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Assessing the Influence of Supply Chain on the Completion of Road Construction Projects: A Case Study of Great North Road

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Abstract

This study assessed the influence of supply chain management on the completion of road construction projects using the Great North Road in Zambia as the case study. The study sought to assess the influence of supply chain practices on project completion, analyze the relationship between supply chain management practices and project performance, and examine the effectiveness of stakeholder coordination in influencing project timelines. A mixed-methods case study research design with a quantitative orientation, supplemented by qualitative analysis of open-ended questionnaire responses, was adopted. Purposive sampling was used to select 50 respondents from an estimated target population of 195 project stakeholders. Because respondent-level paired data were unavailable, inferential statistics could not be calculated for the second objective; instead, qualitative responses were used to triangulate and explain the perceived relationships. Data were collected using a structured questionnaire and analyzed using frequencies, percentages, and thematic grouping of open-ended responses. The findings showed that supply chain practices were perceived to have an important influence on project completion. Delayed material deliveries were identified by 94% of respondents, payment delays by 90%, while 86% rated procurement delays as having a high or very high effect. Regarding the relationship between supply chain management practices and project performance, 80% of respondents agreed or strongly agreed that these practices improved overall project performance, with qualitative responses explaining that supplier selection improved material quality and ICT improved delivery tracking. For stakeholder coordination, funding gaps (92%) and payment delays (88%) were the most significant challenges. Furthermore, 70% rated coordination's influence on timelines as high or very high, and 92% agreed that coordination challenges delayed project completion. The study concludes that procurement timing, supplier capacity, material availability, funding continuity, and stakeholder coordination are important factors associated with road project progress and completion. The study recommends stronger procurement planning, timely financing and payment, improved supplier management, better inventory control, and enhanced stakeholder coordination.

Keywords: Supply Chain Management, Project Completion, Road Construction, Procurement, Project Performance, Stakeholder Coordination, Great North Road

1. Introduction

1.1 Background

Road infrastructure is a significant contributor to global economic development, yet its successful delivery remains heavily dependent on the efficient coordination of resources, materials, and stakeholders. According to Flyvbjerg *et al*. (2018) [8], major infrastructure projects frequently experience cost and time overruns, highlighting the critical role of effective supply chain management. In response to these challenges, supply chain management has gained increasing global attention as an approach that seeks to ensure materials, information, and finances flow efficiently from suppliers to the construction site (Vrijhoef & Koskela, 2000) [28]. Central to this approach is the adoption of robust supply chain practices such as procurement planning, logistics, and material availability, alongside strategic management practices like supplier selection, ICT adoption, and planning and scheduling. In developed countries, these practices have become increasingly standardized. However, while global studies report significant benefits including improved delivery times and cost control, they are largely based on completed projects, with limited attention given to how these supply chain practices are implemented and coordinated during

the active construction phase.

In Africa, the adoption of effective supply chain practices is gradually increasing as urbanization drives demand for infrastructure. However, road construction projects face persistent challenges, including inadequate financing, delayed payments, material shortages, transportation problems, and weak stakeholder coordination (Sambasivan *et al*., 2017) [23]. Countries like South Africa have made strides in formalizing contract management, while in landlocked nations like Zambia, reliance on imported construction materials and logistical difficulties create significant delays (Matipa & Siamuzwe, 2005) [13]. Despite these advancements, the application of supply chain management across the continent remains inconsistent due to financial constraints, limited supplier capacity, and weak institutional coordination. Furthermore, much of the existing research in Africa focuses on general contract management or completed projects, with limited empirical evidence on how supply chain practices and stakeholder coordination are managed during the construction phase, particularly under the constraints typical of developing economies.

In Zambia, road infrastructure connects communities, agricultural areas, commercial centers, and regional trade corridors. Although the country continues to invest heavily in road development, projects often experience significant delays and incomplete works. Studies indicate that while there is moderate awareness of supply chain management among professionals, actual implementation remains limited due to several barriers, including funding gaps, procurement delays, weak contractor performance, and poor stakeholder coordination (Munga & Mwiya, 2024; Mutale, 2021) [14, 15]. Existing research in the Zambian context has documented various causes of construction delays, demonstrating how financial and procurement issues affect project delivery. However, these studies rely on retrospective data and do not capture the realities of supply chain implementation during the construction phase. This creates a critical gap, as decisions made during construction such as supplier selection, inventory management, and the coordination of funding and materials directly influence the ultimate completion and performance of the project.

The Great North Road, particularly the Chinsali-Isoka-Nakonde corridor, provides a suitable case study to address this gap, as it offers an opportunity to examine the implementation of supply chain practices and stakeholder coordination in real-time within a large-scale, ongoing construction project. This allows for a deeper understanding of practical challenges, contextual factors, and anticipated outcomes, thereby contributing valuable empirical evidence to the Zambian and broader African literature.

