Int. j. adv. multidisc. res. stud. 2026; 6(1):2827-2835

Received: 02-01-2026
Accepted: 09-02-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

To Analyze the Effectiveness of e-Commerce on the Operation Performance of SMEs in Hardware Retailer: A Case Study of Town Center, Lusaka

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DOI: https://doi.org/10.62225/2583049X.2026.6.1.5855

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Abstract

The aim of this study was to analyze the effectiveness of e-commerce on the operational performance of small and medium enterprises (SMEs) in the hardware retail sector at Town Center, Lusaka. The specific objectives were to examine how e-commerce adoption influences inventory management efficiency, assess the role of e-commerce in enhancing customer reach and sales growth, and determine the effect of e-commerce integration on operational cost reduction among hardware SMEs. A mixed-method research design was employed, combining quantitative and qualitative approaches, with a purposive sample of 50 respondents comprising hardware SME owners and managers. Data were analyzed using descriptive and inferential statistics in Stata, while qualitative insights were thematically interpreted to complement quantitative results.

The findings revealed that e-commerce adoption significantly improved inventory management efficiency by enabling real-time stock monitoring and reducing incidences of overstocking or stockouts. The study also found that e-commerce expanded customer reach beyond local markets, leading to higher sales volumes and enhanced business growth. Furthermore, e-commerce integration was associated with reduced operational costs through streamlined ordering, lower marketing expenditures, and optimized resource use.

The study concluded that e-commerce adoption enhances operational performance and competitiveness of hardware SMEs in Lusaka's Town Center. It was recommended that SMEs strengthen digital capacities through training, adopt hybrid sales models, and that government and private stakeholders provide policy support and affordable digital infrastructure to enhance e-commerce implementation across the SME sector.

Keywords: E-Commerce, SMEs, Inventory Management, Customer Reach, Operational Performance, Lusaka

1. Introduction

1.1 Background

E-commerce has revolutionized global business operations by offering new opportunities for marketing, sales, and customer engagement, enabling small and medium enterprises (SMEs) to enhance efficiency, reduce costs, and expand market reach (UNCTAD, 2020; OECD, 2021) [59, 46]. In Sub-Saharan Africa, increased internet penetration and mobile financial innovations such as M-Pesa and MTN Mobile Money have accelerated e-commerce adoption, although challenges like limited infrastructure, low digital literacy, and mistrust in online transactions persist (GSMA, 2022; Jack and Suri, 2014 [30]; Kende and Quast, 2020 [31]). In Zambia, SMEs are vital to economic growth, contributing approximately 70% of employment and 88% of total businesses (ZDA, 2020) [65], with government policies such as the National ICT Policy and E-Government Strategy supporting digital transformation (GRZ, 2019) [21]. However, hardware retailers in Lusaka's Town Centre have been slow to adopt e-commerce, continuing to depend on traditional business models that limit operational efficiency and customer reach (Chisala, 2019) [11]. Given the rising demand for construction materials and expanding digital access, e-commerce presents significant potential to enhance inventory control, reduce costs, and improve overall operational performance, yet its effectiveness among hardware SMEs in Town Centre remains underexplored, warranting this study (Musonda, 2021 [38]; World Bank, 2019).

1.2 Statement of the Problem

Although e-commerce has grown rapidly worldwide and is recognized for enhancing business efficiency, inventory management, and customer service (UNCTAD, 2020 [59]; OECD, 2021 [46]; World Bank, 2019), SMEs in developing countries, including Zambia, have been slow to adopt digital platforms due to limited digital skills, poor infrastructure, and low trust in online transactions (Kende and Quast, 2020 [31]; ZICTA, 2021). Hardware retailers in Lusaka's Town Centre largely rely on manual stock management and sales tracking, resulting in inefficiencies, higher operational costs, and constrained competitiveness (Chisala, 2019; Musonda, 2021) [11, 38]. Despite the recognized potential of e-commerce, empirical evidence on its operational impact in Zambia's hardware retail sector remains scarce, highlighting the need for this study to analyze how e-commerce adoption affects the operational performance of SMEs in this context (ZDA, 2020 [65]; GSMA, 2022).

1.3 General Objective

To analyze the effectiveness of e-commerce on the operation Performance of SMEs in hardware Retailer, with a specific focus on Town center Lusaka, using the TOE framework.

1.3.1 Specific objectives

1. To examine how e-commerce adoption influences inventory management efficiency among hardware SMEs in Town Center, Lusaka.
2. To assess the effectiveness of e-commerce in enhancing customer reach and sales growth for hardware SMEs in Town Center, Lusaka.
3. To determine the limitations of e-commerce integration on operational cost reduction for hardware SMEs in Town Center, Lusaka.

