

Effects of Contract Management on Project Performance at the Road Development Agency

Mwenya Mwenya^{1*}, Richard Mwale Kasongo¹

¹Graduate School of Business, University of Zambia

* Corresponding Author

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Abstract

The study sought to establish the effects of contract management on project performance at the Road Development Agency in Zambia. It was anchored in institutional theory and the iron triangle theory. Contract management in procurement involves overseeing contracts with suppliers and buyers to ensure adherence to obligations outlined in the Public Procurement Act No. 8 of 2020 as amended by the Public Procurement (Amendment) Act No. 17 of 2023 and Statutory Instrument No. 30 of 2022 (Public Procurement Regulations, 2022) as well as the terms and conditions outlined in the contract. Contract management is vital for managing costs, ensuring quality, meeting deadlines, and resolving disputes. Zambia, like many African countries, faces challenges with incomplete construction projects, affecting economic growth linked to the sector. Although research exists on project performance in Zambia, there is a lack of understanding on how contract management affects project performance in Zambia's public sector. This study aimed to establish the effects of contract management on project performance at the Road Development Agency in Zambia. The study used a cross-sectional study design and quantitative data from structured questionnaires (n = 31). Descriptive statistics and multivariable linear regression were used for quantitative analysis. Compliance with contractual obligations (93.6%) emerged as the most prominent performance objective, followed by timelines, quality standards, and cost (each 83.9%). Contract management practices were widely adopted (mean = 4.52, SD = 0.89), with compliance, transparency, and professionalism highly reported. Quality performance scored highest (mean = 3.67, SD = 0.64), followed by cost (mean = 3.00, SD = 0.71), while time performance was lowest (mean = 2.63, SD = 0.67), indicating challenges with delays. Regression analysis showed no statistically significant association between contract management practices and project performance ($p > 0.05$). While contract management is well established at the Road Development Agency, its impact on project performance is limited by challenges in time and cost control. Strengthening monitoring systems, enhancing managerial capacity, and promoting integrated management approaches are essential to improve project outcomes.

1. Introduction

An increasing number of performance criteria and dimensions in project management, are utilized across strategic, tactical, and operational levels to gauge performance and determine project success (Ahmed, 2023). These dimensions include schedule performance, quality performance, innovation performance, benefit performance, project scope, time, cost, procurement management, associated risk, human resource, customer satisfaction, learning & innovation, senior management support, and skills, integration of resources, safety, financial performance, stakeholder satisfaction, and effective communication (Ahmed, 2023). Literature suggests that contract management can either positively or negatively influence project performance (Seboka, and Gidebo 2025).

The Public Procurement Act No. 8 of 2020 (PPA) defines a contract as an agreement between a procuring entity and a supplier for the provision of goods, works, or services. On the other hand, contract management in procurement is overseeing and administering contracts with suppliers and buyers to ensure that both parties meet their contractual obligations under the terms and conditions specified in the contract. Contract Management ensures that procurement objectives are met and risks are minimised. Effective contract management is crucial for cost control, quality, timeliness, compliance, performance tracking, and dispute resolution. Contract management is essential in ensuring that projects are delivered on time. Delays in project completion, particularly in public procuring entities, can have profound and far-reaching consequences. In Zambia, where public infrastructure projects are critical for development, timely completion is paramount. A delay in constructing essential facilities like hospitals maternity annexes, staff houses, roads, classroom blocks etc directly affects public health and safety. For example, when a hospital's construction is delayed, the community's access to healthcare is compromised, potentially leading to loss of lives because of inadequate medical facilities (Oyeyo, Rambo, & Ndiritu, 2020). Additionally, delays often result in increased costs because of prolonged labour and material expenses. This is not just a local challenge, but a widespread issue observed in public projects globally (Ali & Wali, 2019).

The Eighth National Development Plan (8NDP) focuses on economic development with one strategy being, enhancing the coordination of public projects and investments to ensure value for money (MOFNP, 2022). Therefore, projects that are completed on time, within budget, and to the required quality can significantly contribute to economic growth and improve the quality of life of citizens. Additionally, they can enhance public service delivery, improve infrastructure, and stimulate economic activity. Conversely, projects that fail to meet these objectives can have a detrimental effect on the economy, draining resources and failing to provide the intended benefits to the populace. In Zambia, this is particularly crucial, given the country's focus on infrastructure development as a catalyst for economic growth. Effective contract management is essential in overseeing project cost, quality, and time. It involves the continuous monitoring and evaluation of a project's progress against its planned objectives. In Zambia, the use of contract management as a strategic tool in the public sector is vital for ensuring that projects are delivered according to the specified terms and conditions outlined in the contract and within the stipulated timeframe. Contract management can identify potential issues early, allowing for timely interventions to keep projects on track thereby avoiding contract termination or cancellation. This encompasses a range of activities, from initial contract drafting and negotiation to ongoing contract administration and closure (Coleman et al., 2020).

The Road Development Agency faces its own set of challenges, as highlighted by the Auditor General's report, including over-procurement of projects, late engagement of supervising consultants, and non-availability of detailed engineering road designs. These practices have led to delayed commencements, increased project costs, and compromised quality. The Road Development Agency's approach to contract management raises questions about the efficacy of existing policies and their implementation.

