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Causes of cost overruns on Zimbabwe's construction infrastructure projects

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ABSTRACT

The cost performance of infrastructural projects has been problematic, especially in countries with fragile economies like Zimbabwe. However, interrogations of the causes of such cost overruns are scarce within the study area. This article reports on a study that sought to determine the causes of cost overruns on infrastructural construction projects and to establish statistically significant differences in ranking due to quantity surveyor designations. A survey on quantity surveyors from construction companies and quantity surveying consultancy firms in Zimbabwe was instituted and analysed through descriptive and inferential statistics. The most critical causes of cost overruns included currency exchange rate unpredictability, poor financial planning for the project, and an unstable economic climate. A statistically significant difference due to the designations was revealed in individual causes, indicating functional differentiation in determining preventative strategies. Ten components were revealed through factor analysis: excessive use of prime cost and provisional sums, unstable economic fundamentals, project complexity, and duration risks, amongst others. Inculcation of project management competencies, which include risk management, is recommended to resolve these challenges within the Zimbabwean construction industry. There is a need to innovate toward adequate planning for unstable economic climates and risk management. Only the perspectives of quantity surveyors were considered due to the exploratory nature of the study; however, their role in the cost and financial management of construction projects validated their participation in the study.

Keywords: Cost overrun, infrastructure, Quantity surveyors, developing countries

1. INTRODUCTION

Research on cost overruns on construction projects has been topical and contentious in developed and developing countries (Dada, 2014; Steininger, 2020). More so for developing countries where fragile economic structures exist (Durdyev, 2021), thus significantly contributing negatively to their developmental goals. While a plethora of studies on causes of cost overruns on construction projects may indicate enough has been done, the continued focus signifies the need for distinctive interrogations and determinations from an empirical survey. This approach is paramount as it enables the generation of specific interventions within the Zimbabwean construction industry. This need is paramount for Zimbabwe, where the economic fundamentals are untenable. For example, the Global competitiveness report (2013) ranked the quality of the country's infrastructure amongst the lowest 15% in the world. Further, a 10% contraction of Gross Domestic Product (GDP) in 2020 and a negative projection for 2021, an inflation rate ranging around 53% in the last quarter of 2021, and an unstable foreign currency exchange rate (African development bank group, 2021), are all detrimental to the construction industry's performance. The less than 1% contribution of the construction industry to the GDP (Zimbabwe National Statistics Agency, 2020) may seem insignificant. However, the thrust of the Zimbabwe government towards financing the

housing, roads and dam infrastructural projects from the GDP (The Zimbabwe infrastructure development programme, 2021) supports the focus on remedying cost overruns caused on such projects. This, theoretically and not empirically, potentially explains the general cost and time overruns on infrastructural construction projects (Chigara and Moyo, 2014; Moyo, Crafford and Emuze, 2021) and more complex and related challenges of productivity, profitability, and performance (Mhlanga, 2017; Mhlanga, 2018). Although time overruns are equally important, cost overruns have taken centre stage in many studies, especially for infrastructural projects. Thus, they are the focus of this study.

Despite cost overruns being topical, research on this aspect in the study area is scarce. Hence, the objectives of this study are two-fold. First, this study examines the important causes of cost overruns on infrastructural projects in Zimbabwe. Various authors support contextual approaches to causes of cost overruns as they enable appropriate responses within the study areas (Amadi and Higham, 2017; Akinradewo et al., 2019; Mahmud et al., 2021). Second, the statistically significant differences between the views of consultant and contractor's quantity surveyors are examined. While a significant number of studies (Park and Papadopoulou, 2012; Ahiaga-Dagbui and Smith, 2014; Adam et al., 2017; El- Maaty, 2017; Lu et al., 2017; Habibi and Kermanshachi, 2018) considered insights from various construction professionals, this study sought perceptions from the most proficient professional on cost and financial management aspects of construction projects (Royal Institute of Chartered Surveyors, 2018). Quantity surveyors, also known as construction economists or cost managers, are critical for the financial management of construction projects (Dada and Jagboro, 2012; Shayan et al., 2019) hence they are best to participate in this exploratory study. Consequently, this study considers the consultants' and contractors' quantity surveyors within the designated demography. The role and responsibility differences among the respective quantity surveyors that work for consultants' and contractors' organisations indicate potential differences in insights on the causes of cost overruns on infrastructural projects (Ramus et al., 2008). Hence, the importance of the causes of the cost overruns is likely dependent on designation factors.

The next section of the article reports on the cost performance of infrastructural projects, which includes a review of the causes of cost overruns from previous studies. Then, the research method utilised to address the research questions is clarified, and the findings are delineated. Lastly, the conclusions on the causes and remedies of cost overruns are stated together with the study's recommendations and limitations.

2. COST PERFORMANCE OF INFRASTRUCTURAL PROJECTS

As a key performance criterion, the cost has been a prominent definition of project success (Asiedu and Adaku, 2020). Cost overruns have been borne in technical, economical, psychological and political issues (Steinger et al., 2021). Cost overruns are defined as excesses beyond the set budget or cost of a construction project (Amoatey et al., 2015). Cost overruns include all loss and expense claims and changes in scope due to project conditions (Oyewobi et al., 2016). Uncertainties in the construction industry environment contribute to difficulties in the management of costs and lead to cost overruns (Olatunde and Alao, 2017). The cost overrun conundrum has been a popular topic in construction projects worldwide, with the effective use of cost control techniques being significant (Oyegoke et al., 2021), albeit to varying extents.

Cost performance is critical to the success or failure of infrastructural construction projects (Olatunde and Alao, 2017). Notwithstanding the complexity of infrastructural projects increasing, as citizens seek healthy and sustainable environments (Steinger et al., 2021, Afzal et al. (2021) assert that cost overrun issues have been common due to the complex and dynamic nature of infrastructural construction projects. In addition, the risk information uncertainty and the risk network's complexity have been identified as the root cause of cost overruns (Afzal et al., 2021). Although project success has been dependent on controlling costs (Oyegoke et al., 2021), cost overrun factors have been numerous and emanate from various sources.

2.1 Causes of cost overruns from previous studies

Dada (2014) revealed that cost overruns are significantly dependent on the nature of project team relationships in Nigeria. However, no dependence on procurement methods exists. Contrary to the findings, the implication of project team relationships within procurement methods is difficult to ignore, both being significant to the extent of cost overruns. However, Dada (2014) determined client-contractor relationships to have the most significant influence on explaining cost overruns on construction projects, as supported by Park and Papadopoulou (2012) and Ahiaga-Dagbui and Smith (2014). Sambasivan et al. (2017) determined consultant-related, material-related, and dispute-related issues as explaining cost overruns on construction projects. Akinradewo et al. (2019) revealed significant factors related to owner/consultant, environmental, political, economic, bidding, construction, project, contractor, design, resources, technical/managerial, and legal. Afzal et al. (2020) classified the cost risk factors into dimensions of the engineering design process, construction management practices, construction safety standards, geographical natural hazards, and domestic social and economic problems. Oyegoke et al. (2021) categorise the cost overruns factors into nine (9) broader themes of price and cost, delay and extension of time, project management, design, construction, payments, contractor-specific factors, consultants' specific factors, and force majeure.