1.4 Theoretical Framework

This study is grounded in the **Technology–Organization–Environment (TOE) framework** (Tornatzky and Fleischer, 1990), which provides a holistic perspective on e-commerce adoption by SMEs in Lusaka's hardware retail sector. The TOE framework considers three key contexts: **technological**, including available digital tools and e-commerce platforms; **organizational**, encompassing firm size, resources, managerial support, and employee digital skills; and **environmental**, covering external pressures such as competition, customer demand, government regulations, and ICT infrastructure (Chong *et al*., 2009; Ifinedo, 2011; Scupola, 2009) [15, 29, 53]. By applying TOE, the study links e-commerce adoption (independent variable) to operational performance (dependent variable), measured through inventory management efficiency, customer reach and sales growth, and cost reduction. The framework is particularly suitable for SMEs in developing countries, as it accounts for internal readiness and external pressures influencing digital adoption (Oliveira and Martins, 2011 [49]; Baker, 2012). The technological context aligns with the study objective on inventory management, the environmental context corresponds to customer reach and sales growth, and the organizational context reflects operational cost reduction. Compared to individual-focused models like TAM (Davis, 1989) [16] or innovation-focused models like DOI (Rogers, 2003) [51], TOE provides a comprehensive lens to examine the multi-dimensional drivers and barriers of e-commerce adoption and its impact on SME performance, integrating internal capabilities with external environmental factors (ZICTA, 2021).

1.5 Significance of Study

This study is important as it provides empirical evidence on how e-commerce adoption affects the operational performance of SMEs in Zambia's hardware retail sector, a context that has received limited research despite SMEs' critical role in employment and economic growth (ZDA, 2020) [65]. By using the Technology–Organization–Environment (TOE) framework, the study offers practical insights for hardware retailers on leveraging digital tools to improve inventory management, reduce operational costs, and expand customer reach (Oliveira and Martins, 2011) [49]. The findings are also relevant for policymakers and institutions, including the Ministry of Commerce, Trade and Industry and ZICTA, in formulating strategies to support SME digitalization through enhanced ICT infrastructure, training, and policy interventions (ZICTA, 2021; OECD, 2021 [46]). Additionally, the research contributes to academic knowledge by adding a sector-specific case study on e-commerce in a developing country, thereby enriching global discussions on SME competitiveness and digital transformation in the retail sector (UNCTAD, 2020) [59].

2. Literature Review

2.1 Effects of e-commerce adoption influences inventory management efficiency among hardware SMEs

Chong *et al*. (2009) [15] found that efficient inventory management is critical for operational performance in hardware retail, minimizing stockouts and overstocking, and improving service levels. Similarly, Oliveira and Martins (2011) [49] and Christopher (2016) [12] reported that digital transformation through e-commerce enhances inventory visibility, demand forecasting, and process automation, while Mwila (2019) noted that implementation costs and managerial capabilities can limit immediate benefits. World Bank (2019) and UNCTAD (2020) [59] confirmed that integrated e-commerce systems improve turnover ratios and reduce lead times, though some SMEs experience transitional inefficiencies if process redesign is absent.

Empirical studies in Asia and Latin America show that SMEs using cloud-based inventory systems and ERP-e-commerce linkages experience 15–30% improvements in inventory turnover and reduced stock-taking errors (Hopstack, 2022; Market Data Forecast, 2025; LinkedIn Reports, 2025). OECD (2021) [46] and World Bank (2019) similarly found that digital adoption, coupled with logistics innovations, significantly lowers stockouts and improves fill rates, while Chong *et al*. (2009) [15] cautioned that wider market reach can temporarily increase demand variability if forecasting is inadequate.

In Africa, the Alliance for Trade Development (2024) and GSMA (2022) reported that SMEs leveraging digital platforms achieve better stock control and fewer stockouts, particularly when marketplaces or third-party logistics support integration. Jack and Suri (2014) [30] and Tembo (2024) [56] highlighted that infrastructure gaps, high logistics costs, and limited software availability constrain these benefits. Contrarily, Ken Research (2025) [32] found that South African SMEs with access to AI-enabled inventory analytics achieve substantial efficiency gains, illustrating the heterogeneity of outcomes across the continent.

In Zambia, Chisala (2019) [11] and Musonda (2021) [38] observed that hardware SMEs largely rely on manual systems, limiting inventory optimization, while Ngwira (2024) and Tembo (2024) [56] noted that adoption of basic e-commerce tools (WhatsApp catalogues, Facebook Marketplace) improves transactional records but does not fully integrate inventory management. M&J Consultants (2025) [37] and ZICTA (2021) highlighted the potential of nascent digital systems, although cash sensitivity, product heterogeneity, and infrastructure challenges remain significant barriers. The evidence underscores the need for integrated adoption, capacity building, and policy support to realize sustained inventory efficiency gains in Town Centre hardware SMEs.

