

Assessment of the Effect of Road Infrastructure Development on Market Accessibility among Manufacturing MSMEs In Lusaka Zambia



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ABSTRACT: The aim of this study was to assess the effect of road infrastructure development on market accessibility among manufacturing Micro, Small and Medium-sized Enterprises (MSMEs) in Lusaka, Zambia. Infrastructure development is a critical factor in promoting economic growth and development, particularly among Micro, Small and Medium Enterprises (MSME'S). According to the World Bank (2019), infrastructure development can have a significant effect on the growth and competitiveness of MSMEs. Despite the importance of road infrastructure development for the growth and competitiveness of manufacturing MSMEs in Zambia, there is a significant gap in the existing literature on the effect of infrastructure development on market accessibility among manufacturing MSMEs. Specific objectives included examining the effect of road infrastructure on market accessibility, evaluating key infrastructure factors affecting market access, and to determine the strategies that can be implemented to overcome accessibility challenges faced by MSMEs. The study utilized a survey of 240 respondents from various MSMEs in Lusaka and 22 participants who were purposively selected. The study adopted a mixed methods approach combining both qualitative and quantitative. Key findings revealed that improved road infrastructure positively influences market accessibility by reducing transportation costs, enhancing delivery times, and opening new market opportunities. However, challenges such as poor road quality, traffic congestion, and high transportation costs persist. The Chi-Square test results indicated a significant association between the quality of road infrastructure and market accessibility perceptions among MSMEs. Several infrastructure projects, including the, great East Road Rehabilitation, Great North Road Expansion, and Tokyo Road (Ring Road), were highlighted for their positive impact on market accessibility. Thus, the study concluded that continued investment in road infrastructure is crucial for the growth and development of MSMEs, and addressing the identified challenges can further enhance market access and contribute to regional economic development. The findings underscore the need for continuous investment in road infrastructure to support MSMEs and foster economic growth.

KEYWORDS: Road infrastructure development, market accessibility, Manufacturing MSMEs, transportation costs, delivery times.

I. INTRODUCTION

Infrastructure development is crucial for economic growth, particularly for Micro, Small, and Medium-Sized Enterprises (MSMEs), which are vital to Zambia's economy, contributing to employment, income generation, and poverty reduction (Kiggundu, 2022; CSO, 2020). However, MSMEs face challenges such as limited market access, high transportation costs, and poor communication infrastructure, hindering their competitiveness (World Bank, 2019). Inadequate roads and logistical inefficiencies increase operational costs, while weak communication networks restrict access to market intelligence, stifling growth.

Zambia's road infrastructure has evolved amid economic shifts and policy changes. Post-independence, copper revenues funded large-scale road projects, but economic decline in the 1970s led to neglect, leaving only 20% of major roads in good condition by 1995 (World Bank, 2010). To address this, the government launched rehabilitation programs in the 2000s, including Link Zambia 8000 and Pave Zambia 2000, aimed at improving connectivity (Ngulube, 2021). However, funding shortfalls led to rising debts, reaching ZMW 4.24 billion in 2016 (NRFA Report, 2016), highlighting the need for Public-Private Partnerships (PPPs).

Despite challenges, infrastructure investments have spurred growth. The Nacala Road Corridor, for instance, boosted GDP by 21% in adjacent regions (Ngulube, 2021). Yet, Zambia's road projects prioritize connectivity over direct industrial benefits, unlike China or Brazil. To sustain progress, Zambia must adopt long-term maintenance strategies and alternative financing models like PPPs to avoid recurring deterioration.

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This study examines how infrastructure development enhances market access for manufacturing SMEs, offering insights for policies supporting MSME growth. Addressing infrastructure gaps remains key to unlocking Zambia's economic potential.

