World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Assessing the effect of construction delivery and lead time on the performance of local road construction contractors in Lusaka district, Zambia

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World Journal of Advanced Research and Reviews, 2025, 26(03), 476-493

Publication history: Received on 24 April 2025; revised on 31 May 2025; accepted on 03 June 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.26.3.2194

Abstract

Contactor's expertise and performance plays an important role in successful delivery of a project. While clients want to make the best decisions in selecting the right contractor for the job, a clear understanding of the underlying attributes associated with contractors' selection in the context of achieving successful project outcomes poses to be a critical issue. The purpose of the research was to establish whether Construction delivery and lead time have an effect on the performance of Local Road Construction Contractors in Lusaka. This research used the mixed method research methodology. The research was an evaluative in nature and followed the descriptive approach and was conducted in Lusaka district of Zambia. The research used a non- experimental design to assess the effects of construction delivery and lead time on the performance of Local Road Construction Contractors in Lusaka city. The local road contractor's performance was looked at from the perspective of quality of work and timely completion of projects. The sample consists of 54 respondents from local road contractors, chosen using data from National council of Construction, of Grade 1 to 4 of Road contractors in Lusaka and directors from government agencies using purposive sampling to select key informants. The data collected was quantitative in nature and was analyzed using Statistical Package for Social Sciences (SPSS), percentages and chi-square to establish the results to the study. Findings reviewed that there is an association between construction delivery and the quality of work and timely completion as well as between lead time and the quality of work and time timely completion of projects by the Local Road Construction Contractors in Lusaka. The research results further identified the following as reasons to why road local contractors are having challenges:

- Local Road Construction Contractors lack professionalism in their operations.
- Lack the financial capacity, human resource.
- Lack of sufficient support from government.
- The lack of expert skills and technical experience by road local contractors.

Recommendations include:

- Government to help to make the business environment conducive for Local Road Construction Contractors in order for them to compete favorable with foreign contractors.
- A request for a call on government to amend the National Council for Construction Act No. 13 of 2003 so that it (NCC) can also regulate and punish all the erring contractors that do sub-standard jobs and those that abandon works before completion.
- Government through its partners and stakeholders should provide financial schemes for the Local Road Construction Contractors to access loans, equipment and raw materials and the necessary technical support for them to compete favorable with foreign contractors.

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Keywords: Project completion; Lead time management; Local Road contractors; Project cost and Construction delivery**.**

1. Background

The roads and infrastructure projects are budgeted under the Economic Affairs section of the Zambian annual budget which has accounted for on average of 25% of the annual budget from 2016 to 2020 (Appendix 3). Road infrastructure is the largest budget item under the Economic Affairs section accounting for on average K8, 197.81 million or 11% of the budget. From 2016 to 2020, the Zambian government had planned to spend K40, 989.03 million on building and repairing roads in a bid to improve the road network in Zambia (Ministry of Finance, Zambia, 2017). With such amounts being planned for, it makes these projects attract attention from stakeholders, ranging from cooperating partners to project funders. In 2017 Government planned to work with the private sector using the Public Private Partnership (PPP) model for the Lusaka-Ndola, Ndola-Kasumbalesa, Kasomeno-Mwenda road projects (Ministry of Finance, Zambia, 2017). In 2017, the government launched a US $ 200million Improved Rural Connectivity Project (IRCP) set to cover 3,375 km of roads in the country (Namukolo, 2019). The project is funded by the World Bank in collaboration with the Zambian Government and was said to be implemented in 6 provinces over an 8-year period (Namukolo, 2019).

The road projects have been seen more in Lusaka than any other town in Zambia. Lusaka city is the capital and largest city in Zambia with an estimated population of 2.774 million as of May 2020 (Central Intelligence Agency, 2020). This is compared to 2.191 million as at the last official census in 2010 (Zambia Central Statistics Office, 2020). In 2018, Lusaka accounted for about 60 percent of Zambia's estimated 780,000 cars making traffic in the city a nightmare (Namukolo, 2019). Additionally, Lusaka has the fastest-growing road users with the registration of about 100 vehicles a day on average (Nawa, 2017). Some of the existing roads have become compromised in the central business district (CBD). Building capacity for local contractors has the potential of reducing road construction costs which in turn have a repel effect to help build the economy. Therefore, the acute shortage of proper roads in urban and rural areas of the country coupled with delays by some contractors has been a thorny issue not only motorists, but the local authority too. The huge population size and density in Lusaka district exerts pressure on service delivery. The National Road Fund Agency (NFRA) noted the lack of visibility of Zambian construction companies stating that most of the construction companies that excelled were foreign companies (National Road Fund Agency, 2017). NFRA contended that most Zambian contractors were subcontractors who suffered project management problems like design, contract management, quality and financial aspects.

This low participation of local contractors in the road sector had been identified by the Parliamentary Committee on Communications, Transport, Works and Supply in 2014 which noted that only 12% of the Link Zambia 8000 projects were awarded to Zambians as principal contractors (National Assembly of Zambia, 2014). A field inspection conducted by NRFA in 4th quarter of 2017 revealed the following observations:

- A total value of works of K43, 505,210,000 for all projects. Out of this total only K10, 394,714,847.44 which is 24% was attributable to Zambian contractors. This was despite having 5,959 Zambian registered contractors out of a total number of 6,266 registered contractors in 2017. Meaning 24% of value of projects inspected in Q4 2017 was being done by 95% of the contractors while 76% value of projects was given to the 5% foreign contractors.
- Lusaka province had total project worth K5, 320,381,769.15 being done by 31 contractors (16 Zambian and 15 foreign).
- The total value of works of K22, 624,810,000 was done on roads in a total of 83 projects. Out of this K2, 363,560,000 representing 10% was for Lusaka province road works being done in 1 project.

Despite government opening institutions such as National Council for construction (NCC) there is still levels of poor project performance among local contractors. National Council for Construction (NCC) is a statutory body set up under the National Council for Construction Act No. 13 of 2003 under the Laws of Zambia. Under this Law, NCC is charged with the responsibility of providing for the promotion, development, training and regulation of the Construction Industry in Zambia. NCC has a number of functions a few being: Monitor and evaluate, from time to time, the capacity and progress of persons engaged in the construction industry; Promote and develop the construction industry in Zambia, and give priority to Zambian firms and Zambian companies. The aim of the National Council for Construction is to promote and build the capacity of the Zambian construction industry (National Council for Construction, 2019).