2.2 Effectiveness of e-commerce in enhancing customer reach and sales growth for hardware SMEs

Tolstoy (2021) highlights that e-commerce transforms SME customer engagement and revenue generation, a view corroborated by Hassan (2023) and Soto-Acosta *et al*. (2015) [55], while Mwila (2019) notes that low digital literacy and infrastructural constraints limit these benefits in developing economies. Venkatesh *et al*. (2003) [61] and Davis (1989) [16] confirm that perceived usefulness and ease of use drive technology adoption, influencing the integration of digital marketing and CRM systems for sales growth. Hussain *et al*. (2022) add that supportive policies and ICT infrastructure are critical for SMEs to leverage these digital advantages effectively.

Globally, e-commerce adoption increases SME sales by enhancing market visibility, data-driven marketing, and cross-border trade opportunities (World Bank, 2019; UNCTAD, 2020 [59]; ClickPost, 2025 [13]). Soto-Acosta *et al*. (2015) [55] and Ortiz-Chávez *et al*. (2024) [50] found that SMEs with online platforms experience higher customer retention and export participation, though sectoral differences exist, with hardware SMEs lagging behind FMCG due to higher shipping costs and lower standardization (OECD, 2023). Diwan (2024) [17] supports this, noting that strategic digital capabilities like analytics and CRM are crucial for sustained competitive advantage.

In Africa, GSMA (2022) and Alliance for Trade Development (2024) report that online marketplaces and mobile money enhance SME market reach, customer retention, and revenue generation. Adewuyi (2022) [2] and Ken Research (2025) [32] similarly found that South African and Nigerian SMEs using e-commerce grow sales by 20–35%, while Mwiinga (2020) highlights that less digitally mature markets like Malawi and Zambia rely heavily on social commerce for incremental gains. ZICTA (2021) emphasizes that infrastructural and regulatory barriers constrain scalability and performance in these contexts.

Specifically, in Zambia, Mwila (2019) and Mwiinga (2020) indicate that social media marketing and mobile payment systems expand customer reach beyond Lusaka's central districts, while Hassan (2023) reports measurable increases in inquiries and conversions from basic e-commerce adoption. Ngwira (2024) and Bwalya (2020) [7] note that despite positive outcomes, most hardware SMEs operate at low digital sophistication, with limited integration of marketing, inventory, and delivery systems. GRZ (2023) [22] and ZDA (2020) [65] highlight government initiatives promoting digital adoption, yet empirical, sector-specific studies remain scarce, underscoring the need for localized evidence on e-commerce impacts on sales growth.

2.3 Limitations of E-commerce Integration on Operational Cost Reduction for Hardware SMEs

Sharma (2024) [54] highlights that e-commerce can reduce operational costs through digital inventory, online marketing, and electronic payments, a finding supported by OECD (2023) and Budhree (2017) [8], yet Soto-Acosta *et al*. (2015) [55] argue that high initial investment costs and maintenance expenses often offset these savings. Hussain *et al*. (2022) and UNCTAD (2021) [60] note that cybersecurity risks, technology adaptation, and lack of economies of scale limit SMEs' ability to achieve full cost efficiencies globally. Tolstoy (2021) also observes that continuous marketing and system updates are recurring financial burdens for SMEs operating online.

Globally, SMEs adopting e-commerce achieve efficiency gains through automation, D2C models, and reduced administrative overhead (Hopstack, 2022; OECD, 2023; Sharma, 2024 [54]), but high software licensing, logistics, and training costs remain barriers (Tolstoy, 2021; European Commission, 2023 [18]). Arinaitwe (2024) [5] and Market Data Forecast (2025) in Uganda and Latin America report moderate cost reduction due to transaction fees, internet costs, and underdeveloped delivery networks, demonstrating that operational savings are highly context-dependent. Budhree (2017) [8] and CNBC Africa (2025) [14] further emphasize that logistical complexity for bulky products, like hardware, diminishes potential efficiency gains.

In Africa, digital infrastructure, mobile money, and regional trade initiatives (AfCFTA) have facilitated e-commerce adoption among SMEs (GSMA, 2022; UNCTAD, 2020 [59]; CNBC Africa, 2025 [14]), yet persistent challenges such as unreliable internet, power outages, and high data costs continue to hinder operational cost reductions (ZICTA, 2021; Mwila, 2019). Salim Market (2025) [52] and Mwiinga (2020) note that hardware SMEs face additional constraints from logistics, physical inventory handling, and technical capacity gaps, limiting scalability and cost efficiency.

