SMALL BUSINESS AND LOW-COST SOLUTIONS: THE IMPERATIVE OF BUSINESS INTELLIGENCE APPLICATIONS IN RETAILING STORES IN SUB–SAHARAN AFRICA

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Abstract
This study examines small business and low-cost solutions: the imperative of business intelligence applications in retailing stores in Lagos State, Nigeria. The purpose of the study is to ascertain how constraints infrastructure, competitive pressure, management support, cost-benefit analysis, and technology readiness affect the use of BI and its effects on small business performance. The findings show that the most common factors influencing BI effectiveness are technological readiness and competitive pressure. Although each has a positive impact on BI adoption, cost-effectiveness and management support have less of an impact on effectiveness. Due to the interconnection with competitive pressure, infrastructure constraints have an indirect impact on BI performance. Thus, the results highlight how internal capabilities and the external environment interact to support BI success. The study suggests that small retail businesses must have a digital capacity, integrate infrastructure, and cultivate competitive markets to fully employ BI. Leadership participation and affordable, scalable BI solutions are also essential for long-term acceptance by local requirements. This study contributes to the insignificant magnitude of literature that discusses the adoption of BI in small retail businesses in Lagos State by combining organizational, technological, and environmental factors. Policymakers, practitioners, and tech developers who want to use data-driven decision-making to promote small business growth may find it instructive.

Keywords: *Business intelligence, small retail business, technology adoption, structural equation modelling, technological readiness, competitive pressure.*

JEL Classification: *M10, M19*

INTRODUCTION

In sub-Saharan Africa, small business is vital to local development and the fight against poverty and fuel economic growth and job creation. However, small businesses, especially those in the retail industry, are working in a highly competitive market with growing operating expenses and restricted access to sophisticated management tools (Qhal, 2025; Siddiqui, 2025). Over the past ten years, business intelligence software has become a burgeoning field for small businesses looking to enhance decision-making, streamline operations, and preserve a competitive advantage (Abdulnabi, 2024; Chebrolu, 2025). Corporate intelligence uses technological tools to evaluate

corporate data, which helps retailers make decisions about inventory, customer interactions, and finance management skills that are becoming more and more crucial in the data-intensive market environment (Siddiqui, 2025). Despite the clear benefits, business intelligence solutions have not been widely adopted by small businesses in Lagos State, Nigeria. Most businesses face several major challenges, including a lack of technical competence, limited government incentives, inadequate digital infrastructure, and a financial barrier.

According to the research studies of scholars such as Khalatur et al. (2022), Widhiastuti et al. (2025), and Tichavavamwe & Rachmawati (2024) government assistance systems are in place, but they usually don't meet the specific needs of small businesses when it comes to utilising business intelligence technologies. Many parts of the region in sub-Saharan African are still plagued by long-standing problems that hinder the digital revolution for successful business intelligence deployment, such as poor internet connectivity, limited access to less expensive digital technology, and insufficient data literacy (Tichavavamwe & Rachmawati, 2024). These are supported by organisational factors such as managerial support, the belief that business intelligence is valuable, and businesses' propensity to adopt new technologies. Although the potential benefits of business intelligence for small businesses, yet there is a lack of specific research on scalable, low-cost business intelligence solutions that are suitable for the unique requirements of small business retailing (Maghsoudi & Nezafati, 2023; Tarigan et al., 2025). Siddiqui (2025) and Abdulnabi (2024) indicates that this is a critical research gap because small business (shops) lacks the resources to invest in sophisticated business intelligence platforms, so they require simpler, less expensive ones. This is why the majority of current research focuses on larger companies or ignores their needs. In particular, from the perspective of the business owner who operates in resource-constrained contexts, there is a dearth of empirical data on the very facilitators and obstacles that impact business intelligence adoption within this segment (Suswanto et al., 2025; Tichavavamwe & Rachmawati, 2024).

However, the purpose of this study is to close these gaps by investigating the impact of business intelligence solutions on small retail businesses, specifically focusing on low-cost solutions in Lagos State, Nigeria, this study seeks to illustrate the advantages and disadvantages of this digital transformation. It's clear why: providing small business owners with reasonably priced business intelligence tools improves not only their operational resilience and competitiveness but also more general economic development objectives like job creation and poverty alleviation. In this way, the study seeks to educate technology vendors, business support organisations, and policymakers on the best ways to promote an environment that is conducive to digitising Africa's main small business base.

In order to provide answer to the research question raised, the null hypothesis will be tested:

RQ: what is impact of constraints infrastructure, competitive pressure ->management ->support, cost-benefit analysis, and technology readiness affect on ->BI effectiveness in small business retailing stores in Lagos State, Nigeria?

H_{01}*: constraints infrastructure, competitive pressure, management support -> cost->benefit analysis, and technology readiness affect has no significant impact on ->BI effectiveness in small business retailing stores in Lagos State, Nigeria?*

I. LITERATURE REVIEW

Literature on business intelligence adoption in small businesses highlights the interplay between technological, organizational, and environmental factors that shape the capacity of enterprises to integrate data-driven solutions, especially in resource-constrained contexts such as retailing stores in Sub-Saharan Africa.

I.1. Conceptual Review
Within the conceptual review, several critical dimensions emerge as particularly relevant for understanding the adoption of business intelligence in small retail enterprises, namely technological readiness, cost-effectiveness, management support, competitive pressure, and infrastructure constraints.

