difference in cost overruns is 3.93, with a p-value of 0.0830. This indicates there is no significant difference, with Routine > 1 year projects having, on average, cost overruns that are 3.93 units higher than 6 months - 1 year duration projects

Delay:

- <6 months vs. six months to 1 year**:** The mean delay difference between these projects is 2.692. However, with a p-value of 0.00, this difference is statistically significant at the 0.05 level. This suggests that, on average, projects with a duration of six months to 1 year experience delays that are 2.692 units longer than those <6 months less than six months.
- <6 months vs. More than one year**:** There is a mean difference of 4.444 delays. The p-value of 0.000 indicates a highly statistically significant difference. This suggests that more than one-year duration projects experience, on average, delays that are 4.444 units longer than those <6 months.
- 6 months - 1 year vs. More than one year: The mean delay difference is 1.752, and the associated p-value is 0.000. This indicates a significant difference in delays, with more than one-year duration projects experiencing delays that are, on average, 1.752 units longer than 6-month to 1-year duration projects.

Overall, the findings suggest significant differences in cost overruns and delays among the different duration types of projects.

Project Type and Performance Disparities

The analysis reveals that routine maintenance projects had no recorded cost overruns or delays, in contrast to bitumen surfacing and rehabilitation projects. These results are congruent with findings

ISSN: 2408-7920

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

by Amoatey et al. (2020), who noted that simpler maintenance tasks, with clearly defined scopes, are less prone to variation and cost escalation. Moreover, studies such as Ahiaga-Dagbui and Smith (2019) support the assertion that complex infrastructure projects like surfacing and rehabilitation tend to face higher risk exposure, frequently resulting in overruns.

Conversely, this finding slightly contrasts with Osei-Kyei et al. (2021), who found that some maintenance contracts in sub-Saharan Africa suffered delays due to poor resource planning and insufficient monitoring mechanisms, suggesting that even routine projects are not inherently immune to inefficiencies.

Project Size and Cost Overruns

The data shows that projects within the 1–10 million Ghana cedis range had the highest cost overruns, followed by those exceeding 10 million, while smaller projects (<1 million) fared better. This aligns with the conclusions of Famiyeh et al. (2020), who observed that medium-sized public sector projects often suffer from scope creep and administrative delays due to less rigorous oversight compared to either smaller or major capital works.

However, Al-Hazim et al. (2023) present an alternative view, arguing that large-scale projects are more susceptible to cost overruns due to coordination complexity, which contrasts with the current study's observation that projects above 10 million had more controlled overruns than mid-sized projects.

Project Duration and Schedule Performance

In terms of project duration, the study finds that projects completed in under six months experienced neither delays nor cost overruns. In contrast, those extending beyond one year exhibited the highest overruns. These findings are corroborated by the works of Boateng et al. (2022), who found that extended project timelines typically increase exposure to external risks, including price fluctuations, contractor inefficiencies, and administrative bottlenecks.

Nonetheless, recent work by Tengan et al. (2021) indicates that short-duration projects can also face delays when contract packaging is inadequately aligned with procurement planning, suggesting that zero-overrun records in such cases might be a function of effective planning rather than duration alone.

CONCLUSION AND RECOMMENDATIONS

Overall, the findings of the current study align with much of the recent literature on construction project performance, particularly regarding the influence of project complexity, financial scope, and duration on cost and time overruns. However, deviations from specific global trends, such as

ISSN: 2408-7920

Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

the better performance of large-scale projects in this dataset, highlight the importance of contextual factors in infrastructure delivery outcomes.

This study gathered information and examined 156 similar road construction projects. The same organisation managed all the projects using the same project delivery methodology. These projects varied in terms of price, length of construction, and project kind. The study revealed that the cost and schedule overruns data were considerably based on project kinds, size, and construction duration.

The findings demonstrated a strong correlation between the three variables examined in this analysis and construction timeline and budget overruns. The trial data demonstrated that cost and timeline overruns vary as project size and construction time change. This conclusion might be explained by the fact that as a project's size grows, its complexity also grows, leading to more expenses and time overruns. Similarly, there was a higher likelihood of disruption as the project's development time extended, which raised project costs and caused timeline overruns.