2 Literature Review

This section delves into the theoretical underpinnings of contract management and project performance in understanding their application and effectiveness in the context of project management. Furthermore, an empirical review of the literature aims to offer a thorough summary of current knowledge, pinpoint missing information, and grasp international and local trends in contract management.

2.1 Theoretical Framework

This study is grounded primarily on Total Quality Management (TQM), the Institutional Theory the Iron Triangle Theory, which offer critical insights into the development and implementation of project management practices.

Total Quality Management (TQM)

A core definition of Total Quality Management (TQM) describes a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services, and the culture in which they work. According to Vokurka (2008) TQM is a management philosophy or approach that is grounded on three core principles: a focus on the customer, participation and teamwork, and continuous improvement. Some of the principles of total quality management are Customer satisfaction, Employee involvement and Continuous improvements in quality. TQM operates through systematic, organization-wide processes aimed at preventing defects rather than reacting to them. It embeds continuous monitoring, feedback loops, and team-based problem solving to identify issues early and implement corrective action. TQM significantly enhances project performance by embedding a culture of continuous improvement, customer focus, and process optimization throughout the project lifecycle. It transforms how teams plan, execute, and deliver projects by emphasizing quality at every stage. TQM focuses on holistic quality management. Gomes, Small, & Yasin (2019), and Small, Bakry, & Ayyash (2019) illustrate its role in ensuring quality throughout the project lifecycle. For Zambia's public procuring entities, TQM can integrate quality management into all aspects of contract management, aligning various stakeholder objectives towards superior project outcomes. TQM enhances efficiency by ensuring that projects are completed faster and with better resource utilization International Journal of Recent Research in Commerce Economics and Management (IJRRCEM, 2021). Further, IJRRCEM (2021) indicated that TQM enhances project management by continuous monitoring and feedback loops that help identify issues early as well as preventative actions that reduce the likelihood of failure.

TQM is relevant to this study because public infrastructure projects such as those undertaken by the Road Development Agency require continuous quality assurance, stakeholder satisfaction, and efficient resource utilization to achieve project success. The theory aligns with the study's focus on project performance dimensions (time, cost, quality) by emphasizing systematic monitoring, adherence to standards, and early detection of performance issues.

Institutional Theory

An institutional theory emphasizes the importance of the institutional environment in shaping organizational structure and actions. As such, Scott identifies three pillars of institutions, which include: regulatory, normative, and cultural cognitive. The regulatory pillar emphasizes the use of rules, laws, and sanctions as enforcement mechanisms to ensure compliance. As the basis of compliance, the normative pillar defines the norms and things that should be done; values (preferred or desirable) that should be adhered to; and social responsibilities. Finally, the cultural-cognitive pillar rests on common beliefs, symbols and perceptions that together bolster shared understanding (Scott, 2005). Together, these pillars explain why organizations adopt particular practices even when they are inefficient because compliance with institutional expectations ensures stability, legitimacy, and acceptance. Institutional Theory is highly relevant to the study because it explains why compliance is the most emphasized performance objective at RDA. Compliance was reported by 100% of respondents as the most important ethos in contract management. This reflects strong regulatory pressures arising from the Public Procurement Act, the Public Procurement Regulations, and audits by the Auditor General. Despite a strong regulatory framework (PPA, 2020) and (PPR, 2022), RDA still face project delays and cost overruns. Therefore, Institutional theory helped explain this gap between policy and practice, showing that compliance pressure exists, but behavioural, structural, and cultural factors affect implementation.

Iron Triangle Theory

The Iron Triangle Theory, also known as the Project Management Triangle, is one of the foundational theories in project management. It explains that project success is determined by the balance of three key constraints: cost, time, and quality (scope). These three elements are interdependent, meaning that a change in one inevitably affects the other two (Atkinson, 1999). The theory operates on the principle that time (Schedule Performance) refers to the duration required to deliver the project. Cost (Budget Performance) represents the financial resources required for project completion. Quality (Technical Performance) refers to the extent to which the project meets specifications, standards, and stakeholder expectations. The Iron Triangle is highly relevant to this study as it directly reflects the core variables used to measure project performance at RDA. The Auditor General's report

highlighted weaknesses such as delayed construction works, discrepancies between budgeted amounts and contract sums, and poor workmanship. These issues correspond to failures in balancing the three constraints. The theory demonstrates why contract management practices must be evaluated not in isolation, but in relation to how they influence the balance among cost, time, and quality.

These theories provide a diverse range of approaches to project management and contract management. Each theory has its strengths and contexts where it is most applicable. The critical evaluation of these theories in the context of contract management reveals that no single approach is universally effective. The choice of methodology should depend on the specific requirements, scope, and context of the project. Furthermore, a combination or hybrid approach may often be the most practical solution, leveraging the strengths of multiple theories to achieve project success. The theoretical framework for contract management in public procuring entities encompasses a range of methodologies, each offering unique perspectives and tools.

2.2 Empirical literature review

Empirical research on contract management and project performance has evolved across global contexts, reflecting differences in institutional capacity, governance systems, and project delivery environments. Globally, studies from regions such as Europe, Asia, North America, South America, and Australia/New Zealand highlight that effective contract management is central to improving operational efficiency, ensuring compliance, and enhancing overall project outcomes.

