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# A SYSTEMATIC REVIEW AND PROPOSITION OF AN E-COMMERCE FRAMEWORK FOR AFRICAN SMEs: INTEGRATING TAM AND TPB INTO TOE FRAMEWORK

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## Abstract

This study offers a systematic review to identify the facilitators and barriers to African Small and Medium Enterprises (SMEs') adoption of e-commerce and proposes an integrated e-commerce adoption framework. The review integrates two widely used theoretical frameworks, the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), into the Technology-Organization-Environment (TOE) framework. Following a rigorous literature search and careful evaluation in accordance with the PRISMA-P standards, 21 studies that were published between 2012 and 2022 were selected for inclusion in this study. The findings identified several key facilitators and barriers to e-commerce adoption. Facilitators include perceived ease of use (PEOU), perceived usefulness (PU), subjective norms (SU), perceived behavioral control (PBC), compatibility, organizational readiness for change, external support, security and trust, market and competitive pressures, access to reliable internet connectivity, social and cultural factors, economic factors, government policies, and education and training. Barriers include perceived technology trust, perceived relative advantage, firm size, senior management support, attitude, SME owners' IT skills, consumer readiness, etc. The proposed integrated TOE framework will offer valuable insights for policymakers, researchers, and practitioners seeking to enhance e-commerce adoption and its benefits for African SMEs. The study's discussion provides insights into the patterns and trends identified, their theoretical implications, and practical recommendations for policymakers and SMEs in Africa.

## Keywords

African Small and Medium Enterprises (Smes), E-Commerce Adoption, Facilitators, Barriers, Integrated E-Commerce Adoption Framework, Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Technology-Organization-Environment (TOE) Framework, Systematic Review

## 1. Introduction

Small and medium-sized enterprises (SMEs) play a crucial role in fostering economic growth and development within any given economy (Makame et al., 2014). They are major job creators, providing employment opportunities for a significant portion of the workforce (Yakasai, 2017; Ajmal, 2017; Akanbi & Akintunde, 2018; Zain et al., 2020). In today's business world, SMEs gradually shift to online marketplaces to enhance their performance and gain a sustainable competitive edge (Hussain et al., 2022). Many governments, especially in developing nations, have supported SMEs by offering incentives for them to conduct online transactions (Ebenezer et al., 2020; Nazir & Roomi, 2021).

The Internet has revolutionized the way businesses operate. It is no longer a luxury for a select few but a vital necessity for the success of any business in any part of the world. It has become one of the most important means by which businesses worldwide can reach out to their customers and prospective clients and compete with larger firms on a global platform. Electronic commerce, also known as "e-commerce," is a business model that has gained significant popularity and become a prominent aspect of modern commerce. It has gained widespread public acceptance due to the experiences of individuals, companies, and governments in online trading. Most modern companies now depend on e-commerce for their growth and survival strategy, resulting in increased spending ofbillions of dollars by consumers, businesses, and governments (Idris et al., 2017; Sarfo & Song, 2021). E-

commerce has quickly gained popularity with many SMEs as a marketing tool to increase sales in their online shops (Yadav et al., 2021). A report has demonstrated that online transactions boost profit margins for SMEs by 200% and reduce the number of lost sales due to customers not being able to visit the shop itself (Anand, 2022).

There has been remarkable e-commerce growth worldwide. In 2021, global e-commerce sales reached USD 5.2 trillion; by 2026, that number is expected to rise to more than $8.1 trillion (Statista, 2022). This growth can be attributed to the increasing adoption of digital technologies, expanding internet penetration, and the ease and availability of buying online. Convenience, price comparisons, product variety, and personalized shopping experiences are some of the factors driving consumers to embrace online shopping (Jlková & Králová, 2021). The COVID-19 pandemic further accelerated this shift as lockdowns and social distancing measures forced consumers to rely on e-commerce for shopping.

Recent advancements in mobile technology, rising levels of internet accessibility, and changes in consumer preferences have all contributed to the African e-commerce industry's significant expansion and evolution (Igue et al., 2021). According to the World Economic Forum (2022), there was a 52.7% increase in revenue in Africa's e-commerce market from 2019 to 2020. Galal (2023) reports that the e-commerce industry in Africa is projected at a CAGR of +66.18% (USD 27 billion) between 2023 and 2027 and USD 67.78 billion market value by 2027, as per the findings of a Statista report. The continent's large population (1.43 billion in 2023, approximately 17% of the total global population), rising middle class, and increasing urbanization present the significant market potential for e-commerce businesses (Worldometer, 2023; WTO, 2020). More than 500,000 Africans are predicted to utilize e-commerce by 2025, according to the International Trade Administration (ITA 2023). With limited access to traditional banking and limited desktop computer usage, mobile phones have become the primary gateway for online transactions (ITA, 2023). Mobile commerce (m-commerce) accounts for a significant portion of African e-commerce activities. Alongside traditional business-to-consumer (B2C) platforms, there is a growing presence of peer-to-peer (P2P) marketplaces, social commerce platforms, and online classifieds (Igue et al., 2021). These diverse models cater to African consumers' and businesses' unique needs and preferences (World Economic Forum, 2022).

The African e-commerce industry has grown significantly, but compared to other regions, its penetration level is still relatively low (UNCTAD, 2017). This presents a significant opportunity for businesses to enter and capture market share in various sectors, including retail, travel, financial services, and logistics. E-commerce allows African businesses to engage in cross-border trade and expand their customer base beyond domestic boundaries. According to Igue et al. (2021), the AFCFTA agreement further facilitates regional trade integration, making cross-border e-commerce a promising avenue for growth. E-commerce platforms provide opportunities for integrating the informal sector into the formal economy. By enabling small-scale entrepreneurs, artisans, and informal businesses to sell their products online, e-commerce can enhance their visibility, customer access, and income-generating opportunities.