As evidenced by the studies above, the plethora of categorisations of causes of cost overruns suggests that contextual consideration is paramount. Therefore, this study considered the causes of cost overruns as contractor-related, client and consultant-related, and external and project-related factors. This is supported by the study by Dada (2014), which determined client-contractor relationships as having the most significant influence on explaining cost overruns. Hence, Table 1 summarises the categories selected for this study. In addition, the actual causes were selected from previous similar studies, especially within developing countries. Therefore, justification of the causes is reviewed hereafter, together with the shortcomings of previous similar studies. This study will address, as it seeks to determine causes of cost overruns on infrastructural projects and proffer mitigatory measures.

Table 1: Causes of cost overruns from previous studies

No.	Causes	Sources
Contractor related		
CC1	Poor material planning	Enshassi et al. (2009), Adam et al. (2017), El-Maaty et al. (2017), Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al. (2019), Asiedu and Ameyaw (2021)

CC2	Poor plant and machinery planning	Enshassi et al., (2009), Adam et al., (2017), El-Maaty et al., (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC3	Poor labour planning	Enshassi et al. (2009), Park and Papadopoulou (2012), Adam et al. (2017), El-Maaty et al. (2017), Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC4	Shortage of adequate plant and equipment	Habibi and Kermanshachi (2018)
CC5	Poor organisation structure	Ahiaga-Dagbui and Smith (2014), Enshassi et al., (2009), Lu et al., (2017), Akinradewo et al., (2019)
CC6	Poor process procedures	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), El-Maaty et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC7	Poor site management	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Lu et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC8	Poor cost monitoring and control by contractors	Enshassi et al. (2009), Ahiaga-Dagbui and Smith (2014), El-Maaty et al. (2017), Famiyeh et al. (2017), Lu et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
Client and Consultant related		
CC9	Poor budget estimation of the project cost by consultants	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Adam et al. (2017), Famiyeh et al. (2017)
CC10	Inadequate design specifications	Ahiaga-Dagbui and Smith (2014), Akinradewo et al. (2019), Lu et al. (2017), Durdyev (2021)
CC11	Lack of communication between clients and consultants	Park and Papadopoulou (2012) Ahiaga-Dagbui and Smith (2014) Adam et al., (2017) El-Maaty et al., (2017), Famiyeh et al., (2017), Lu et al., (2017), Habibi and Kermanshachi (2018), Asiedu and Ameyaw (2021), Durdyev (2021)
CC12	Lack of communication and coordination between consultants	Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Adam et al., (2017), El-Maaty et al., (2017), Lu et al., (2017), Habibi and Kermanshachi (2018), Durdyev (2021)
CC13	Deficiencies with procurement methods	Park and Papadopoulou (2012), Akinradewo et al. (2019), Asiedu and Ameyaw (2021)
CC14	Client initiated changes	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Famiyeh et al. (2017) Lu et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC15	Slow decision-making by the project team	Enshassi et al., (2009), Adam et al., (2017), Famiyeh et al., (2017) Lu et al., (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC16	Delays between tender and contract award date	Enshassi et al., (2009), El-Maaty et al., (2017), Famiyeh et al., (2017), Akinradewo et al., (2019) Asiedu and Ameyaw (2021)
CC17	Delays and uncertainties surrounding payment of work done	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019), Asiedu and Ameyaw (2021)
CC18	Lack of frequent and effective supervision by consultants	Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Adam et al. (2017), Famiyeh et al. (2017), Asiedu and Ameyaw (2021)
CC19	Deliberate underestimation of the initial project cost	Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Adam et al. (2017), Famiyeh et al. (2017), Habibi and

		Kermanshachi (2018), Akinradewo et al., (2019) Asiedu and Ameyaw (2021), Durdyev (2021)
CC20	Poor financial planning for the project	Enshassi et al., (2009), Adam et al., (2017), El-Maaty et al., (2017), Famiyeh et al., (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019), Durdyev (2021)
CC21	Errors and discrepancies in the contract documents	Enshassi et al. (2009), Ahiaga-Dagbui and Smith (2014), Habibi and Kermanshachi (2018), Asiedu and Ameyaw (2021)
External and project-related factors		
CC22	Harsh weather conditions	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Adam et al. (2017), Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Asiedu and Ameyaw (2021), Durdyev (2021)
CC23	Lack of enforcement of contract provisions by all parties	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019), Asiedu and Ameyaw (2021), Durdyev (2021)
CC24	Unforeseen ground conditions	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Habibi and Kermanshachi (2018), Akinradewo et al. (2019), Asiedu and Ameyaw (2021), Durdyev (2021)
CC25	Poor calibre of contractors selected	Enshassi et al., (2009), El- Maaty et al., (2017), Lu et al., (2017), Akinradewo et al., (2019) Asiedu and Ameyaw (2021)
CC26	Collusion between consultant and contractor	Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Akinradewo et al. (2019), Asiedu and Ameyaw (2021)
CC27	Excessive bribery and cronyism	Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), Akinradewo et al. (2019), Asiedu and Ameyaw (2021)
CC28	Project complexity	Ahiaga-Dagbui and Smith (2014), Lu et al. (2017), Habibi and Kermanshachi (2018)
CC29	Long project duration	Ahiaga-Dagbui and Smith (2014), Habibi and Kermanshachi (2018), Akinradewo et al. (2019)
CC30	Currency exchange rate unpredictability	Enshassi et al. (2009), Park and Papadopoulou (2012), Habibi and Kermanshachi (2018), Akinradewo et al. (2019)
CC31	Unstable economic climate	Enshassi et al., (2009), Habibi and Kermanshachi (2018), Akinradewo et al., (2019)
CC32	Excessive use of prime cost and provisional sums	Famiyeh et al., (2017), Asiedu and Ameyaw (2021)
CC33	Excessive increase in material and labour prices	Enshassi et al. (2009), Park and Papadopoulou (2012), Ahiaga-Dagbui and Smith (2014), El-Maaty et al. (2017, Famiyeh et al. (2017), Habibi and Kermanshachi (2018), Akinradewo et al., (2019), Asiedu and Ameyaw (2021), Durdyev (2021)

Consistent with Table 1, Shehu et al. (2014) reported on the most critical factors that affected delays. These were cost-related and included cash flow problems faced by the contractor and difficulties in financing the project by the contractor. The cumulative results showed that all the other professionals (Architects, Engineers and Project managers) agreed with Quantity surveyors on these critical factors. Although Amoatey and Ankrah (2017) reported on a study on the most critical causes of road construction delays, the nature of the

causes is cost and finance-related. These include delays in finance and payment of completed work by owners, changes in scope by the owner during construction, inadequate contractor experience, and delays in furnishing and delivering the site to the contractor. These findings are consistent with studies on causes of cost overruns by Enshassi et al. (2009) and Habibi and Kermanshachi (2018). Olatunde and Alao (2017) revealed that most public and private universities in the Osun state of Nigeria were completed beyond the estimated costs.

Further, suggested interventions of detailed client briefs, precision in design development, adequate cost engineering by quantity surveyors, and improved integrity and professionalism of contractors were proffered. However, Akinradewo et al. (2019) also determined additional cost aspects and poor financial control on sites as the most causative factors for cost overruns on construction projects in South-Western Nigeria. Significantly, there was consensus from the construction professionals (Architects, Builders, Engineers, Project Managers and Quantity Surveyors) on the causative factors. However, the plethora and overlap of the factors make it difficult to institute responses to these causes, although not impossible.