II. LITERATURE REVIEW

Infrastructure development plays a crucial role in the success of Micro, Small, and Medium Enterprises (MSMEs), particularly in Zambia, where transportation and digital infrastructure deficiencies hinder business growth. Studies by Beck et al. (2016), Bergkvist and Qiang Zhou (2019), and Sohrabpour et al. (2020) highlight that efficient road networks reduce transport costs and expand market access—critical for Zambia's landlocked economy. However, poor road conditions increase operational expenses, limiting MSME competitiveness. Additionally, while digital connectivity is essential for e-commerce and communication (Bergkvist & Qiang Zhou, 2019; Esin et al., 2016), Zambia's unreliable internet infrastructure restricts MSMEs from fully leveraging digital platforms.

Infrastructure financing remains a major challenge, with high costs and long payback periods deterring private investment (Adenikinju, 2005; World Bank, 2014). Calderón and Servén (2004) note that investors prefer regions with developed infrastructure, but in Zambia, businesses often resort to self-provision—such as private power generation—increasing costs and reducing profitability (Kimuyu & Kayizzi-Mugerwa, 1998; Lee & Anas, 1991). This issue extends to foreign direct investment, as inadequate infrastructure discourages potential investors (Azémar & Desbordes, 2009; Dupasquier & Osakwe, 2006).

Empirical evidence shows that infrastructure improvements boost productivity and economic growth. Hulten, Bennathan, and Srinivasan (2006) found that infrastructure expansion accounted for nearly half of India's manufacturing productivity growth, while Calderón and Servén (2004) demonstrated its role in reducing income inequality. However, Zambia's infrastructure gaps—particularly in roads and electricity—increase production costs (Adenikinju, 2005). Social infrastructure also impacts MSME performance, with deficiencies undermining business efficiency (Kunda, 2021; Morley & Perdakis, 2000). Musanda (2020) notes that while Zambia's road density has improved, rising traffic accidents highlight unintended consequences of rapid infrastructure development.

Despite these insights, gaps remain in understanding Zambia's MSME-specific infrastructure challenges. Existing studies often rely on macroeconomic models (Calderón & Servén, 2004) or secondary data (Musanda, 2020), overlooking firm-level realities. This study addresses these gaps by using primary data to analyze how infrastructure constraints affect Zambian MSMEs, their coping strategies, and policy solutions for sustainable growth. By focusing on firm-level experiences, the research provides actionable recommendations to enhance infrastructure support for MSMEs, fostering broader economic development.

III. RESEARCH METHODOLOGY

3.1 Research Design

The study employed a mixed-methods research design combining quantitative surveys and qualitative interviews to assess the impact of road infrastructure on MSME market accessibility. This approach enabled both statistical analysis of measurable outcomes and in-depth exploration of contextual factors influencing business operations. The design was particularly suitable for capturing both breadth of experiences across MSMEs and depth of understanding about infrastructure challenges (Creswell, 2014; Fleming, 2011).

3.2 Research Approach

A pragmatic research approach was adopted, allowing for the integration of both quantitative and qualitative methodologies to address the study's objectives. This approach prioritized practical problem-solving over theoretical debates, aligning with the study's focus on real-world infrastructure challenges faced by Zambian MSMEs (Maxwell, 2016; Thomas, 2015). The dual-method implementation provided complementary datasets that enhanced the robustness of findings (Swanson, 2015).

3.3 Sample Size and Selection

The study targeted MSMEs in Lusaka district, with a quantitative sample of 278 respondents determined through Cochran's formula for 95% confidence level and 5% margin of error (Bartlett et al., 2001). Qualitative sampling involved 40 MSMEs selected through maximum variation purposive sampling to capture diverse business experiences (Patton, 2002). The stratified random sampling technique for quantitative data ensured representation across different MSME categories, while purposive sampling for qualitative data targeted information-rich cases (Cresswell, 2004; Creswell & Poth, 2018).

3.4 Data Collection

Primary data was collected through structured questionnaires (quantitative) and in-depth interviews (qualitative) with MSME owners and managers. The quantitative survey captured measurable indicators of infrastructure impact, while qualitative

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interviews explored experiential dimensions of market accessibility challenges. Data collection occurred over an eight-week period to ensure comprehensive coverage of seasonal business variations (Mugenda & Mugenda, 2003).