The presence of online marketplaces, both regional and local, such as Jumia, Konga, Kilimall, and Takealot, significantly influences the e-commerce landscape in Africa. These platforms function as intermediaries, facilitating transactions between buyers and sellers and providing diverse products and services. Efforts should be made to bridge the digital divide and promote e-commerce in rural areas. Initiatives such as digital hubs, infrastructure, mobile-based marketplaces, and rural e-commerce training programs aim to empower rural communities, foster entrepreneurship, and drive economic inclusion (Ndulu et al., 2022). Integrating e-commerce with financial technology (fintech) solutions is gaining traction in Africa. Mobile money services, digital wallets, and innovative payment solutions are enhancing the convenience and accessibility of online transactions, particularly for unbanked and underbanked populations.

Inadequate physical and digital infrastructure remains a significant challenge for African e-commerce (Igue et al., 2021). The cost of digital infrastructure is high. Businesses need to invest a lot in equipment and software, which can burden SMEs that may be struggling to stay afloat in business. Limited internet connectivity, especially in rural areas, and inconsistent power supply can hinder e-commerce growth (Ajao et al., 2018; Awa et al., 2017; Igue et al., 2021; Johnson & Iyamu, 2019; Muathe & Muraguri-Makau, 2020). Building trust and ensuring security in online transactions are critical challenges. Concerns about fraud, privacy, and data protection can deter consumers from engaging in e-commerce activities (Igue et al., 2021). Addressing these concerns through robust cybersecurity measures, secure payment systems, and consumer protection regulations is crucial for fostering trust (Fatonah et al., 2018). The lack of qualified staff is another challenge for SMEs, especially those with little capital, to hire personnel with relevant IT skills and experience. The skills gap also makes it difficult for SMEs to implement new technology because they cannot afford the required training programs for their employees. The lack of IT literacy among consumers is another barrier that hinders e-commerce growth in Africa (Merhi, 2022). Some consumers may not be familiar with the basics of shopping online, making it difficult for them to adopt the technology. Logistics and last-mile delivery pose challenges for e-commerce in Africa. Inadequate transportation networks, inefficient delivery systems, and addressing the complexities of delivering to remote or underserved areas can increase costs and create logistical hurdles for e-commerce businesses (Lilako, 2021).

A plethora of studies have expressed the need to bridge literature gaps pertaining to the adoption of e-commerce in developing nations (Ebenezer et al., 2020; Hajli et al., 2012; Idris et al., 2017; Kimana, 2020; Nwosu, 2017; Rahayu & Day, 2017; Ramdansyah & Taufik, 2017). While e-commerce adoption studies have been abundant, there are several reasons why specific attention should be given to the context of developing countries, including contextual differences, limited research focus, unique challenges and opportunities, policy relevance, and knowledge sharing. This study applies a systematic framework based on the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Technology Organization Environment (TOE) to identify the factors that promote or hinder the adoption of e-commerce by SMEs in Africa. The research addresses the following questions: (1) What are the facilitators and barriers to e-commerce adoption among African SMEs? (2) How can integrating TAM and TPB into the TOE framework contribute to understanding e-commerce adoption among African SMEs and its implications for policymakers and practitioners? The subsequent sections of the paper include (2) Theoretical underpinnings—a review of TAM, TPB, and TOE frameworks; (3) Methodology; (4) Study Findings; (5) Proposed Integration of TPB and TAM into the TOE Framework; (6) Conclusion and Implications; and (7) Limitations and recommendations.

## 2. Theoretical Frameworks

### *2.1 Technology Acceptance Model (TAM)*

TAM is a well-established theoretical construct that facilitates understanding users' acceptance and implementation of novel technologies. TAM, first introduced by Davis in 1989, has been widely utilized across multiple fields, such as e-commerce, to gain insights into consumers' attitudes and actions regarding adopting and utilizing online platforms (King & He, 2006). According to Awa et al. (2011), TAM is considered the earliest and most prominent example of a conventional adoption theory in the realm of information technology. TAM helps explain consumers' attitudes and intentions toward embracing new technology by focusing on the technology's perceived usefulness and ease of use. Extensions of TAM, such as perceived trust, risk, and advantage, further enrich the understanding of e-commerce adoption.

### *2.2 Theory of Planned Behavior (TPB)*

TPB is a psychological theory that explains human behavior and decision-making in various contexts, including adopting new technologies. Icek Ajzen (1991) proposed the TPB to expand the earlier Theory of Reasoned Action. TPB provides a valuable framework for understanding and promoting e-commerce adoption by considering the attitudes, subjective norms, and perceived behavioral control of individuals (Ajzen, 1991). TPB posits that certain attitudes and behaviors are more likely to occur when an individual has a positive intention to perform them (Sharma et al., 2022). Businesses can leverage social influence by highlighting testimonials, reviews, and recommendations from satisfied e-commerce users to create a positive social norm around e-commerce adoption. Providing user-friendly interfaces, clear instructions, and accessible customer support can enhance consumers' perceived control over using e-commerce platforms, thus increasing their intention to adopt. TPB can therefore be used as an analytical framework for understanding behavioral intentions and their antecedents, which helps marketers understand consumers' adoption patterns in e-commerce (Hamid & Azhar, 2023).