Afzal et al. (2020) revealed that poor design issues and material price increases increased the risk of cost overruns on transit projects in China. However, experts' perceptions present non-holistic and subjective response bias, although developing a cost-risk contingency would aid effective cost planning (Afzal et al., 2020). Similarly, Aje et al. (2017) identified design and documentation issues and ineffective financial management by construction stakeholders as two of the most prevalent causes of cost overruns on construction projects. However, in their study, external factors were found insignificant in causing cost overruns. Olatunji et al. (2018) also revealed a significant correlation between cost overruns and material price fluctuations. The authors suggested price risk mitigation through rewarding efficiency and intelligence.

Project complexity and unforeseen ground conditions are significant for accurately assessing contingency sum allowances, justifying a departure from the mainly utilised traditional percentage assessment method even for public sector infrastructural projects (Lam and Siwingwa, 2017). Thus, predictive models for contingency sums are supported for enhancing project cost performance. Generally, the implementation of risk management is pertinent in contingency sum estimation. For example, Amadi and Higham (2017) empirically exposed the contribution of geotechnical factors to cost overruns on highway projects in Nigeria. Consequently, effective geotechnical investigations at pre-contract stages were supported to exponentially reduce the extent of cost overruns on such infrastructural projects.

Cost performance has been significantly affected by change orders on construction projects during the construction phase (Shrestha et al., 2019). Further, probability curves were suggested as a way of predicting cost growth through the determination of change orders. Effective change management systems were extended. Oyewobi et al. (2016) also determined increases in construction costs as the most frequent effect of variations.

An analysis of the reviewed causes of cost overruns and contextual singularities of the study area was important in determining the methodology for this study, as explained in the next section.

3. METHODOLOGY

This research is part of a broader study on issues affecting Zimbabwe's construction industry. Hence, certain aspects of the methodology are similar to articles published in other journals. A survey research strategy was utilised in this quantitative study as it enabled interpretation and generalisability (Saunders et al., 2016). A questionnaire survey, as supported by Famiyeh et al. (2017) and Asiedu and Ameyaw (2021), was initially undertaken to collect quantitative data on the causes of cost overruns from both consultants' and contractors' quantity surveyors. Consequently, remedies were derived from the revealed important causes of cost overruns. The exploratory nature of this study limited respondents to quantity surveyors due to them having the most robust understanding of cost and financial issues on construction projects. All eighty-three (83) construction companies resident in Harare and Bulawayo and listed in the list of companies of the Construction Industry Federation of Zimbabwe (CIFOZ) (2021) were included in the contractors' quantity surveyor selection. According to the CIFOZ list, more than 90% of the construction companies in Zimbabwe are found in the selected geographical areas. Consultant quantity surveyors in all twenty-two (22) quantity surveying firms in Zimbabwe were also selected for the study. For the quantitative inquiry, a web-based questionnaire was instituted, and it comprised two sections. The first section requested demographic information on gender, designation, educational levels and experience, while the second section required the respondents to rate the importance of causes of cost overruns on infrastructural construction projects where 1- not important, 2–slightly important, 3- somewhat important, 4- important and 5- very important. The relative importance index (RII) was utilised to evaluate univariate importance. Importance intervals, as modified by Perera et al. (2007), as follows: 'not important' < 0.2; $0.2<$ 'of little importance' ≤ 0.4; $0.4<$ 'somewhat important' ≤ 0.6; $0.6<$ 'important' ≤ 0.8; $0.8<$ 'very important' ≤ 1. From this evaluation scale, importance was regarded from RII of ≥ 0.6.

The Statistical Package for Social Science (SPSS) version 24 (with 95% confidence in the results) was used to aid descriptive and inferential statistical analysis (Field, 2014). An excellent reliability of 0.933 was computed using the Cronbach alpha reliability test, which showed that the questionnaire provided stable and consistent results (Taherdoost, 2016). Factor analysis reduced the variables by assembling common variables into descriptive categories (Yong and Pearce, 2013), and it was utilised to reveal the significant interrelated causes of cost overruns. The resultant latent variables' occurrence is hidden but represents the accurate measure of the variables (Santos et al., 2019). The validity of data for conducting factor analysis was confirmed by the Kaiser-Meyer-Olkin (KMO) test, where an acceptable measure of 0.623 was obtained as it was > 0.5 (George and Mallery, 2003; Ather and Balasundaram, 2009). A significant Bartlett's test for sphericity value of 0.000, which was < 0.05, indicated that the correlation matrix was not random (Watkins, 2018). Significant components with eigenvalues ≥ 1, were extracted using the principal component analysis with varimax rotation (Kaiser, 1958). Eigenvalues measure the variance in all variables attributable to that component or factor, and those with values < 1 are discarded (Ather and Balasundaram, 2009). Varimax rotation is strategic in maximising variance for each factor by enhancing the high loadings and lowering the low loadings (Benson and Nasser, 1998). Acceptable loadings ≥ 0.4 were considered stable for utilisation (Guadagnoli and Velicer, 1988). The descriptive categories of components' titles were derived from the constituents'

variables (Lu et al., 2017; Asiedu and Ameyaw, 2021; Yap et al., 2021) instead of utilising the variable with the highest factor model (Ather and Balasundaram, 2009).

Since the data were not normally distributed due to a sig. Shapiro-Wilk test value of 0.032 for samples more than 50, which is less than 0.05 (Ghasemi and Zahediasl, 2012), the use of non-parametric tests for testing significant differences due to demographic variables are supported. Blumberg, Cooper and Schindler (2008) define the Mann-Whitney U test as a test comparing the central tendency of two independent samples, in this case, designation. The statistical significance level for all tests is based on a standard value of $p < 0.05$.

4. RESULTS AND DISCUSSION

This section reports on the profile of respondents as well as results and discussion on the causes of cost overruns on infrastructural construction projects.

4.1 Profile of respondents

The response rate for participation was a combined 48.6%, represented by 51 respondents (14 out of 22 consultants' quantity surveyors and 37 out of 83 contractors' quantity surveyors) from a population size of 105. This was satisfactory and acceptable as it complies with Moser and Kalton (1979)'s return rate lower limit of 30% for validity. Hence, the validity of the study is supported by this response rate. The profile of respondents, as shown in Table 2, represents the construction industry in Zimbabwe.

Table 2: Demographics of respondents

Description	Total	Proportion (%)
Gender		
Male	44	86
Female	7	14
Designation		
Contractor's Quantity surveyor	37	72
Consultant's Quantity surveyor	14	28
Educational Level		
Diploma	17	33
Degree	19	37
MSc	15	30
Experience		
0 – 5 Years	19	37
6-10 Years	15	30
11-15 Years	9	18
Above 15 Years	8	15

Cumulatively, all the demographic variables are competently constituted to allow for statistical analysis and validity of the study.

4.2 Causes of cost overruns

As shown in Table 3, respondents submitted their insights on important causes of cost overruns on infrastructure projects in Zimbabwe. The overall results show that the

univariate causes of Unforeseen ground conditions (RII=0.592) and Harsh weather conditions (0.514) were not important, as their RII was < 0.6. Seven of the causes were very important, with Currency exchange rate unpredictability (RII= 0.894), Poor financial planning for the project (RII=0.855), and Unstable economic climate (RII=0.851) being the most important. These are critical external and project-related causes that require national policy intervention and enhancing quantity surveying functions of financial planning. The economic structure of some developing countries, as alluded to by Enshassi et al. (2009) and Akinradewo et al. (2019), is characterised by such economic shocks, and responses should include the conducting of construction business in more stable currencies. Innovation is required in dealing with financial planning, where vast uncertainties hamper forecasting. Key project management competencies, including risk management, can go a long way in preparing construction professionals for working in such conditions. Hence, there is a need to have these skills developed and incorporated into their continuous professional development. Table 3 also shows the differences in insights by consultants and contractors' quantity surveyors. The Mann-Whitney results show* significant differences where the value is ≤ 0.05.