Technological Readiness
Technological readiness is the degree to which small retail businesses have the digital infrastructure, skills, and resources needed to adopt and use business intelligence solutions (Hammad et al., 2025). Africa's adoption of business intelligence is still mostly driven by technological preparedness because different countries have differing degrees of access to reasonably priced digital devices, the internet, and technical know-how (Borodako et al., 2023). Businesses that are better equipped to use business intelligence tools in their operations are known to be more competitive and make better decisions since they are more technologically savvy (Alarefi, 2024). Additionally, as Africa's youth population becomes more accustomed to mobile technology, technical readiness is gradually increased, and small and medium-sized enterprises find it simpler to adopt digital advances (Abdulnabi, 2024). However, the majority of retailers continue to be impacted by a lack of technical expertise and persistent digital inequalities, necessitating capacity-building initiatives to guarantee readines (Borodako et al., 2023).

Cost-Effectiveness

High costs and intricate pricing schemes deter small enterprises from implementing business intelligence technology, according to the literature. The affordability, scalability, and minimal maintenance costs of business intelligence platforms are what make them cost-effective because it prevents retailers from having to replace their expensive systems too soon, scalability the capacity of business intelligence solutions to develop in proportion to the business is particularly crucial (Khalatur et al., 2022). Moreover, affordability encompasses not only the original cost but also continuing expenditures like technical assistance and software maintenance, which should be easily within the means of small business firms (Siddiqui, 2025). According to recent studies Widhiastuti et al. (2025), Alarefi (2024) and Molete et al. (2025) pricing structures and cost-effective cloud-based business intelligence solutions are gaining traction in Africa, enabling small shops to access powerful insights whenever they want without incurring prohibitive upfront costs.

Management Support

Managerial support is widely recognised as one of the most critical elements in a successful business intelligence adoption. It is the practice of managers or business owners devoting themselves to overseeing business intelligence initiatives by assigning funds, organising schedules, and encouraging a data culture (Khalatur et al., 2022). When management takes action to begin implementing business intelligence, acceptance rates and utilisation intensity increase significantly, according to empirical research (Qhal, 2025). Support from leaders makes it easier to overcome resistance to change and motivate employees to embrace new technology, particularly in Africa, where businesses typically lack funding. Additionally, training and capacity building are essential to ensuring the long-term use of business intelligence, and they are made possible by management support (Borodako et al., 2023).

Competitive Pressure

Competitive adoption, in which businesses imitate their competitors who effectively use business intelligence to increase efficiency, is another element at play. Organisations are forced to utilise technology despite internal resistance because of outside pressure that creates urgency (Abdulnabi, 2024). Competitive pressure is the degree to which market competitiveness and customer expectations influence the adoption of business intelligence technology (Carvalho, 2025). In the very competitive and dynamic environments in which small shops operate, timely market data can make all the difference. In order to better analyse customer behaviour, support pricing decisions, and improve customer care, organisations that confront fierce competition are more likely to implement business intelligence systems, according to these studies (Siddiqui, 2025; Suswanto et al., 2025; Tarigan et al., 2025).

Infrastructure constraints

Infrastructure constraints include things like a lack of hardware, an unstable power source, and an unstable internet connection. According to Tichavavamwe and Rachmawati (2024), Alarefi, (2024) and Khalatur et al. (2022) these continue to be the key barriers to BI adoption in much of Africa. When the infrastructure is inadequate, the dependability and efficiency of BI systems are compromised, which leads to user annoyance and disengagement (Lennerholt et al., 2021; Tichavavamwe & Rachmawati, 2024). Infrastructure preparedness has been found to influence general satisfaction, usability views of BI tools, and the viability of BI adoption (Abdulnabi, 2024; Hammad et al., 2025). It is the responsibility of governments, corporations, and development partners to collaborate on these infrastructure problems to improve connection and electrical reliability.

I.2. Theoretical Review

The study's theoretical approach is based on two complementary theories the Technology Acceptance Model (TAM) and the Technology-Organisation-Environment (TOE) framework that best match the constructs that underpin the adoption and application of business intelligence solutions among small retail businesses in Lagos State, Nigeria.

The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis in 1989, is still a widely used hypothesis to explain how people adopt new technologies. According to TAM, two perceptions perceived utility and perceived ease of use are what influence users' adoption of new technology (Tichavavamwe & Rachmawati, 2024). In this study, TAM takes into consideration how small retailers' perceptions of the cost-effectiveness of business intelligence solutions and their level of technological preparedness affect their propensity to embrace and make efficient use of business intelligence technologies (Hammad et al., 2025). Businesses are more inclined to adopt business intelligence platforms if they believe they are inexpensive, scalable, and simple to incorporate into their company plans. TAM also discusses the impact of management support by demonstrating how organisational dispositions influence perceived utility and usability, which in turn influence adoption choices (Alarefi, 2024).

According to studies Abdulnabi (2024), and Suswanto et al. (2025) small business adoption of technology is greatly aided by enhancing their perceptions of its usefulness and simplicity of use (Abdulnabi, 2024; Suswanto et al., 2025). These empirical findings in African contexts have validated the validity of TAM.

The Technology-Organisation-Environment (TOE)

The Technology-Organisation-Environment (TOE) theory is expanded to complement TAM by taking into account environmental and organisational factors that encourage technology adoption. TOE divides circumstances into three categories: organisational (management support), technological (cost savings and technology preparedness), and environmental (infrastructure limitations and competitive factors) (Abdulnabi, 2024). Retail businesses are particularly relevant to the TOE paradigm, where business intelligence adoption is heavily influenced by external motivators like market competition and infrastructure limitations (Tichavavamwe & Rachmawati, 2024). While infrastructural limitations, such as inadequate internet and electricity availability, can prevent the proper use of business intelligence, competitive pressure will force retailers to implement business intelligence in order to obtain market knowledge and improve response (Siddiqui, 2025). According to Hammad et al. (2025) and Qhal 2025), the TOE framework thus reflects an overall picture of adoption dynamics by capturing the intricate interaction between internal abilities and external influences. This study has a strong theoretical foundation based on the combination of TAM and TOE. The cognitive and perceptual elements cost and usability that influence management and individual acceptance of business intelligence solutions are explained by TAM (Siddiqui, 2025). TOE goes a step further by placing these factors in the organisational and environmental settings, emphasising the crucial roles that infrastructure limitations, competitive pressure, and management support play. In line with more recent research, this integrated theoretical framework proposes the use of mixed models to capture the complexity of technology adoption among African small businesses (Kgakatsi et al., 2024; Mathu & Tlare, 2017). This, in turn, provides insight into how low-cost business intelligence solutions can be used to improve retail business performance.