### *2.3 Technology-Organization-Environment (TOE) Framework*

TOE is a theoretical framework that facilitates the comprehension of the acceptance and deployment of technological innovations within organizational settings, as proposed by Tornatzky & Fleischer (1990). According to researchers, three important dimensions impact technology adoption: technological, organizational, and environmental dimensions. These three factors not only present barriers to the growth of technology but also opportunities (Al-Fahim et al., 2022). This understanding can inform decision-making, assist in identifying barriers and facilitators to adoption, and guide strategies for successfully implementing and integrating new technologies within organizations (Idris et al., 2017).

## 3. Methodology

### *3.1 Approach to Research*

A systematic review methodology was adopted to identify, evaluate, and synthesize relevant studies. This approach ensures a comprehensive and unbiased approach to gathering and analyzing existing knowledge in the field (Tawfik et al., 2019).

### *3.2 Search Strategy*

To find relevant studies, a thorough search technique was used. Searches were conducted on electronic databases, including ProQuest, Academia, and Google Scholar, using keywords related to e-commerce adoption, SMEs in Africa, and relevant theoretical frameworks (TAM, TPB, and TOE). Additionally, manual searches of key

journals, conference proceedings, and references of the included studies were conducted to ensure the inclusion of all relevant literature.

### *3.3 Criteria for Inclusion and Exclusion*

The studies considered in the review fulfilled the following criteria:

- The studies centered on the adoption of e-commerce among African SMEs.
- The studies included empirical research, case studies, or conceptual papers.
- The studies provided insights into the factors that facilitate or hinder the adoption of e-commerce among African SMEs.
- The studies were published in English.

Studies excluded included duplicates irrelevant to the research topic or studies lacking sufficient data.

### *3.4 Process for Selection of Study*

The study selection process consists of two stages: the initial screening of titles and abstracts and a comprehensive evaluation of the full text. The identified studies' titles and abstracts were screened according to the criteria for inclusion and exclusion. The studies that were chosen underwent a thorough evaluation of their full text to determine their final inclusion in the review.

### *3.5 Extraction of Data*

In order to pool the data from the various studies, a standardized data extraction form was created. Study specifics were among the data culled, which included (e.g., author, year, country), research design, sample characteristics, theoretical frameworks used, identified facilitators and barriers, and any additional findings relevant to the research objectives.

### *3.6 Data Synthesis and Analysis*

A combination of thematic review and framework synthesis was applied. The extracted data were analyzed thematically. The facilitators and barriers identified in the included studies were organized and categorized based on their outcomes (positive or negative impacts).

### *3.7 Quality Assessment*

The process was done based on the PRISMA-P guidelines. The quality assessment criteria focused on the nature of the included studies, such as a clear research question or objective, appropriate study design and methodology, adequate sample size and sampling technique, valid and reliable data collection methods, appropriate data analysis techniques, transparent reporting of findings, and minimization of biases and limitations. The researchers ensured that relevant information from each study, such as study characteristics, methodologies, and key findings, was appropriately extracted and recorded. The researchers assigned ratings and scores based on predetermined rating scales to each criterion. The quality assessment helped evaluate the strength and reliability of the included studies.

| S/N | Author(s)/ Year | Country of Study | Research Aim | Sample Size | Research Design/ Measures | Data Analysis Techniques | Key Findings | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Facilitators (Positive impact) | Barriers (Negative impact) |
| 1 | Ocloo et al., (2020) | Ghana | To investigate the associations between TOE factors and diverse levels of B2B e-commerce adoption. | 315 manufacturing SMEs | Quantitative/ / Surveys | PLS structural equation modelling | Perceived desirability<br>Organization's readiness<br>Competitive pressure<br>Top management support<br>Government support | Business partner's pressure |
| 2 | Awiagah et al., (2016) | Ghana | To evaluate the TPB and TOE determinants of e-commerce adoption in Ghana | 111 participants, including government officers | Quantitative / Surveys | Structural equation modelling | Perceived credibility<br>Management support<br>Government support<br>Enabling conditions<br>Mimetic pressure<br>Perceived behavioral control<br>Attitude | Relative advantage<br>CEO self-efficacy<br>Subjective norm |
| 3 | Boateng et al., (2021) | Ghana | To examine the adoption of e-commerce among SMEs in Ghana. | 291 SME representatives from four administrative regions. | Quantitative Structured questionnaire | Binary logistic regression model<br>Friedman test | Perceived relative advantage<br>IT knowledge of SME Owner<br>Perceived security Perceived compatibility | Competitive pressure<br>Perceived cost |
| 4 | Ndayizigamiye & McArthur (2014) | South Africa | To explore the factors influencing e-commerce adoption among South African SMMEs in the Durban area. | 180 SMME owners/ managers | Quantitative/ Survey questionnaire | Chi-square test | Relative advantage<br>Compatibility | Complexity |
| 5 | Brima & Sesay (2019) | Sierra Leone | To explore the e-commerce adoption barriers among SMEs | 442 SME owners from three districts | Quantitative Survey | Pearsons's correlation and multiple linear regression models | X | Technological barriers (internet access, ICT affordability, ICT complexity, and perceived advantages of technology)<br>Organizational barriers (a low level of ownership support, ICT experience, lack of available resources, and lack of computer skills)<br>Environmental barriers (lack of competition among SMEs, lack of regulation, lack of ICT support in the environment and lack of internet security) |