1.2 Statement of the Problem

The construction sector is a major driver of economic development, yet successful project delivery remains heavily reliant on the efficient coordination of materials, finances, and stakeholders. Globally, inadequate supply chain management is a primary contributor to construction delays, accounting for significant cost overruns and extended timelines (Flyvbjerg *et al*., 2018) [8]. Effective supply chain practices have been shown to improve material availability, reduce delivery times, and enhance overall project performance (Alaghbari *et al*., 2007; Vrijhoef & Koskela, 2000) [1, 28]. However, in Zambia, the effective implementation of these practices in road construction remains limited due to funding gaps, weak procurement processes, and poor stakeholder coordination (Mutale, 2021; Munga & Mwiya, 2024) [15, 14]. Existing studies in Zambia report that road projects are frequently delayed by payment issues, supplier capacity constraints, and contractor performance (Silwamba, 2023) [25].

Despite these findings, such studies are largely based on general contract management or rely on retrospective data, which does not capture the realities of supply chain implementation during the construction phase. This presents a critical gap in understanding how construction-stage decisions such as supplier selection, material delivery, and the coordination of funding influence project completion and timelines. Furthermore, current research has focused predominantly on broad administrative factors, with limited attention given to the integrated relationship between supply chain practices, project performance, and stakeholder coordination. As a result, there is insufficient empirical evidence on the practical supply chain challenges affecting road construction completion in Zambia. This study therefore addresses this gap by examining the implementation of supply chain management in an ongoing major infrastructure project, with the aim of providing context-specific evidence on its influence on project completion, performance, and timelines on the Great North Road.

1.3 Objectives of the Study

To assess the influence of supply chain management on the completion of road construction projects: a case study of the Great North Road in Zambia.

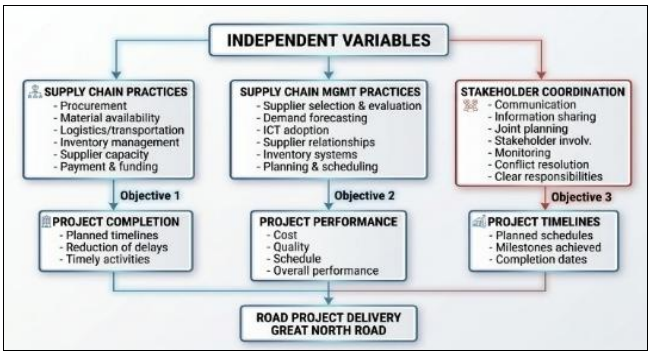
1.4 Specific objectives of the study

1. To assess the influence of supply chain practices on project completion on the Great North Road.
2. To analyze the relationship between supply chain management practices and project performance on the Great North Road.
3. To examine the effectiveness of stakeholder coordination in influencing project timelines on the Great North Road.

1.5 Research Questions

1. What is the influence of supply chain practices on project completion on the Great North Road?
2. What is the relationship between supply chain management practices and project performance on the Great North Road?
3. How effective is stakeholder coordination in influencing project timelines on the Great North Road?

1.6 Conceptual framework



The conceptual framework is built around three main categories of independent variables (supply chain practices, supply chain management practices, and stakeholder coordination), one mediating variable (intervening contextual factors), and three outcome measures (dependent variables based on project delivery).

Independent Variables (Supply Chain and Coordination Factors):

Supply Chain Practices: These include procurement, material availability, logistics and transportation, inventory management, supplier capacity, and payment and funding. These operational factors determine the physical availability of resources required for construction. Delays in procurement processes or transportation bottlenecks can immediately disrupt site activities.

Supply Chain Management Practices: These include supplier selection and evaluation, demand forecasting, Information and Communication Technology (ICT) adoption, supplier relationship management, inventory systems, and planning and scheduling. These strategic practices support resource coordination, cost control, quality management, and schedule adherence.

Stakeholder Coordination: This includes communication, information sharing, joint planning, stakeholder involvement, monitoring, conflict resolution, and clarity of responsibilities. Effective coordination supports timely decisions, technical approvals, and resource allocation among government agencies, contractors, and suppliers.

Mediating Variable:

Intervening Factors and Implementation Challenges: This is represented by the practical actions and conditions during the construction phase, such as funding gaps, procurement delays, supplier capacity constraints, and communication breakdowns. This variable acts as the link between the planned supply chain strategies and the final outcomes. Even if the right management practices are chosen, poor communication or funding delays (challenges) will negatively mediate the final result.

Dependent Variables (Road Project Delivery Outcomes):

Project Completion (Primary Focus): This is the core outcome measure of the study, operationalized through the achievement of planned timelines, the reduction of project delays, and the timely completion of project activities.

Project Performance: This relates to the overall efficiency and quality of the project, measured through schedule adherence, cost control, quality outcomes, and overall performance indicators.

Project Timelines: This relates to the specific time-based outcomes, including the achievement of milestones, adherence to planned schedules, and the meeting of contractual completion dates.