It is government policy that a minimum of 20 percent of all government funded road contracts awarded by the Road Development Agency, Local Road Authorities and other government institutions be executed by Zambian owned

companies in line with the shareholding structure specified in the Citizens economic empowerment Act No.9 of 2006. Government through the various agencies has been trying to implement this policy. The National Road Fund Agency said it was important that capacity should be developed among local contractors (Namukolo, 2019). Namukolo (2019), further pointed out that building capacity for local contractors had the potential of reducing road construction costs. The inquiry of the Parliamentary Committee established that the challenges that hindered local contractor participation were: Access to finance; Collateral requirements; high Interest rates; Limited technical and managerial skills; Lack of access to plant and equipment; Document preparation; Corruption and unfair competition; Delayed payments; The need for public institutions to outsource consultancy services; Lack of Zambian Construction Industry professionals in the Office of the Auditor General; Procurement method; Indifference to provisions of the law of Zambia; Perceptions of lack of capacity.

1.1. Study objectives

The research questions that guided this study were as follows:

- To establish the construction delivery and lead time management being used by Local Road Construction Contractors in Lusaka.
- To determine the relationship between construction delivery and lead time management on the quality of work done by Local Road Construction Contractors in Lusaka.
- To assess the connection between construction delivery and lead time management on the timely completion of projects by the Local Road Construction Contractors in Lusaka.

1.2. Theoretical Framework

1.2.1. Game Theory

The Game theory is the formal study of decision-making, where several players must make choices that potentially affect the interests of the other players (Theodore & Stengel, 2001) such as Local Road Contractors, these players may be individuals, groups, firms, or any combination. The game growth theory is appropriate for this research because the main respondents were senior personnel from the local contractors in the road sector. Their view of what could be the best predictors of performance was paramount. Further, this research investigates the capabilities of managers and how they make choices in the execution of projects.

1.2.2. Expectancy Theory

Expectancy theory proposes that an individual will decide to behave or act in a certain way because they are motivated to select a specific behavior over other behaviors due to what they expect the result of that selected behavior will be (Ward et al. (1991). Using expectancy theory reasoning states that: Risks should be borne out of willingness if there is adequate perception of risk/return trade-offs risk assessment, ability to bear occurring consequences and real ability to manage the associated uncertainty and thereby mitigate project risks. Risk should not be willingly borne if there is inadequate perception, need to obtain work and false perception of the risk/return trade-offs of transferring risk to another party such as funders.

1.3. Conceptual Framework of the Study

In this study, an analysis of the different factors that affect the performance of Local Road Construction Contractors and impede their growth in the road sector in Lusaka was conducted. Based on the literature review and the current research undertaken the research model presented in below was constructed to investigate the factors affecting performance Local Road Construction Contractors in the road sector. The figure below illustrates how the concepts in the framework are related. The independent variables which include construction delivery and lead time are listed on the left side of the model. The dependent variable which is performance of Local Road Construction Contractors being quality of work done and timely completion. This conceptual framework was also used in conducting analysis and explains the relationship that exists between construction delivery and lead time management with performance of Local Road Contractors. The presentation of the conceptual framework has definition of key concepts and the conceptual framework guiding the research.

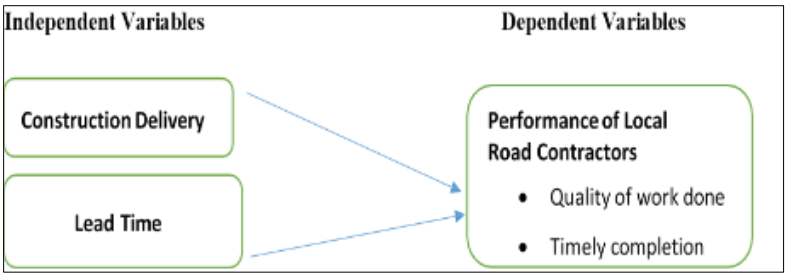

Figure 1 Conceptual framework

2. Literature Review

2.1. Construction Delivery

Construction delivery is the period that is required to finish the work, starting from site handover until completion and the final handover of the completed project. "Duration" is the time, normally within times, instituted in accordance with perfecting the whole project besides beginning the preceding challenge after finishing the last one (Baker and Baker 2003). A significant number of literatures emphasized more the time aspect as an indicator for project success. Nkado (1995) quoted NEDO Faster Building for Commerce published in 1988, which regarded completing projects on time as a logo of an efficient housing industry. The Latham Report (1994) suggested that ensuring timely delivery of projects is one of the important needs of clients of the construction industry.

2.2. Lead Time Management

Lead time refers to the time taken between the start and completion of an operation or project (Joseph Sarkis 2012).On construction projects, Joseph Sarkis mentioned that lead time typically refer to the amount of time that elapses between placing an order for an item and its delivery to site, but it can also refer to the time required for the preparation of drawings, plant hire, approval processes, and so on. In relation to the activities of the main contractor, the term 'lead time' may be used in relation to mobilization activities(Al-Moumani -2000).

According to Al-Moumani, current construction projects are complex, requiring the support of the design and construction profession to complete. A realistic project execution time will decrease the possibility of dispute between state agencies and contractors (Nordas K. H. et al, 2006). To the clients, delay means loss of revenue through lack of productive facilities and rentable space or a dependence on present facilities (Nordas K. H. et al, 2006). For the contractor, on the other hand, delay means higher overhead costs because of a longer work period, increased material costs as a result of inflation and labour cost increases. Nordas K. H. et al furthers mentioned that the amount of time that elapses between when a process starts and when it's completed is lead time.

Lead time is examined closely in manufacturing, supply chain management and project management, as companies want to scale back the quantity of time it takes to deliver products to the market and it is therefore required in business. Nordas, Pinali & Geloso (2006) indicated that Lead time is the amount of time between the placement of an order and the receipts of the goods ordered. They further stated that it depends on the nature of the product for example whether it is made to order or if it is from a shelf product. Lead time also depends on planning and provides chain management, logistics services and in fact distance to customers and suppliers. Long time interval doesn't get to be a drag if delivery is predictable and demand is stable.

According to Pongpeng and Liston (2003), problems such as schedule delays, budget overruns, low quality work, as well as a large number of claims and litigation result largely from not selecting the best contractor to construct the facility. Williams (2003) posits that in recent decades, projects have tended to be more time- constrained and the ability to deliver a project quickly is becoming an increasingly important element in winning a bid. However, Olatunji, 2010 ascertained that if there's uncertainty about future demand, long time interval is expensive even when the customer knows exactly when the merchandise will arrive. If future demand has been underestimated, running out of stock has costs in terms of foregone sales and therefore the possibility of losing customers. If future demand has been overestimated, excess supply must be sold at a reduction. Furthermore, the longer the lead time and the more varieties of the product in question are on the market, the larger stocks are needed. It is also important to note that competitiveness on time interval is not a static concept (Olatunji, 2010). When some firms can shorten lead time, others must follow to avoid punishment in terms of discounted prices or at worst exclusion from the bidding process. The

latter can happen when a critical mass of suppliers is able to deliver just-in-time and the customer finds it safe to reduce inbound inventories to a couple of days or in some cases even a couple of hours (Nordas, et al., 2006). Gross and Soriano (n.d) demonstrate that lead-time variation has a major impact on lot size and inventory costs. Furthermore, they indicated that a listing system is more sensitive to lead-time variation than to demand variation. Variations in time interval can occur for purchased items and for people who are manufactured in-house. A major factor associated with these variations is quality problems. Typically, either safety stock or safety time interval is employed to cushion the impact of this variability. In either case, larger variability requires increased inventories. High lead-time variability may be a major reason for a plants' inability to realize inventory goals and to incur longer average throughput.