Table 3: Ranking of causes of cost overruns

	Causes of cost overruns	**Overall**		**Consultants' Quantity Surveyor**		**Contractors' Quantity Surveyor**		**Mann Whitney results**
		RII	Rank	RII	Rank	RII	Rank	Sig
CC30	Currency exchange rate unpredictability	0.894	1	0.943	1	0.876	1	0.138
CC20	Poor financial planning for the project	0.855	2	0.857	11	0.854	2	0.849
CC31	Unstable economic climate	0.851	3	0.943	1	0.816	6	0.078
CC11	Lack of communication between clients and consultants	0.843	4	0.842	16	0.843	3	0.772
CC33	Excessive increase material and labour prices	0.843	4	0.886	5	0.827	4	0.206
CC8	Poor cost monitoring and control by contractors	0.839	6	0.886	5	0.822	5	0.187
CC27	Excessive bribery and cronyism	0.808	7	0.829	17	0.800	8	0.539
CC9	Poor budget estimation of the project cost	0.796	8	0.871	9	0.768	10	0.071
CC14	Client initiated change orders	0.792	9	0.757	29	0.805	7	0.594
CC15	Slow decision-making by the project team	0.792	9	0.771	25	0.800	8	0.911
CC10	Inadequate design specs	0.788	11	0.843	15	0.768	10	0.700
CC4	Shortage of adequate plant and equipment	0.780	12	0.857	11	0.751	12	0.126
CC13	Deficiencies with procurement methods	0.773	13	0.900	3	0.724	19	0.002*
CC1	Poor material planning	0.772	14	0.886	5	0.730	17	0.010*
CC29	Long project duration	0.761	15	0.800	21	0.746	13	0.335

CC17	Delays and uncertainties surrounding payment of work done	0.765	15	0.814	18	0.746	13	0.160
CC7	Poor site management	0.761	17	0.871	9	0.719	20	0.014*
CC19	Deliberate underestimation of the initial project cost	0.761	17	0.814	18	0.740	16	0.371
CC2	Poor plant and machinery planning	0.760	19	0.814	18	0.741	15	0.177
CC3	Poor labour planning	0.749	20	0.900	3	0.692	24	0.000*
CC16	Delays between tender and contract award date	0.745	21	0.786	24	0.730	17	0.190
CC25	The poor calibre of contractors	0.745	21	0.857	11	0.703	22	0.012*
CC32	Excessive use of prime cost and provisional sums	0.737	23	0.857	11	0.692	24	0.006*
CC5	Poor organisation structure	0.729	24	0.886	5	0.670	29	0.003*
CC12	Lack of coordination and communication between the consultants	0.725	25	0.800	21	0.697	23	0.045*
CC21	Errors and discrepancies in the contract document	0.725	25	0.771	25	0.708	21	0.229
CC6	Poor process procedures	0.714	27	0.800	21	0.681	27	0.040*
CC18	Lack of frequent and effective supervision by consultants	0.710	28	0.771	25	0.686	26	0.243
CC28	Project complexity	0.698	29	0.743	30	0.681	27	0.299
CC23	Lack of enforcement of contract provisions by all parties	0.694	30	0.771	26	0.665	30	0.073
CC26	Collusion between consultants and contractors	0.671	31	0.686	31	0.665	30	0.793
CC24	Unforeseen ground conditions	0.592	32	0.557	33	0.605	32	0.514
CC22	Harsh weather conditions	0.514	33	0.586	32	0.486	33	0.229

*Significant differences ≤ 0.05

The individual causes of cost overruns, as shown in Table 4, were subsequently analysed concerning their statistically significant differences.

Table 4: Summary of Mann-Whitney U test results on designations

Causes of cost overruns	Sig.	Designation means ranks	
		Consultant's quantity surveyor	Contractor's quantity surveyor
CC1 Poor material planning	0.010	34.29	22.86
CC3 Poor labour planning	0.000	37.00	21.84
CC5 Poor organisation structure	0.003	35.57	22.38
CC6 Poor process procedures	0.040	32.50	23.54
CC7 Poor site management	0.014	33.96	22.99
CC12 Lack of coordination and communication between the consultants	0.045	32.50	23.54
CC13 Deficiencies with procurement methods	0.002	36.04	22.20
CC25 The poor calibre of contractors	0.012	34.14	22.92
CC32 Excessive use of prime cost and provisional sums	0.006	34.86	22.65

For all the individual causes of cost overruns with significant differences, as shown in Table 4, the consultant's quantity surveyors ranked them higher than the contractor's quantity surveyor. While both designations acknowledged their importance, contractors' quantity surveyors ranked them as less important than their consultants' quantity surveyors. These causes speak to insufficiencies within construction companies in undertaking appropriate planning for and managing their projects, as Enshassi et al. (2009) highlighted. While it is inevitable that these causes lead to the construction companies incurring cost overruns, their contribution to the infrastructural project cost overruns needs to be clarified.

Potentially the client faces indirect and direct cost overruns from the lack of planning and mismanagement of construction companies as alluded to by the causes due to Poor material planning, Poor labour planning, Poor organisation structure, Poor process procedures, and Poor site management. The causes of cost overruns that are client and consultant-related include Deficiencies with procurement methods and Lack of coordination and communication between the consultants. While both parties acknowledge the deficiencies of procurement methods as a cause of cost overruns, as supported by Park and Papadopoulou (2012), consultants play a prominent role in its selection and implementation. For emphasis, procurement methods within the public sector are regulated but are not immune to interrogation. The Lack of coordination and communication between consultants is also a cause for concern (Dada, 2014). This points to a general need for more technological advancement within the coordination and communication of consultants. Introducing such advancements as building information modelling is highly recommended to improve the synergy amongst consultants.

The causes of cost overruns that are external and project-related include Excessive use of prime cost and provisional sums and the poor calibre of contractors. The excessive use of prime cost and provisional sums has been perceived, especially by consultants' quantity surveyors, as being highly contributory to cost overruns, which is supported by El-Maaty et al., (2017). Having large infrastructural projects being initiated with substantial work items being allocated under prime cost and provisional sums has been expected. However, these allocations have contributed to cost overruns. Such a large allocation for unknown costs needs to be rectified by allowing for completion of all designs and procurement of sub-contractors prior to tendering and commencement of works. This gives more confidence to the estimated construction costs, and the client faces a lesser risk of budget overrun. The poor calibre of contractors selected for project works is also of concern (Lu et al., 2017). Although consultants' quantity surveyors view this as a significant cause of cost overruns, they contribute to this problem through their evaluation and recommendation of tenders. However, their susceptibility to cause any overruns may be reduced to other factors.

4.3 Relationships within the causes of cost overruns

Further to the univariate analysis, a multivariate analysis was undertaken to expose any relationships within the causes of cost overruns. The analysis revealed ten (10) groups of causes of cost overruns with an eigenvalue of ≥ 1, which explained 79.059% of the total variance with factor loadings ranging from 0.843 to 0.430, as shown in Table 5. The titles of each component were derived from the causes of cost overruns (Ather and Balasundaram, 2009).