In Zambia, Hassan (2023) and Mwiinga (2020) report that mobile money systems and digital inventory tools improve cash flow management and reduce transaction-related costs, while Mwila (2019) and Ngwira (2024) note that high implementation costs, limited digital literacy, and weak delivery networks constrain the full realization of operational savings. GRZ (2023) [22] and ZICTA (2021) emphasize policy initiatives to improve ICT access and digital skills, yet empirical evidence shows that most hardware SMEs operate at low e-commerce sophistication, relying on incremental gains from social commerce rather than integrated systems. Hussain *et al*. (2022) further underscore the need for cybersecurity support to prevent financial and operational losses.

The literature collectively indicates that while e-commerce offers potential operational cost savings for hardware SMEs, the magnitude of these benefits depends on technological readiness, financial capacity, logistics infrastructure, and managerial skills (Sharma, 2024 [54]; OECD, 2023; Mwiinga, 2020; Ngwira, 2024). In Zambia, incremental adoption through mobile payments and social media produces modest efficiency gains, but systemic and contextual barriers remain, highlighting the need for

supportive policies, capacity building, and strategic investment to optimize cost reduction.

3. Research Methodology

3.1 Research Design

The study used a descriptive design to examine e-commerce effects on operational performance in hardware SMEs in Town Centre, Lusaka (Kothari, 2014; Creswell, 2014; Bryman and Bell, 2015; Saunders *et al*., 2019). Both quantitative questionnaires and qualitative interviews were used to capture measurable outcomes and practical insights.

3.2 Target Population

The target population included owners, managers, and employees of hardware SMEs involved in daily operations and e-commerce adoption (Bryman and Bell, 2015; Mwila, 2019; Creswell, 2014; Kothari, 2014). This ensured comprehensive perspectives on inventory management, customer reach, sales growth, and cost reduction.

3.3 Sampling Design

Purposive sampling was used to select respondents with direct experience in e-commerce integration and operational decision-making (Etikan *et al*., 2016; Creswell, 2014; Bryman and Bell, 2015; Saunders *et al*., 2019). This targeted approach ensured rich and relevant data from those actively using digital tools.

3.4 Sample Size

A sample of 50 respondents, including owners, managers, and employees, was used to provide quantitative and qualitative insights (Creswell, 2014; Kothari, 2014; Bryman and Bell, 2015; Mwila, 2019). The size is adequate for meaningful analysis and aligns with prior SME e-commerce studies (Mwiinga, 2020).

3.5 Data Collection Methods

Data were collected using structured questionnaires for quantitative analysis and semi-structured interviews for qualitative insights (Creswell, 2014; Kothari, 2014; Bryman and Bell, 2015; Saunders *et al*., 2019). This mixed-methods approach enabled triangulation and comprehensive understanding of e-commerce impacts.

3.6 Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics in SPSS, while qualitative data were thematically coded to identify patterns and operational insights (Kothari, 2014; Creswell, 2014; Bryman and Bell, 2015; Saunders *et al*., 2019). Triangulation integrated findings for robust and reliable results.

3.7 Triangulation

Triangulation combined questionnaires and interviews to cross-verify results and enhance credibility (Denzin, 2012; Creswell, 2014; Bryman and Bell, 2015; Saunders *et al*., 2019). This approach validated statistical relationships with real-world operational experiences of SMEs.

3.8 Limitations of the Study

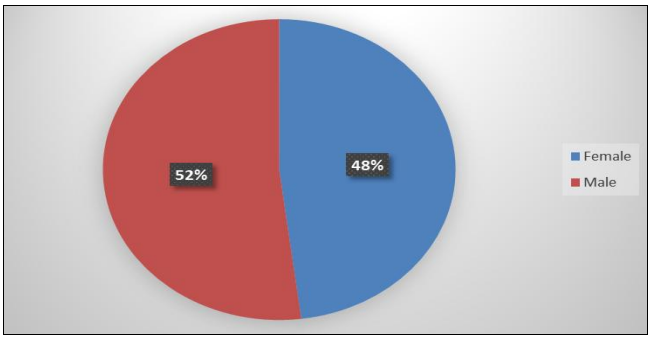
The study was limited to hardware SMEs in Town Centre, Lusaka, with self-reported data, a sample of 50, and technological constraints affecting generalizability (Bryman and Bell, 2015; Creswell, 2014; Kothari, 2014; Saunders *et al*., 2019). Triangulation and careful sampling mitigated potential biases.

3.9 Ethical Considerations

Ethical practices included informed consent, confidentiality, anonymity, voluntary participation, secure data storage, and proper citation of sources (Bryman and Bell, 2015; Creswell, 2014; Kothari, 2014; Saunders *et al*., 2019). These ensured integrity, transparency, and credibility of the study.