I.3. Theoretical Framework

This study is informed by two primary theories that explain how small retail businesses use and implement business intelligence solutions. These are the three primary areas that are analysed by the Technology-Organisation-Environment (TOE) framework: the organisation (management support), the environment (infrastructure and competition issues), and the technology itself (availability and readiness of business intelligence tools). In regions with limited infrastructure and resources, these factors collectively determine whether and how businesses adopt new technologies (Hammad et al., 2025). The Technology Acceptance Model (TAM) is the second, and it focuses on how people's views affect their acceptance of technology use. It centres on two key ideas: if the technology is helpful and convenient to use. According to TAM, small business owners' opinions about the price and usability of business intelligence tools affect their decision to use them. Management support also plays a role by elevating the technology's perceived value and accessibility (Qhal, 2025). The study captures both the internal side, such as attitudes and firm support and the external side, such as market forces and infrastructure, by utilising both TOE and TAM. This is beneficial because it helps us understand the actual obstacles and possibilities small merchants face when utilising reasonably priced business intelligence technologies to enhance operations and boost their competitiveness.
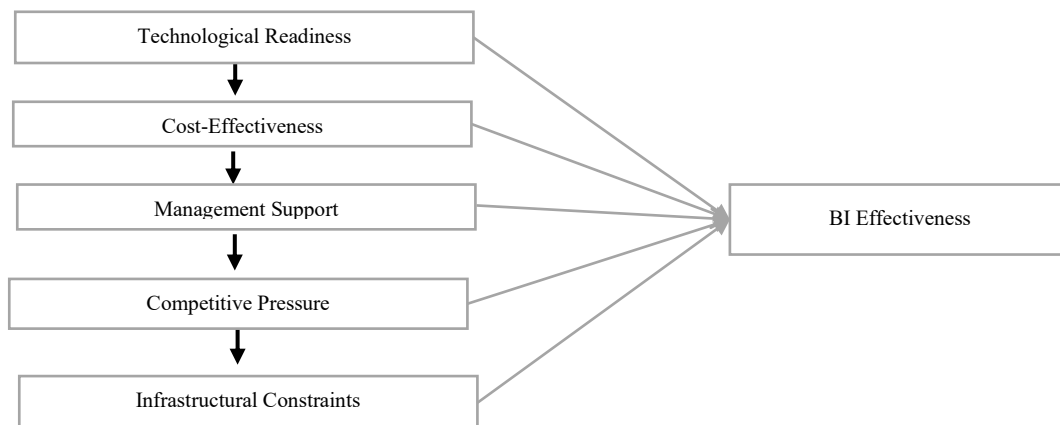

Figure 1. Proposed Model
Source: Own elaboration

I.4. Empirical Review

Siddiqui (2025) examined how business intelligence (BI) platforms powered by artificial intelligence (AI) affect key business domains such as supply chain management, consumer segmentation, financial decision-making, fraud detection, and strategic planning. Strict PRISMA standards were used to analyse 98 high-quality papers from more than 2,400 sources. According to the study, AI-driven BI enhances customer interactions, optimises supply chains, reduces fraud by almost half, and increases prediction accuracy by up to 45%. However, issues like bias, transparency, and data governance continue to be obstacles. In addition to technical capabilities, the study points out that in order to guarantee that AI-enabled BI is reliable and efficient for businesses both now and in the future, ethical and explainable AI as well as improved data integration are required.

Qhal (2025) examined how business intelligence (BI) and knowledge management (KM) are influencing data-driven decision-making, sustainability, teamwork, and creativity in the age of the fourth industrial revolution. The healthcare and industrial sectors are most interested in adopting KM and BI, whereas retail and public management are less interested, according to a mixed-methods approach that included surveys, regression, and sentiment analysis of 500 industry stakeholders from various sectors. Prospects are bright despite privacy and employment concerns. The study predicts that by 2030, KM and BI will increase productivity, employee motivation, and return on investment. It highlights the importance of improved knowledge exchange, information accuracy, and system integration.

Abdulnabi (2024) looked at how business intelligence (BI) utilisation among Iraqi SMEs is impacted by the Technology Acceptance Model (TAM), information quality, organisational preparedness, and technology infrastructure. Applying quantitative methodologies with 281 participants, the results reveal that information quality has a considerable impact on perceived utility and ease of use. BI adoption is positively impacted by perceived utility, usability, organisational preparedness, and technological infrastructure. The study helps managers, entrepreneurs, and academics create efficient business intelligence (BI) systems that support decision-making, stimulate economic growth, encourage innovation, and enhance SMEs' overall performance in a changing economic climate.

Tichavavamwe and Rachmawati (2024) used a combination of the Technology-Organization-Environment (TOE) and Technology Acceptance Model (TAM) to examine the factors that influence Zimbabwean enterprises' intentions to utilise business analytics (BA). The results of 157 interviews with businesses across a range of industries demonstrate that government legislation, competitive pressure, top management backing, and perceived relative advantage all have a substantial impact on the intentions of BA implementation. Organisational preparedness, IT infrastructure, compatibility, and complexity, however, had little bearing. As the first use of the combined TOE-TAM model in Zimbabwe, this study adds additional evidence supporting the adoption of BA in emerging economies. The paper offers managers and policymakers useful suggestions for advancing BA towards strategic value development.

