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*Impact of Cost Overruns and Funding Challenges on
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Impact of Cost Overruns and Funding Challenges on Electrical Infrastructure Project Performance in TANESCO Geita Zone, Tanzania

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Abstract

The study assessed the impact of cost overruns and funding challenges on electrical infrastructure project performance in TANESCO Geita Zone, Tanzania. The study used a quantitative research approach and explanatory research design. The sample size was 80 personnel (project managers, engineers, finance officers, and procurement staff) directly involved in TANESCO electrical infrastructure projects in Geita Zone. A census sampling technique was used for selecting the respondents. Structured questionnaires were used for gathering information. Quantitative data were analyzed through mean scores and standard deviations and multiple linear regression analysis. The findings revealed that, cost overruns ($\beta = -0.45$, $p = 0.001$) and funding challenges ($\beta = -0.37$, $p = 0.018$) have a negative and statistically significant effect on project performance. This study concludes that; cost overruns and funding challenges are critical barriers to effective implementation of electrical infrastructure projects in TANESCO Geita Zone. Both factors significantly compromise project performance, delaying project completion and reducing the quality and reliability of electricity delivery. It is recommended that policy makers should ensure timely budget allocation and release of funds for electrical infrastructure projects. The TANESCO management in Geita Zone should strengthen project cost management and monitoring systems. Also, it should implement risk assessment frameworks to anticipate cost escalations and funding shortfalls.

Keywords: cost overruns, funding challenges, electrical infrastructure, project performance, Tanzania.

1. INTRODUCTION

Electrical infrastructure projects are critical for socio-economic development, providing energy that supports industries, healthcare, education, and households (Herrera et al., 2020). Recent studies indicate the prevalence of cost overruns and financial challenges in both developed and developing countries. For instance, over 55% of construction projects in Malaysia experienced cost overruns, while 65% of public projects in Jordan faced similar challenges (Shah et al., 2023).

Given the widespread nature of this issue, effective cost control is crucial to preventing expenses from escalating into larger issues like project delays or economic pressures due to unexpected expenditures (Memon et al., 2012). Enshassi et al. (2010) emphasized that cost overruns and

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funding challenges are a global issue that affect projects worldwide, regardless of socioeconomic status. Researchers have conducted extensive investigations into the factors contributing to cost overruns and funding challenges in construction projects globally (Preuss, 2022). Love et al. (2016) summarized that in Australian construction projects, management errors and design changes were the key factors impacting project costs. Srinivasan et al. (2016) identified that rising raw material prices, delays in planned activities, and lack of coordination between construction parties were critical factors causing cost overruns in India. These studies provide insights into the overarching challenges and specific hurdles countries face in managing cost escalation.

In Africa, countries such like Kenya and Uganda, have experienced similar obstacles in electricity sector projects, often due to financial constraints, poor project planning, and reliance due to external funding design changes, rising material prices, client changes, and ambiguities in contract conditions (Munyua & Nyambura, 2020).

In Tanzania, the electricity sector has expanded to meet growing energy demands (Mshana & Mallya, 2022). TANESCO, the main electricity utility company, has implemented several infrastructure projects aimed at improving transmission, distribution, and rural electrification (Wamba, 2021). Yet, evidence indicates that many projects experience cost overruns and funding gaps, which compromise project timelines, quality, and overall performance (URT, 2022).

Geita, a region in Tanzania, has been undergoing various electrical infrastructure projects aimed at improving access to electricity and enhancing the overall quality of life for its residents. In the agriculture and mining sectors in this area, reliable electricity is essential for productivity and growth (Katunzi & Mwakapala, 2023). However, the performance of electrical infrastructure projects is often undermined by budgetary constraints and unplanned expenses and by mid-2020, only 30% of the planned electrical infrastructure projects had been completed (Wamba, 2021). These challenges hinder TANESCO's ability to deliver reliable and timely electricity services, impacting both industrial and residential consumers. Understanding the impact of cost overruns and funding challenges is essential for improving project planning, resource allocation, and overall project performance in the electricity sector.

While previous studies have examined cost overruns and funding issues in infrastructure projects (Catalão et al., 2021; Cavalieri et al., 2019b, 2019a; Gao & Touran, 2020; Love et al., 2022), few studies focus specifically on electrical infrastructure projects in TANESCO Geita Zone. Furthermore, limited research investigates the combined impact of cost overruns and funding challenges on project performance in Tanzanian electricity projects. There is a need for empirical research that examines how cost overruns and funding challenges jointly affect the performance of electrical infrastructure projects in Geita Zone, Tanzania. By investigating these issues, the study can provide practical recommendations to enhance the efficiency and reliability of electrical infrastructure projects in TANESCO Geita Zone.

2. RESEARCH METHODOLOGY

This study employed a quantitative research approach supported by an explanatory research design. This study was carried out in the TANESCO Geita Zone in the Geita Region due to the fact that, the available evidence indicates that various undergoing electrical infrastructure projects (agriculture and mining sectors) have faced significant hurdles (Katunzi & Mwakapala, 2023). Only 30% of targeted villages have received reliable electricity due to logistical challenges and insufficient community engagement (Mshana & Mallya, 2022). Additionally, the Rural Electrification Initiative launched in early 2019 to extend electricity access to rural communities in Geita showed that the Transmission Line Expansion project aimed at connecting remote areas to the national grid, has significant delays attributed which resulted in only partial completion (Wamba, 2021).