The development of service processes is treated with a lot of significance both in the public and private sector organizations since it affects the level of customer satisfaction. Most contemporary organizations face myriad challenges in efficient time interval management thanks to turbulent financial times. When a corporation experiences long lead times, there's an opportunity of getting high supply chain costs also as poor quality of services being delivered. It is therefore important for organizations within the industry to practice better time interval management practices so as to enhance their quality and reduce supply chain costs (Henri & Janne, 2018). Time Performance and Delay in Construction Project Delay in construction could be described as an action and event that extends beyond the required time in conformity with performing the construction of a contract (Sweis et al. 2008) and are of the opinion that delay often gives additional days of work. According to Assaf and Alhejj (2006), extension of time could be defined as the time overrun both beyond ending date designated in a contract, or beyond the date that the parties agreed to on the delivery of a project. It is a project shedding above its deliberate time table and is considered common problem in construction projects. In some cases, to the contractor, delay connotes higher overhead expenses as a result of longer duty period, high material charges through inflation, and due to labor cost increase. Aibinu and Jagboro, (2002) described delay as a situation where the contractor and the project owner at the same time make a contribution to the non-finishing of the project within the agreed arrangement time. Delays in building project are often expensive, considering the fact that generally, construction projects are financed through foreign loans involving charges, expenses interest, administration of workers devoted to the construction whose prices are time reliant, and ceaseless inflation of salary and material costs.

2.3. Performance

Performance is commonly refers to the carrying out of works according to requirements set out in a given contract. Any business, big or small is affected by internal and external environment in which it operates and this determines its success or failure of its performance. Delma and Wiklund (2008), poise that the business environment is considered to play a vital role in the growth. Factors inside the business are called internal factors while the factors outside the business are called external factors.

Contractor Performance involves the process that enables both parties to a contract to meet their obligations in order to deliver the objectives required from the contract. It also involves building a good working relationship between the client and its contractors. Therefore, it is very important that measures to ensure project success are taken into consideration. A client is considered as the initiator of a project, responsible for the production of the project. There are two types of clients; public and private clients. Private clients could further be divided into private (home dwellings) and private commercial. It is important that private clients understand the design, procurement, and construction processes. The clients provide valuable information which may help various participants to improve their performance on a project. Clients are either experienced or inexperienced.

Several research studies have been conducted in different parts of the world prior to the year 2000 with respect to construction delays. Some examined the causes as well as the effects of delays in construction project delivery, while others used a predictive model to ascertain construction period estimation and effects on performance. Beginning in the year 2000, a concerted effort has been made all over the world to determine remedies to the issues of project delivery.

Generally, performance magnitude may have one or more indicators, and could be influenced by various project characteristics. Performance is defined as results from processes, products or services that on the set goals and conditions. Tahir & Darton (2010) confessed that measuring the performance of any construction project in terms of success or failure, despite looking simple, is in fact a very complex process. Modern construction projects even moderate in size are generally multidisciplinary in nature and that they involve participation of designers, contractors, subcontractors, specialists, construction managers, and consultants. The objectives or goals of all participants need not be the same even in a given project. Tahir & Darton contended that to define the success or failure of a project without specifying the participant and without specifying the criteria for judging the performance holds no meaning to

measuring the performance of any construction project. The study will measure project performance on quality of work and timely completion as measures of performance. The Project Management Book of Knowledge (2007) states that project management knowledge areas are project integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, procurement management, safety management, environmental management, financial management and claim management on which success measures need to be based. Sustainable development concepts, namely, environmental respect, social integration and social economy, are factors with growing importance as indicators of successful performance of infrastructure projects.

The concept of performance has attracted an escalating debate over the years, being all- which explains a huge number of significant reflections on the concept and its measuring instruments (Criveanu, 2016). For decades now, assessing performance in the construction had remained a problem. A number of concepts and measures were experimented to assess and measure performance of projects. Alarcon (1994) indicated that the majority of these procedures slow down their assessment to required standards such as, time, cost or output. Contractors are required to evaluate performance and upgrade strategies to gain competitive advantage. To boost competitiveness and be relevant in the industry, construction firms have to make use of performance evaluation methods to ensure sustainable performance (Baldwin et al., 2001).

The measuring of performance in any construction project with regards to success or failure, in spite of looking simple, is in fact a very difficult procedure (Shrestha, Burns, and D. R. Shields, 2013). In this new era road construction projects are moderate in size and commonly multidisciplinary in nature as they require the participation of various expertise such as designers, contractors, subcontractors, surveyors, specialists, construction managers, and consultants. Atkinson (1999) explained that in the early 1990s, project success was tied to performance measures, which in turn were tied to project objectives. At the project level, success was measured by the project duration, monetary cost, and project performance. Atkinson called the time, cost, and quality criteria the “Iron Triangle.” However, he argued that using the Iron Triangle of project management, time, cost, and quality as the criteria of success may have resulted in biased measurement of project management success.

The contractor in a construction project has the task of achieving success in the execution of a project which largely depends on the contractor’s performance. On the other hand, it has become a universal inclination that local contractors in developing countries are not performing to expectations of the customers that they serve and indeed many roads local contractors have been unable to perform (Aftab, 2012). The delays by local contractors in project execution and poor-quality works in the construction industry has led to failure in achieving effective time and cost performance (Aftab, 2012).

In this study performance is operationalized using the following two indicators:

- Quality of work
- Timely completion

Based on the evidence the following hypothesis was formulated:

- H1: Performance has a significant influence on construction delivery and lead time of local road in Lusaka district.

2.3.1. Working Capital and Contractor Performance

Working capital is the amount of available capital that a company can readily use for day-to- day operations. It measures a company's liquidity, operational efficiency, and short-term financial health. Contractor’s working capital is the resource required to effectively implement the procedure of the construction work on site and this includes cash as hand, in the bank, overdraft, credit purchases, and work-in-progress and invoiced amount. Working capitals also include resources needed to smear the daily activities of the construction firm (Harris and McCaffer, 2005).