2. Literature Review

2.1 Influence of supply chain practices on project completion

The first step in successful road construction is the identification and adoption of effective supply chain practices that ensure materials, finances, and information flow efficiently to the project site. A study by Alaghbari *et al*. (2007) [1] on construction projects emphasized that a holistic approach to managing activities ranging from procurement planning to material delivery can significantly reduce project delays. They highlighted that integrating supply chain activities during the planning phase prevents disruptions, where material shortages or poor logistics are exacerbated during construction. Similarly, Flyvbjerg *et al*. (2018) [8] found that standardizing planning and resource management helps project teams systematically isolate and mitigate financial and resource-based delays globally.

In the African context, the adoption of structured supply chain practices is gradually increasing, particularly as urbanization drives demand for infrastructure (Sambasivan *et al*., 2017) [23]. However, road construction projects face persistent challenges. Matipa and Siamuzwe (2005) [13] noted that in landlocked countries like Zambia, reliance on imported construction materials, bureaucratic border procedures, and logistical difficulties create significant supply chain delays. Similarly, in Tanzania, Sambasivan *et al*. (2017) [23] identified payment problems, material delivery issues, and poor contractor planning as key factors affecting project implementation.

In Zambia, the concept of formalized supply chain management is still developing (Munga & Mwiya, 2024) [14]. A seminal study by Mutale (2021) [15] examined contract management in high-value road works, documenting the use of formal procurement practices but highlighting persistent weaknesses in funding allocation. Building on this, Munga and Mwiya (2024) [14] noted that the most commonly employed supply chain practices in Zambia focus on operational cost reduction, specifically targeting procurement delays and supplier performance. Zimba (2020) [31] further observed that the most prominent supply chain challenge affecting project completion in the Zambian context is the lack of supplier capacity for bulk supply and inadequate supplier planning.

2.2 Relationship between supply chain management practices and project performance

Effective supply chain management practices play a pivotal role in ensuring that construction projects achieve cost efficiency, schedule adherence, and quality standards. Various studies have shown that the ability to implement these practices systematically can significantly influence project outcomes. Evaluating this relationship requires systematic assessment frameworks that link supply chain activities to project performance metrics (Flyvbjerg *et al*., 2018) [8].

Globally, the relationship between SCM practices and project performance is well documented. Vrijhoef and Koskela (2000) [28] reported that integrating supply chain activities with project planning can achieve up to 30% reduction in schedule delays and a 20% decrease in operational costs. The implementation of ICT and supplier relationship management has enabled firms to avoid massive material wastage through better tracking (Kärkkäinen *et al*., 2003) [11]. In terms of logistics and procurement, Alaghbari *et al*. (2007) [1] established benchmarks indicating that effective supply chain coordination can reduce project cost overruns by up to 40%.

In the African context, the effectiveness of these practices is highly context-dependent. In South Africa, structured contract administration and monitoring have been shown to improve project delivery (Munga & Mwiya, 2024) [14]. In landlocked nations, Matipa and Siamuzwe (2005) [13] demonstrated that long-term supplier relationships and ICT adoption led to lower tender sums and more efficient project delivery.

In Zambia, Munga and Mwiya (2024) [14] documented

measurable effectiveness, reporting a positive correlation between contract administration and implementation (Spearman coefficient of 0.776). However, as Flyvbjerg *et al*. (2018) [8] notes, the true effectiveness of supply chain practices is ultimately realized during the operational phase. For ongoing road construction projects, this relationship must be assessed through anticipated performance based on procurement timing, supplier capacity, and coordination, as poorly managed supply chains can negate design benefits.

2.3 Effectiveness of stakeholder coordination in influencing project timelines

Stakeholder coordination refers to the process of aligning different participants within a supply chain towards shared objectives through effective communication, information sharing, joint planning, decision-making, and conflict resolution. Coordination is particularly important in construction because projects involve multiple stakeholders whose activities are interdependent. Weaknesses in communication, information sharing, or clarity of responsibilities can interrupt the sequence of project activities and contribute to delays (Matipa & Siamuzwe, 2005) [13].

In the African context, coordination challenges may be intensified by institutional capacity constraints, financial limitations, fragmented responsibilities, and weaknesses in information flow. Research on road construction projects has highlighted the importance of supply chain flows, including information, material, labour, and cash flows, in influencing project lead times. Effective coordination of planning activities among project stakeholders is therefore important for reducing delays and improving project implementation (Sambasivan *et al*., 2017) [23].

In Zambia, coordination challenges among stakeholders have been consistently associated with delays and incomplete infrastructure projects. The Office of the Auditor General (2025) [16] identified overlapping mandates between the Road Development Agency (RDA) and Local Road Authorities (LRAs), creating challenges related to planning, responsibility, and implementation. Munga and Mwiya (2024) [14] also identified coordination challenges across different stages of the road contract management process. Their findings indicate that the viability of strategic plans may be affected by regime changes, politically initiated contracts, limited stakeholder involvement, and delayed payments. These coordination failures directly impact project timelines, as funding gaps and unclear responsibilities stall procurement and material delivery.