4. Results/Findings

4.1 presentation of results on background characteristics of results



Source: Primary Data

Fig 4.1: Gender

The study included 50 respondents, with a fairly balanced gender distribution: **26 males (52%)** and **24 females (48%)**. This near-equal representation indicates that both male and female perspectives on the effectiveness of e-commerce in hardware retail operations are captured. The balance ensures that gender-related differences in the adoption and use of e-commerce platforms are considered, providing a comprehensive understanding of operational performance across the workforce.

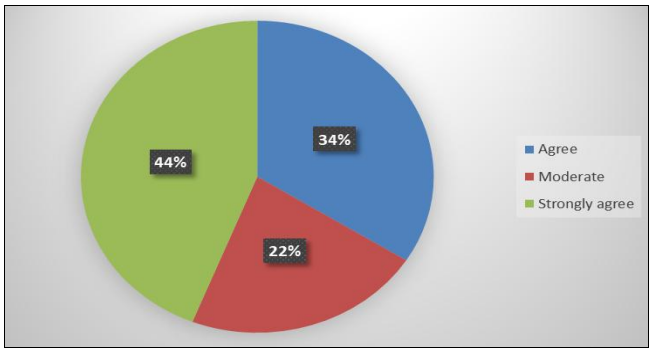
Table 4.1: Age

Age	Percent (%)
Below 25	26%
25-34	18%
35-44	14%
45-54	16%
55+	26
Total	100%

Source: Primary Data

Respondents were spread across diverse age groups, with the largest proportions in the **Below 25 years (26%)** and **55+ years (26%)** categories. Other age groups included 25–34 years (18%), 35–44 years (14%), and 45–54 years (16%). This distribution suggests that both younger staff, who may be more tech-savvy, and older, more experienced staff were included. Consequently, the findings reflect a combination of innovative adoption behaviors and institutional knowledge, offering insights into how different age groups perceive e-commerce effectiveness.

4.2 Effectiveness of E-Commerce Adoption Influences Inventory Management Efficiency



Source: Primary Data

Fig 4.2: E-Commerce and Stock Level Tracking

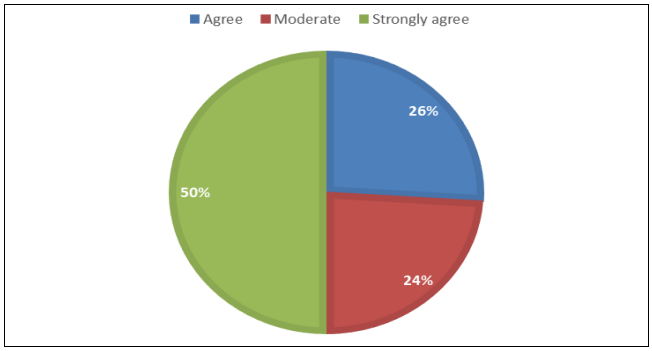
The findings indicate that e-commerce has significantly improved the ability of hardware retailers to track stock levels. **44% of respondents strongly agreed** and **34% agreed** that e-commerce makes it easier to monitor inventory, while 22% were moderate in their agreement. This shows that the majority of respondents perceive digital platforms as effective tools for keeping accurate records of stock, enabling better planning and reducing manual errors. E-commerce systems provide real-time updates and alerts, which helps retailers maintain optimal stock levels and avoid both overstocking and stockouts.

Table 4.2: E-Commerce and Reduction of Extra Stock or Stockouts

E-Commerce and Reduction of Extra Stock or Stockouts	Percent (%)
Strongly agree	28%
Agree	50%
Moderate	22%
Total	100%

Source: Primary Data

When asked whether e-commerce helps reduce excess stock or prevent running out of items, **50% of respondents agreed**, **28% strongly agreed**, and **22% moderately agreed**. This suggests that e-commerce adoption plays a crucial role in enhancing inventory efficiency. By providing automated stock alerts, demand tracking, and sales forecasting, hardware retailers can respond quickly to fluctuations in demand, ensuring that they neither hold unnecessary stock nor face shortages, ultimately improving operational performance.