The management of working capital is very important to make sure that the level of working capital is constant and that there is enough provision of funds to finance existing possessions to facilitate projects to be project conclusion within cost and time, there is a required of coming up with most favorable level of working capital requirements of a project. There is also need of constant scrutiny and monitor of the quantum of individual parts that comprise the working capital to ensure that the requirements are not exceeded. The awarding of major construction projects favors foreign

contractors because of their technical experience and finance capability compared to local contractors who lack the technical ability and financial stability (Harris and McCaffer, 2005).

In most cases, contractors are accused of not having the required experience and skill required for the necessary project. Local contractors find it hard to have the required funds and tools for a particular project. Sufficiency of working capital relies on the ability of having the precise financing at all times during construction (Badu et al., 2012). This requires the local contractor to have a positive effort as any mismanagement and poor pricing affects productivity and profit level (Nwude, 2010).

A study by Koppelmann (2011) concluded local contractors face a number of challenges in the road construction industry; these included the lack of acceptance of local contractor's ability to performance, local contractors not having a strategy, inability to procure project materials, lack of skills and experience for a particular project, poor costing and pricing and lack of innovation amongst some the challenges contributing failure by local contractors in national government tender process. Misozi (2020) shared this same concern by insisting that most emerging economies did not have qualified individuals to perform and meet quality contractual obligations to satisfy the government. The number of foreign companies participating in biding processes of emerging economies had increased and this was because of the existing market available. Most of these foreign contractors win government and donor tender projects, subjecting local contractors to only being sub-contractors (Shachinda, 2016).

Sadly enough, local contractors require an international recognized credibility beyond the profile and reputation that they used to enjoy in in their country. Moreover, they find they need to adapt to meet the requirements of clients from different cultures and with disparate values (Shachinda, 2016). Laryea (2010) demonstrated the importance of having right and correct contract price as both affect the supply chain and project function efficiency, effectiveness and the success of the project. Laryea further emphasize the role of the engineer in estimating the project price because it affects the successful execution of the supply chain management during the construction project. Only if the engineer's estimate is correct will it be possible to attain the level of service required to produce the right quality of products, at the correct time and budget.

In this study Working Capital is operationalized using the following 4 indicators:

- Correct timing and budget
- Experience and skill
- Inability to procure project materials, lack of skills and experience for a particular project
- Poor costing and pricing

Based on the evidence the following hypothesis was formulated:

- **H2:** Working Capital has a significant influence on the Contractor Performance of Local Road Construction Contractors in the road Sector in Lusaka district.

2.3.2. Quality of Work

Quality is how good or bad something is. Quality management offers several opportunities to enhance all aspects of a project, and those of the company delivering it. Chilongo & Mbetwa (2017) noted that in construction projects, quality of work is associated with adherence to conditions of the contract and specifications stipulated in the contract documents in their entirety during the execution of the project. The Concise Oxford English Dictionary defines quality because the standard of something as measured against other things of an identical kind.

However, Soanes and Steven (2004) showed that there are two distinct areas during which quality of labor achieved is measured for fulfillment. Soanes and Steven further said that the primary one is by measuring and testing of construction materials forming the weather of the work product in situ or within the materials laboratory against a typical measure or specification. These materials must fulfil the prescribed characteristics within the contract documents for them to be incorporated into the development process. Similarly, the work product must be within prescribed standard characteristics to be considered successful. This is often generally fulfilled through the testing of the merchandise at different stages during or after each job process. The second aspect of quality of labor concerns what beneficiaries see and feel when making use of the event product. This is often a product of workmanship.

Chilongo & Mbetwa (2017) noted that workmanship was defined as the degree of skill with automatically when project specifications are adhered to. For example, when the surfacing stone sizes are within tolerance, the roads are going to

be nice and smooth to drive on. Similarly, when the ultimate layer of a road base is within the stipulated level tolerance, the roads are going to be comfortable to ride on. However, the degree of riding comfort of a road, all other things being equal, will depend upon how the extent tolerance has been controlled within the lower and upper limits. The road are going to be easier to ride on where the upper and lower tolerance limits are maintained to the minimum than where they need been allowed to fluctuate from the uppermost to the lowermost limits.

Kulemeka, Kululanga & Mortonet (2015) described the organization and management of quality control for small works, combined the phrases "quality of work" and "workmanship." He labelled quality of work (workmanship) as involving, ensuring that the attributes of the work satisfy the required needs. Kulemeka, et al. (2015) further described quality of work as measuring the ongoing and finished works against recognized standards and implementing quality control and quality assurance procedures. Quality is meeting the customer requirements.

Quality of management during construction concerns the steps taken to ensure that products are in accordance with the quality standards and measure the effectiveness / competency of consultants and contractors (Orji and Obodah, 2019). Orji and Obodah further mentioned that supervision during construction is critical to ensure quality. They mentioned that the following can determine the speed of construction and ensure quality of the product: timely inspection procedure, adequate quality management inspection resources, quality management information processing requirements, materials or work rejection rate, and clean / dry working environment requirements. On the part of the contractor, the effectiveness of construction management will affect the speed of construction. Data such as analysis of construction methods, analysis of resource movement to and within site, analysis of work sequencing to achieve and maintain effective workflow, monitoring and updating of plans need to be prioritized. Supervision during construction is critical to ensure quality products and timely delivery of project. On the part of the contractor, the effectiveness of construction management will affect the speed of construction.

According to Olatunji, 2010, the quality of management during construction does significantly influence project delivery time. Olatunji further showed the result of the analysis revealed that effective coordination of resources, developing an appropriate organizational structure to maintain workflow, analyzing of work sequencing to achieve and maintain workflow and forecasted planned date (activity duration and resource quantity required) were the factors, inter alia, that contributed to quality management. In this study quality of work is operationalized using the following 7 indicators:

- Measuring and testing of construction materials or specification.
- Effective coordination of resources,
- Supervision during construction
- Analysis of resource movement to and within site
- Developing an appropriate organizational structure to maintain workflow,
- Analyzing of work sequencing
- Maintain workflow and forecasted planned date

Based on the evidence the following hypothesis was formulated:

- **H3:** Quality of work has a significant influence on the construction delivery and lead time on Local Road Construction Contractors in the road Sector in Lusaka district.

2.3.3. Timely Completion of Construction Projects

Timely completion is working at the appropriate time that is completion of the work or designated portion thereof on or before the date required. According to Elinwa & Joshua (2001), time on construction projects is concerned with (i) planning of the work over the anticipated duration (program) in relation to its requirements with full appreciation of the resources needed and resources available; planning for utilization sets the basis or yardstick (plan) against which progress can be monitored and assessed; (ii) progressing which follows the programming of the work and compares the work undertaken against the plan allowing the redistribution of resources, if necessary, to hurry up the work if it's falling behind the plan.