2.4 Research gaps

Despite the growing body of literature on supply chain management and road construction, there remains a significant gap when it comes to context-specific research focused on Zambia, particularly in large-scale, ongoing infrastructure projects like the Great North Road. Much of the existing research provides generalized insights into project performance, primarily using post-completion data from developed economies or generalized road projects. While these discussions are valuable, they often fail to consider the construction-phase realities, supply chain nuances, and stakeholder capacity constraints that shape project implementation in Zambia.

A critical gap in the literature is the lack of thorough examination regarding the interaction between supply chain practices and specific challenges encountered during the construction phase. While numerous studies underscore procurement delays and funding gaps as key contributors to poor project completion, few delve into how these issues directly affect the actual implementation and anticipated performance of supply chains before a project is operational. Most Zambian studies, such as Munga and Mwiya (2024) [14], rely on retrospective data and general contract management. Empirical data on how supply chains are being managed in real-time specifically in high-stakes environments like the Great North Road corridor is currently limited. Without such context-specific evidence, policymakers and project managers are left without a clear roadmap for improving future road projects.

Another noted gap is that empirical studies exploring the actual practices, challenges, and effectiveness of stakeholder coordination within a Zambian road context are extremely limited. There is a clear lack of context-specific frameworks that accommodate Zambia's socio-political, economic, and infrastructural realities. Existing studies (Mutale, 2021; Silwamba, 2023) [15, 25] focus on contract management and procurement methods without linking them to measured or perceived performance outcomes across different stakeholder groups. This study therefore bridges the gap by examining the influence of supply chain management on the completion of road construction projects, using the Great North Road as a case study. By capturing the perceptions of diverse stakeholders (contractors, suppliers, RDA staff) alongside management, this research provides a construction-phase perspective that is currently missing from the Zambian literature.

3. Methods and Procedures

3.1 Research Design

The study adopted a mixed-methods case study research design, using a quantitative orientation supported by qualitative responses. This design was chosen to enable a systematic description of the supply chain practices being implemented and the coordination challenges encountered during the construction phase. According to Yin (2018) [29], a case study design is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context," and is highly suitable when seeking to understand the "what" and "how" of a phenomenon. The design allows for both quantitative and qualitative data collection to explore the relationships between supply chain practices, project performance, and stakeholder coordination within a specific infrastructure project.

3.2 Target Population

The target population included professionals and stakeholders directly involved in the construction and supply chain management of the Great North Road Project, particularly the Chinsali-Isoka-Nakonde corridor in Zambia. This group included Road Development Agency (RDA) staff, contractors and subcontractors, suppliers, consultants, and representatives from relevant regulatory and funding institutions (NRFA, NCC, and ZPPA). The total population was estimated at approximately 195 individuals. This group was selected for their direct knowledge and hands-on experience in procurement, material supply, and project coordination.

3.3 Sampling Design

A purposive sampling technique was employed to identify key informants who possess rich insights on the subject. This technique was appropriate because it focuses on individuals who are especially knowledgeable about or experienced with a phenomenon of interest (Palinkas *et al*., 2015). The study specifically targeted project managers, site engineers, procurement officers, and supplier representatives directly involved in the project's supply chain.

Sample Size: The final study sample comprised 50 respondents. The sample size was considered appropriate because it provided representation from the main stakeholder groups directly involved in the Great North Road project while remaining manageable for data collection and analysis. The sample was purposively distributed across stakeholder categories (RDA Staff: 12, Contractors: 12, Suppliers: 8, Consultants: 8, Regulatory Agencies: 10) to capture perspectives from professionals involved in project management, procurement, construction, supply, supervision, regulation, financing, and stakeholder coordination. This sample size is consistent with similar case study research in construction management and provides sufficient data for the descriptive and thematic analyses employed in this study.

3.4 Data Collection Method

Data were collected using a structured questionnaire. As Creswell (2014) points out, "multiple forms of data collection help to establish a comprehensive understanding of the problem under study." The questionnaire included both closed-ended questions (Likert scales and ranking questions) to allow for numerical analysis, and open-ended questions to gather nuanced information and understand the perceptions and experiences of stakeholders regarding supply chain management. The questionnaire was administered directly to the 50 selected respondents. Furthermore, documentary review of Road Sector Annual Work Plans (RSAWPs) from 2017 to 2024 was conducted to provide contextual evidence. No separate semi-structured interviews were conducted as independent data collection methods; instead, the open-ended questionnaire items provided the necessary qualitative depth.

3.5 Triangulation

Triangulation was employed to enhance the credibility and validity of the findings. The study used data triangulation (collecting data from different stakeholder categories, such as contractors versus suppliers versus regulatory agencies) and methodological triangulation (comparing the quantitative Likert-scale findings with the qualitative open-ended explanations and documentary evidence from the RSAWPs). According to Patton (1999), "triangulation strengthens a study by combining multiple data sources, methods, or theories." This helped ensure a more holistic and accurate understanding of the research problem, particularly in distinguishing between perceived supply chain effects and actual on-site challenges.