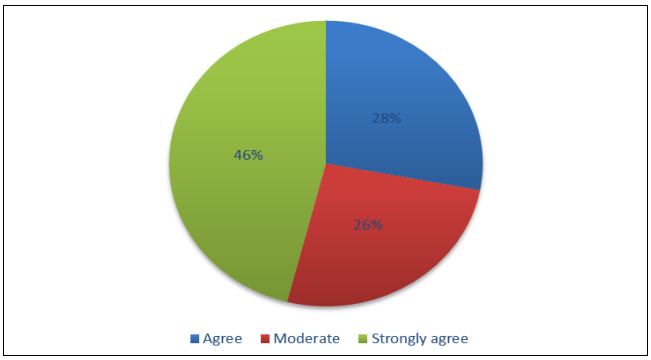


Source: Primary Data

Fig 4.3: E-Commerce and Faster, Timely Ordering

Regarding the speed and timeliness of ordering new stock, **50% of respondents strongly agreed**, **26% agreed**, and **24% were moderate**. This demonstrates that e-commerce adoption facilitates faster procurement processes, enabling retailers to replenish stock promptly. The integration of digital ordering systems reduces delays, supports on-time deliveries, and allows managers to align inventory with customer demand efficiently. As a result, operational workflows become more streamlined and responsive.

4.3 Effectiveness of E-Commerce in Enhancing Customer Reach and Sales Growth for Hardware SMEs



Source: Primary Data

Fig 4.4: E-Commerce and Business Helpfulness

Respondents were asked to what extent they agreed that e-commerce (like online selling) has helped their business. The results show that **46% strongly agreed**, **28% agreed**, and **26% were moderate**. This indicates that a substantial majority perceive e-commerce as a significant contributor to operational improvements, reflecting its role in streamlining business processes, improving efficiency, and enhancing overall store performance.

Table 4.3: E-Commerce and Increased Hardware Store Performance

E-Commerce and Increased Hardware Store Performance	Percent (%)
Strongly agree	40%
Agree	38%
Moderate	22%
Total	100%

Source: Primary Data

Regarding the impact of e-commerce on store performance, 40% of respondents strongly agreed, 38% agreed, and 22% were moderate. This suggests that online sales platforms have expanded market reach, increased sales volumes, and strengthened operational capabilities, leading to enhanced performance of hardware stores at Town Center, Lusaka.

Table 4.4: Online Tools and Business Growth

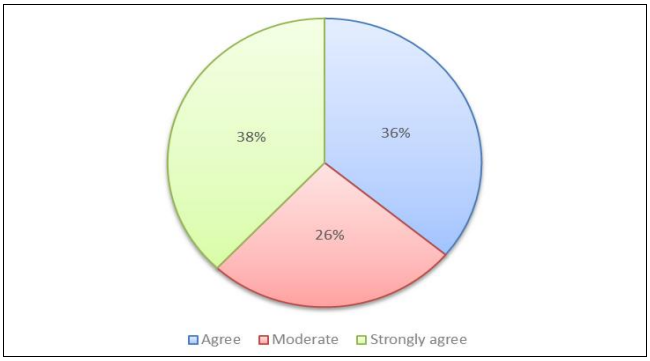
Online Tools and Business Growth	Percent (%)
Strongly agree	48%
Agree	30%
Moderate	22%
Total	100%

Source: Primary Data

The study also explored perceptions on online tools (such as websites or apps) in business growth. **48% of respondents**

strongly agreed, **30% agreed**, and **22% were moderate**. This demonstrates that digital tools are widely recognized as important drivers for expanding customer reach, improving marketing, and facilitating smoother transactions, which contribute to business growth.

4.4 Effects of E-Commerce Integration on Operational Cost Reduction for Hardware SMEs



Source: Primary Data

Fig 4.5: E-Commerce and Reduction of Daily Running Costs

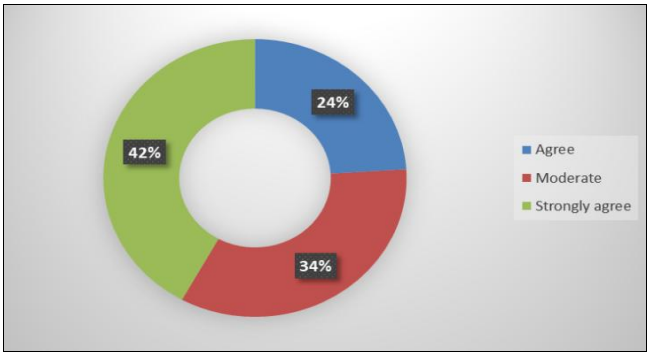
The study sought to assess whether using online sales has helped businesses cut down daily running costs. The results show that **38% of respondents strongly agreed**, **36% agreed**, and **26% were moderate**, indicating that the majority perceive e-commerce as effective in reducing operational costs. Respondents noted savings on utilities, staff time, and physical store management, suggesting that digital sales platforms streamline processes and improve cost efficiency.