Contract Management

The Public Procurement Act No. 8 of 2020 defines a contract as an agreement between a procuring entity and a supplier for the provision of goods or services. Contract management in procurement is overseeing and administering contracts with suppliers and buyers to ensure that both parties meet their contractual obligations under the terms and conditions specified in the contract. On the other hand, Regulation 8 (4)(i) of the Public Procurement Regulations, 2022 highlights that a procuring entity shall when undertaking a procurement obtain value for money by ensuring that an effective contract management plan is developed to ensure that the contract is successfully implemented and the deliverables are met as aligned in the contract. Contract management practices are practices that ensure both parties to a contract fully meet their respective obligations as efficiently and effectively as possible, in order to deliver the business and operational objectives and obtain a value for money, therefore managing contracts is a skill required in order to enhance procurement performance in public institutions (Adrienne Watt, 2018). Successful and efficient contract management practices are those that meet the needs of the company's stakeholders, achieve optimum conditions and value (Benon C. Basheka, 2014). The purpose of contract management is to ensure that all parties to the contract fully meet their contract obligations as efficiently and effectively as possible, delivering the business and operational output required from the contract and providing value for money (PPR, 2022). Contract management is a vital part of a procurement process in achieving the procurement performance objectives and the overall organisation's objective hence without effective contract management, procurement objectives cannot be achieved within defined time, budget, and quality.

Effects of Contract Management on Project Performance: Global Perspective

This subsection examines how contract management practices influence project performance across different global regions. It provides insights into the varying approaches and outcomes observed in Europe, Asia, North America, South America, and Australia/New Zealand, reflecting the diverse nature of project management worldwide. In North America, the emphasis is on strategic planning and the utilisation of advanced management techniques in contract management. Mahajan and Baride (2023) discuss the importance of planning and contract management strategies for successful (Engineering, Procurement, Construction) EPC projects project execution, highlighting that strategic foresight in contract formulation is key to project success. Manzanares, García-Segura, and Pellicer (2023) investigate the relationship between contract conditions and the effectiveness of BIM use, suggesting that contract stipulations can significantly influence the successful adoption of technological tools, thereby improving project performance. In Europe, contract management practices have been closely studied for their impact on project performance. Research by Kapsali, Roehrich, and Akhtar (2019) highlights the significance of effective contracting in ensuring high operational performance in projects. Their study suggests that tailored contract management strategies are essential for managing complex project environments, ensuring that operational objectives are met. Lee et al. (2020) explore the joint effects of contract functions and Building Information Modeling (BIM) on project performance in (Engineering, Procurement, Construction) EPC projects. Their findings suggest that the integration of technology with effective contract management can lead to significant improvements in project outcomes. Similarly, Shang et al. (2023) and Lu et al. (2019) examine the impact of trust and governance mechanisms on project management performance, indicating that relational aspects of contract management, like trust and collaboration, are vital in the Asian context for achieving project objectives.

In Australia and New Zealand, contract management is often analysed through the lens of incentive structures and post-service performance management. Dawande, Janakiraman, Qi, and Wu (2019) explore optimal incentive contracts in project management, emphasizing the importance of incentives in aligning contractor motivations with project goals. Forbes and Brady (2019) delve into ex-post service contract performance management, highlighting the need for effective monitoring and evaluation mechanisms in contract management to ensure ongoing service quality and project performance. In South America, contract management significantly influences project performance, especially amid industrial transitions and developing business practices. Contract management is increasingly recognised as a strategic function in project-based industries, not just a legal or administrative task. It involves risk mitigation, performance monitoring, and relationship management, all of which directly affect project success.

The global perspective on contract management and project performance reveals varied approaches based on regional characteristics and priorities. These diverse approaches reflect the multifaceted nature of contract management in project performance, underscoring the importance of contextual and regional considerations in developing effective contract management strategies.

Effect of Contract Management on Project Performance: African perspective

This sub section explores the impact of contract management on project performance in various regions of Africa, highlighting the unique practices and outcomes in North, West, East, and Southern Africa, as well as a detailed analysis of Zambia. In North Africa, with a focus on Egypt, contract management in building projects plays a critical role in achieving project success. Kineber et al. (2020) emphasize the importance of value management activities in Egyptian building projects, demonstrating how effective contract management can lead to enhanced project value and quality. This study reveals the necessity for strategic contract management practices to navigate the complex and dynamic nature of the construction industry in Egypt. Contract management in West Africa, particularly in Ghana, has been studied for its strategic importance in the construction industry. Coleman et al. (2020) assess contract management as a strategic tool for achieving quality work in Ghana's construction sector. Their findings suggest that meticulous contract management is integral to ensuring quality and compliance in construction projects, highlighting the need for rigorous and structured contract management processes. These studies underscore the importance of tailored contract management practices in enhancing project outcomes in the West African context. Southern Africa presents diverse approaches to contract management. In South Africa, Du Plessis (2018) found that construction contract frameworks significantly influence project performance through improved control of time, cost, and quality. The research provides insights into how structured contract frameworks can lead to improved project outcomes in the South African construction sector.

The African region exhibits diverse contract management practices, influenced by socio-economic, cultural, and political factors. From the structured approach in North Africa and Understanding these regional distinctions is crucial for developing effective contract management practices that cater to the specific needs of each African region.