Table 5: Factor analysis results

Item	Causes of cost overruns	Component									
		1	2	3	4	5	6	7	8	9	10
1	*Project on-site and pre-contract planning inadequacies*										
	CC1 Poor material planning	0.795									
	CC2 Poor plant and machinery planning	0.766									
	CC3 Poor labour planning	0.733									
	CC4 Shortage of adequate plant and equipment	0.667									
	CC10 Inadequate design specifications	0.562									
	CC5 Poor organisation structure	0.561									
	CC9 Poor budget estimation of the project cost	0.523									
	CC24 Unforeseen ground conditions	0.430									
2	*Poor organisational, communication and procurement structures*										
	CC6 Poor process procedures		0.795								
	CC7 Poor site management		0.743								
	CC25 Poor calibre of contractors		0.720								
	CC11 Lack of communication between clients and consultants		0.690								
	CC12 Lack of communication and coordination between consultants		0.545								
	CC13 Deficiencies with procurement methods		0.522								
3	*Poor project change management and initiation and inclement weather*										
	CC14 Client initiated changes			0.843							
	CC15 Slow decision-making by the project team			0.770							
	CC16 Delays between tender and contract award date			0.625							
	CC22 Harsh weather conditions			0.440							
4	*Inadequate contractual management*										

	CC17 Delays and uncertainties surrounding payment of work done				0.838						
	CC23 Lack of enforcement of contract provisions by all parties				0.733						
	CC26 Collusion between consultant and contractor				0.519						
5	*Inadequate consultant supervision and corruption*										
	CC18 Lack of frequent and effective supervision by consultants					0.769					
	CC27 Excessive bribery and cronyism					0.735					
6	*Poor cost, financial and contractual professionalism*										
	CC19 Deliberate underestimation of the initial project cost						0.804				
	CC20 Poor financial planning						0.497				
	CC21 Errors and discrepancies in the contract documents						0.477				
7	*Poor cost planning, monitoring and control*										
	CC33 Excessive increase in material and labour prices							0.735			
	CC8 Poor cost monitoring and control by contractors							0.521			
8	*Project complexity and duration risks*										
	CC28 Project complexity								0.834		
	CC29 Long project duration								0.671		
9	*Unstable economic fundamentals*										
	CC30 Currency exchange rate unpredictability									0.744	
	CC31 Unstable economic climate									0.501	
10	*CC32 Excessive use of prime cost and provisional sums*										0.517
	Eigenvalue	11.305	2.199	2.083	1.843	1.789	1.669	1.480	1.361	1.296	1.063
	The proportion of variance (%)	34.257	6.663	6.312	5.586	5.423	5.058	4.485	4.125	3.927	3.222
	Cumulative variance (%)	34.257	40.919	47.232	52.818	58.240	63.299	67.784	71.909	75.837	79.059
	Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 40 iterations.										

Each group of causes of cost overruns is discussed hereafter.

Component 1- Project on-site and pre-contract planning inadequacies

The first group of interrelated causes of cost overruns, as shown in Table 5, was named 'Project on-site and pre-contract planning inadequacies' and accounted for 11.306 eigenvalues and a variance of 34.257%. This group consists of contractor-related, client, consultant, and external and project-related causes of cost overruns. Of the contractor-related causes, the study revealed that the emphasis is on the need for proper planning and application of organisational structures by construction companies in dealing with material, labour and plant and equipment requirements of infrastructural projects as supported by Habibi and Kermanshachi (2018) and Akinradewo et al., (2019). Successful cost performance is reliant on sound management practices in these aspects. Achieving this also requires the site management team to be well-trained in construction management. However, this is a potential challenge, as construction organisations need to coordinate better and train construction industry professionals. Management programmes instituted by professional bodies are necessary for the industry to be improved. Establishing material labour, plant and equipment baselines, and execution strategies are paramount in any planning activity. Efficient cost performance is only achieved once these aspects have been sufficiently resolved. Client and consultant-related causes of cost overruns that include Inadequate design specifications and Poor budget estimation of the project cost, as suggested by Olatunde and Alao (2017), relate to competency inadequacies of construction professionals. Architectural, Engineering and Quantity surveying professionals ensure that all design specifications are complete and accurate (Afzal et al., 2020). There is strong advocacy for enhanced financial literacy and management for all construction professionals, as more often than not, the cost is the "bottom line" for the construction of infrastructural projects. In addition, incentivised professional contracts that include penalties for any shortcomings of construction consultants may push for improved competency. Unforeseen ground conditions have been ever-present in the construction industry (Amadi and Higham, 2017; Lam and Siwingwa, 2017). While this external factor is unforeseen, comprehensive risk management can be instituted to reduce the effects of this aspect on the cost performance of the construction of infrastructural projects.

Component 2- Poor organisational, communication, and procurement arrangements

The second group of interrelated causes of cost overruns, as shown in Table 5, was named 'Poor organisational, communication and procurement arrangements' and accounted for 2.199 eigenvalues and a variance of 6.663%. This group consists of contractor-related, client, consultant, and external and project-related causes of cost overruns. Poor process procedures and Poor site management are contractor-related causes of cost overruns that are borne on-site within construction companies. As highlighted in the first component, construction companies have management challenges, and they need to be well-trained to efficiently and effectively manage their construction sites (Enshassi et al., 2009). Waste minimisation and value maximisation are pertinent and are supported by lean construction implementation on construction sites. Effective communication among the project team, between clients and consultants and consultants, has seemingly deteriorated, which was considered a significant factor by Dada (2014). This could be due to several factors, including cultural, technological and technical differences. Thus, improvements should be encapsulated in modern forms of communication. Besides technical communication being

pertinent, other types of communication between clients and consultants need to be improved. Consultants should have the flexibility to communicate effectively to various audiences and this can be inculcated through stakeholder analysis and project communication management. The Poor calibre of contractors, as supported by Olatunde and Alao (2017), and the Deficiences of procurement methods (Asiedu and Ameyaw, 2021) are the two external and project-related causes of cost overruns in the group. Brain drains and lack of technological advances within the construction companies have hampered any positive development of these firms. The quality of the construction companies needs to be considered from a policy context. Also, construction companies need concessions and considered policy allowances that facilitate their growth. The absence of all these targeted interventions has perpetuated the perception of the poor calibre of construction companies. Attempts to motivate partnerships with international entities have yet to bring about the expected benefits. Hence, the capacitation of construction firms is paramount to resolving the challenges. The existent procurement methods have been perceived to be deficient in ensuring adequate cost performance of infrastructural construction projects. The treasury and privately funded projects have been procured under specific and regulated methods. Any challenges should have been well documented, and efforts to remedy them duly implemented. However, construction professionals' general need for proactiveness has contributed to the challenge. The possibility of exploiting the shortcomings of the procurement methods must be addressed. The rampant corruption in the construction industry is a testimony to a perceived lack of proactiveness in resolving procurement deficiencies.