3.6 Data Analysis

Quantitative data from the closed-ended questionnaires were coded and analyzed using Microsoft Excel. Descriptive statistics such as frequencies and percentages were used to summarize the data, with results presented in tables, charts, and graphs. For Objective Two, the relationship between supply chain management practices and project performance was examined; however, because respondent-level paired data were unavailable to calculate a valid Spearman correlation coefficient, qualitative responses were used to explain the perceived associations. Qualitative data from the open-ended responses were analyzed using thematic analysis to identify emerging patterns, themes, and narratives related to supply chain effectiveness and implementation challenges. Braun and Clarke (2006) [4] define thematic analysis as "a method for identifying, analyzing and reporting patterns (themes) within data."

4. Presentation of Findings

4.1 Presentation of results on background characteristics of the respondents

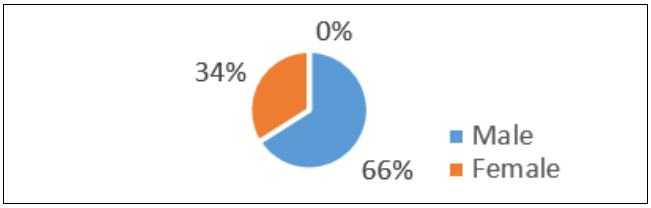


Fig 4.1: Gender of the Respondents

The findings indicate that 66% (33) were male and 34% (17) were female, with no respondents selecting "prefer not to say." This male majority likely reflects the professional and technical roles represented in the construction sector.

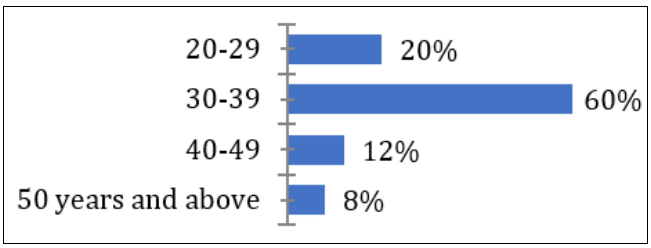


Fig 4.2: Respondents Age Group

The results show that 60% of respondents were aged 30-39 years, followed by 20% (20-29 years), 12% (40-49 years), and 8% (50 years and above). This indicates a sample composed mainly of working-age professionals with relevant exposure to project activities.

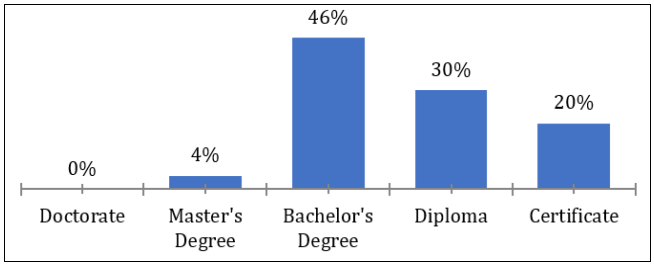


Fig 4.3: Highest Level of Education

The results show that 46% of respondents held a Bachelor's Degree, followed by 30% with diplomas, 20% with certificates, and 4% with Master's Degrees. This indicates a sample with formal educational exposure relevant to professional project activities.

Table 1: Respondents' Professional Role on Project

Professional Role	Frequency	Percentage
Project Manager	4	8%
Site Engineer	5	10%
Procurement Officer	4	8%
Quantity Surveyor	3	6%
Clerk of Works	2	4%
Site Supervisor	4	8%
Contractor	4	8%
Subcontractor	4	8%
Supplier/Logistics Manager	5	10%
Consultant	4	8%
RDA Official	4	8%
NRFA Official	2	4%
NCC Official	2	4%
ZPPA Official	2	4%
Other	1	2%
Total	50	100%

The results show a diverse range of professional roles, led by Site Engineers and Supplier/Logistics Managers (10% each), followed by Project Managers, Procurement Officers, and Contractors (8% each). This broad distribution provides relevant perspectives across management, supply, and regulatory functions.

4.2 Presentation of Results Based on the Supply Chain Practices and Project Completion

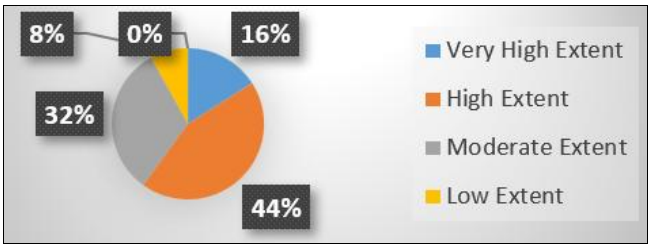


Fig 4.4: Extent to which Supply Chain Practices Affected project Completion

The results indicate that 60% of respondents perceived a high or very high effect of supply chain practices on project completion. This demonstrates that procurement, logistics, and supplier performance are critical components directly influencing construction continuity.