Table 4.5: E-Commerce Tools and Storage/Maintenance Costs

E-Commerce Tools and Storage/Maintenance Costs	Percent (%)
Strongly agree	36%
Agree	46%
Moderate	18%
Total	100%

Source: Primary Data

When asked about the effect of e-commerce tools, such as online ordering, on storage and maintenance costs, **46% agreed**, **36% strongly agreed**, and **18% were moderate**. This demonstrates that digital tools help businesses reduce costs related to stock management, minimizing unnecessary storage and optimizing resource allocation, which supports more efficient operations.



Source: Primary Data

Fig 4.6: E-Commerce and Marketing/Advertising Costs

Regarding marketing and advertising, **42% strongly agreed**, **24% agreed**, and **34% were moderate** that adding e-commerce has reduced spending. Online platforms allow retailers to reach customers digitally rather than relying solely on traditional in-store advertising, which lowers costs while expanding market reach. However, respondents also acknowledged that initial investments in digital marketing and online tools may offset some savings.

4.5 Discussion of Results

The results of this study reveal that e-commerce adoption has significantly contributed to enhancing the operational performance of hardware SMEs in Town Center, Lusaka. The findings align with previous literature emphasizing that digital technologies improve efficiency, reduce costs, and expand market access for small and medium enterprises (Laudon & Traver, 2022; OECD, 2021) [34, 46].

The results indicate that most respondents strongly agreed that e-commerce has improved inventory management efficiency. Specifically, 44% strongly agreed and 34% agreed that digital platforms have enhanced the ability to track stock levels and manage inventory. This supports the argument by Kotler and Keller (2016) [33] that e-commerce enables real-time data sharing, which reduces human error and facilitates accurate stock control. Similarly, the majority (78%) of respondents agreed that e-commerce reduces excess stock and stockouts, a finding consistent with UNCTAD (2022), which states that automation in inventory systems allows SMEs to align supply with market demand efficiently. Therefore, the study confirms that integrating e-commerce solutions in hardware retailing enhances inventory visibility and responsiveness, leading to better operational planning.

Findings from Figure 4.3 show that 76% of respondents agreed or strongly agreed that e-commerce facilitates faster and more timely ordering of stock. This implies that digital procurement systems minimize delays in the supply chain, allowing retailers to respond promptly to customer needs. Similar conclusions were drawn by Baryannis, Dani, and Antoniou (2019) [6], who found that digital supply chain technologies enable predictive inventory management and faster replenishment cycles. Hence, e-commerce not only streamlines workflows but also enhances the agility and responsiveness of SMEs in the hardware sector.

The study also found that a substantial number of respondents (74%) strongly agreed or agreed that e-commerce has improved customer reach and overall business helpfulness. Online platforms have enabled hardware SMEs to engage a broader customer base beyond the physical boundaries of Town Center. These results are consistent with findings by the GSMA (2022), which highlighted that online business presence and mobile platforms significantly expand SME market access. Furthermore, 78% of respondents agreed that e-commerce has increased hardware store performance, confirming that digital engagement leads to higher sales volumes and greater visibility (OECD, 2021) [46]. Thus, e-commerce serves as both a sales and marketing enabler that strengthens competitiveness among local SMEs.

The study revealed that 78% of respondents acknowledged that online tools, such as websites and mobile applications, contribute to business growth. This aligns with UNCTAD (2022), which emphasizes that digital presence improves brand recognition, consumer trust, and repeat purchases.

The findings also demonstrate that hardware retailers view e-commerce as a strategic driver for sustainable expansion and long-term competitiveness.

E-commerce integration was also found to reduce operational costs for hardware SMEs. A total of 74% of respondents agreed that using e-commerce platforms lowered daily running costs by reducing expenses associated with rent, utilities, and manual operations. Similar patterns were observed regarding storage and maintenance costs, with 82% of respondents agreeing that online tools help minimize unnecessary stock accumulation and related expenses. These findings support the conclusions of the World Bank (2020) [64], which argue that digitalization in SMEs enhances cost-efficiency by automating administrative and logistical processes. Additionally, 66% of respondents indicated that online marketing reduces advertising costs, corroborating the findings of Chaffey and Ellis-Chadwick (2019) [9], who noted that digital marketing offers cost-effective channels to reach targeted audiences compared to traditional advertising.

Overall, the study demonstrates a clear positive correlation between e-commerce adoption and the operational performance of hardware SMEs in Lusaka's Town Center. E-commerce enhances key operational areas—inventory management, customer engagement, marketing efficiency, and cost control. However, some respondents highlighted challenges such as the high initial cost of digital tools, limited ICT skills, and inconsistent internet connectivity, which may hinder full-scale adoption. These challenges reflect observations by GSMA (2022) and the OECD (2021) [46], who identified infrastructural and capacity barriers as key obstacles to digital transformation among SMEs in developing countries.