II. METHODOLOGY

This study adopts a survey research design which is quantitative in nature and rely on the prior study methodology of Adeyemi & Olubiyi (2024), Olubiyi (2025a, 2025b, 2025c), Olubiyi (2024a, 2024b, 2024c).0, Olubiyi (2022a), Olubiyi et al. (2022), Olubiyi (2022b), Uwem et al. (2021), Onyia et al. (2019) Uwem, et al. (2022). The study captures small businesses that focus on low-cost solutions: the imperative of business intelligence applications in retailing stores in Lagos State, Nigeria the economic capital of Nigeria and an important retailing market in Africa.

The study adopts the stratified random sampling technique in order to select sample representation from technology-based retail small businesses in Lagos State Nigeria. The Research Advisor Table was used to determine the sample size, which was 378 with a 95% confidence level and a 5% margin of error. Appropriate measures were taken to address the issue of non-response, which led to the addition of 113 respondents, or 30% of the original sample. A final sample size of 491 from a variety of industries, including groceries and convenience stores, garments and apparel, electronics, and household items, was obtained after the adjustment. A structured closed-ended questionnaire using Likert scale response type was administered to respondents. In order to improve question clarity and cultural sensitivity, 30 respondents in Oyo State and Ogun State participated in a pilot study. After testing validity (AVE > 0.5) and reliability (Cronbach's α > 0.7) with the measurement model, the structural model is used to assess hypothesised routes.

The study uses structural equation modelling (SEM) to investigate the effects of five independent constructs on the dependent construct: competitive pressure, management support, cost-effectiveness competitive pressure and ci on BI effectiveness. On the basis of several observed indicators, each concept is operationalised. The method is based on recent findings from (Abdulnabi, 2024; Qhal, 2025; Siddiqui, 2025; Tichavavamwe & Rachmawati,

2024). The study utilized a questionnaire consisting of 24 items spread across six key variables, as shown in *Table 1*.

Table 1. Research Instrument

Variables	No. of Items	Source(s)
BI Effectiveness	4	(Bruce et al., 2023; Widhiastuti et al., 2025)
Cost-Effectiveness	4	(Khalatur et al., 2022; Widhiastuti et al., 2025)
Constraints Infrastructure	4	(Abdulnabi, 2024; Alarefi, 2024)
Management Support	4	(Khalatur et al., 2022; Qhal, 2025)
Competitive Pressure	4	(Qhal, 2025; Tichavavamwe & Rachmawati, 2024)
Technological Readiness	4	(Borodako et al., 2023; Hammad et al., 2025; Shibiti et al., 2023)

Source: Compilation of authors based on specialized literature

Respondents rated each statement using a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). To analyze the collected data, the researcher employed SMART PLS 4 software, which is well-suited for handling complex models and provides robust tools for validating and interpreting the results. This approach allowed for a thorough examination of the relationships between the variables in the study.

III. RESULT AND DISCUSSION OF RESULTS

Result and data analysis

Out of the 491 copies of the questionnaire that were distributed by the researcher and trained research assistants, 480 copies were completed and returned for analysis, indicating a 98% response rate from small retail businesses in Lagos State, Nigeria, that rely on technology. The percentage of respondents that completed the survey and distributed copies of the questionnaire is known as the response rate. Even though the remaining ones were either unreturned or had incomplete answers, the overall number of surveys received was enough to accurately represent the population, and they were examined. Table 2 displays the specifics of the answers.

Table 2. Response Rate

	Frequency		Percentage %
Completed usable copies of the questionnaire	480	98	
Unreturned/Incomplete copies of the questionnaire	11	2	
Total received	**491**	**100**	

Source: Researchers' computation

Validity of Measurement Model

For the survey items to accurately reflect the most significant variables influencing the uptake and efficacy of business intelligence in small retail businesses in Lagos State, the measurement model must be measured. The findings presented in *Table 3*, show that each construct from technological readiness to BI effectiveness is incredibly dependable and consistent. The dependability of each construct's items is demonstrated by Cronbach's alpha, which ranges from 0.846 to 0.882 across all constructs, significantly above the widely accepted benchmark of 0.7. In a similar vein, the composite reliability measures (0.864 to 0.904) show consistency across the measurement scales. These results give assurance regarding the operationality of the constructs and the robustness of the measurement model for analysing the relationship between the variables in this investigation.

Convergent Validity

Convergent validity verifies that each construct's measurements truly measure the relevant latent variable by determining whether they have a high percentage of variation in common. All of the constructs' AVE values, which range from 0.596 to 0.650 in *Table 3*, are higher than the suggested minimum of 0.5. With an AVE of 0.639, the construct BI Effectiveness shows that its four elements combined together offer a reliable and robust evaluation of the idea. The validity and reliability of the measurement model are further supported by the fact that measures which include Cost-Effectiveness (AVE = 0.611), Competitive Pressure (AVE = 0.650), and Management Support (AVE = 0.643) satisfy the convergent validity criterion.

Table 3. Construct Validity and Reliability

Construct	Items	Cronbach's alpha	Composite reliability	AVE
BI Effectiveness	4	0.876	0.876	0.639
Cost-Effectiveness	4	0.861	0.864	0.611
Constraints Infrastructure	4	0.882	0.904	0.648
Management Support	4	0.880	0.891	0.643
Competitive Pressure	4	0.881	0.886	0.650
Technological Readiness	4	0.846	0.874	0.596

Source: Calculated by the author

Discriminant Validity

The Heterotrait-Monotrait (HTMT) ratios, which are used to evaluate discriminant validity the degree to which each construct in the model is different from the others are shown in *Table 4*. BI Effectiveness (BE), Cost-Effectiveness (CE), Perceived Competitive Pressure (PC), Management Support (MS), Competitive Pressure (CI), and Technological Readiness (TR) are among the constructs used in this study.