Documentary Evidence on the Great North Road Project

Table 2

Year	RSAWP Reference	Project Status	Key Documentary Evidence
2017	RSAWP 2017, Items 33-36, 47, 64, 71	Ongoing	Project listed with allocations from AfDB, AGTF and GRZ, together with provisions for resettlement and holding maintenance
2020	RSAWP 2020, Items 197-212, 540	Ongoing	Continued allocations for Lot 1, Lot 2, supervision, resettlement, feeder roads and other supporting activities
2021	RSAWP 2021, Items 120-139	Ongoing	Continued allocations for Lots 1 and 2, supervision, resettlement, feeder roads, institutional support, audits and road safety
2023	RSAWP 2023, Items 77-88, 101-102, 121-128, 134-136, 160	Ongoing	Lot 1 included construction of 17 km of road works; Lot 2 included 47 km of road works and allocation for weighbridge construction
2024	RSAWP 2024, Items 79-83, 86–88, 101-102, 122-129, 136-138, 156	Ongoing	Project continued to be listed as ongoing, with further allocations for Lots 1 and 2, supervision, access roads, toll plazas and resettlement

Documentary evidence from RSAWPs (2017-2024) confirms the project remained ongoing, supporting perceptions that completion was affected by challenges. However, these records do not independently establish the exact duration or causality of specific delays.

Supply Chain Challenges Experienced

The results identify delayed material deliveries (94%) and payment delays to suppliers (90%) as the most frequently experienced supply chain challenges. These were followed by limited local manufacturing capacity (78%) and border clearance delays for imported materials (76%). This indicates that financial and material flow constraints were the primary barriers to project continuity.

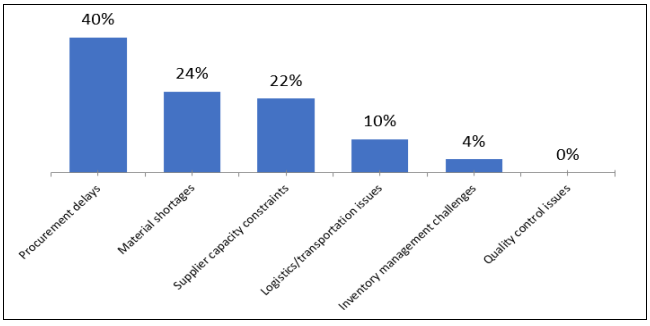


Fig 4.5: Supply Chain Practice with the Greatest Impact on Project Completion

Procurement delays were identified as the supply chain practice with the greatest impact on project completion by 40% of respondents, followed by material shortages (24%) and supplier capacity constraints (22%). This highlights the critical role of timely material acquisition and reliable supplier performance in project delivery.

4.3 Presentation of Results Based on the Supply Chain Management Practices and Project Performance

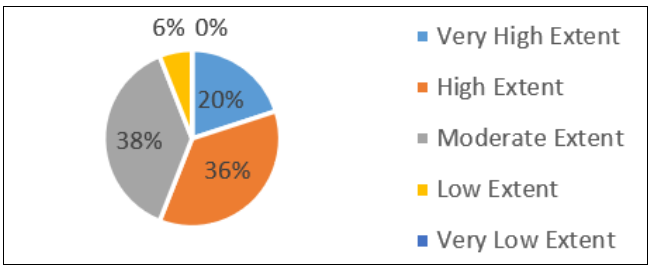


Fig 4.6: Extent to Which SCM Practices Influenced Project Performance

The results indicate that 56% of respondents perceived SCM practices as having a high or very high influence on project performance. Supplier selection, monitoring, and inventory management were considered relevant to cost, quality, and schedule. However, this represents perceived influence rather than statistical proof of causation.

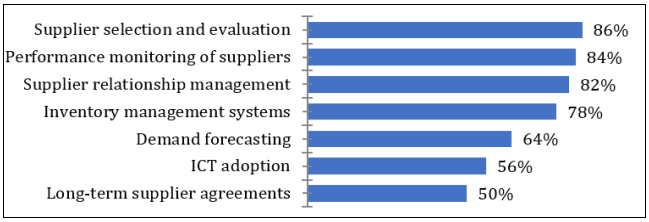


Fig 4.7: Supply Chain Management Practices Being Used

The results show that supplier selection (86%) and performance monitoring (84%) were the most widely used SCM practices, highlighting a strong focus on supplier-related decisions. However, formal technology-supported approaches like ICT adoption (56%) and long-term agreements (50%) were less frequently reported, indicating a need to improve information flow and coordination.

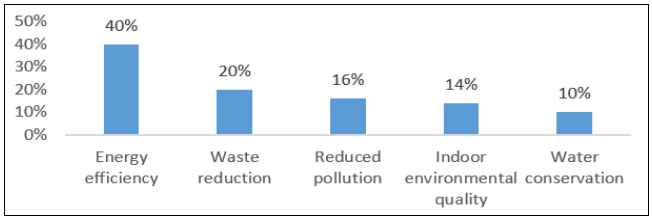


Fig 4.8: Reasons for Ranking the Highest Environmental Benefit First

Energy efficiency was selected as the highest environmental benefit by 40% of respondents, followed by waste reduction (20%) and reduced pollution (16%). Indoor environmental quality (14%) and water conservation (10%) were the least reported. This reinforces the prominence of energy technologies, though it represents perceived priorities rather than measured outcomes.