In summary, the findings indicate that e-commerce adoption significantly enhances operational performance by improving efficiency, reducing costs, and increasing customer reach. These outcomes underscore the transformative potential of digitalization in strengthening SME competitiveness within Zambia's retail sector. To maximize these benefits, it is essential to address existing technological and infrastructural gaps through targeted training, government support, and improved access to affordable digital solutions.

5. Conclusion and Recommendations

5.1 Conclusion

The study examined the effectiveness of e-commerce on operational performance in hardware retailers at Town Center, Lusaka, focusing on inventory management, customer sales, and operational costs. The findings indicate that e-commerce significantly enhances operational efficiency by improving stock tracking, reducing overstocking and stockouts, and enabling faster and more accurate ordering of new stock. Respondents highlighted that automated alerts, remote monitoring, and digital records have transformed traditional inventory practices, making them more organized and disciplined. This aligns with Singh and Kumar (2021), who emphasize that digital platforms enable data-driven stock decisions and reduce wastage.

E-commerce also contributes positively to business growth by expanding customer reach, increasing sales, and improving customer engagement. Retailers reported higher volumes of repeat orders, sales to distant clients, and increased interaction with bulk buyers and contractors. This is consistent with Laudon and Traver (2021), who argue that e-commerce expands market access and enhances customer relationships. Additionally, online tools, such as websites and mobile apps, provide opportunities for continuous sales beyond traditional store hours, further boosting revenue.

Regarding operational costs, the study revealed that e-commerce reduces daily running costs, storage, and marketing expenses, while introducing new costs in areas such as courier services, internet, electricity, and platform fees. Despite these additional expenditures, the overall benefits improved inventory management, increased sales, and greater operational efficiency outweigh the challenges. This finding corroborates Kaur and Singh (2020), who note that digital platforms optimize resources and reduce traditional operational costs.

In conclusion, e-commerce is an effective strategy for improving operational performance in hardware retail, supporting the research objective by demonstrating measurable improvements in stock management, customer sales, and cost efficiency. Retailers who strategically integrate e-commerce into their operations are better positioned to enhance efficiency, expand their market reach, and remain competitive in the evolving retail landscape (Chaffey, 2019; Kumar *et al*., 2022).

5.2 Recommendations

Based on the findings of this study on the effectiveness of e-commerce on operational performance in hardware retailers at Town Center, Lusaka, several practical recommendations can be made to enhance operational efficiency, customer reach, and cost management:

Enhance E-Commerce Adoption and Training

Hardware retailers should invest in comprehensive training for employees on the use of e-commerce platforms and digital tools. Proper training will ensure that staff can efficiently manage inventory, process orders, and engage with customers online. This aligns with Chaffey (2019), who notes that effective e-commerce adoption requires skilled personnel to maximize operational benefits.

Optimize Inventory Management Systems

Retailers should leverage advanced inventory management systems integrated with e-commerce platforms to automate stock tracking, forecasting, and replenishment. Automated alerts for low stock and predictive analytics can minimize stockouts and overstocking. Singh and Kumar (2021) emphasize that digital tools in inventory management enhance accuracy, reduce wastage, and improve operational efficiency.

Expand Online Customer Engagement and Marketing

To increase sales and customer loyalty, retailers should strengthen their online presence through websites, mobile applications, and social media channels. Strategic digital marketing can attract new customers, retain existing ones, and encourage repeat purchases. Laudon and Traver (2021) highlight that online engagement and digital marketing are crucial for expanding market reach and improving business performance.

Manage Operational Costs Effectively

Although e-commerce reduces some costs, new expenses such as courier fees, electricity, and platform charges arise. Retailers should implement cost-monitoring strategies,

negotiate favorable delivery terms, and use efficient digital payment systems to minimize additional expenditures. Kaur and Singh (2020) suggest that careful cost management ensures that the benefits of e-commerce outweigh the challenges.

Continuous Monitoring and Evaluation

Retailers should continuously monitor and evaluate the impact of e-commerce on operational performance, customer satisfaction, and financial outcomes. Regular performance assessments allow for timely adjustments, process improvements, and informed decision-making, supporting long-term sustainability (Kumar *et al*., 2022).

By implementing these recommendations, hardware retailers can optimize e-commerce adoption, improve inventory control, expand customer reach, and enhance overall operational performance, ensuring competitiveness in an increasingly digital marketplace.

6. Acknowledgment

I would like to sincerely thank my wife, children, officers, senior officers, executive, and deputy executive for their love, patience, and unwavering support throughout this study.

Their encouragement and understanding were a constant source of strength during this journey. Above all, I give glory to God and thank him for his unfailing love that encompasses my life.

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