Effects of Contract Management on Project Performance: local Perspective

In Zambia, contract management within various sectors, especially in public administration and construction, has been a subject of extensive research. Studies have focused on assessing the effectiveness of different contract management strategies and their impact on project performance.

Nsefu et al., (2020) have extensively explored the effectiveness of contract management performance within the Lusaka Provincial Administration. Their study assesses how the application of the Balanced Scorecard can enhance contract management performance. The Balanced Scorecard, a strategic planning and management system, is used to align business activities with the vision and strategy of the organization, improve internal and external communications, and monitor organizational performance against strategic goals. Nsefu et al.'s research reveals challenges affecting the success of contract management and examines the relationship between the Balanced Scorecard and contract management performance. The study proposes a model for implementing the Balanced Scorecard to mitigate these challenges and enhance contract management performance.

Another critical aspect of contract management in Zambia is the relationship between main contractors and subcontractors, especially in the construction industry. Mudzvokorwa, Mwiya, and Mwanaumo's, (2019) study focuses on improving this relationship through partnering on construction projects. The research confirms that partnering improves the main contractor-subcontractor relationship, thereby increasing the probability of project success and enhancing project performance. The study develops a project partnering model based on factors obtained from industry experts and best practices guidelines, aiming to address the unsatisfactory relationship between main contractors and subcontractors in most Zambian projects.

In the road construction, Ilimi's, (2020) study on performance-based road contracts in Zambia provides valuable insights. Performance-based contracts (PBCs) are agreements where the contractor is paid for the quality of the work performed rather than the quantity. Ilimi's research highlights the benefits and challenges of implementing PBCs in Zambia. The study points out how PBCs can lead to better road quality, reduced costs, and more efficient project delivery. However, it also notes the challenges in implementing these contracts, such as the need for effective monitoring and evaluation systems to ensure compliance with performance standards.

The studies on contract management in Zambia reveal a multifaceted approach to improving project performance. The application of the Balanced Scorecard in public administration and the focus on contractor-subcontractor relationships in construction projects demonstrate a keen understanding of the unique challenges in Zambia's contract management landscape. These studies provide valuable frameworks and models that can be implemented to overcome these challenges.

The review identified gaps in existing literature, notably the limited empirical evidence isolating the influence of contract management practices on project performance within Zambia's public procuring entities, especially the Road Development Agency. These gaps justified the need for the present study and informed the development of the study's conceptual framework and methodological approach.

2.3 Conceptual Framework

The conceptual framework for this study is designed to examine the interplay between various factors influencing project performance. This framework transforms theoretical constructs into measurable variables, establishing a clear relationship between independent and dependent variables. Independent variables include compliance, transparency, fairness and equity, professionalism and value for money whereas the dependent variables include Quality, cost, and Time.

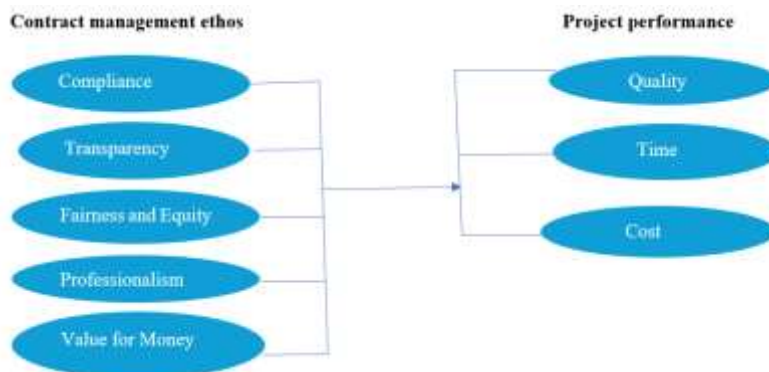


Figure 1: Conceptual Framework

2.4 Operationalization of the Conceptual framework

The study examines project performance in terms of quality, time, and cost, influenced by independent variables such as compliance, transparency, fairness and equity, professionalism and value for money. It proposes hypotheses indicating that effective contract management practices enhance project performance, which was evaluated through survey that assess their application in relation to theoretical principles.

3 Methodology

3.1 Philosophical Approach

The study used the positivist research philosophy, which allows the study to use quantitative research methods to understand the influence of contract management on project performance at the Road Development Agency in Zambia. The study used a quantitative method approach. The use of a quantitative method approach is justified by the nature of the research objectives.

3.2 Research Design

The study used a cross-sectional study design to capture objective project performance indicators such as cost, time, and quality, reflecting the tangible aspects of reality, this approach allowed for a more objective assessment of the research questions.

3.3 Study setting

The study was conducted at the Road Development Agency. This agency was chosen at random from a group of other public procuring entities, such as the Ministry of Health, the Ministry of Education, and the Ministry of Local Government and Rural Development and the Ministry of Infrastructure, Housing and Urban Development. These ministries are crucial to Zambia's economy and the well-being of its citizens, making it an important topic for studying how contract management impacts project outcomes. Conducting this study at Road Development Agency provided an opportunity to understand procurement processes within a context that is both dynamic and critical to the Zambian economy.