HTMT estimates between items should typically be less than 0.90 to show discriminant validity, meaning that the constructs assess distinct things and are not overly connected. A discriminant validity failure may be indicated by estimates greater than 0.90, meaning that the constructs may overlap or measure similar things.

The majority of the HTMT values in the table are less than 0.90, indicating strong discriminant validity between categories like Technological Readiness and Management Support (0.799) and BI Effectiveness and Competitive Pressure (0.825). This indicates that respondents view these constructs as unique determinants of BI uptake and efficacy.

Other values, such as Cost-Effectiveness and BI Effectiveness (1.105), Competitive Pressure and Management Support (1.103), and Cost-Effectiveness and Perceived Competitive Pressure (0.933), however, surpass 0.90. These high values suggest a strong correlation between these construct pairs, which may be a sign of conceptual overlap or of respondents' opinions that these aspects are closely related in the context of small retailing businesses in Lagos State.

Although most constructs have great discriminant validity overall, some constructs' high HTMT scores call for care in interpretation. It can be worthwhile to look over the questionnaire items or enquire as to whether these constructs naturally relate to one another in this corporate setting, indicating the interconnected forces of competition, management support, and cost that drive the efficacy of BI.

Table 4. HTMT

	BE	CE	CI	MS	PC	TR
BE						
CE	1.105					
CI	0.694	0.738				
MS	0.706	0.738	1.103			
PC	0.825	0.933	0.905	0.898		
TR	0.969	0.891	0.719	0.799	0.738	

Source: Calculated by the author

Assessment of the structural model

The structural model in *Figure 2* gives a clear and insightful portrayal of how numerous elements interconnect to influence business intelligence (BI) application success in small retail enterprises in Lagos State. Each blue circle indicates an essential aspect, such as technical preparedness, cost-effectiveness, managerial support, competitive pressure, and infrastructural constraints, while the arrows represent the directionality and size of their links. Each construct's level of capture by the survey's questions is indicated by the numbers inside the circles (e.g., 0.596 for technical preparedness and 0.639 for BI effectiveness); values above 0.5 denote strong measurement.

Technology readiness is emphasised as a major motivator while examining the pathways. Its substantial positive influence on cost-effectiveness (0.886) indicates that it not only directly improves BI effectiveness but also increases the cost-efficiency and scalability of BI solutions for businesses. It is implied that a retail company is more likely to find BI solutions that are both feasible and efficient if it is digitally equipped, with the right tools

and skills. Since cost-effectiveness and management support are correlated (0.738), business executives are more likely to support the use of BI technologies if they are affordable.

Cost-effectiveness and management support have a slightly negative direct influence on BI effectiveness (-0.106 and -0.117, respectively), which may suggest that although these factors are significant, they are not as potent on their own as competitive pressure or technical preparedness.

The other powerful factor is competitive pressure, which has a very favourable impact on BI efficacy (1.058). This implies that companies are more likely to employ BI tools to optimise their operations and stay competitive when they are facing pressure from rivals or increasingly demanding clients. Because market forces and leadership are interconnected in the adoption of technology, management assistance also has the impact of boosting competitive pressure (0.917).

Although infrastructure constraints are not directly associated with BI effectiveness in this model, they do have a strong correlation with competitive pressure (0.925), demonstrating how outside factors like erratic internet or power supplies can affect the level of competition and, consequently, the adoption of BI.

The business climate for small shops in in Lagos State is generally depicted by this model with accuracy. Technological preparedness and sensitivity to competitive pressures are shown to be the most important factors in determining how best to employ BI tools. The impact of infrastructure, managerial support, and cost is more complex and often depends on how these elements interact with other aspects of the business environment.
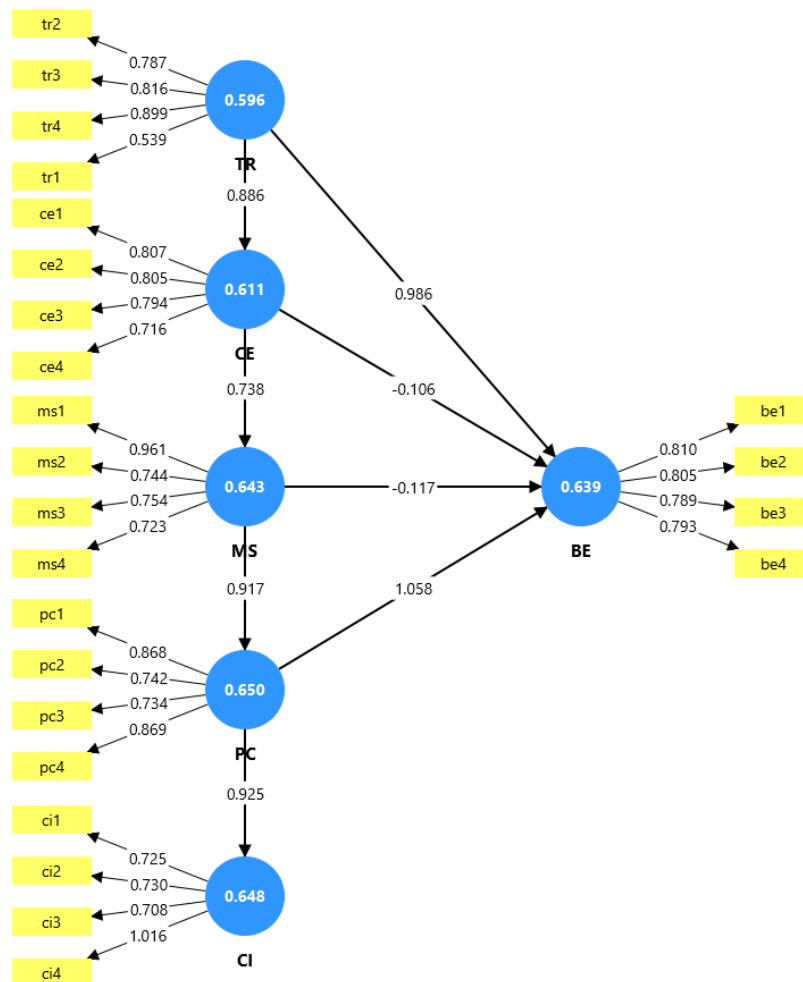

Figure 2. Measurement Model
Source: author

According to these findings, small retailers may maximise the benefits of business intelligence solutions by using an inclusive approach that addresses both market and infrastructure issues, supports leadership, and develops digital competencies.