Kaming et al (1997) defined time overrun as the delay beyond planned completion dates traceable to the contractors. The construction industry plays a serious role within the development of the many countries. At the macro level, delay will cause a negative rate of national economic process and monetary loss. Kaming, et al. (1997) noted that at the micro level, a delayed project can lead to time and cost overruns, disputes, arbitration, and even total abandonment. Elinwa & Joshua (2001) confesses that delays in construction projects are global phenomena and the sub-Saharan region is no exception. This trend has become the norm instead of the exception, especially in developing countries. This scenario,

thus, constitutes a serious risk and debilitating effect on relationships and income among employers, consultants, and contractors, which may cause exhaustive disputes, arbitrations, and expensive litigations. The significance of this impact, therefore, clearly justifies the concern over such a chronic problem facing the industry. Timely Completion of work or designated portion thereof on or before the date required.

In this study timely Completion of work done was operationalized using the following 3 indicators:

- planning of the work
- Progress reports which follow the programming of the work and
- Comparison of the work undertaken against the plan allowing the redistribution of resources.

2.4. Global view on Contractor's performance

In developing economies, a number of studies on contractor performance have been conducted, there were extensive disappointments in meeting performance landmarks in the construction sector. On the other hand, local contractors in emerging economies face serious competition from foreign contractors who have the required funds, experience and skills to undertake any construction project (Guyani, 2016). Guyani advised governments in developing nations to make sure they help build capacity of local contractors by empowering them through financial help to enable them to compete favorably.

In Malaysia delay is a common occurrence particularly where the government projects are concerned. Three of the most decisive factors noted in Malaysia are fluctuation in cost of materials, cash flow and financial difficulties faced by contractors, poor site management and supervision (Rahman, 2013). Ejaz et al., (2013) maintained that a contract is an exchange of something of value by two or more parties‟ meaning that they have entered into a legally binding agreement between them. Further, Murali Sambas Ivan is his research Causes and effects of delays in Malaysian construction industry said "the problem of delays in the construction industry is a global phenomenon and the construction industry in Malaysia is no exception."

Thomas & Ellis, (2007) described the construction industry as where public economy depend on, contracts in the construction industry causes mutually contractual and legal promises on partners that are not easy to adjust based on financial exchanges. The client employs the services of a construction firm to execute a contract in order to deliver a project on the fixed timeline. Concerning the factors in performance of local contractors, the increased in the cost makes a key financial risk for clients and construction companies (Akinci and Fischer, 1998). Tao and Kumaraswmay (2012) in Hong Kong cited that the link between employers and their advisers‟ calls for an evaluation process that is price-based. Even then, the least offer normally leads to encounters such as inferior quality, cost increase, including lateness. Contractors are more accepting of threats that are incorporated in contracts than of additional types of threats that materialize during the project (Hatami and Behsan, 2012). Abbasnejad and Moud (2013) argued that most projects suffer from delays, leading to severe problems for contractors, and that these problems are unbearable and terribly affect contractor's performance, which vary among nations (Proverbs, 1998). Rateb et al, (2014) examined factors affecting contractors‟ performance on public construction projects. In this study, contractors, advisers, and owners decided on the most important factors affecting contractor. First among these important performance factors are contractors‟ financial difficulties, shortage of manpower, and change orders. The results agree with Xiao and Proverbs (2003), research results on contractor performance in Japan, the UK, and the USA.

Dainty *et al.* (2002) in Cooke-Davis (2001) declare that project management competence represents only one of many criteria upon which project performance is contingent. It is also arguably the most significant as it is people who deliver projects, and not processes and systems. According to Pongpeng and Liston (2003), problems such as schedule delays, budget overruns, low quality work, as well as a large number of claims and litigation result largely from not selecting the best contractor to construct. Santoso *et al.* (2003) studied risk in high-rise building construction in Jakarta and determined that management and design are the most significant factors affecting construction performance. The study by Ponpeng and Liston (2003) of contractor ability criteria determined, inter alia, a contractors quality management system is an important factor affecting a contractor's delivery of a project within schedule.

In the United Kingdom, according to Yakubu and Sun (2009), design change(s) is the most influential factor inhibiting the delivery of projects on time in the United Kingdom construction industry from the perspective of the contractor and the consultants. Walker and Shen (2002) declare that a delay in design documentation was ranked the second most influencing factor that negatively affects project delivery. Time should not be wasted in the process of issuing revised drawings.

2.5. Africa's prospective on Contractor's performance

Most African countries on local contractor's performance have similar system and regulations regarding tenders and bidding process. Local contractors in Africa, depend on the existence of business opportunities in the construction industry. These contractors only survive if they are able to win tenders or are subcontracted to undertake a job in their particular area of expertise from time to time. Approaches used by contractors to remain in business are through direct engagement by employer or buyer or through tendering and this is made possible only if they participate in bids from time to time in a competitive bidding or tendering process (Joshua, 2010). CIDB (2013) found that in Africa public sector projects have requirements to give confidence local economic development and to obligate contractors to stick to various policy and regulatory conditions such as local employment, socio-economic targets like training and skills development. World Bank (2010) indicated that in Africa, there is a lot of effort made towards tenders and a negative outcome really dampens the morale of bidding organizations. Reasons given for disqualifying some bids are not convincing to bidders that have lost the opportunity. Generally, these bids are affected by political influence which shape the way such exercises are conducted as they favor foreign contractors.

2.5.1. Contractor performance in Nigeria

Ngomi (2017) quote Adams (1997) who identified that constraints on original contractors' in Nigeria being the following: uncertainties in supplies and costs of materials, obtaining temporary payment, procuring work, admission to assets, negotiate difference payment, admission to plant and equipment, unsuitable contract conditions, maintaining plant and equipment, resolving contract disputes, reaching contract deadlines, design changes, incomplete contract documents, transporting materials and tools materials control on location, providing reliable tenders, communicating with customer/representatives, shortages of skilled labour, public picture accounting of monetary management, inadequate supervision by client, project planning and place management, technical know-how, obligation to construction, company organization, personnel management, providing quality workmanship, dishonesty, changes in government and economy, prejudice against original contractors' competence, stealing and scam by own employees, double taxation, and breach of contract by public clients. Omoregie & Radford (2006) revealed the following delay factors: poor contract management, financing and payment of completed works, changes in site conditions, shortages of materials, contractor's financial difficulties, client's income problem, architect's incomplete drawing, subcontractor's slow mobilization, equipment breakdown and maintenance problem, suppliers late delivery of ordered materials, incomplete structural drawings, contractor's planning and scheduling problems, price escalation and subcontractor's financial difficulties, contractors' difficulties in receiving payments from public agencies, inadequate public agencies' budgets, improper payment to contractor for completed work, problems in planning, unrealistic time estimation, frequent changes in material and design, and noncompliance with the contract conditions.