Component 3- Poor project change and initiation management and inclement weather

The third group of interrelated causes of cost overruns, as shown in Table 5, was named 'Poor project change management and initiation and inclement weather and accounted for 2.083 eigenvalues and a variance of 6.312%. These causes of cost overruns are client and consultant related and external and project-related. Adhering to contractual provisions would limit the client from initiating changes unprocedural, and this can be achieved by having detailed client briefs, as revealed by Olatunde and Alao (2017) and Akinradewo et al. (2019). Client-initiated changes should be undertaken within proper change management structures (Oyewobi et al., 2016; Shrestha et al., 2019) and the effect communicated fully before implementation. Decisions should also be promptly made according to the contractual timeframes as supported by Enshassi et al., (2009). Any deviation would be detrimental to the cost performance of the project through the initiation of claims by the contractor. If adequate project initiation is undertaken, prompt commencement of works should be undertaken after the award of the contract. This limits the effect of fluctuations on the cost performance of projects, amongst other aspects. Also, weather conditions play a significant role in affecting project cost performance, as suggested by Oyegoke et al. (2021). Any delays in the delivery of projects culminate in the generation of claims by contractors, affecting the cost of construction of infrastructural projects. Adequate risk management ensures that the effect of harsh weather conditions is adequately catered for in the construction costing.

Component 4- Inadequate contractual management

The fourth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Inadequate contractual management' and accounted for 1.843 eigenvalues and a variance of 5.586%. These causes of cost overruns are client and consultant related and external and project-related. Delays of payment of work done come with remedies that

increase the costs of construction of infrastructural projects (Amoatey and Ankrah, 2017). These include claims for interest, suspension of works and even determination of contracts. Consultants are encouraged to comprehensively advise clients on these aspects and ensure adequate funding arrangements for construction projects are made prior to the commencement of works. However, while this may work for private clients, public-sector clients are less likely to comply. Regardless, they should be advised of the consequences of delayed payment for work undertaken. Consultants can also allow for sufficient contingencies to reduce the effect of such actions, especially for public sector clients. Numerous disputes emanate from a failure to enforce such provisions as and when they occur (Sambasivan et al., 2017). Upholding professionalism by all the construction stakeholders is pertinent to circumventing any cost overruns that may arise from such actions (Dada, 2014). Also, collusion between consultants and contractors leads to a lack of enforcement of contractual provisions, as revealed by Park and Papadopoulou (2012), with clients bearing adverse cost effects. Adherence to and enforcement of contractual provisions is highly recommended for infrastructural construction projects.

Component 5- Inadequate consultant supervision and corruption

The fifth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Inadequate consultant supervision and corruption' and accounted for 1.789 eigenvalues and a variance of 5.423%. These causes of cost overruns are client and consultant-related and external and project-related. The failure of contractors on sites is exacerbated by the lack of frequent and effective supervision by consultants, as supported by Ahiaga-Dagbui and Smith (2014). This may be due to needing more competent clerks of work or engineers' technical representatives on sites. Any delays or reworks that emanate from this failure by consultants will affect the cost performance of projects. Clients deserve the utmost attention and competent delivery of roles and responsibilities from consultants. Corruption has a negative impact on the cost of construction (Asiedu and Ameyaw, 2021). Instances where contractors are paid when the work has not been done satisfactorily or nominations are made due to prior unprofessional relationships add to the cost overrun concerns on infrastructural construction projects. Both these challenges require professional bodies to take a proactive role in raising awareness and taking decisive action where such contraventions occur.

Component 6- Poor cost, financial and contractual professionalism

The sixth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Poor cost, financial and contractual professionalism' and accounted for 1.669 eigenvalues and a variance of 5.058%. These causes of cost overruns are client and consultant-related. Matching client requirements with their budget can be a challenge for consultants. Added to this, the scarcity of work can lead to some consultants acting unprofessionally and deliberately underestimating the initial project costs determined by Olatunde and Alao (2017). This action is detrimental to the project's cost performance and is avoidable. Upon execution, the actual costs of the project manifest, and this puts unwarranted pressure on clients to provide additional budgets. Unfortunately, the lack of knowledge of clients and their trust in consultants prevents them from taking remedial action beyond their contractual arrangements. Incentivised professional contracts can act to reduce this risk if any deviation from the initial project cost estimate will negatively affect the fees claimable by the consultants. This may go a long way in promoting professional conduct from the consultants. Related to this, Poor financial planning for the project and Errors and

discrepancies in the contract documents, as also determined by Akinradewo et al., (2019) and Aje et al., (2017) respectively, are resolvable by incentivised professional contracts.

Component 7- Poor cost planning, monitoring and control

The seventh group of interrelated causes of cost overruns, as shown in Table 5, was named 'Poor cost planning, monitoring and control' and accounted for 1.480 eigenvalues and a variance of 4.485%. These causes of cost overruns are external and project-related, and contractor-related. Material and labour increases are expected in construction projects (Olatunji et al., 2018; Akinradewo et al., 2019; Afzal et al., 2020). However, in unstable economies, these expectations are difficult to forecast. If the type of contract is favourable towards fluctuations, the client bears the costs of excessive increases in material and labour prices. A solution would be to promote labour-only contracts when and if the client has enough capital to procure material. This can have a significant effect on reducing cost overruns.

Conversely, the nature of infrastructural projects having high construction costs may make it difficult for clients to invest substantial capital in procurement. Still, any proactive step taken by the client would reduce the effects of cost overruns. Unfortunately, contractors have had the challenge of poor cost monitoring and control for some time now (Chigara et al., 2013; Shehu et al., 2014). The root cause is their lack of competent manpower and/or technological advances to undertake such management requirements, as espoused by Oyegoke et al. (2021).

Component 8- Project complexity and duration risks

The eighth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Project complexity and duration risks' and accounted for 1.361 eigenvalues and a variance of 4.125%. These causes of cost overruns are external and project-related. As stated by Lam and Siwingwa (2017) and Afzal et al. (2021), project complexity has significantly led to cost overruns on infrastructural projects. The lack of an experienced construction professional workforce means complex projects are not competently designed and managed and this has a knock-on effect of increasing construction costs. The cost of reworks is also substantial, with delays affecting cashflow projections of clients and increasing costs. The situation is worsened by the insistence on undertaking most of these projects using only local contractors (The Zimbabwe infrastructure development programme, 2021). Engaging international contractors through joint ventures would remedy the capability concerns and enhance the successful delivery of such projects. Linked to this cause is the issue of long project duration. In an unstable economy, long project durations exacerbate the risk of cost overruns. Hence, a short-term project-phased approach potentially reduces such risks.

Component 9- Unstable economic fundamentals

The ninth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Unstable economic fundamentals' and accounted for 1.296 eigenvalues and a variance of 3.927%. These are external and project-related causes of cost overruns. The impact of unstable economic fundamentals is severe, especially in the study area where periodic economic downturns are significant. Abrupt changes in currencies and the consequent unpredictability of the exchange rate make cost budgeting of construction projects problematic, as also revealed by Mahmud et al. (2021). As clients migrate from one currency to another and try to navigate between official and non-official exchange rates, the construction costs tend to balloon, primarily due to the currency exchange rate unpredictability cost. Risk management, especially by Quantity surveyors, is strongly

advocated. However, this still needs to exist within the competency framework for construction professionals. Generally, the unstable economic climate affects all the stakeholders (Habibi and Kermanshachi, 2018). Resolutions are implementable from policy pronouncements where the construction industry is preferentially treated in respect of a multi-currency approach to project implementation, access to foreign currency, and tax breaks for infrastructural projects.