Contribution to the Existing Body of Knowledge

This study offers a significant contribution to the infrastructure management literature by providing an empirical, data-driven analysis of cost and schedule overruns across 156 feeder road projects in Northern Ghana. Unlike prior studies that focused generically on road projects or aggregated cost overruns by region or sector, this research systematically disaggregates project performance by type, size, and duration. It reveals that medium-sized and longer-term projects are more prone to inefficiencies and that routine maintenance projects demonstrate superior cost and schedule adherence. The study's use of post hoc ANOVA analysis to statistically validate performance disparities offers a rigorous and replicable methodological model. These findings expand the geographical scope of construction overrun literature to a West African context and provide new benchmarks for project performance in low-resource settings.

Practical and Social Implications

Practically, this study equips policymakers, project managers, and contractors in Ghana with empirical insights to improve project planning and resource allocation. The identification of performance disparities across project typologies and sizes underscores the need for differentiated contract management strategies. For example, large and medium-scale projects should receive more robust oversight mechanisms to mitigate overruns.

Socially, improving the delivery of feeder roads enhances rural connectivity, access to healthcare, education, and markets—key factors in reducing spatial poverty and improving regional equity.

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

By highlighting inefficiencies in public works delivery, this study supports reforms aimed at improving accountability and community outcomes in infrastructure development. Additional research with projects from various geographical regions and owners is advised to corroborate these findings. It is also advised that other factors that affect construction costs and timetable delays in public works projects be identified.

Limitations

Due to the uniformity of the projects, the public sector authorities' function, and the fact that the projects were built in specific geographic areas, restraints must be exercised when extrapolating the findings of this work to further types of projects and agencies. The conclusions of this study were derived from road construction projects completed in Ghana by the feeder road agency that cost less than 27 million dollars. Both new construction and reconstruction tasks were included in the example projects.

REFERENCES

Abdelalim, A. M., Salem, M., Salem, M., Al-Adwani, M., & Tantawy, M. (2024). An Analysis of Factors Contributing to Cost Overruns in the Global Construction Industry. *Buildings*, *15*(1), 18.

Abdul-Rahman, H., Yahya, I. A., Berawi, M. A., & Wah, L. W. (2008). Conceptual delay mitigation model using a project learning approach in practice. Construction Management and Economics, 26(1), 15–27.

Abdullah, M. R., Abdul Azis, A. A., & Abdul Rahman, I. (2009). Causes of delay and its effects in large MARA construction project. International Journal of Integrated Engineering (Issue on Mechanical, Materials and Manufacturing Engineering).

Adam, A., Josephson, P. E. B., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects: Trends and implications. *Engineering, construction and architectural management*, *24*(3), 393-406.

Agyemang, E., & Silva, A. (2021). Performance-based maintenance of feeder roads in Ghana: Current practices and challenges. *International Journal of Construction Management*, 21(3), 202–215.

Ahmed, R., Philbin, S. P., & Cheema, F.-A. (2021). Systematic literature review of project manager's leadership competencies. Engineering, Construction and Architectural Management, 28(1), 1–30.

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

Al Amri, T., & Marey-Perez, M. (2021). Project delays and cost overruns between public and private sectors in Oman. *Journal of Public Affairs*, *21*(3), e2262.

ISSN: 2408-7920

Alrasheed, H. A., Al-Hazim, N., & Rustom, R. N. (2023). Delays and cost overrun causes in construction projects: Evidence from Kuwait. International Journal of Construction Management. https://doi.org/10.1080/15623599.2023.2199246

Alrawagh, F. S., Solikin, M., & Harnaeni, S. R. (2024). Assessing Key Delay Factors in Construction Projects in Palestine: Cause-Effect Relationships Utilizing Construction Experts' Insights. *Journal homepage: https://gjrpublication. com/gjrecs*, *4*(04).