2.5.2. Contractor performance in Ghana

Fugar &Agyakwah-Baah (2010) quoted by Ngomi (2017), found the subsequent to be causes of delays in building construction projects in Ghana: delay in honoring payment certificates, underestimation of cost of projects, underestimation of complexity of projects, complicatedness in accessing bank credit, poor supervision, underestimation of a while for conclusion by contractors, scarcity of materials, poor qualified management, fluctuation of costs , poor site management, construction methods, stoppage in instructions from consultants, late deliveries of materials, lack of program of works, delay by sub-contractors, poor design, breakdown of kit , client initiated variations, obtaining permit from municipality, inadequate communication between parties, essential variations, shortage of skilled labor, legal disputes, unfavorable site conditions, foundation conditions encountered on site, discrepancy between design specification and code , inclemency conditions, mistakes with soil investigations, unskilled equipment operators, accidents during construction, shortage of unskilled labor, and public holidays. Frimpong, Oluwoye & Crawford (2003) studied factors that cause cost overruns in construction of ground water projects in Ghana. Frimpong explained that the contractors and consultants mentioned monthly payments difficulties because the foremost vital cost overruns factor, while owners ranked poor contractor management because the foremost vital factor. Frimpong, et al. (2003) added that despite some difference in viewpoints among the three groups surveyed, there is a high degree of agreement among them with respect to their ranking of the factors. The three groups felt that the main factors which will cause excessive groundwater project cost overruns in developing countries are poor contractor management, monthly payment difficulties, material procurement, poor technical performances, and escalation of material prices.

2.5.3. Contractor performance in Swaziland

Thwala & Mvubu (2008) identified the following factors as constraints to the success of local contractors in Swaziland: lack of business management skills, lack of financial management skills, exorbitant interest rates from banks, compulsory business management services, risks involved in housing industry, lack of access to finance both during preconstruction and construction, bad relationships with suppliers, late payments of completed work by the client, lack

of collateral, bidding for projects beyond contractor technical or financial capacity, lack of skills to properly program projects resources in monthly segments for healthy cash flow, inability to prepare documents for timely payment, misunderstanding of terms of contract and inability to use applicable contractual instruments to demand performance by client.

2.5.4. Contractor performance in Malawi

Kululanga (2012) explained that training (to teach writing and reading skills, financial management and business management skills), business management skills (to ensure sustainable business enterprises), financial management (to manage cash flow, among other things), unethical manners (to combat collusion, professional pricing the same job for more than one bidder, among others) and information technology(to make specific software available such as those required to aid preparation of works programs) were areas identified to be amongst constraints and challenges faced by local contractors in Malawi. According to National Construction Industry of Council of Malawi (2012) the causes of delay in traditional contracts were due to owner interference, inexperienced contractor, and improper payments of completed work, labor productivity, poor site management, slow deciding, construction methods and improper planning subcontractors.

2.5.5. Contractor Performance in Zambia

According to Coyle et al. (1996) quoted by Ngomi, the Zambian construction industry has undergone some change due to the changing nature of the marketplace, globalization of the economy and markets, the upsurge of technology including information technology (IT), the changes in government policy including privatization and liberalization and strategic changes in supply chains. Nsabika (2002) explained that the changing nature of the marketplace with the liberalization and privatization programs which were put into effect in the early 1990s almost complete, construction customers not need to stay loyal to their former sister companies under the Zambia Industrial and Mining Corporation (ZIMCO) group of companies, the economic Development Corporation (INDECO) group of companies or the Zambia Consolidated Copper Mines (ZCCM). INDECO and ZCCM jointly formed ZIMCO, which until its unbundling and subsequent privatization of the individual corporations was the second largest corporation in Africa. Nsabika (2002) added that the changes have a fundamental implication on the way ZIMCO construction contractors used to conduct business. The privatized companies have become increasingly more knowledgeable about construction products and have become much more demanding about price and quality. Quality and delivery are and will remain the most critical factors in the market. Moreover, they need a free market from which to settle on contractors from. Similarly, Kangwa (2012) also eluded that the need for developing countries government to make financial provisions fixable to local companies so that they can build the local contractors in project engagement.

3. Study methodology

The study employed a descriptive research approach to investigate the relationships between construction delivery, lead time management, and contractor performance among Local Road Construction Contractors in Lusaka, Zambia. Utilizing a survey design, data was collected from staff at 54 contractors and various government agencies, focusing on the correlation between construction delivery and project quality, as well as timely completion. The research population included 3,205 contractors registered in Lusaka, with a significant concentration of category R contractors engaged in general roads and earthworks. A sample size of 226 respondents was determined using Yamane's formula, and purposive and stratified sampling techniques were used to select participants. Data collection involved structured questionnaires, which were pre-tested for reliability and validity. The analysis utilized descriptive statistics through SPSS, ensuring ethical considerations were met throughout the research process.

4. Data presentation and analysis

4.1. Construction deliveries used by the Local Road construction contractors in Zambia.

Table 1 Views on Qualifications and competence of Local Road Construction Contractors by Agencies

Factor	**Response %**					**Results Interpretation**
	Scale					
	SD	**D**	**UC**	**A**	**SA**	

Design-Build.	0	30	0	70	0	Results on whether local road construction contractors use Design-build delivery showed that the majority of the respondents 70.0% agreed and 30% of the respondents strongly disagree.
Construction Manager at Risk (CMAR)	0	0	0	40	60	Results on whether local road construction contractors in Zambia uses construction manager at risk showed that the majority of the respondents 60.0% strongly agreed, and 40.0% of the respondents agreed.
Integrated Project Delivery (IPD)	0	0		20	80	When asked whether the local road construction contractors use integrated project delivery, 80.0% of the respondents strongly agreed and 20.0%% agreed.
Job Order Contracting (JOC)	0	70	0	30	0	Job order contracting was supported by 30% of the respondents while 70.0% disagreed that job order contracting is being used by local road construction contractors.
Public-Private Partnerships (PPP)	0	60	0	20	20	Public partnership had 20.0%% of the respondents strongly agreeing to use (PPP), 20% of the respondents indicated agreed to have used PPP while 60% disagreed.