3.4 Study participants

The study population consisted of 50 members of staff at the Road Development Agency involved in contract management of projects within the Road Development Agency. This group included professionals such as project personnel, engineers, procurement officers, end users and other relevant staff who are directly engaged in the contract management process within the Road Development Agency. There are 50 members of staff, therefore, the study invited 50 participants to participate in the study. However, only 31 participated in the study giving a response rate of 68.8%. The study used a census technique to collect data from each eligible participants at RDA. This method was chosen because the total number of participants from RDA was small, making a census feasible.

3.5 Data Collection

The questionnaire was designed to be comprehensive and structured which served as the key tool for gathering quantitative data directly from participants. The questionnaire was further subdivided into six sections; (A) socio-demographics, (B) contract management, (C) performance objectives, (D) Cost, quality and time, (E) contract management best practices, and (F) project performance. A 5-point Likert scale and a yes or no options was used as response options.

3.6 Data Analysis

The completed questionnaires were checked for completeness and consistency before the data was entered into Microsoft Excel and later imported into Stata version 17. Descriptive statistics were generated to summarize key variables, using means and standard deviations for continuous data or medians and interquartile ranges when normality assumptions were not met. Categorical variables were presented as frequencies and percentages. A t test was conducted to examine the association between performance and contract management, and both univariate and multivariable linear regression analyses were used to assess the influence of contract management on project performance. All analyses were carried out at a 5% significance level with a 95% confidence interval.

3.7 Ethical Considerations

Ethical approval was sought from the University of Zambia Ethics Committee and the Road Development Agency. Informed consent was obtained from participants, who were given the right to understand the purpose of the study and were treated with respect throughout the process. Confidentiality was a key consideration throughout the research process. Participants were assured that their identities and the information they provide would be kept confidential.

4 Results

The results are presented according to the research objectives. The analysis focused on examining project performance, the factors that influence it, and the role of contract management practices in enhancing outcomes.

4.1 Demographic Characteristics

The study included 31 participants from RDA. The study participants were predominantly middle-aged, with most aged 41–50 years ($n = 15$, 48.39%), followed by those aged 31–40 years ($n = 10$, 32.26%). Most of the participants were males ($n = 25$, 80.65%), had Master's degree ($n = 16$, 51.61%), and had 10 or more years of experience ($n = 19$, 61.29%) (Table 1).

Table 1: Demographic Characteristics of study participants

Variable	Category	Frequency (n)	Percent (%)
Age Group	Below 30 yrs	5	16.13
	31–40 yrs	10	32.26
	41–50 yrs	15	48.39
	51 and above yrs	1	3.23
	Total	31	100
Gender	Male	25	80.65
	Female	6	19.35
	Total	31	100
Highest Qualification	Bachelor's	15	48.39
	Master's	16	51.61
	Total	31	100
Job Experience	1–5 years	5	16.13
	6–10 years	7	22.58
	10+ years	19	61.29
	Total	31	100

4.2 Performance objectives of a project

Figure 1 shows the performance objectives of RDA projects. Compliance with contractual obligations was the most frequently reported performance objective (n = 29, 93.6%). This was followed by timelines (n = 26, 83.9%), standards/quality measures (n = 26, 83.9%), and budget/cost (n = 26, 83.9%). Fewer respondents reported dependability (n = 11, 35.5%) and speed (n = 9, 29.0%) as performance objectives.

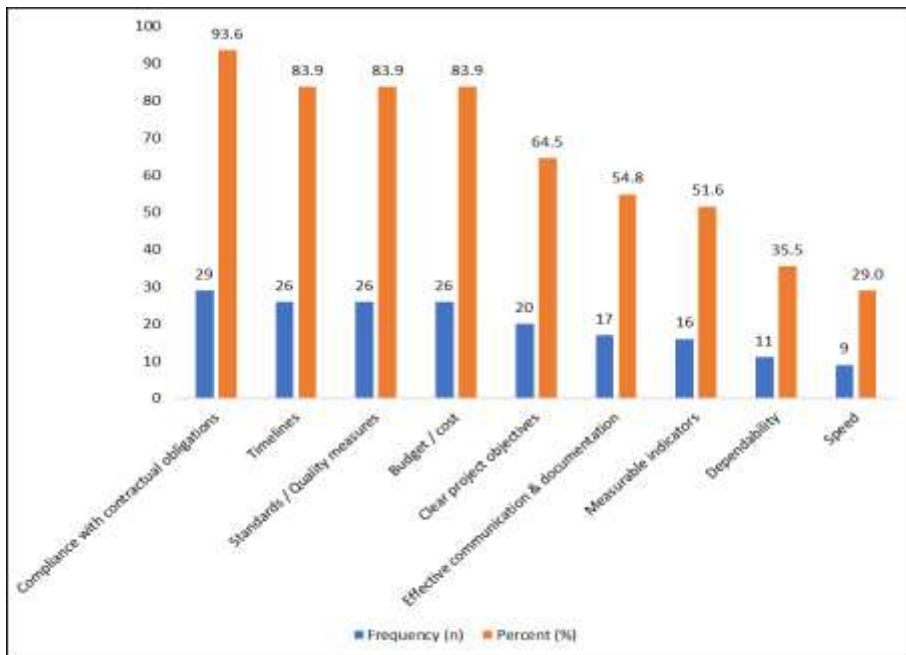


Figure 1: Performance objectives of RDA projects

4.3 Contract management best practices ethos for project performance

Figure 2 shows contract management best practices ethos for project performance. Compliance was reported by all participants (100%). Transparency and professionalism were each reported by 93.6% of participants, followed by fairness (87.1%). Confidentiality was reported by 77.4%, while conflict of interest avoidance and invoicing and payments were each reported by 74.2%. Compliance monitoring and staff experience were both reported by 67.7%, and effective communication by 61.3%. Risk clauses implementation was reported by 58.1%, while risks being fairly allocated and mutual trust were each reported by 48.4%. Managers being trained was the least reported aspect (29.0%).