Amini, S., Rezvani, A., Tabassi, M., & Malek Sadati, S. S. (2023). Causes of cost overruns in building construction projects in Asian countries; Iran as a case study. *Engineering, Construction and Architectural Management*, *30*(7), 2739-2766.

Amoatey, C. T., Ameyaw, Y. A., Adaku, E., & Famiyeh, S. (2015). Analysing delay causes and effects in Ghanaian state housing construction projects. *International Journal of Managing Projects in Business*, *8*(1), 198-214.

Arditi, D., Akan, G. T., & Gurdamar, S. (1985). Cost overruns in public projects. International Journal of Project Management, 3(4), 218–224.

Asomani-Boateng, R., Fricano, R. J., & Adarkwa, F. (2015). Assessing the socio-economic impacts of rural road improvements in Ghana: A case study of transport sector program support (II). Case studies on transport policy, 3(4), 355-366.

Bamfo-Agyei, E., Thwala, D. W., & Aigbavboa, C. (2021). Beneficiaries' Knowledge of Tools in Achieving Productivity of Labour-Intensive Work In Ghana. African Journal of Applied Research, 7(2), 176-193.

Canadian Society for Civil Engineering-30th Annual Conference: 2002 Challenges Ahead, 2799–2808.

Chan, D. W., & Kumaraswamy, M. M. (2002). Compressing construction durations: Lessons learned from Hong Kong building projects. International Journal of Project Management, 20(1), 23–35.

Chimwaso, K. D. (2001). An Evaluation of Cost Performance of Public Projects. Case of Botswana, Department of Architecture and Building Services, Gaborone.

Coffie, G. H., & Aigbavboa, C. O. (2020). Comparative assessment of construction cost overruns: A case study of regional distribution in Ghana. African Journal of Science, Technology, Innovation and Development, 12(1), 123–126.

Daoud, A. O., El Hefnawy, M., & Wefki, H. (2023). Investigation of critical factors affecting cost overruns and delays in Egyptian mega construction projects. *Alexandria Engineering Journal*, *83*, 326-334.

Durdyev, S., & Hosseini, M. R. (2020). Causes of delays on construction projects: a comprehensive list. *International journal of managing projects in business*, *13*(1), 20-46.

El-Sayegh, S., Romdhane, L., & Manjikian, S. (2020). A critical review of 3D printing in construction: Benefits, challenges, and risks. Archives of Civil and Mechanical Engineering, 20, 1–25.

Enshassi, A., Al-Najjar, J., & Kumaraswamy, M. (2009). Delays and cost overruns in the construction projects in the Gaza Strip. Journal of Financial Management of Property and Construction, 14(2), 126–151.

Enshassi, A., Liska, R., Sawalhi, N., & Radwan, I. (2003). Contributors to construction delays in Palestine. AMERICAN PROFESSIONAL CONSTRUCTOR, 27(2), 45–52.

Gómez-Cabrera, A., Gutierrez-Bucheli, L., & Muñoz, S. (2024). Causes of time and cost overruns in construction projects: a scoping review. International Journal of Construction Management, 24(10), 1107-1125.

Gravel, K., Jananthan, H., & Kepner, J. (2019). Visually Representing the Landscape of Mathematical Structures. 2019 IEEE Integrated STEM Education Conference (ISEC), 253–257.

Irankunda, G., Zhang, W., Abdullahi, U. I., Fernand, M., David, B., & Jean-Petit, S. (2025). Understanding Critical Delay Causative Factors and Their Mitigation Measures in Burundi Communal Construction Projects: A Factor Analysis and Structural Equation Modeling Approach. *Buildings*, *15*(3), 473.

Kaiser, N., & Barstow, C. K. (2022). Rural transportation infrastructure in low-and middle income countries: a review of impacts, implications, and interventions. *Sustainability*, *14*(4), 2149.

Kraiem, Z. M., & Diekmann, J. E. (1987). Concurrent delays in construction projects. Journal of Construction Engineering and Management, 113(4), 591–602.