| S/N | Author(s)/ Year | Country of Study | Research Aim | Sample Size | Research Design/ Measures | Data Analysis Techniques | Key Findings | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Facilitators** | **Barriers** |
| | | | | | | | **(Positive impact)** | **(Negative impact)** |
| 6 | Awa et al., (2017) | Nigeria | To introduce and empirically test a ten-factor framework based on the T-O-E theory and UTAUT to enhance understanding of technology adoption. | 373 SME owners and executives | Quantitative Questionnaire | Partial least square (PLS) | Perceived simplicity<br>Performance expectancy<br>Top management support<br>Size of the enterprise<br>Scope-of-business operations<br>Normative pressure<br>Mimetic pressure | Perceived compatibility |
| 7 | Ajao et al., (2018) | Nigeria | To examine the factors influencing e-commerce innovations implementation among SMEs | 387 SMEs | Quantitative Questionnaire | Logistic regression. | Employees with ICT background<br>Internet bandwidth quality<br>Internet security technologies<br>Customer and supplier readiness<br>Government policies<br>Attitude of SME owner | Frequency of training<br>Existing technologies<br>Size of customer Industrial support<br>Competition Infrastructural support |
| 8 | Justino et al., (2022) | Angola | To examine the factors influencing mobile commerce adoption by retail SMEs in seven districts in Angola using an expanded TOE framework. | 263 retail personnel | Quantitative Structured questionnaire | Structural equation modelling | Relative advantage<br>Data security<br>Top management support<br>Technology competence,<br>Readiness for mobile distribution systems | Policies and regulations<br>Technological cooperative institutions<br>Operator network<br>Mobile payment gateway<br>Competitive Pressure |
| 9 | Dahbi & Benmoussa (2019) | Morroco | To examine the inhibitors of e-commerce adoption among Moroccan SMEs | 4 SMEs in travel, cosmetic, artisanal manufacturing, and textile sectors. | Qualitative Case study | Narrative analysis | X | Employee's IT knowledge<br>Customer's confidence in technology<br>Transactional trust<br>Customer's technology knowledge<br>Logistics costs<br>Implementation costs<br>Financial resources<br>Price transparency |

| S/N | Author(s)/ Year | Country of Study | Research Aim | Sample Size | Research Design/ Measures | Data Analysis Techniques | Key Findings | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Facilitators** | **Barriers** |
| | | | | | | | **(Positive impact)** | **(Negative impact)** |
| | | | | | | | | Price transparency<br>Management support, Perceived need of e-commerce<br>Reluctance to change<br>Customers' preference for human contact<br>Customers' preference for products touch<br>Government support<br>Customs regulations<br>Competitive pressure<br>Customer/supplier pressure |
| 10 | Ocloo et al., (2018) | Ghana | To examine the factors influencing e-commerce adoption in developing countries. | 209 manufacturing SMEs | Quantitative Questionnaire | Structural Equation Modelling | Relative advantage<br>Intensity of competition<br>Top management support | Compatibility<br>Complexity<br>Organizational readiness<br>Employees'<br>IT knowledge<br>business partner pressure<br>Government support |
| 11 | Agwu & Murray (2015) | Nigeria | To identify the barriers to e-commerce adoption among SMEs in Nigeria | 30 SMEs | Qualitative Interviews | Thematic analysis | X | Infrastructure<br>External pressures<br>Socio-cultural factors<br>Size<br>Resource availability<br>Organizational culture<br>Trained labour<br>Perceived benefits<br>Perceived costs<br>Perceived trust<br>Perceived risks<br>Age<br>Occupational relevance<br>Languages and education |
| 12 | Elsmani et al., (2017) | Africa | To identify e-commerce barriers facing SMEs in Africa | African SMEs | Literature Review | Citation analysis | X | Money transaction challenges: security, fraud, and internet connectivity.<br>Limited external pressure from suppliers, customers, or competitors. |

| S/N | Author(s)/ Year | Country of Study | Research Aim | Sample Size | Research Design/ Measures | Data Analysis Techniques | Key Findings | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Facilitators** | **Barriers** |
| | | | | | | | **(Positive impact)** | **(Negative impact)** |
| | | | | | | | | High infrastructure costs.<br>System incompatibility.<br>Inexperience in sales and taxes.<br>Technical barriers: limited access to online database.<br>Importance of internet access and connectivity.<br>Knowledge exposure for owners and employees.<br>Government support and sociopolitical barriers: frequent changes, racial conflicts.<br>Language barrier rooted in colonial history.<br>Internet security: money transfer and online information exchange.<br>Lack of clear legal and regulatory rules.<br>Currency instability.<br>Crime and corruption |
| 13 | El-Ebiary et al., (2022) | Nigeria | To examine the factors causing low adoption of e-commerce among SMEs | 4 retail SME owners and managers | Qualitative Semi-structured face-to-face interviews | Content Analysis | X | Technical problem<br>Lack of Internet security<br>Lack of legal and regulatory support<br>Limited knowledge |
| 14 | Ekong et al., (2012) | Nigeria | To examine the DIT and TOE framework factors influencing e-commerce acceptance among small businesses | | Quantitative Questionnaire | Partial Least Squares | Relative advantage<br>Management support<br>IS vendor support | Compatibility<br>Perceived complexity<br>Organizational readiness |
| 15 | Oluyinka et al., (2013) | Nigeria | To examine the factors influencing e-commerce adoption | 140 post-graduate Nigerian students in Malaysia | Quantitative Questionnaire | Multiple regression | | Lack of government support and policy |
| 16 | Osakwe et al., (2016) | Nigeria | To identify the issues in the adoption of e-commerce among small businesses in Nigeria | | Quantitative Questionnaire | | Expected benefits<br>Organizational readiness<br>Information intensity Perceived government support | Educational attainment<br>Gender |