3.5 Data Collection Tools

The study utilized two principal instruments: a structured questionnaire with closed and open-ended questions for quantitative data, and a semi-structured interview guide for qualitative data. The questionnaire employed Likert-scale items and categorical response options to facilitate statistical analysis, while the interview guide featured open-ended probes to elicit detailed narratives (Rahi, 2018). Both instruments underwent pilot testing and refinement to ensure validity and reliability (Kotari, 2005).

3.6 Data Analysis

Quantitative data was analyzed using SPSS (v26) and Excel, employing descriptive statistics (frequencies, percentages) and inferential tests at 95% confidence level (Saunders & Lewis, 2012). Qualitative data underwent thematic analysis using NVivo software, following a rigorous process of transcription, coding, and pattern identification (Mugenda & Mugenda, 2003). The mixed-methods analysis enabled both verification of statistical findings through qualitative evidence and enrichment of numerical data with contextual explanations (Maxwell, 2016).

III. RESULTS

3.1 Characteristics of the Sample

The majority of respondents were male (66.2%), indicating significant gender disparity in business ownership/management. Most entrepreneurs fell within the 26-30 age group (32.1%), suggesting a relatively young business population. Education levels were moderate, with 42.9% holding certificates and 24.6% diplomas. Micro-enterprises dominated the sample (50%), followed by small (35.4%) and medium (14.6%) enterprises, highlighting the prevalence of smaller businesses. The workforce composition showed sales staff (26.2%) and drivers (25.4%) as predominant roles, emphasizing the importance of logistics and sales operations. Most businesses were relatively new, with 51.7% operating for 3-5 years, which may influence their market experience and resilience.

3.2 Descriptive Statistics

3.2.1 The Effect of Road Infrastructure Development on Market Accessibility among Manufacturing MSMEs in Zambia

a) Quantitative Findings

Table 1: Effect on Market Accessibility

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Very Negatively	18	7.5	7.5	7.5
Negatively	81	33.8	33.8	41.2
No Effect	99	41.2	41.2	82.5
Positively	25	10.4	10.4	92.9
Very Positively	17	7.1	7.1	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

41.2% of respondents reported no effect on market accessibility, while 33.8% experienced negative impacts. Only 17.5% noted positive effects, suggesting infrastructure benefits remain unevenly distributed.

Table 2: Effect on Transportation Costs

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	137	57.1	57.1	57.1
No	56	23.3	23.3	80.4
No (additional)	47	19.6	19.6	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

A majority (57.1%) reported reduced transportation costs, demonstrating clear financial benefits. However, 42.9% saw no improvement, indicating variable impacts across different locations.

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Table 3: Effect on Delivery Times

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes Increased	123	51.2	51.2	51.2
No Change	78	32.5	32.5	83.8
No Decreased	39	16.2	16.2	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

51.2% achieved faster deliveries, showing improved logistical efficiency. Yet 32.5% reported no change, revealing gaps in infrastructure implementation.

Table 4: Access to New Markets

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	103	42.9	42.9	42.9
No	120	50	50	92.9
Not Applicable	17	7.1	7.1	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

42.9% gained access to new markets, proving infrastructure's expansion potential. However, half of respondents saw no improvement, suggesting coverage limitations.

b) Qualitative Perspectives on Road Infrastructure's Impact on Manufacturing MSMEs

Lusaka's road infrastructure presents a mixed picture, with notable improvements in some areas alongside persistent challenges. While central business districts benefit from well-maintained roads, outskirts struggle with potholes and poor drainage. "The government has made commendable efforts," noted one participant, "but many areas still need urgent attention." Another emphasized the stark contrast: "In the CBD, roads are good, but conditions worsen drastically in outlying areas."