Krishnamurthy, A. D., & Mahesh, G. (2024). Stimulation of construction industry output through enhanced efficiency of Indian residential real estate sector. Built Environment Project and Asset Management, 14(4), 562-589.

Kumaraswamy, M. M. (2006). Accelerating construction industry development. Journal of Construction in Developing Countries.

Mavasa, A. V. (2017). The influence of unrealistic initial contract duration on time performance of construction projects in South Africa [PhD Thesis]. University of the Witwatersrand, Faculty of Engineering and the Built ….

Mezher, T. M., & Tawil, W. (1998). Causes of delays in the construction industry in Lebanon. Engineering, Construction and Architectural Management, 5(3), 252–260.

Ministry of Roads and Highways (2020). *Guidelines for Feeder Road Construction and Maintenance*. Accra: Government of Ghana.

Mirza, M. N., Pourzolfaghar, Z., & Shahnazari, M. (2020). Significance of scope in project success based on project management performance indicators. Procedia Computer Science, 100, 940–949. https://doi.org/10.1016/j.procs.2020.09.242

Odeck, J. (2004). Cost overruns in road construction—What are their sizes and determinants? Transport Policy, 11(1), Article 1.

Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: Traditional contracts. International Journal of Project Management, 20(1), 67–73.

Okpala, D. C., & Aniekwu, A. N. (1988). Causes of high costs of construction in Nigeria. Journal of Construction Engineering and Management, 114(2), 233–244.

African Journal of Applied Research
Vol. 11, No. 3 (2025), pp.21-46
http://www.ajaronline.com
https://doi.org/10.26437/ajar.v11i3.1134
Received: February 9, 2025
Peer reviewed: June 6, 2025
Revised: June 23, 2025
Published: July 2025

Olaniran, O. J., Love, P. E., Edwards, D., Olatunji, O. A., & Matthews, J. (2015). Cost overruns in hydrocarbon megaprojects: A critical review and implications for research. Project Management Journal, 46(6), 126–138. Overrun in construction projects: A fuzzy synthetic evaluation. Buildings, 12(11), 2028.

Oluwajana, S. M., Ukoje, J. E., Okosun, S. E., & Aje, I. O. (2022). Factors affecting time and cost performance of road construction projects in Nigeria. African journal of applied research, 8(1), 72-84.

Pokharel, R., Bertolini, L., & te Brömmelstroet, M. (2023). How does transportation facilitate regional economic development? A heuristic mapping of the literature. *Transportation Research Interdisciplinary Perspectives*, *19*, 100817.

Rashid, Y. (2020). Analysis of delay factors and their effects on construction projects. *Management Science Letters*, *10*(6), 1197-1204.

Sepasgozar, S. M., Karimi, R., Shirowzhan, S., Mojtahedi, M., Ebrahimzadeh, S., & McCarthy, D. (2019). Delay causes and emerging digital tools: A novel model of delay analysis, including integrated project delivery and PMBOK. Buildings, 9(9), 191.

Umar, T., & Egbu, C. (2021). Construction project risk management frameworks: An updated systematic review. Engineering, Construction and Architectural Management, 28(10), 3172–3192. https://doi.org/10.1108/ECAM-02-2021-0142

Vidalis, S. M., & Najafi, F. T. (2002). Cost and time overruns in highway construction. Vrchota, J., Řehoř, P., Maříková, M., & Pech, M. (2020). Critical success factors of the project management in relation to industry 4.0 for sustainability of projects. Sustainability, 13(1), 281.

Wyke, S., Lindhard, S. M., & Larsen, J. K. (2024). Using principal component analysis to identify latent factors affecting cost and time overrun in public construction projects. Engineering, Construction and Architectural Management, 31(6), 2415-2436.

Xie, W., Deng, B., Yin, Y., Lv, X., & Deng, Z. (2022). Critical factors influencing cost overrun in construction projects: A fuzzy synthetic evaluation. Buildings, 12(11), 2028.

ISSN: 2408-7920