| S/N | Author(s)/ Year | Country of Study | Research Aim | Sample Size | Research Design/ Measures | Data Analysis Techniques | Key Findings | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Facilitators (Positive impact) | Barriers (Negative impact) |
| 17 | Garg & Cheu (2015) | South Africa | To assess the e-commerce adoption level among SMEs in Pretoria East and the motivating factors behind their adoption | 48 SMEs | Quantitative Questionnaire survey | Pearson Correlation Multiple Regression | Relative advantage<br>Competitive pressure<br>IT knowledge | Security<br>Government support |
| 18 | Johnson & Iyamu (2019) | South Africa | To examine the factors that influence and impact the adoption and utilization of e-commerce within the mainstream retail grocery sector in South Africa. | | Qualitative Semi-structured interview | Systematic and subjective techniques | Business drivers<br>Stock of knowledge<br>Alliance of actors<br>Training and skills<br>Assimilation of processes<br>organizational requirements<br>Network of people<br>Technology architecture<br>Culture | X |
| 19 | Mushaya vanhu & Simuka (2022) | Zimbabwe | To identify the barriers to e-commerce adoption by manufacturing MSEs in Harare, Zimbabwe. | 10 respondents | Qualitative Semi structured in-depth interview | Content analysis | X | High cost of ICTs<br>Incompatibility<br>lack of ICTs infrastructure<br>support by the government<br>Accessibility challenges<br>Lack of education and awareness<br>Cultural and trust issues. |
| 20 | Sarfo & Song (2021) | Ghana | To examine e-commerce adoption among SMEs in Ghana, utilizing the theoretical frameworks of TAM) and TOE models | 152 survey participants 38 interview participants (SME owners and managers) | Quantitative (Survey) Qualitative (interviews) | Partial least squares regression analysis | Perceived usefulness<br>Perceived ease of use<br>perceived usefulness<br>Delivery system<br>subjective norm | Credibility of e-commerce<br>Perceived cost<br>A lack a well-structured payment system<br>Demand |
| 21 | Gurure & Takavarasha Jr (2020) | Zimbabwe | To evaluate the importance of e-commerce adoption for SME growth and explore the motivating dynamics behind e-commerce adoption in developing countries, specifically Zimbabwe. | 15 participants | Qualitative Interviews | TOE Framework analysis | Management support<br>Suppliers / partners expectations<br>Government support<br>Customer expectations<br>Competitive pressure | ICT Infrastructure<br>Technology competence<br>Technology affordability<br>Organizational awareness<br>Customer orientation<br>Organizational resistance to change |

## 4. Study Findings

This study has reviewed a plethora of literature in the context of Africa, as presented in Table 1.

### *4.1 Facilitators of E-commerce Adoption Among SMEs in Africa*

A study by Ocloo et al. (2020) examined the impact of business-to-business (B2B) e-commerce on TOE variables among 315 SMEs in Ghana's manufacturing sector. The study's findings reported a noteworthy connection between perceived desirability, organizational readiness, competitive pressure, government support, and B2B e-commerce adoption levels. Studying the TPB and TOE variables of e-commerce adoption in Ghana, Awiagah et al. (2016) surveyed 111 individuals. Perceived credibility, managerial support, support from the government, enabling conditions, mimetic pressure, perceived behavioral control, and attitude had meaningful connections with the rate of e-commerce adoption. Boateng et al. (2021) investigated the prevalence of e-commerce among SMEs in Ghana. Perceived relative advantage, IT knowledge of SME owners, perceptions of security, and perceptions of compatibility were shown to be positive contributors to the adoption of e-commerce. South African SMMEs in the Durban region were the focus of research by Ndayizigamiye and McArthur (2014). The findings verified that variables, including relative advantage and compatibility, aided in embracing e-commerce. To better understand technology adoption among 373 SME owners and executives in Nigeria, Awa et al. (2017) evaluated a ten-factor framework based on the T-O-E theory and UTAUT, and the findings revealed that perceived ease of use, performance expectancy, support from top management, company size, operational scope, normative pressure, and mimetic pressure were positive influencing factors of e-commerce adoption.

Ajao et al. (2018) investigated 387 SMEs in Nigeria's informal sector to determine what characteristics influence the adoption of e-commerce technologies. Employees with an ICT background, high-quality internet connectivity, internet security technologies, consumer and supplier readiness, government regulations, and the mindset of the SME owner were found to all play a role in the successful implementation of e-commerce. Using the TOE framework, Justino et al. (2022) analyzed the variables affecting mobile commerce adoption among 263 retail SMEs in seven districts in Angola. The study's findings corroborated the significance of previously identified drivers of e-commerce adoption, including relative advantage, data security, top-level management support, technological proficiency, mobile distribution system readiness, and critical mass. Ocloo et al. (2018) analyzed data from 209 small and medium-sized manufacturing enterprises (SMEs) in Ghana to determine which variables influence the adoption of e-commerce in developing nations. The research found that variables, including relative advantage, high levels of competition, and management support, were all important in facilitating e-commerce adoption by SMEs. Ekong et al. (2012) analyzed the DIT and TOE framework variables affecting SMEs' embrace of electronic commerce in Nigeria. The study discovered that relative advantage, management support, and IS vendor support all contributed to the use of e-commerce.