4.2. Lead time Management used by local road construction contractors

Table 2 Lead time management used by local construction contractors

Factor	**Response %**					**Results Interpretation**
	Scale					
	SD	**D**	**UC**	**A**	**SA**	
Customer lead time.	0	10	0	60	30	Results on whether local road construction contractors use customer lead time showed that the majority of the respondents 60.0% agreed and 30% of the respondents strongly disagree while 10% disagreed.
Material lead time	1	19	0	20	60	60.0% of the respondents strongly agreed to have used material lead time and 20.0% agreed. 19% of them disagreed have used material lead time while 1% of the respondents strongly disagreed.
Production lead time	0	0		10	90	Production lead time was supported by 80.0% who strongly agreed have used it and 20.0% agreed only to have used it.

4.3. The relationship between construction delivery and lead time management on the quality of work

4.3.1. Relationship between Construction Delivery and the Quality of Work done by the Local Road Construction Contractors in Lusaka

The following hypothesis was tested:

- H_0: There is no significant relationship between construction delivery and the quality of work done by the Local Road Contractors.
- H_1: There is significant relationship between construction delivery and the quality of work done by the Local Road Contractors. The result in the table below (4-3) indicates a negative relationship (r = -0.148) exist between construction delivery and quality of work done by Local Road Contractors. However, at 5% level of significant, the H_0 was weak indicating a negative (r-0.148) this shows there was slightly significant but not significant relationship. Therefore, there is a weak relationship between construction delivery and quality of work done by Local Road Construction Contractors but not statically significant because, p=0.378.

Table 3 Significant relationship between construction delivery and quality of work

		Construction delivery	**Quality of work done by Local Road Contractors**
Quality of Work done by Local Road Contractors	Pearson Correlation	1	-0.148
	p-value		0.378
	N	54	54

Source: Author field data, 2025

4.3.2. The relationship between Lead Time Management and the Quality of Work done by the Local Road Contractors

The following hypothesis was tested:

- H_0: There is no a significant relationship between lead time management and the quality of work done by the Local Road Contractors.
- H_1: There is significant relationship between lead time management and the quality of work done by the Local Road Contractors.

Using bivariate analysis – Pearson's, the following are the results

Table 4 Significant relationship between lead time management and quality of work

		Quality of work done by the local road contractors	**Lead time management**
Lead time management	Pearson Correlation	1	0.420**
	P-value		0.008
	N	54	54

**. Correlation is significant at the 0.01 level (2-tailed). Source: Author field data, 2025

The results as tabulated in table 4 indicates that there is a positive relationship (r=0.420) between lead time management practices and the quality of work done by the Local Road Construction Contractors at 1% level of significant. This indicates that there is a relationship between lead time management practices and the quality of work done by the Local Road Construction Contractors were the p-value was (p=0.008 ;< 0.01). Therefore, there is a significant relationship between lead time and the quality of work done by the local road contractors.

4.4. Connection between construction delivery and lead time management on the timely completion of projects

4.4.1. Significant relationship between Construction Delivery and Timely Completion of Projects by the Local Road Construction Contractors in Lusaka

The following hypotheses were tested:

- H_0: There is no significant relationship between construction delivery and the timely completion of project by the Local Road Construction Contractors in Lusaka.
- H_1: There is significant relationship between construction delivery and the timely completion of projects by the Local Road Construction Contractors in Lusaka.

Table 4 Significant relationship between construction delivery and timely completion

		Construction delivery	**Timely completion of project by Local Road Contractors**
Timely completion of projects	Pearson Correlation	1	0.43
	p-value		0.09
	N	54	54

The results as tabulated in table 4-5 indicates that there is a positive relationship (r=0.43) between construction delivery and timely completion of project by the Local Road Construction Contractors at 1% level of significant. This indicates that there is a relationship between construction delivery and timely completion of project by Local Road Construction Contractors were the p-value was (p=0.009 ;< 0.01). Therefore, there is a significant relationship between construction delivery and timely completion of project by the Local Road Contractors.

4.4.2. Relationship between Lead Time Management and the Timely Completion of Projects by the Local Road Construction Contractors in Lusaka

The following hypothesis was tested:

- H_0: There is no significant relationship between lead time management and the timely completion of projects by the Local Road Construction Contractors in Lusaka**.**
- H_1: There is a significant relationship between lead time management and the timely completion of projects by the Local Road Construction Contractors in Lusaka.

Using bivariate analysis – Pearson's, the following are the results.

Table 5 Significant relationship between lead time management and the timely completion projects

		Timely completion of projects by the Local Road Construction Contractors in Lusaka	**Lead time management**
Lead time management	Pearson Correlation	1	-0.098
	Sig. (2-tailed)		0.547
	N	54	54

Source: Author field data, 2025

The results as tabulated in table 4-6 indicates that there is a negative relationship (r=-0.098) between lead time management and the timely completion of projects by the Local Road Construction Contractors in Lusaka. However, the relationship was not statistically significant at 5% level of significant (p=0.547,>0.01). Therefore, the researcher failed to reject the H_0 and H_1 was accepted, there was a relationship between Lead time management and the timely completion of projects by the Local Road Construction Contractors in Lusaka but not statistically significant.

4.4.3. Regression Analysis Results

The study conducted a multiple regression analysis to determine the relationship between independent variables and the dependent variable. The reasons for using multiple regression analysis are because it helps to determine the correlation between two or more variables.

4.4.4. Coefficient of Determination

The coefficient of determination clarifies the extent to which changes in the dependent variable can be explained by the change in the independent variables. The two independent variables studied were construction delivery and lead time.

Table 6 Model Summary, R square

Model	**R**	**R Square**	**Adjusted**	**R Std. Error of the**
			Square	**Estimate**
1	0.784[a]	0.585	0.575	0.542

Source: Author field data, 2025

The R square was 0.585, and the adjusted R square was 0.575. Since the Adjusted R square was 0.575 this indicates that there was evidence that the data used in analyzing the relationship between the independent variables and dependent were closely related as it above 5% level of significant.

Table 7 ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	14.243	3	3.561	5.354	0.000b
1 Residual	9.532	6	0.268		
Total	23.775	9			

Source: Author field data, 2025

Analysis of Variance (ANOVA) was used to establish whether there was relationship between the independent variables and dependent variable. Therefore (p-value) 0.0001 in the study which was less than 0.05 in the model is statistically significant in predicting how the independent variables construction delivery and lead time and dependent variables are related. The F test critical was at 5% level of significance. Therefore, the F test calculated from the ANOVA in the table above was 5.354, which is greater than the F critical (0.268). This shows that the overall model was significant.