Improved infrastructure has significantly enhanced market access for businesses. Key projects like the Lusaka-Ndola Dual Carriageway have cut travel times by 25%, while rehabilitated urban roads (e.g., Tokyo Express, Mungwi Road) streamline deliveries. "The Lusaka-Kitwe route transformed our cross-border trade," shared a business owner. Ring roads and flyovers, such as those at Arcades and Makeni, alleviate congestion, with one participant noting: "Flyovers reduced bottlenecks, helping us meet tight deadlines."

Road quality directly impacts operations. Smooth roads lower costs and boost reliability, whereas poor conditions increase wear-and-tear and delays. "Good roads mean fewer breakdowns and timely deliveries," explained a manager. Conversely, another lamented: "Potholes spike fuel costs and damage goods." Despite progress, uneven maintenance and traffic bottlenecks persist, underscoring the need for sustained investment to fully unlock MSMEs' market potential.

Table 5: Effect of Maintenance Activities

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Positively	133	55.4	55.4	55.4
No Effect	60	25	25	80.4
Negatively	47	19.6	19.6	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

55.4% benefited from maintenance activities, underscoring their importance. Yet 19.6% faced disruptions, indicating need for better-planned maintenance schedules.

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3.2.2 Challenges Faced By Manufacturing MSMEs in Zambia in Accessing Markets and Customers

a) Quantitative Findings

Table 6: Primary Challenges Faced by MSMEs in Accessing Markets and Customers

Challenge	Frequency	Percent	Valid Percent	Cumulative Percent
Poor road Infrastructure	117	48.8	48.8	48.8
High transportation costs	38	15.8	15.8	64.6
Traffic Congestion	22	9.2	9.2	73.8
Lack of reliable transport services	38	15.8	15.8	89.6
Loss of customers due to delivery delays	25	10.4	10.4	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

Poor road infrastructure emerged as the top challenge (48.8%), significantly impacting market access. Transportation costs and unreliable services tied as secondary concerns (15.8% each), compounding operational difficulties.

Table 7: MSME Opinions on Current State of Road Infrastructure

Rating	Frequency	Percent	Valid Percent	Cumulative Percent
Very Poor	18	7.5	7.5	7.5
Poor	43	17.9	17.9	25.4
Average	106	44.2	44.2	69.6
Good	52	21.7	21.7	91.2
Very Good	21	8.8	8.8	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

Most respondents gave neutral assessments (44.2% "Average"), while 30.5% rated roads positively. However, 25.4% reported poor conditions, indicating inconsistent infrastructure quality.

b) Qualitative Findings

Lusaka's MSMEs face persistent road network challenges that disrupt market access. Chronic traffic congestion during peak hours severely impacts deliveries, with one participant noting, "Peak-hour gridlock delays our shipments, while rainy-season flooding completely disrupts supply chains." Poor road conditions compound these issues—"Unpaved roads damage our vehicles and inflate transport costs," shared a business owner. Inadequate signage creates additional hurdles, increasing accident risks and delivery complications. "Missing road markers cause confusion and accidents, throwing off our schedules," explained a manager. Ongoing construction projects further destabilize logistics, as highlighted by one participant: "Unexpected roadwork's force costly detours, making reliable deliveries impossible." These interconnected challenges—congestion, poor maintenance, unclear signage, and disruptive construction—drive up operational costs while reducing efficiency. "Every delay strains customer relationships and eats into profits," lamented an entrepreneur. Without systemic improvements, Lusaka's MSMEs will continue struggling to maintain competitive market access amidst these infrastructure constraints.