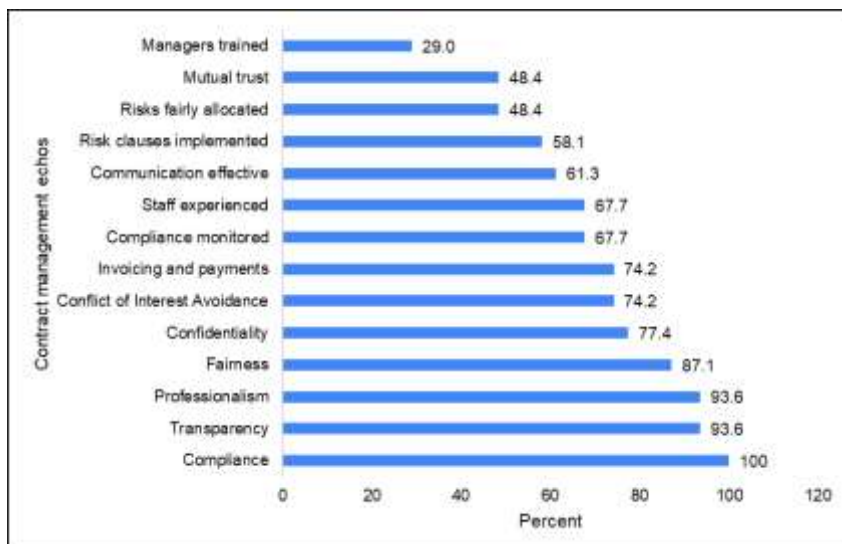


Figure 2: Contract management best practices ethos for project performance

4.4 The effects of Cost, Quality, and Time on Project Performance

For time performance, the mean scores ranged from 2.13 (SD = 0.85) for time extensions being rarely required to 3.26 (SD = 0.82) for effective schedule monitoring. Projects completed within scheduled timelines had a mean of 2.35 (SD = 0.84), while delays being minimal had a mean of 2.48 (SD = 1.00). Contractors' adherence to agreed timelines recorded a mean of 2.71 (SD = 0.86), and time-related disputes being minimal had a mean of 2.84 (SD =

0.93). The composite time performance score was 2.63 (SD = 0.67).

For cost performance, mean scores ranged from 2.65 (SD = 0.95) for projects completed within approved budgets to 3.42 (SD = 0.96) for timely and accurate financial reporting. Cost overruns being minimal had a mean of 2.77 (SD = 0.99), while budget variations being well controlled recorded a mean of 3.23 (SD = 0.96). Contractor payments being timely had a mean of 2.81 (SD = 0.95), and cost-related disputes being minimal had a mean of 3.13 (SD = 0.96). The composite cost performance score was 3.00 (SD = 0.71).

For quality performance, the mean scores ranged from 3.45 (SD = 0.72) for stakeholder satisfaction with quality to 4.03 (SD = 0.60) for regular quality inspections. Projects meeting required quality standards had a mean of 3.61 (SD = 0.72), while rework due to defects being minimal had a mean of 3.58 (SD = 0.92). Compliance with technical specifications recorded a mean of 3.55 (SD = 0.85), and materials meeting approved standards had a mean of 3.81 (SD = 0.83). The composite quality performance score was 3.67 (SD = 0.64).

Table 2: The effects of Cost, Quality, and Time on Project Performance

Project Performance	Mean	S.D
Time		
Projects completed within scheduled timelines	2.35	0.84
Delays are generally minimal	2.48	1
Schedule monitoring is effective	3.26	0.82
Contractors adhere to agreed timelines	2.71	0.86
Time extensions are rarely required	2.13	0.85
Time-related disputes are minimal	2.84	0.93
Composite time performance score	2.63	0.67
Cost		
Projects completed within approved budgets	2.65	0.95
Cost overruns are minimal	2.77	0.99
Budget variations are well controlled	3.23	0.96
Financial reporting is timely and accurate	3.42	0.96
Contractor payments are timely	2.81	0.95
Cost-related disputes are minimal	3.13	0.96
Composite cost performance score	3	0.71
Quality		
Projects meet required quality standards	3.61	0.72
Rework due to defects is minimal	3.58	0.92
Quality inspections are regularly conducted	4.03	0.6
Compliance with technical specifications	3.55	0.85
Materials meet approved standards	3.81	0.83
Stakeholder satisfaction with quality is high	3.45	0.72
Composite quality performance score	3.67	0.64

Overall performance of RDA projects

Regarding project completion on time, more than half of the participants indicated that RDA projects are completed on time to some extent (54.84%). In terms of completion within budget, 41.94% of respondents reported that RDA projects are not completed within budget, while 32.26% indicated that they are completed within budget to some extent. With respect to quality standards, the majority of respondents indicated that RDA projects meet required quality standards (51.61%), while 45.16% reported that this is achieved to some extent (Figure 3).