Component 10- Excessive use of prime cost sums and provisional sums

The tenth group of interrelated causes of cost overruns, as shown in Table 5, was named 'Excessive use of prime cost and provisional sums' and accounted for 1.063 eigenvalues and a variance of 3.222%. This is an external and project-related cause of cost overruns. Prime cost and provisional sums have always been allowable and acceptable on construction contracts. However, this has seemingly been problematic, contributing to cost overruns, as supported by Asiedu and Ameyaw (2021). Their existence is due to the need for specialists to undertake some of the works, the need for certain suppliers to provide some of the material, allow for work that has to be done by statutory undertakings, and to allow for defined and undefined work in construction contracts (Ramus et al., 2008). Although they are essential, they are seemingly being exploited by construction professionals to either engage in collusion with nominated sub-contractors or main contractors during the execution of works and/or as an excuse for their failure to complete designs on time.

5. CONCLUSION

Infrastructural construction projects are inundated with cost performance concerns in developed and developing countries. This is despite their importance to the economies of developing countries like Zimbabwe. Although an excess of studies exists on the causes of such cost overruns, contextual distinctiveness makes it highly inappropriate to superimpose the existent findings on the Zimbabwean construction industry. Therefore, this research aimed to empirically determine the causes of cost overruns on infrastructural construction projects. The univariate analysis exposed the economic aspects of currency exchange rate unpredictability, poor financial planning, and an unstable economic climate as the most important causes. Enhanced economic and financial risk management is paramount to reducing the effect of such causes. Statistically significant differences due to designation (consultants' and contractor's quantity surveyors) were established for individual causes. The causes of cost overruns that consultant quantity surveyors perceived to be more severe as compared to contractors include Poor site management, Poor labour planning, Poor material planning, Poor organisation structure, Poor process procedures, Excessive use of prime cost and provisional sums, The poor calibre of contractors, Deficiencies with procurement methods, and Lack of coordination and communication between the consultants. These causes of cost overruns are contractor-related and consultant-related. This indicates a consensus from the consultants' quantity surveyors on the management deficiencies of contractors on infrastructural projects. The factor analysis generated ten component groups of interrelated causes of cost overruns as; Excessive use of prime cost sums and provisional sums, Unstable economic fundamentals, Project complexity and duration risks, Poor cost planning, monitoring and control, Poor cost, financial and contractual professionalism, Inadequate consultant supervision and corruption, Inadequate contractual management, Poor project change and initiation management and inclement

weather, Poor organisational, communication and procurement structures, and project on-site and pre-contract planning inadequacies. These components reflect the entrenched challenges within construction stakeholders and contribute to the derivation of preventative strategies.

The study had the limitation of having quantity surveyors as the only respondents; however, this was an exploratory study, and their views were substantially vital as they have the required competency in cost and financial management of construction projects. Also, the causes of cost overruns for the survey were mainly selected from studies on developing countries. Although this potentially limited the respondents, this consideration was appropriate in considering the likely relevance of such causes to the study area. Further studies should incorporate the views of other construction stakeholders and assess statistically significant differences due to other demographic variables.

6. IMPLICATIONS FROM THE STUDY

The preventative strategies from the findings are numerous. Construction risk management should be instructed to both built environment students and professionals through tertiary education curricula and continuous professional development programmes to reduce the impact of unstable economic fundamentals. The implementation of contract-specific requirements through a short-term phased approach is supported. This will address the exposure to long-term risks. Also, the multi-currency approach will address currency shocks by using more stable currencies for construction projects. Third, the commencement of infrastructural construction projects with completely defined work and financial agreements with subcontractors is beneficial to the successful cost performance of projects. Competency in project management cycle phases of project initiation, planning and execution need to be inculcated in both contractor, consultant and client organisations to improve the management of projects. The lack of professional, ethical integrity of construction stakeholders substantially adds to the construction cost. With corruption activities becoming rampant, custodial sentences for such commercial crimes can go a long way in deterring such activities. In addition, construction organisations and professional bodies have the mandate and should intensify the training of their members against such behaviour.

7. REFERENCES

Adam A., Josephson P.E.B. and Lindahl G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects. Engineering, Construction and Architectural Management. 24(3), 393-406.

Afzal, F., Yunfei, S., Junaid, D. and Hanif, M.S. (2020). Cost-risk contingency framework for managing cost overrun in metropolitan projects: using fuzzy-AHP and simulation, International Journal of Managing Projects in Business, 13(5), 1121-1139.

Afzal, F., Yunfei, S., Nazir, M., Bhatti, S.M. (2021). A review of artificial intelligence-based risk assessment methods for capturing complexity-risk interdependencies: Cost overrun in construction projects, International Journal of Managing Projects in Business, 14(2), 300-328.

Ahiaga-Dagbui D.D. and Smith S.D. (2014). Rethinking construction cost overruns: cognition, learning and estimation. Journal of Financial Management of Property and Construction. 19(1), 38-54.

Aje O.I., Olatunji O.A. and Olalusi O.A. (2017). Overrun causations under advance payment regimes. Built Environment Project and Asset Management. 7(1), 86-98.
Akinradewo, O., Aigbavboa, C., and Akinradewo, O. (2019). Revisiting causative factors of project cost overrun in building construction projects in Nigeria. In IOP Conference Series: Materials Science and Engineering. 640 (1), p. 012002 DOI:10.1088/1757-899X/640/1/0120002.
Amadi AI and Higham A. (2017). Latent geotechnical pathogens inducing cost overruns in highway projects. Journal of Financial Management of Property and Construction. 22(3), 269-285.
Amoatey, C.T and Ankrah, A.N O. (2017). Exploring critical road project delay factors in Ghana, Journal of Facilities Management, 15(2), 110-127
Amoatey, C.T., Ameyaw, Y. A., Adaku, E. and 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
Asiedu R. O. and Adaku E. (2019). Cost overruns of public sector construction projects: a developing country perspective. International Journal of Managing Projects in Business. 13(1), 66-84.
Asiedu, RO and Ameyaw, C. (2021). A system dynamics approach to conceptualise causes of cost overrun of construction projects in developing countries, International Journal of Building Pathology and Adaptation, 39(5), 831-851.
Asiedu, R.O., Adaku, E. and Owusu-Manu, D. (2017). Beyond the causes: Rethinking mitigating measures to avert cost and time overruns in construction projects, Construction Innovation, 17(3), 363-380.
Ather S.M. and Balasundaram N. (2009). Factor analysis: Nature, mechanism and uses in social and management science research. Journal of Cost and Management Accountant, XXXVII (2), 15-25.
Benson J. and Nasser, F. (1998). On the use of factor analysis as a research tool. Journal of Vocational Education Research. 23(1), 13-33.
Blumberg, B, Cooper, D. R. and Schindler, P. S. (2008). Business research methods.2nd Ed. Berkshire: McGraw-Hill Higher Education.
Chigara, B. and Moyo, T. (2014). Factors affecting labour productivity on building projects in Zimbabwe. International Journal of Architecture, Engineering and Construction,3(1), 57-65.
Dada, J. O. and Jagboro, G.O. (2012). Core skills requirement and competencies expected of quantity surveyors: perspectives from quantity surveyors, allied professionals and clients in Nigeria. Australasian Journal of Construction Economics and Building. 12(4), 78-90.
Dada, M.O. (2014). The influence of project team relationships on cost growth, Journal of Financial Management of Property and Construction, 19(1), 76-94
Durdyev, S. (2021). Review of construction journals on causes of project cost overruns, Engineering, Construction and Architectural Management, 28(4), 1241-1260
El-Maaty, A.E.A., El-Kholy, A.M. and Akal, A.Y. (2017). Modeling schedule overrun and cost escalation percentages of highway projects using fuzzy approach, Engineering, Constructionand Architectural Management, 24(5), 809-827
Enshassi, A., Al-Najjar, J. and 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.
Famiyeh, S., Amoatey, C.T., Adaku, E. and Agbenohevi, C.S. (2017). Major causes of construction time and cost overruns, Journal of Engineering, Design and Technology, 15(2), 181-198.
Field, A. (2014). Discovering statistics using IBM SPSS statistics. 4th Ed. Los Angeles: Sage Publications.
Ghasemi, A. and Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. International Journal of Endocrinology Metabolism, 10(2), 486-489.
Guadagnoli, E. and Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. Psychological Bulletin, 103(2), 265-275.