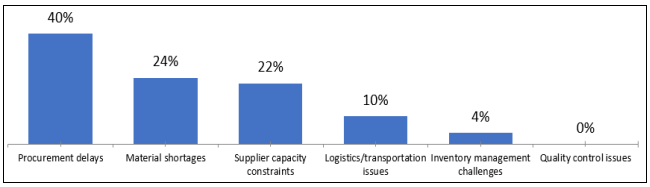


Fig 4.9: SCM Practice with the Greatest Impact on Project Performance

Procurement delays (40%), material shortages (24%), and supplier capacity (22%) had the greatest impact on completion. This underscores that timely material acquisition and supplier reliability are major determinants of progress. While RSAWP records confirm the project's extended duration, they do not detail the exact days lost.

4.4 Presentation of Results Based on the Supply Chain Coordination and Project Timelines

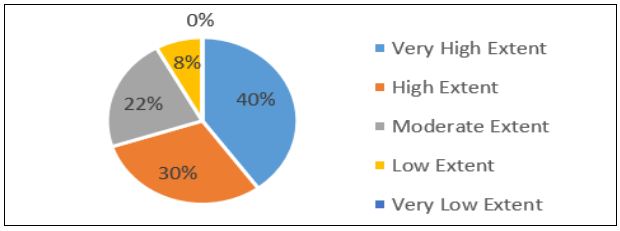


Fig 4.10: Extent to Which Supply Chain Coordination Affected Project Timelines

The findings show that 70% of respondents rated the influence of supply chain coordination on project timelines as high or very high. This indicates that coordinating information, payments, and decisions is perceived as a critical factor affecting construction progress.

Table 3: Coordination Challenges Experienced

Coordination Challenge	Frequency	Percentage
Funding gaps	46	92%
Payment delays	44	88%
Delayed decision-making	39	78%
Lack of regular coordination meetings	37	74%
Poor communication between contractors and suppliers	36	72%
Limited information sharing	33	66%
Overlapping mandates	27	54%
Conflicting project priorities	23	46%
Other	6	12%
Total Respondents	**50**	**100%**

Funding gaps (92%) and payment delays (88%) were the most prominent coordination challenges, followed by delayed decision-making (78%) and poor communication (72%). This indicates that financial coordination and information flow were the weakest links in the project's administrative processes.

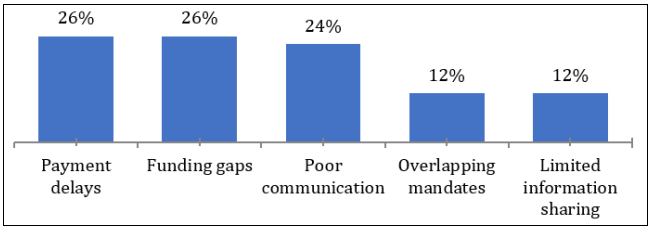


Fig 4.11: Coordination Challenge with the Greatest Impact on Project Timelines

Payment delays and funding gaps (26% each) had the greatest impact on project timelines, followed by poor communication (24%). This close distribution indicates that timeline issues resulted from several interconnected coordination weaknesses rather than a single challenge.

5. Discussions

The study examined the influence of supply chain management on the completion of road construction projects, focusing on the Great North Road Project in Lusaka, Zambia. Its purpose was to assess the influence of supply chain practices, analyze the relationship between supply chain management practices and project performance, and examine the effectiveness of stakeholder coordination on project timelines. This section discusses the findings in light of previous literature, aligning them with the study's objectives and the broader framework of supply chain management in the construction sector.

Objective One: To assess the influence of supply chain practices on project completion on the Great North Road.

The findings revealed that supply chain practices had a significant influence on project completion, with 60% of respondents rating the overall effect as high or very high. Delayed material deliveries (94%) and payment delays (90%) were the most widely identified challenges, while procurement delays recorded the strongest severity rating, with 86% stating it had a high or very high effect. This

aligns with Alaghbari *et al*. (2007) [1], who identified material-related and financial constraints as primary contributors to construction delays globally. The prominence of payment delays corresponds with Munga and Mwiya (2024) [14], who noted that funding gaps and delayed payments severely disrupt public road works in Zambia. Furthermore, the logistical challenges mentioned by respondents reflect Matipa and Siamuzwe (2005) [13], who highlighted how Zambia's landlocked status and reliance on imported materials create inherent supply chain vulnerabilities and border delays.

Objective Two: To analyze the relationship between supply chain management practices and project performance on the Great North Road.

Results showed that respondents generally perceived SCM practices as having a positive relationship with project performance. A combined 56% rated the influence as high or very high, with 80% agreeing that SCM practices improved overall project performance. Supplier selection (86%) and performance monitoring (84%) were the most prominent practices. This finding supports Vrijhoef and Koskela (2000) [28], who argued that managing supply chain activities is critical for project performance due to the interdependency of construction networks. The focus on supplier selection aligns with Kärkkäinen *et al*. (2003) [11], who emphasized that rigorous evaluation ensures reliability and quality, rather than relying solely on price. It is essential to note that while these findings demonstrate a positive perceived association, the study did not have respondent-level paired data to calculate a statistical correlation coefficient. Therefore, the results align with the qualitative perceptions discussed by Munga and Mwiya (2024) [14], rather than proving independent causality.