IV. DISCUSSION

The results of this investigation offer a significant understanding of the elements that impact small retail businesses' adoption and effectiveness of business intelligence (BI) tools. According to the findings, the two main factors influencing BI effectiveness are technological preparedness and competitive pressure. It follows that companies that are competing in highly competitive marketplaces and have the requisite digital tools and expertise are more likely to use BI solutions to enhance their operations and performance. These findings are consistent with Tanui and Mutua, (2024) findings, which highlighted the significance of digital infrastructure and skills in small business adoption of technology. In a similar vein, Mathu and Tlare (2017) and Adukpo and Mensah (2025) discovered that small retailers are driven to embrace cutting-edge technologies to stay relevant in the market by competitive pressure. Furthermore, Bruce et al. (2023) emphasised how important it is for small business to be technologically prepared in order to use data analytics to make better decisions.

Cost-effectiveness and management support, on the other hand, play more complex roles in the study and have less direct impact on BI effectiveness. This stands in contrast to some previous research, including that conducted by Khalatur et al. (2022), and Siddiqui (2025) which found that management commitment had a significant beneficial impact on the adoption of technology in South African businesses The minor negative direct impact seen here can be a reflection of African contextual issues, where conflicting priorities and scarce resources can lessen the immediate advantages of leadership support or cost reductions. Hence, these findings contribute to a more comprehensive understanding of how small retail businesses navigate the complexities of adopting low-cost BI solutions, highlighting the need for integrated strategies that not only enhance technological readiness and respond to competitive demands but also address infrastructural challenges and foster strong managerial engagement. Additionally, the strong correlation between infrastructure constraints and competitive pressure suggests that external environmental factors may indirectly shape BI adoption more than previously recognised. This finding differs from the work of Tichavavamwe and Rachmawati (2024), who emphasised infrastructure as a direct barrier to technology use rather than an indirect influence through market dynamics.

Contribution to Knowledge

This study significantly expands the existing understanding of the application of business intelligence by small retail businesses in sub-Saharan Africa, a region that is frequently overlooked in studies on technology adoption. The study emphasises the crucial role that market dynamics and digital readiness play in influencing technology deployment in resource-constrained situations by identifying technological readiness and competitive pressure as the main determinants of BI effectiveness. Furthermore, the subtle conclusions about infrastructure limitations, managerial support, and cost-effectiveness provide new understandings of how these elements interact in intricate ways rather than having direct effects. Including organisational and environmental variables unique to developing nations, enhances current theoretical frameworks and offers a more comprehensive view of BI adoption in small businesses.

Limitations of the Study

The study has limitations despite its contributions: First, the cross-sectional design records data at a single point in time, making it difficult to observe changes in BI adoption over time or infer causality; longitudinal studies could offer more insight into how these relationships change as businesses mature or as infrastructure improves; second, the study focusses on retail businesses in urban and peri-urban areas, which may have better access to technology and infrastructure than their rural counterparts, potentially limiting the generalisability of the findings in Lagos contexts; and finally, the use of self-reported data may introduce biases related to respondents' perceptions or social desirability, which could be mitigated in future research through mixed-method approaches or objective performance metrics.

Implications of the Study

The findings have significant applications for technological businesses, business support agencies, and policymakers. To create a supportive climate for the adoption of BI, the government should prioritise developing competitive markets and improving digital infrastructure. With an emphasis on skill development and real-world BI applications, business support agencies can provide customised training programs to increase small merchants' technology preparedness. To meet the unique requirements and limitations of small retail businesses in Lagos State, technological businesses are urged to create scalable, reasonably priced BI solutions. Additionally, the study emphasises how crucial it is to involve management in supporting BI projects and recommends that capacity-building activities incorporate leadership development.

V. CONCLUSIONS

The study concludes that competitive pressure and technological readiness are significant variables in the successful adoption and efficacy of low-cost BI solutions in in Lagos State small retail businesses, with more intricate, indirect roles played by cost-effectiveness, management support, and infrastructure limitations. These observations demonstrate the complex relationship between internal capabilities and external environmental conditions in developing economies when it comes to technology adoption. It is crucial to address these aspects comprehensively to enable small retailers to use BI technologies for better decision-making, increased operational effectiveness, and long-term competitiveness.