Osakwe et al. (2016) conducted research to better understand the factors that influence small businesses in Nigeria to adopt e-commerce and discovered that perceived advantages, organizational readiness, information intensity, and perceived support from the government all facilitated the adoption of e-commerce. Garg & Cheu (2015) surveyed 48 SMEs in Pretoria East, South Africa, to determine their familiarity with and enthusiasm for e-commerce. There is evidence that factors like relative advantage, competitive pressure, and IT skills have facilitated the adoption of e-commerce. To understand what variables affect the mainstream retail grocery industry in South Africa's adoption and use of e-commerce, Johnson & Iyamu (2019) undertook qualitative research. Based on the findings, many variables, including business motivations, knowledge stock, actor alliance, training and skills, process integration, organizational needs, human resource architecture, and cultural norms, were shown to impact e-commerce adoption substantially. Sarfo & Song (2021) used both the TAM and the TOE frameworks in their research on the widespread adoption of e-commerce among SMEs in Ghana. The research found that variables contributed to its widespread acceptance, including the perceived usefulness of e-commerce, the perceived ease of using e-commerce, the delivery system, and the subjective norm. Gurure & Takavarasha Jr. (2020) examined the role of e-commerce in expanding SMEs and the factors that drive its use in Zimbabwe and other developing nations. According to the research, factors like management support, expectations from suppliers and partners, government support, consumer expectations, and competitive pressure all aided in adopting e-commerce.

### *4.2 Barriers to E-commerce Adoption among SMEs in Africa*

Ocloo et al. (2020) investigated the associations between TOE variables and the extent to which businesses engage in business-to-business electronic commerce. Findings indicated that pressure from business partners was a significant barrier. The factors of TPB and TOE that influence Ghanaians' willingness to engage in online shopping were analyzed in a study by Awiagah et al. (2016). The research found that CEO self-efficacy, subjective norms, and relative advantage were the most significant barriers. Boateng et al. (2021) investigated the prevalence of e-commerce among SMEs in Ghana. The study's findings corroborated previous speculations on the importance of competitive pressure and perceived cost in preventing wider e-commerce use. South African SMMEs in the Durban region were the focus of a study by Ndayizigamiye & McArthur (2014). The study's findings confirmed that the

complexity of the technology was a major barrier. To understand the challenges that 442 SMEs in Sierra Leone face while trying to implement e-commerce, Brima & Sesay (2019) performed a research study. The findings showed a lack of internet access, low ownership support, a lack of resources and computer skills, a lack of competition among SMEs, a lack of regulation, a lack of environmental support for ICT, and a lack of internet security were the barriers. T-O-E theory and UTAUT formed the basis of the ten-factor paradigm that Awa et al. (2017) introduced and experimentally tested to understand technology adoption better. The research confirmed that perceived compatibility was a major barrier. Ajao et al. (2018) investigated the variables that influence SMEs in Nigeria to adopt e-commerce technologies. The research found that the most significant challenges in implementing e-commerce were related to training, technology, customer size, industry support, competitiveness, and enabling infrastructure.

Using the TOE framework, Justino et al. (2022) investigated what variables influence SMEs' adoption of mobile commerce across seven provinces in Angola. The research found that several factors were barriers, including regulations and laws, cooperative institutions, operator networks, mobile payment gateways, and competitive pressure. Four tourism, cosmetics, artisanal manufacturing, and textile SMEs were surveyed in Dahbi & Benmoussa's (2019) qualitative research. The findings of the study suggested that logistics costs, implementation costs, financial resources, price transparency, management support, the perceived need for e-commerce, reluctance to change, customers' preferences for human contact, customers' preferences for product touch, government support, customs regulations, competitive pressure, and customers' and suppliers' pressure were barriers. Ocloo et al. (2018) looked into the factors contributing to the growth of e-commerce in Ghana. Major barriers were compatibility, complexity, organizational readiness, workers' IT competence, pressure from business partners, and support from the government. Agwu & Murray (2015) found that many factors, including lack of necessary infrastructure, external pressures, social factors, firm size, resource availability, organizational culture, trained labor, perceptions of benefits, costs, trust, risks, age, occupational relevance, languages, and level of education, were significant barriers

A study by Elsmani et al. (2017) shed light on issues related to safety and fraud as well as internet access, trust, product distribution, and sanctions, which are barriers SMEs in Africa are facing in relation to e-commerce adoption. Other barriers include limited external pressure, high infrastructure costs, incompatibility of systems, lack of experience in sales and taxes, limited online database access, knowledge exposure for owners and employees, frequent government changes, racial conflicts, language, money transfer, online information exchange, lack of clear legal and regulatory rules, location, currency instability, and crime and corruption. El-Ebiary et al. (2022) conducted a qualitative study to determine what is preventing Nigerian small businesses from embracing e-commerce. The study's findings pointed to technological issues, insufficient Internet security, a lack of legal and regulatory support, and a lack of understanding as key barriers. Ekong et al. (2012) analyzed the DIT and TOE framework factors affecting SMEs' embrace of e-commerce in Nigeria. The study's findings corroborated that compatibility, perceived complexity, and organizational readiness were barriers.