3.2.3 Strategies to Overcome These Challenges Arising From a Poor Road Network

a) Quantitative Findings

Table 8: Strategies Implemented to Overcome Market Accessibility Challenges

Strategy	Frequency	Percent	Valid Percent	Cumulative Percent
Optimizing Delivery Routes	50	20.8	20.8	20.8
Investing in Reliable Vehicles	45	18.8	18.8	39.6
Forming Strategic Partnerships	40	16.7	16.7	56.3
Adopting Technology	35	14.6	14.6	70.8
Adjusting Operational Schedules	30	12.5	12.5	83.3
Enhancing Communication	20	8.3	8.3	91.6

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Diversifying Distribution Channels	10	4.2	4.2	95.8
Training and Development	5	2.1	2.1	97.9
Government and Community Engagement	5	2.1	2.1	100
Total	240	100	100	100

Source: Survey December 2024-January 2025

MSMEs primarily focus on logistical solutions, with route optimization (20.8%), vehicle investments (18.8%) and partnerships (16.7%) being top strategies. Less emphasis on training (2.1%) and distribution diversification (4.2%) reveals potential gaps in long-term capacity building.

b) Qualitative Findings

Lusaka's MSMEs are implementing innovative solutions to counter poor road conditions. Many businesses now optimize delivery routes and schedules, with one manager explaining: "We use alternative routes during off-peak hours and maintain flexible inventory to buffer against delays." This dual approach of strategic timing and stock management helps mitigate traffic congestion impacts.

Technology adoption is proving transformative, particularly GPS navigation systems. "Real-time GPS tracking helps our drivers avoid congestion and find efficient routes," shared an entrepreneur, noting significant improvements in delivery reliability. Simultaneously, companies are prioritizing vehicle maintenance, with one owner stating: "Regular fleet servicing is non-negotiable—it keeps our vehicles roadworthy despite terrible conditions."

Collaborative networks among businesses have emerged as another key strategy. "We share live traffic updates with neighboring companies to coordinate deliveries better," revealed a participant. These collective measures—route optimization, tech integration, vehicle upkeep, and information sharing—enable MSMEs to maintain operations despite infrastructure limitations.

IV. DISCUSSION

Lusaka's road infrastructure receives mixed ratings, with 37.5% of respondents describing it as "Average" and 25% as "Poor," though specific improvements are noted. Enhanced roads have significantly improved market accessibility through faster deliveries (25% time reduction on the Lusaka-Ndola route), lower transport costs, and expanded market opportunities (Stifel, 2011). These findings align with global studies: German MSMEs saw productivity gains from better roads (Petersen, 2019), Nigerian businesses benefited from reduced costs (Oluwole & Adebayo, 2021), and Indonesian toll roads boosted profitability despite environmental concerns (Setiawan et al., 2020). A Chi-Square test confirmed this link ($\chi^2=113.512$, $p<.05$), showing road quality directly impacts market access.

Key factors influencing accessibility include road condition (25% of respondents) and traffic congestion (30%). Poor roads increase vehicle wear and travel times, while congestion raises fuel costs—challenges corroborated by Fungo (2017). MSMEs adapt through route optimization, durable vehicles, and transport partnerships (World Bank, 1992). Major projects like the Great East Road rehabilitation boosted cross-border trade by 15%, enhancing regional integration (Fungo, 2017), while the climate-resilient Great North Road upgrade attracted investors (Salas-Olmedo et al., 2015). The Tokyo Ring Road reduced urban congestion, and the upcoming Lusaka-Ndola Dual Carriageway promises 25% faster travel with improved safety (Rombo et al., 2022). Despite progress, persistent issues—congestion, uneven road quality, and high transport costs—hinder MSMEs. Addressing these gaps remains critical to unlocking full economic potential (Olsson, 2009; Stifel, 2011).

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study demonstrates that road infrastructure development significantly improves market accessibility for Lusaka's manufacturing MSMEs through reduced transport costs (25% time savings on key routes), faster deliveries, and expanded market reach. Critical factors include road quality, congestion (reported by 30% of respondents), and connectivity. While projects like the Great East Road rehabilitation boosted cross-border trade by 15%, persistent challenges like poor road conditions and high costs hinder MSME growth, necessitating targeted interventions.

5.2 Recommendations

Key proposals include: regular road maintenance budgets; peripheral network upgrades; congestion-reduction measures (dedicated lanes, improved signage); and MSME transport subsidies. These measures would enhance reliability and reduce operational burdens.

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