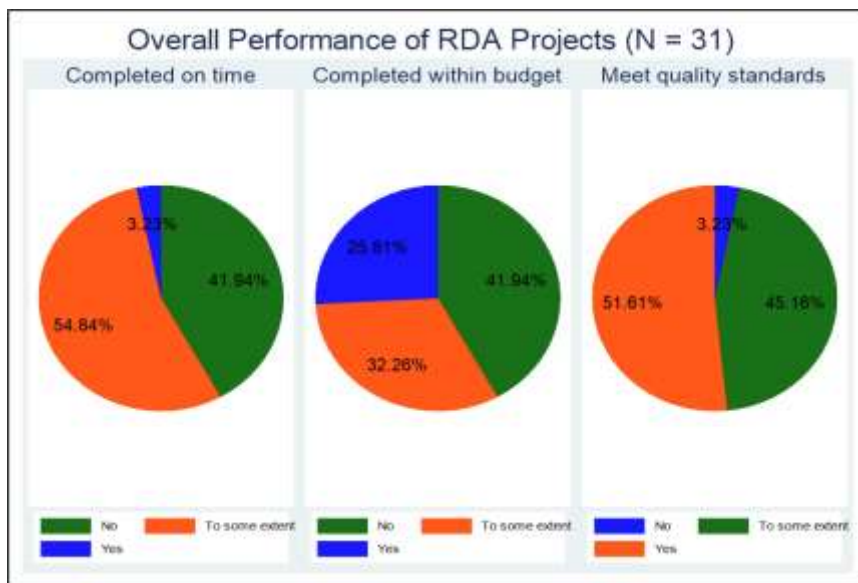


Figure 3: Overall performance of RDA projects

4.5 Association Between Contract Management Practices and Project Performance

The multivariable regression model assessed the simultaneous effects of multiple contract management factors on project performance. In this model,

compliance was omitted due to lack of variability. The results indicate that none of the included contract management variables were statistically significant predictors of project performance at the 5% level. Fairness had a positive coefficient of 0.779 (95% CI: -1.199, 2.757; $p = 0.417$), while transparency had a negative coefficient of -0.617 (95% CI: -3.886, 2.653; $p = 0.696$). Other factors, including confidentiality, professionalism, conflict management, risk allocation, risk clauses, communication, managers trained, compliance monitored, invoicing, staff experience, and mutual trust, also showed non-significant associations.

Table 4: Multivariable linear regression analysis of the association Between Contract Management Practices and Project Performance

Variable	Coefficient	95% Confidence Interval	P-value
Transparency	-0.617	-3.886, 2.653	0.696
Fairness	0.779	-1.199, 2.757	0.417
Confidentiality	0.32	-1.369, 2.008	0.694
Professionalism	-0.244	-1.705, 1.217	0.729
Conflict	-0.38	-1.640, 0.881	0.533
Risks Allocated	-0.037	-1.314, 1.239	0.952
Risk Clauses	0.482	-0.969, 1.933	0.493
Communication	-0.287	-1.580, 1.006	0.646
Managers Trained	0.069	-0.748, 0.887	0.86
Compliance Monitored	-0.06	-1.044, 0.923	0.899
Invoicing	-0.552	-1.444, 0.340	0.209
Staff Experienced	0.256	-0.690, 1.203	0.575
Mutual Trust	-0.059	-0.937, 0.819	0.889

4.6 Discussion

This study aimed to investigate the effects of contract management on project performance at the Road Development Agency in Zambia. The findings identify compliance with contractual obligations as the most frequently reported performance objective, followed by adherence to timelines, quality standards, and budget control. Less emphasis was placed on dependability and speed. Overall, the results indicate that participants strongly aligned performance objectives with compliance, timeliness, quality, and cost control elements traditionally associated with the “iron triangle” of project performance. These findings are consistent with prior studies that highlight contractual compliance and timely delivery as core objectives, while also underscoring the growing recognition of stakeholder engagement and resource management as vital to project success. In contrast, a study noted participants typically defined failures by schedule, performance, and cost objectives, mirroring “faster, better, cheaper” (Eaton et al., 2022).

The results show that quality performance scored the highest composite mean, followed by cost and time, indicating that quality standards are most strongly associated with project success in this context. Supporting the findings of this study, Ahmed (2023) reported that many organizations struggle to deliver high-quality projects, products, and services on time and at a low cost. In Zambia, another study reported similar findings to this study as they found that funds were moderately available for project execution ($M=3.84$). Contractors adhered to budget estimates ($M=3.55$), completed projects within the scheduled time ($M=3.47$), and maintained relatively low construction costs ($M=3.51$). Stakeholder satisfaction with the quality of construction projects was also noted as relatively high ($M=3.56$) (Kafula et al., 2023). In a study by Eaton et al. (2022) participants considered it a failure if the project did not meet the cost, schedule, and technical performance objectives. These integrated findings echo established literature that frames cost, quality, and time as the triple constraints of project management, with a growing emphasis on quality assurance as a key determinant of long-term project success (Eaton et al., 2022).