A census sampling technique was used, targeting all personnel involved in the identified projects due to the relatively small population size. This approach ensured that every relevant perspective is captured and enhances the reliability of the study findings. Instruments were validated by research experts, and the reliability of the Likert scale items were ensured through Cronbach's Alpha Coefficient and triangulation. Data were gathered through structured questionnaires. Quantitative data was analysed using mean scores and standard deviations as well as multiple linear regression analysis by the help of an SPSS version 28. The regression model was presented as follows: $PP = \beta_0 + \beta_1 CO + \beta_2 FC + \epsilon PP$

where:

- PPPPPP = Project Performance
- COCOCO = Cost Overruns
- FCFCFC = Funding Challenges
- β_0 = Intercept
- β_1, β_2 = Coefficients of independent variables
- ε = Error term

Additionally, the study adhered to the ethical consideration by asking consent to all respondents of the study, ensured the voluntary participation, as well as the anonymity and confidentiality. Further, the principle of do not harm, and the clearance and permission letters were equally observed during the study.

3. RESULTS

This section presents and discusses the results of the study on the impact of cost overruns and funding challenges on electrical infrastructure project performance in TANESCO Geita Zone, Tanzania. The discussion is based on the findings as they were generated from the data analyzed. They are compared and/or contrasted with the previous literature. Any contribution of each finding is highlighted which helps to clear an in-depth understanding of study under scrutiny. The findings are organized into descriptive statistics summarizing key variables, regression analysis to test the relationship between independent and dependent variables and discussion of findings in relation to existing literature.

3.1 Descriptive Statistics

Descriptive statistics provide a summary of respondents' perceptions and the status of key variables.

Table 1: Descriptive Statistics Results

Variable	Mean	Std. Dev	Interpretation
Cost Overruns	4.2	0.7	High incidence of overruns
Funding Challenges	3.8	0.9	Moderate funding delays
Project Performance	3.5	0.8	Average project outcomes

Table 1 presents the descriptive statistics on respondents' perceptions regarding challenges affecting project implementation. The results indicate that respondents generally acknowledged the existence of several challenges influencing project outcomes, as reflected by the mean scores. Specifically, cost overruns recorded the highest mean score ($M = 4.2$, $SD = 0.7$), suggesting that most respondents strongly agree that projects frequently experience budget overruns. The relatively low standard deviation indicates that respondents had fairly consistent views on this issue, implying that cost escalation is a common and widely recognized challenge affecting project implementation.

Similarly, funding challenges obtained a mean score of ($M=3.8$, $SD=0.9$), indicating that respondents moderately agree that delays or shortages in funding affect project progress. The slightly higher standard deviation shows some variation in opinions, although the overall response still reflects concern about financial constraints during project execution. In addition, project performance recorded a mean score of ($M=3.5$, $SD=0.8$), suggesting that respondents perceive project outcomes to be average. This indicates that while projects are generally completed, their effectiveness, efficiency, or quality may not always reach the expected standards. The moderate standard deviation also implies a reasonable level of agreement among respondents regarding this assessment. Overall, the findings imply that cost overruns and funding challenges are significant issues affecting project implementation, which in turn contributes to only average levels of project performance. These results highlight the need for improved financial planning, effective budgeting mechanisms, and timely funding allocation to enhance overall project outcomes in the Geita Zone.

3.2 Regression Analysis

The study employed multiple linear regression analysis to determine the effect of cost overruns and funding challenges on project performance.

Table 2: Regression Analysis Results

Independent Variable	Coefficient (β)	Std. Error	t-value	p-value
Cost Overruns (CO)	-0.45	0.12	-3.75	0.001**
Funding Challenges (FC)	-0.37	0.15	-2.47	0.018*
Constant (β_0)	4.10	0.34	12.06	0.000

Table 2 presents the regression results showing the effect of cost overruns and funding challenges on project performance. The findings indicate that cost overruns (CO) have a negative and statistically significant effect on project performance ($\beta = -0.45$, $p = 0.001$). This implies that an increase in cost overruns significantly reduces project performance. Similarly, funding challenges (FC) also show a negative and statistically significant relationship with project performance ($\beta = -0.37$, $p = 0.018$). This suggests that delays or shortages in funding significantly decrease the effectiveness of project outcomes. Overall, the results indicate that both cost overruns and funding challenges significantly undermine project performance, highlighting the importance of effective financial management and timely funding in project implementation in the Geita Zone.

4. DISCUSSION

Findings established that cost overruns and funding challenges are major determinants of project performance. Both variables negatively affect timeliness, quality, and efficiency, with cost overruns having a slightly stronger effect. The negative relationship cost overruns and project performance of electrical infrastructure in Geita Zone supports Project Management Theory, which emphasizes the need for effective cost control for project success (Flyvbjerg, 2017). Projects exceeding budgets often face delays and reduced quality, consistent with findings in Tanzania and East Africa (Ofori, 2015; URT, 2022). Delayed or insufficient funding significantly hampers project implementation, aligning with the Resource-Based View, which highlights the role of financial resources in achieving project objectives (Barney, 1991). The study confirms that timely funding is essential to maintain project schedules and quality standards. Findings show that TANESCO projects in Geita Zone often underperform when cost and funding issues arise. This resonates with East African studies on infrastructure projects, where financial mismanagement and

budgetary shortfalls reduce reliability and efficiency (Alinaitwe, 2016; Munyua & Nyambura, 2020).

The study concludes that cost overruns and funding challenges are critical barriers to effective implementation of electrical infrastructure projects in TANESCO Geita Zone. Both factors significantly compromise project performance, delaying project completion and reducing the quality and reliability of electricity delivery. The findings underscore the need for enhanced financial planning, strict budget control, and timely fund allocation to improve project outcomes. Addressing these challenges will contribute to more efficient electricity infrastructure development, supporting economic growth and service delivery in the region.

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