Table 8 Regression Analysis of the determinants of construction delivery by Local Road Construction Contractors - Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	0.149	0.743		0.219	0.814
Construction delivery	0.462	0.21	0.453	0.251	0.154
Lead time	0.265	0.168	0.169	1.327	0.182
Timely completion of projects	0.057	0.25	0033	0.283	0.756
Quality of works.	0.634	0.118	0.695	5.949	0.001

Source: Author field data, 2025

The regression model is as follows:

$$Y= \beta 0+ \beta 1X1+\beta 2X2+ \beta 3X3+ \beta 4X4+\alpha$$

Where:
Y is the dependent variable (cost of works),
β0 is the regression coefficient/constant/Y-intercept, β1, β2, β3, β4 are the slopes of the regression equation, X1 is the Lead time
X2 is the Timely completion of projects X3 is the quality of work done
X4 is the construction delivery
α is an error term at 95% confidence level. The regression was:

$$Y = 0.149 + 0.265X1 + 0.462X2 + 0.057X3 + 0.634X4$$

The above equation established that taking all factors into account (construction delivery, lead time, timely completion of projects and quality of work done) was constant at zero, construction delivery would be 0.149. The findings further indicate that taking all other independent variables constant, a unit increase in lead time to a 0.462, results in increase construction delivery. The overall regression model was significant thus the p–value was 0.148 which was more than 0.05. It was also indicated in the study that a unit increase in quality of work done by Local Road Construction Contractors 0.634 has an effect increase in construction delivery. The p-value was 0.001 and thus the relationship was significant. The result from the study indicates that quality of work done by Local Road Contractors, contributed to the construction delivery. The study conducted a multiple regression analysis so as to determine the influence of the independent variables on construction delivery. The reasons for using multiple regression analysis is that it helps to determine the correlation between two or more variables. The two factors that showed significant effect on construction delivery are timely completion of projects with p=0.168 timely completion of projects with the p-value of 0.25 ($p< 0.05$).

Furthermore, the Pearson Correlation Coefficient computed and tested at 1% significance level indicated that there is a strong positive relationship (r=0.716) between quality of work done Local Road Construction Contractors and construction delivery. The relationship was statistically significant at 1% level (p=0.000, <0.01).

5. Discussion

The study found that the Design-Build (DB) method is the predominant construction delivery approach among local road contractors, with 70% of respondents endorsing its effectiveness in enhancing efficiency and reducing project timelines. Similarly, 60% of participants supported the Construction Manager at Risk (CMAR) method, which is recognized for managing risks while ensuring quality and cost efficiency. Integrated Project Delivery (IPD) received strong approval from 80% of respondents, highlighting its role in fostering collaboration and innovation. Conversely, Job Order Contracting (JOC) and Public-Private Partnerships (PPP) had limited adoption due to financial and governance challenges. In terms of lead time management, Customer Lead Time was prioritized by 60% of contractors, indicating a focus on timely delivery, while Material Lead Time and Production Lead Time were also highly valued, with 60% and 90% support, respectively. These findings underscore the importance of effective lead time management in enhancing project efficiency and client satisfaction.

The research established that effective construction delivery practices significantly enhance the quality of work performed by local contractors, with 73% of respondents affirming this relationship. However, a regression analysis revealed a weak negative correlation between construction delivery and work quality, suggesting that factors such as contractor skills, experience, and financial resources are also critical in determining quality outcomes. Conversely, a significant positive correlation was found between lead time management and work quality, indicating that contractors who effectively manage lead times are likely to deliver higher-quality projects. This suggests that while construction delivery methods are important, equipping contractors with the necessary skills and resources is essential for improving work quality in infrastructure projects.

The findings indicated that effective construction delivery practices positively influence the timely completion of projects, with most respondents agreeing that such practices enhance project efficiency and reduce costs. Regression analysis confirmed a significant correlation between construction delivery and contractor performance regarding timely completion. However, challenges such as inadequate technical expertise and financial constraints hinder some local contractors' ability to deliver effectively. Additionally, the study highlighted that good lead time management is crucial for timely project completion, with 61% of respondents acknowledging its role in reducing delays. Poor lead time management was identified as a major contributor to project delays and cost overruns, emphasizing the need for improved access to materials and financial resources to enhance project delivery efficiency.

6. Conclusion

The study conclusions were as follows:

- The study identified that local road contractors predominantly use DB, CMAR, and IPD delivery methods, which enhance project efficiency and risk management. While these methods are widely accepted, the low adoption of PPP and JOC indicates significant financial and legal challenges that need to be overcome. Effective lead time management practices, particularly in Production Lead Time, were emphasized as vital for minimizing delays and improving project execution, necessitating better procurement strategies.
- Research indicated that good construction delivery practices positively impact work quality, but a weak negative correlation suggests that other factors like contractor skills and financial capacity are also important. The study found a significant positive relationship between lead time management and quality of work, emphasizing the need for structured planning and timely material acquisition. These findings highlight the necessity of investing in contractor training and resources to enhance overall construction quality.
- The findings confirmed that effective construction delivery methods directly influence timely project completion, with structured approaches leading to improved efficiency and adherence to deadlines. Despite this, some contractors face challenges due to a lack of technical expertise and financial resources, which hinder optimal delivery method implementation. Moreover, effective lead time management was shown to significantly reduce delays, indicating that addressing financial constraints and improving supplier relationships are crucial for enhancing project completion rates.

Recommendations

Based on the research objectives, the following are some of the recommendations:

- Local road construction contractors should be encouraged to adopt more structured and efficient delivery methods such as Design-Build (DB) and Integrated Project Delivery (IPD) to enhance project efficiency and reduce timelines.
- The government and construction regulatory bodies should create policies that promote the adoption of Public-Private Partnerships (PPP) by addressing financial, governance, and legal constraints that hinder their implementation.
- Contractors should receive training on the benefits and implementation of alternative construction delivery methods, such as Job Order Contracting (JOC), to improve project flexibility and efficiency.
- Contractors should implement strategic planning tools and digital management systems to optimize lead time management and reduce delays caused by supply chain disruptions.
- Construction firms should establish stronger supplier partnerships and maintain inventory buffers for critical materials to minimize material shortages and procurement lead time.
- Training programs on lean construction principles should be introduced to help contractors improve production lead time, reduce waste, and enhance overall efficiency.
- Local contractors should be provided with capacity-building programs focusing on skills development and technical expertise to ensure that construction delivery methods translate into high-quality work.

Recommendations for future research

- Future researchers should investigate the effectiveness of lesser-adopted construction delivery methods, such as Job Order Contracting (JOC) and Public-Private Partnerships (PPP), in developing countries.
- Studies should assess the impact of policy changes and financial support mechanisms on the adoption of modern construction delivery methods by local contractors.
- Future research should explore innovative technologies, such as artificial intelligence (AI) and blockchain, in optimizing lead time management in construction projects.
- There is a need to conduct comparative studies on lead time management strategies in different regions to identify best practices that can be adapted to local contexts.
- Researchers should examine the role of contractor training programs and skill development initiatives in improving the quality of work under different construction delivery methods.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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