Contract management practices were reported quantitatively as highly utilized, with universal compliance and high levels of transparency, professionalism, and fairness. However, regression analysis indicated that none of the contract management variables had statistically significant predictive effects on project performance, suggesting complex or indirect relationships.

These results correspond with prior research that positions contract management as critical for mitigating risks and enhancing accountability, though its direct impact on measurable project outcomes may be moderated by contextual factors such as organizational culture and stakeholder dynamics. Unlike this study, a Rwandan study found a strong positive correlation between a robust contract cycle and performance. Effective contract execution also correlates significantly, as does the contract relationship and contract monitoring. Among these factors, contract execution has the highest effect on performance, followed by contract monitoring, contract cycle, and relationship (Uwiringiyimana & Dushimimana 2024).

The identified performance objectives including compliance with contractual obligations, adherence to timelines, quality standards, and budget control reflect core principles of Total Quality Management (TQM), which emphasizes meeting customer and stakeholder requirements through systematic processes and continuous improvement. The results showed that quality performance scored the highest among the three constraints (mean = 3.67), supported by strong reporting of regular quality inspections, adherence to specifications, and use of approved materials. These practices aligned with TQM’s focus on ensuring that processes are systematically monitored and improved to prevent defects rather than responding to them after occurrence.

In relation to Institutional Theory, the findings reinforced the notion that organizational behavior is heavily influenced by formal structures, rules, and regulatory expectations. This was particularly evident in the overwhelming emphasis placed on compliance, which was identified by 100% of respondents as a central contract management ethos. In the public procurement context, adherence to statutory requirements such as the Public Procurement Act and its accompanying regulations creates strong institutional pressures that guide organizational norms and practices. The prominence of transparency, professionalism, fairness, and confidentiality further highlighted the extent to which institutional norms shape project and contract management behavior. These norms form the regulatory and normative pillars of institutional theory, ensuring legitimacy and reinforcing expected patterns of conduct within public institutions. Institutional theory helps explain the widespread prioritization of contractual compliance and formalized performance objectives as institutionalized norms within the road development agency, reinforcing legitimacy and consistent project execution through adherence to established rules and expectations.

The findings also aligned closely with the Iron Triangle Theory, which posits that project success depends on balancing the three core constraints of time, cost, and quality. The study revealed that while quality performance was relatively strong, challenges persisted with time (mean = 2.63) and cost (mean = 3.00), indicating that the balance among the three elements was not fully achieved. Respondents recognized that delays, cost overruns, and timeline extensions remained common issues, consistent with the Iron Triangle’s assertion that improvement in one dimension often impacts another. The continued struggle to harmonize the three constraints further affirmed that contract management practices, although well embedded, required

stronger integration particularly in areas such as monitoring, risk management, and managerial capacity to stabilize performance across all dimensions. The moderately strong recognition that contract management significantly influenced project outcomes reinforced the Iron Triangle's view that effective control mechanisms are necessary to maintain equilibrium among cost, time, and quality.

The finding that quality performance scored highest supports TQM's core tenet that quality is non-negotiable and foundational to long-term success, surpassing even cost and time considerations. Together, these findings illustrate that effective project performance at the Road Development Agency depended not only on technical processes, but also on institutional norms and the organization's ability to balance key project constraints.

5 Conclusions and Recommendations

This chapter presents the conclusions and recommendations of the study, drawing on the key findings regarding the relationship between contract management and project performance at the Road Development Agency.

5.1 Conclusion

The findings highlight that compliance with contractual obligations remains the foremost performance objective in RDA projects, supported by timelines, quality standards, and budget adherence. Contract management best practices, particularly compliance, transparency, and professionalism, are widely recognized as critical to project performance. Quantitative results reveal moderate to high scores for quality, cost, and time performance, with quality showing the strongest outcomes. However, overall project completion within budget and on time remains a challenge, as indicated by participant responses. These findings suggest that although technical standards are maintained, inefficiencies in time and cost control continue to affect overall project performance. The regression analysis suggests that individual contract management factors do not significantly predict project performance, underscoring the complex and multifaceted nature of project success. Moreover, effective contract management practices such as clear contractual terms, regular monitoring, stakeholder engagement, and ethical conduct are essential to enhancing project outcomes. These findings emphasize that balanced management of cost, quality, and time, underpinned by robust contract management and ethical practices, is crucial for achieving successful road development projects at RDA.

5.2 Recommendations

Based on the findings from the research, the study recommends that Road Development Agency improves Compliance Monitoring and Enforcement Mechanisms, Strengthens Contract Manager Capacity and Training, Strengthens and Expand the Pool of Designated Contract Managers and Promote Ethical Practices and Integrity Systems.

5.3 Limitations of the study

The limitations are the small sample size, which may reduce the generalization of findings, and that it was done within a given geographical area, which may not be representative of all procuring entities in Zambia. Dependency solely on the Road Development Agency may give room for response bias. Some data, particularly related to factors affecting project performance, relies on self-reporting by respondents.

5.4 Areas for Further Study

There is a need for comparative studies across multiple procuring entities to enhance the generalizability of findings beyond a single procuring entity. Further, incorporating larger sample sizes and mixed stakeholder perspectives, including contractors and consultants, would provide a more comprehensive understanding of the dynamics affecting project performance.

Declaration of Competing Interests

The authors declare that they have no conflicting interests.

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Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

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