REFERENCES

1. Abdulnabi, S. M. (2024). Adoption of Business Intelligence Among Iraqi SMEs Culture: Impact of Technology Acceptance Model, Information Quality, And Organizational Readiness. *Journal of Intercultural Communication*, *24*(3), 32–43. https://doi.org/10.36923/jicc.v24i3.833.
2. Adeyemi, O. S., & Olubiyi, T. O. (2024). An analysis of investment trends, innovation and its impact on cabotage and local content regime: Nigerian experience from businesses in oil and gas and maritime industries. *ABUAD Journal of Social and Management Sciences*, *5*(2), 285-301.
3. Adukpo, T. K., & Mensah, N. (2025). Financial Technology and Its Effects on Small and Medium-scale Enterprises in Ghana: An Explanatory Research. *Asian Journal of Economics, Business and Accounting*, *25*(3), 268–284. https://doi.org/10.9734/ajeba/2025/v25i31709.
4. Alarefi, M. (2024). The Impact of Artificial Intelligence on Business Performance in Saudi Arabia: The Role of Technological Readiness and Data Quality. *Engineering, Technology and Applied Science Research*, *14*(5), 16802–16807. https://doi.org/10.48084/etasr.7871.
5. Borodako, K., Berbeka, J., Rudnicki, M., & Łapczyński, M. (2023). The impact of innovation orientation and knowledge management on business services performance moderated by technological readiness. *European Journal of Innovation Management*, *26*(7), 674–695. https://doi.org/10.1108/EJIM-09-2022-0523.
6. Bruce, E., Shurong, Z., Ying, D., Yaqi, M., Amoah, J., & Egala, S. B. (2023). The Effect of Digital Marketing Adoption on SMEs Sustainable Growth: Empirical Evidence from Ghana. *Sustainability*, *15*(6), 1–24. https://doi.org/10.3390/su15064760.
7. Carvalho, N. L. D. S. (2025). Forecasting for Health: The Strategic Role of FP&A and Business Intelligence in U.S. Healthcare Resilience. *IOSR Journal of Business and Management*, *27*(5), 65–77. https://doi.org/10.9790/487X-2705026577.
8. Chebrolu, S. K. (2025). AI-powered business intelligence: a systematic literature review on the future of decision-making in enterprises. *American Journal of Scholarly Research and Innovation*, *4*(01), 33–62. https://doi.org/10.63125/gq69nv41.
9. Hammad, M. Y., Rahmaddulla, S. R. Bin, Muhammad Tamyez, P. F., Osman, A. A. Bin, & Kamar, A. N. N. (2025). Evaluating Smart Manufacturing Readiness: A Maturity Model Perspective. *International Journal of Research and Innovation in Social Science*, *IX*(III), 2352–2367. https://doi.org/10.47772/IJRISS.2025.90300183.
10. Kgakatsi, M., Galeboe, O. P., Molelekwa, K. K., & Thango, B. A. (2024). The Impact of Big Data on SME Performance: A Systematic Review. *Businesses*, *4*(4), 632–695. https://doi.org/10.3390/businesses4040038.
11. Khalatur, S., Pavlova, H., Vasilieva, L., Karamushka, D., & Danileviča, A. (2022). Innovation management as basis of digitalization trends and security of financial sector. *Entrepreneurship and Sustainability Issues*, *9*(4), 56–76. https://doi.org/10.9770/jesi.2022.9.4(3).
12. Lennerholt, C., Van Laere, J., & Söderström, E. (2021). User-Related Challenges of Self-Service Business Intelligence. *Information Systems Management*, *38*(4), 309–323. https://doi.org/10.1080/10580530.2020.1814458.
13. Maghsoudi, M., & Nezafati, N. (2023). Navigating the acceptance of implementing business intelligence in organizations: A system dynamics approach. *Telematics and Informatics Reports*, *11*, 1–12. https://doi.org/10.1016/j.teler.2023.100070.
14. Mathu, K., & Tlare, M. T. (2017). The impact of IT adoption in SMEs supply chains: A case of Gauteng and Free State provinces of South Africa. *South African Journal of Business Management*, *48*(3), 63–71.
15. Molete, O. B., Mokhele, S. E., Ntombela, S. D., & Thango, B. A. (2025). The Impact of IT Strategic Planning Process on SME Performance: A Systematic Review. *Businesses*, *5*(1), 1–42. https://doi.org/10.3390/businesses5010002.
16. Olubiyi, T. O. (2025a). Service Quality in the Age of Artificial Intelligence: Evidence From Listed Telecommunication Businesses in Sub-Saharan Africa. In S. Misra, M. Kaushik, A. Jain, & C. Banerjee (Eds.), Human-Centric AI in Digital Transformation and Entrepreneurship (pp. 339-358). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-8009-3.ch016.
17. Olubiyi, T. O. (2025b). Aligning Sustainable Consumer Behaviour and Profitability of Listed Indigenous Small Businesses in Sub-Saharan Africa: Towards Achieving Sustainable Development Goal 12. In M. Khokhar (Ed.), Enhancing Social Sustainability in Manufacturing Supply Chains (pp. 61-108). IGI Global Scientific Publishing https://doi.org/10.4018/979-8-3693-9740-4.ch003.
18. Olubiyi, T. O. (2025c). Innovative Behaviour and Profitability in Family-Owned Businesses Post Pandemic: Empirical Investigation from Africa. In T. Olubiyi, S. Suppiah, & C. Chidoko (Eds.), The Future of Small Business in Industry 5.0 (pp. 1-24). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-7362-0.ch001.
19. Olubiyi, T. O. (2024a). Improving Customer Experience Through Differentiation Capability: The Rise of Competition among Africa's Consumer Goods Companies. *PaperAsia*, 40(5b), 230-240.
20. Olubiyi T. O. (2024b). An investigation of the role of airline safety management and its impact on passenger satisfaction: a study of commercial airline businesses in Nigeria. Journal of the Management Sciences, 60(4).
21. Olubiyi, T. O. (2024c). Achieving Sustainable Development Goal Four (4) in Africa: Spotlighting the role of quality education and innovation orientation. Economics, Management and Sustainability, 9(1), 105-118. doi:10.14254/jems.2024.9-1.8.
22. Olubiyi, O.T., Lawal, A, T., & Adeoye, O.O. (2022). Succession Planning and Family Business Continuity: Perspectives from Lagos State, Nigeria. Organization and Human Capital Development, 1(1), 40–52. https://doi.org/10.31098/orcadev.v1i1.865.

23. Olubiyi, T. O (2022a). An Investigation of Technology Capability in Small and Medium-Sized Enterprises (SMEs), Journal of Management Sciences, 9 (2), 21-31. (ABS ranking).