Habibi, M and Kermanshachi, S. (2018). Phase-based analysis of key cost and schedule performance causes and preventive strategies: Research trends and implications, Engineering, Construction and Architectural Management, 25(8), 1009-1033.

Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36.

Kothari, C. R. (2009). Research methodology; Methods and techniques.2nd Ed. New Delhi: New Age International Publishers.

Lam, T.Y.M and Siwingwa, N. (2017). Risk management and contingency sum of construction projects, Journal of Financial Management of Property and Construction, 22(3), 237-251.

Lu, W., Hua, Y. and Zhang, S. (2017). Logistic regression analysis for factors influencing cost performance of design-bid-build and design-build projects, Engineering, Construction and Architectural Management, 24(1), 118-132.

Magwaro-Ndiweni, L. (2016). Celebrating women in construction. Construction and Mining Magazine, 5(1), 10-11.

Mahmud A.T., Ogunlana, S.O. and Hong W.T. (2021). Key driving factors of cost overrun in highway infrastructure projects in Nigeria: a context-based perspective. Journal of Engineering, Design and Technology, 19(6), 1530-1555.

Marelli, A. F., Tondora, J. and Hoge, M. A. (2005). Strategies for developing competency models. Administration and Policy in Mental Health. 32(5/6), 533-561, doi: 10.1007/s10488-005-3264-0.

Mhlanga, P. (2017). Construction industry shrinks. The Financial Gazette, 23 February p. 3.

Mhlanga, P. (2018). Zim construction sector faces major hurdles. The Contractor, February, pp. 1-36. Available at: http://www.financialgazette.co.zw/wp-content/uploads/2018/10/Construction-Magazine-FEBRUARY.pdf. (Accessed on 02 February 2020).

Moser, C. and Kalton, G. (1979). Survey methods in social investigation.2nd Ed.Aldershot: Gower.

Moyo, T., Crafford, G. and Emuze, F. (2019). Decent working conditions for improved construction labour productivity on Zimbabwean building projects. Acta Structilia, 26(2), 1-38.

Olatunde, N.A. and Alao, O.O. (2017). Quantitative appraisal of cost and time performance of construction projects in public and private universities in Osun State, Nigeria, Journal of Engineering, Design and Technology, 15(5), 619-634.

Olatunji, O.A., and Orundami, A.O. and Ogundare, O. (2018). Causal relationship between material price fluctuation and project's outturn costs, Built Environment Project and Asset Management, 8(4), 358-371.

Oyegoke, A.S., Powell, R., Ajayi, S., Godawatte, GAGR and Akenroye, T. (2021). Factors affecting the selection of effective cost control techniques in the UK construction industry, Journal of Financial Management of Property and Construction, DOI 10.1108/JFMPC-07-2020-0050

Oyewobi, L. O., Jimoh, R., Ganiyu, B.O. and Shittu, A.A. (2016). Analysis of causes and impact of variation order on educational building projects, Journal of Facilities Management, 14(2), 139-164.

Park, Y.I. and Papadopoulou, T.C. (2012). Causes of cost overruns in transport infrastructure projectsin Asia", Built Environment Project and Asset Management, 2(2), 195-216, doi: 10.1108/20441241211280873

Perera, B.A. K. S., Hemajith, S. D. M., Ginige, K. and Amaratunga, R. D. G. (2007). Quantity surveyor as the technical appraiser in the Sri Lankan financial industry. Proceedings: Built Environment Education Conference, University of Salford, Manchester. Available at: http://usir.salford.ac.uk/9827/

Ramus, J, Birchall, S. and Griffiths, P. (2008). Contract Practice for Surveyors. 4th Ed. Oxford: Butterworth-Heinemann.

Sambasivan, M., Deepak, T.J., Salim, A. N. and Ponniah, V. (2017). analysis of delays in Tanzanian construction industry: Transaction cost economics (TCE) and structural equation modeling (SEM) approach, Engineering, Construction and Architectural Management, 24(2), 308-325.

Santos, R.O., Gorgulho, B.M., Alessandro de Castro, M., Fisberg, R. M., Marchioni, D.M. and Baltar, VT (2019). Principal component analysis and factor analysis: differences and similarities in Nutritional epidemiology application. Rev Bras Epidemiol, DOI: 10.1590/1980-549720190041

Saunders, M., Lewis, P. and Thornhill, A. (2016). Research methods for business students.7th Ed. London: Pearson Education.

Shayan, S., Kim, K. P., Ma, T., Freda, R. and Liu, Z. (2019). Emerging challenges and roles for quantity surveyors in the construction industry. Management Review: An International Journal. 14(1), 82-96

Shehu, Z., Endut, I.R., Akintoye, A. and Holt, G.D. (2014). Cost overrun in the Malaysian construction industry projects: a deeper insight. International Journal of Project Management, 32(8), 1471-1480, doi: 10.1016/j.ijproman.2014.04.004

Shrestha, P.P., Shrestha, K.K., and Zeleke, H.B. (2019). Probability of change orders and the effect on cost and schedule for new public-school buildings, Engineering, Construction and Architectural Management, 26(6), 1087-1104.

Steininger B.I. Groth M. and Weber B.L. (2021). Cost overruns and delays in infrastructure projects: the case of Stuttgart. Journal of Property Investment & Finance., 39(3), 256-282, DOI 10.1108/JPIF-11-2019-0144

Taherdoost, H. (2016). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in research. International Journal of Academic Research in Management,5(3), 28-36.

The Global Competitiveness Report 2013–2014 (2013). The Global Competitiveness and Benchmarking Network,World Economic Forum, Geneva Available at: https://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf, accessed 15 November 2021.

The Zimbabwe Infrastructure Development Programme (2021). Available at: http://veritaszim.net/node/4612, accessed on 15 November 2021

Watkins, M.W. (2018). Exploraory factor analysis: A guide to best practice, Journal of Black Psychology, 44(2), 219-246, DOI: 10.1177/0095798418771807

Yap, J.B.H., Lim, B.L., Skitmore, M. and Gray, J. (2021). Criticality of project knowledge and experience in the delivery of construction projects, Journal of Engineering, Design and Technology, DOI 10.1108/JEDT-10-2020-0413

Yong, A.G and Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on Exploratory factor analysis. Tutorials in Quantitative Methods for Psychology, 9(2), 79-94, DOI10.20982/tqmp.09.2. p079

Zimbabwe National Statistics Agency (2020). Available at https://www.zimstat.co.zw/statistical-databases/, accessed on 15 November 2021