Objective Three: To examine the effectiveness of stakeholder coordination in influencing project timelines on the Great North Road.

Despite the positive perceptions of SCM practices, the project experienced significant coordination challenges. While 70% rated coordination as having a high or very high influence on timelines, only 22% agreed that existing coordination arrangements were effective in keeping the project on schedule. Funding gaps (92%) and payment delays (88%) were the most frequently reported challenges, and 92% agreed that coordination difficulties delayed project completion. This mirrors the findings of the Office of the Auditor General (2025) [16], which identified overlapping mandates between the Road Development Agency (RDA) and Local Authorities, leading to uncoordinated planning and delayed implementation. The prominence of financial coordination challenges supports Munga and Mwiya (2024) [14], who found that delays in payments and limited stakeholder involvement significantly undermine contract monitoring and control. Furthermore, the communication breakdowns reported align with Matipa and Siamuzwe (2005) [13], who noted that effective information sharing is essential for maintaining project momentum and preventing cascading delays.

The study established that the Great North Road Project was heavily reliant on effective supply chain practices, SCM strategies, and stakeholder coordination. While supply chain practices and supplier management were perceived to improve project performance, persistent challenges such as funding gaps, payment delays, and procurement issues severely constrained project completion. The results reinforce the conclusions of Alaghbari *et al*. (2007) [1], Munga and Mwiya (2024) [14], and the Office of the Auditor General (2025) [16], who argue that successful road construction in Zambia depends not only on operational supply chain activities, but also on financial continuity, robust contract management, and seamless institutional coordination.

6. Conclusions and Recommendations

6.1 Conclusions

The study revealed that the implementation of supply chain management in the construction of the Great North Road Project was perceived to have an important influence on project completion, performance, and timelines. The study confirmed that a broad mix of practices was deployed, with supplier selection (86%), performance monitoring (84%), and supplier relationship management (82%) being the most prominent. The structured application of these practices enhanced stakeholder expectations of project performance (80% agreement) and aligned with global and regional supply chain literature. However, it is crucial to note that the study did not have respondent-level paired data to calculate a statistical correlation; therefore, these conclusions emphasize perceived associations rather than proven operational performance.

Nevertheless, the study highlighted persistent challenges that limited the full potential of project delivery. These included delayed material deliveries (94%), payment delays (90%), and procurement delays (86%), alongside significant coordination failures such as funding gaps (92%) and payment delays (88%). Only 22% of respondents considered existing coordination arrangements effective, and 92% agreed that coordination challenges delayed project completion. While mitigation strategies such as early procurement, alternative suppliers, and technical training were recommended by respondents, the inconsistent availability of funding and weak institutional coordination reduced overall effectiveness. The findings indicate that although supply chain management is crucial for the successful delivery of road infrastructure, its impact depends on early procurement planning, adequate financing, proactive stakeholder coordination, and technical capacity building.

6.2 Recommendations

Align Project Financing with Schedules: The Government of Zambia and road agencies should align project financing with procurement and construction schedules. This addresses the 92% of respondents who identified funding gaps as a major coordination challenge and the 88% who cited payment delays.

Integrate Procurement Planning: Contractors and project managers should identify long-lead and imported materials early in the construction Programme. Procurement schedules must account for customs procedures and potential border delays, directly responding to the 86% who rated procurement delays as having a high impact.

Strengthen Coordination Routines: Coordination among the RDA, NRFA, contractors, and suppliers should be strengthened through regular meetings focused on funding status, outstanding approvals, and material shortages. Responsibility for resolving issues should be assigned to specific offices with clear deadlines.

Enhance Supplier Management: Project teams should

implement rigorous supplier selection, monitoring, and relationship management. This directly supports the 82% of respondents who perceived supplier selection as improving cost performance and the 78% who associated monitoring with improved quality.

Improve Inventory and Digital Tracking: Road contractors should strengthen day-to-day supply chain control through improved inventory visibility and supplier performance monitoring. Digital tools, including GPS-based delivery tracking, should be utilized to mitigate logistics challenges and material shortages (reported by 94% of respondents).

Develop Local Supplier Capacity: Government and industry stakeholders should support local production of construction materials to reduce reliance on imports. This will help minimize border clearance delays (76%) and supply chain disruptions associated with landlocked logistics.

Implement Alternative Sourcing: For critical materials, contractors should maintain approved alternative suppliers so that the failure of one source does not unnecessarily interrupt construction. This addresses the 68% who reported a lack of supplier capacity for bulk supply.

Institutionalize Continuous Monitoring: Road agencies should establish continuous monitoring and feedback mechanisms to track supplier performance, ensure timely payment processing, and evaluate the effectiveness of coordination arrangements to prevent future timeline disruptions.

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