24. Olubiyi, T.O. (2022b). Measuring technological capability and business performance post-COVID Era: Evidence from Small and Medium-Sized Enterprises (SMEs) in Nigeria, Management & Marketing Journal, vol xx (2),234- 248.

25. Olubiyi, T.O., Jubril, B., Sojinu, O.S., & Ngari, R. (2022). Strengthening Gender Equality in Small Business and Achieving Sustainable Development Goals (SDGs), Comparative Analysis of Kenya and Nigeria, Sawala Jurnal Administrasi Negara, 10(2) 168-186.

26. Onyia, V., Enyinnah, N., & Olubiyi, T.O. (2019). Leadership and employee performance: The Dunning-Kruger effect, International Journal of Advanced Research 7(10):358-367.

27. Qhal, E. M. A. (2025). Integrating Knowledge Management and Business Intelligence for Advancing Data-Driven Decision Making in the Fourth Industrial Revolution. *Journal of Posthumanism*, *5*(5), 1651–1669. https://doi.org/10.63332/joph.v5i5.1539.

28. Shibiti, R., Masabo, T. T., & Ladzani, W. (2023). Readiness of SMMEs for the adoption of the fourth industrial revolution in Mamelodi Township. *International Journal of Research in Business and Social Science (2147- 4478)*, *12*(8), 33–47. https://doi.org/10.20525/ijrbs.v12i8.2986.

29. Siddiqui, N. A. (2025). Optimizing Business Decision-Making Through Ai-Enhanced Business Intelligence Systems: A Systematic Review of Data-Driven Insights in Financial and Strategic Planning. *Strategic Data Management and Innovation*, *2*(01), 202–223. https://doi.org/10.71292/sdmi.v2i01.21.

30. Suswanto, R. E., Wahyudi, I., Rahmawati, R., & Said, M. (2025). Bridging Faith and Innovation: A Systematic Literature Review of Islamic FinTech Adoption Patterns and Regulatory Frameworks (2020-2024). *Al-Muamalat: Jurnal Ekonomi Syariah*, *12*(1), 59–76. https://doi.org/10.15575/am.v12i1.41417.

31. Tanui, S., & Mutua, J. (2024). Digital Transformation Strategies and Competitive Advantage In The Kenyan Banking Industry. *IOSR Journal of Business and Management (IOSR-JBM)*, *26*(4), 1–07. https://doi.org/10.9790/487X-2604090107.

32. Tarigan, M. K., Simatupang, T. M., & Bangun, Y. R. (2025). Building Resilience through Digital Transformation: a Systematic Literature Review and Comprehensive Framework for Large Enterprises. *International Journal of Business Innovation and Research*, *36*(5), 1–29. https://doi.org/10.1504/IJBIR.2025.10070413.

33. Tichavavamwe, C., & Rachmawati, R. (2024). Factors influencing the adoption of business analytics in Zimbabwe. *Jurnal Manajemen Dan Pemasaran Jasa*, *17*(2), 203–222. https://doi.org/10.25105/jmpj.v17i2.19932.

34. Uwem, I. E., Olubiyi, T. O., Kuforiji, A. A., & Genty, K. I. (2022). Exploring the relationship between workplace incivility and productivity: SME's Perspective, International Journal of Social Science, Education, Communication and Economics (Sinomics Journal)1(3), 281-296.

35. Uwem, E. I., Oyedele, O. O., & Olubiyi, O. T. (2021). Workplace green behavior for sustainable competitive advantage. In human resource management practices for promoting Sustainability IGI Global. (248–263).

36. Widhiastuti, S., Ahmadi, S., & Helmy, I. (2025). Exploring the link between business intelligence and financial performance in SMEs. *Investment Management and Financial Innovations*, *22*(2), 36–46. https://doi.org/10.21511/imfi.22(2).2025.0.

Appendix A
Questionnaire

Section A: Demographic Information
Please provide the following self-business information:
Gender: Male ()   Female ()
Age: 18-24 ()   25–34 () 35–44 ()   45–54 ()   55 and above ()
Highest Level of Education: Secondary school ()   Bachelor's degree ()   Master's degree ()   Others ……
Years in Business: Less than 1 year ()   1–5 years ()   5–10 years ()   More than 10 years ()
Position in Business: Owner ()   Manager ()   Employee ()   Other: _____
Type of Business: Grocery/Convenience store ()   Clothing/Apparel ()   Electronics ()   Household goods () Other (please specify): _____

Section A: Technological Readiness
Our staff can use computing tools to analyze data with ease.
Our company has hardware and software that can be used to develop BI solutions.
We have sufficient technical competence for successfully implementing BI applications.
Our staff is trained to use BI tools to make decisions.

Section B: Cost-Effectiveness of BI Solutions
The price of the BI platform is within our company budget.
The BI solution is scalable with business growth.
Upgrades and support maintenance charges are reasonable.
The price of the BI tools justifies the investment.

Section C: Management Support
Management is in favour of the utilization of BI technology.
Time, money, and manpower are invested to adopt BI solutions.
Management is encouraging the utilization of BI tools in decision-making.
Leadership identifies the benefit of BI to our retail firm.

Section D: Pressure from the Competition
Pressure from other retailers in terms of competition makes us adopt BI solutions.
Customer pressures require us to make data-driven decisions.
There is pressure to keep up with the competition using BI tools.
Peer organizations adopting BI require us to adopt it.

Section E: Constraints from Infrastructure
We have a stable internet connection capable of hosting BI applications.
Our infrastructure is sufficient to allow constant use of BI tools.
Affordable digital devices needed for BI are accessible to us.
Infrastructure problems limit our use of BI solutions.

Section F: BI Effectiveness (Dependent Variable)
Our inventory turnover has increased with BI tools.
Operational expenditures have been reduced with the help of BI.
Our understanding of customer choices is better with BI applications.
Our business in general has improved with BI solutions.