Oluyinka et al. (2013) researched what variables influence SMEs' adoption of e-commerce in Nigeria. The research found that the absence of government support and legislation was a significant barrier. Oluyinka et al. (2013) researched what variables influence SMEs' adoption of e-commerce in Nigeria. The research found that the absence of government support and legislation was a significant barrier. To understand the barriers that prevent small firms in Nigeria from adopting e-commerce, Osakwe et al. (2016) carried out a study. According to the findings, a person's level of education and gender were barriers. The study conducted by Garg & Cheu (2015) aimed to evaluate the degree of e-commerce adoption among SMEs in South Africa and identify the factors that drive their adoption. The study's findings indicated that security and support from the government were barriers. Mushayavanhu & Simuka (2022) undertook a qualitative investigation to identify the impediments to adopting e-commerce by manufacturing micro and small enterprises in Harare, Zimbabwe. The study findings revealed that significant barriers to adopting and using ICTs included high costs, incompatibility, inadequate government support for ICT infrastructure, accessibility challenges, insufficient education and awareness, cultural issues, and trust issues. The study by Sarfo & Song (2021) aimed to investigate the adoption of e-commerce among SMEs in Ghana. The researchers employed the theoretical frameworks of the TAM) and TOE models to guide their investigation. The research findings indicated that significant barriers included issues related to credibility, perceived cost, inadequacies in payment systems, and demand. The study by Gurure & Takavarasha Jr. (2020) aimed to assess the significance of e-commerce adoption in promoting SMEs' growth and investigate the driving forces that underlie its adoption in Zimbabwe. The study's findings validated that the significant barriers included ICT infrastructure, technological proficiency, technological affordability, organizational awareness, customer orientation, and organizational resistance to change.

## 5. Proposed Integration of TPB, TAM, and TOE Frameworks of Factors for E-commerce Adoption

Variables from the TAM and TPB can be integrated into the TOE model to examine the cognitive and affective factors driving adoption decisions and comprehend the influences and difficulties faced by SMEs in Africa. Figure 1 presents the proposed framework, comprising technological factors [Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Perceived Security Risk (PSR), Perceived Technology Trust (PTT), Perceived Relative Advantage (PRA), and Perceived Behavioral Control (PBC)] ; organizational factors [Firm Size (FS), Organizational Readiness (OR), Senior Management Support (SMS), Attitude, Subjective Norms (SN); SME Owner's IT Skills]; Firm size, organizational readiness, organizational support, attitude, and subjective norms);and environmental factors [Consumer Readiness (CR), Competitive Pressure (CP), Government Support (GS)].

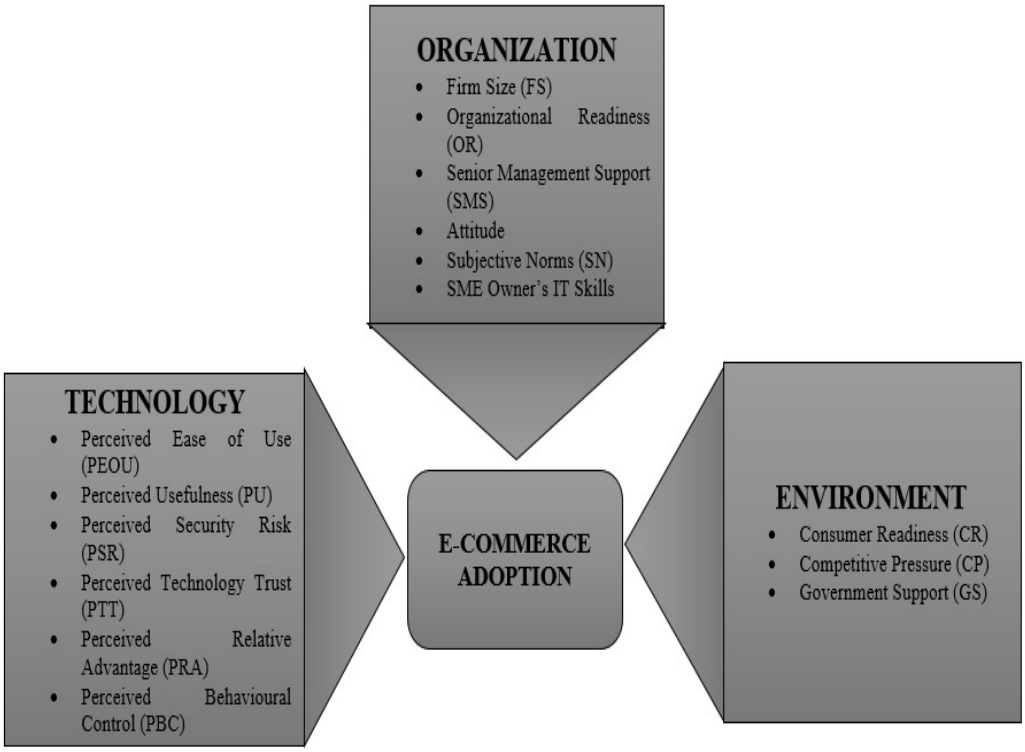


**Figure 1: Proposed Integrated E-commerce Adoption Framework**

### *5.1 Technological Factors*

The context of technology encompasses cutting-edge technology's practical applications and defining characteristics (Hao et al., 2020; Religia et al., 2021). It refers to the specific elements and attributes of technology that influence the decisions of businesses to embrace innovative systems (Zhu & Kraemer, 2002).

#### 5.1.1 Perceived Ease of Use (PEOU)

PEOU refers to the belief or perception that using a particular information technology will be easy (Davis, 1989). The cognitive simplicity and ease that are required by a technological product are what drive adoption behavior (Davis, 1993). The effective utilization of any technology platform by individuals can be facilitated by designing them to be intuitive, easy to navigate, and do not require a significant amount of time to learn (Awa et al., 2014; Bandara & Amarasena, 2018). With user-friendly interfaces and navigation in e-commerce systems, SMEs can streamline their online business processes and efficiently manage their online operations, saving time and increasing productivity. According to research by Herzallah & Mukhtar (2016), who looked into what factors influence SMEs in Palestine to use e-commerce, PEOU was a major determinant. Naruetharadhol et al. (2022) found that PEOU significantly impacted the willingness of two main consumer segments—older people with middle-class incomes and young people with low incomes to adopt online travel in Thailand. In light of this, the following proposition will be presented:

*Proposition 1: The higher the PEOU in relation to simplicity, navigation, user-friendliness, and overall user experience for African SMEs, the greater the likelihood of adoption.*

#### 5.1.2 Perceived Usefulness (PU)

PU is the subjective assessment of the extent to which using technology can lead to improved overall performance or effectiveness (Davis, 1989). It is crucial in shaping individuals' attitudes and decisions regarding adopting and accepting technology (Lu et al., 2003; Naruetharadhol et al., 2022). It can be measured by determining the

influence of information technology on job performance, speed of work, enhanced productivity, and effectiveness, enabling jobs to be much easier and more useful (Davis, 1993). Triandis (1980) noted that PU is consistent with Vroom's expectancy theory because the expected short- and long-term effects of a new technology influence the decision to adopt it. Suppose African SMEs believe that adopting e-commerce will result in tangible benefits or improvements in their business performance (i.e., cost savings, expansion of market reach, operational efficiency, and competitive advantage). In that case, they are more likely to embrace and utilize it. Conversely, if e-commerce is perceived as useless or not contributing significantly to their performance, they may be less inclined to adopt it. Rahman & Ariffin (2022) confirmed a positive and statistically significant correlation between PU and e-wallet adoption in Malaysia. Nurchayati et al. (2022) also confirmed a positive and statistically significant correlation between PU and attitudes toward e-commerce. Therefore, the following proposition is presented:

*Proposition 2: When African SMEs perceive e-commerce as beneficial, such as enabling cost savings, expanding market reach, improving operational efficiency, and improving competitive advantage, they are more likely to adopt it.*

**5.1.3 Perceived Security Risk**

Perceived security risk refers to an individual's subjective assessment or belief regarding the potential threats and vulnerabilities associated with engaging in online transactions, specifically through e-commerce platforms. Security challenges such as a lack of privacy for personally identifiable information and issues with authentication, integrity, and non-repudiation are major concerns for online users (Biucky et al., 2017). The e-commerce environment is fraught with several vulnerabilities; hence, it is essential for every company that has adopted e-commerce to adhere to the following four fundamental security principles: privacy, integrity, authentication, and non-repudiation (Bolek et al., 2023; Zhang et al., 2023). This includes implementing robust security protocols, utilizing encryption technologies, providing secure payment gateways, and ensuring compliance with industry security standards. Biucky et al. (2017) conducted a study that revealed a noteworthy correlation between perceived risk and social commerce adoption. A negative relationship was found in a study by Park et al. (2004). In light of this, the following proposition will be presented:

*Proposition 3: African SMEs that perceive e-commerce platforms as secure in terms of privacy, data security, payment security, transaction integrity, and compliance with security standards are more likely to adopt them for conducting online transactions.*

**5.1.4 Perceived Technology Trust (PTT)**

PTT in relation to e-commerce represents an individual's confidence or trust in the technology infrastructure and systems involved in conducting online business activities. Consumers are more inclined to purchase online, provide sensitive information, and make financial transactions when they trust the technology (Reepu & Arora, 2022). People's reluctance to engage in online activities due to worries about safety, reliability, or privacy, all of which stem from a general lack of trust in technology, may delay the adoption of new technology (Chaudhry et al., 2016). In a study by Tee et al. (2020), privacy and security factors played a significant role in shaping the perception of SMEs in Sarawak regarding adopting an e-business platform. In a recent study conducted by Reepu & Arora (2022), it was discovered that the perceived level of trust played a pivotal role in influencing the decision of SMEs to adopt e-commerce practices. The findings of Herzallah & Mukhtar's (2016) study indicated that managers' perceptions of trust had a favorable impact on their intention to use e-commerce services. Hence:

*Proposition 4: African SMEs that trust the reliability, security, and credibility of e-commerce technology are more likely to adopt and engage in online business activities.*

**5.1.5 Perceived Relative Advantage (PRA)**

PRA in relation to e-commerce refers to the extent to which individuals perceive e-commerce as advantageous, valuable, or superior in terms of efficiency, convenience, cost-effectiveness, and other relevant factors (Ramli et al., 2017; Yang et al., 2008). PRA encompasses several dimensions: efficiency, convenience, cost-effectiveness, enhanced customer experience and engagement, competitiveness, and expanded market reach. When individuals perceive that e-commerce offers significant advantages over traditional methods, they are more inclined to adopt and engage in online transactions. On the other hand, if individuals perceive limited or no relative advantage, they may be less motivated to adopt e-commerce and prefer traditional business approaches. In their study, Wong & Nor (2020) discovered a favorable impact of PRA on the initial trust of customers when considering the utilization of an unfamiliar web vendor. A favorable impact of PRA was found on solar energy adoption (Bandara & Amarasena, 2018), loading-bearing masonry (LBM) technology adoption (Ramli et al., 2017), and SME e-commerce adoption in Malaysia (Zain et al., 2020). To this end, the study proposes that:

*Proposition 5. When African SMEs perceive e-commerce as offering significant advantages over traditional business methods, such as cost-effectiveness, efficiency, improved customer engagement, enhanced competitiveness, and return on investment, they are more likely to adopt it.*

**5.1.6 Perceived Behavioral Control (PBC)**

PBC in relation to e-commerce represents the perceived simplicity or complexity individuals perceive in using e-commerce platforms and conducting online transactions, as well as their perceived ability to overcome any barriers or challenges associated with embracing a technology (Hartono (2007). When individuals have a better perception of their resources and a lower awareness of the challenges they face, they have a greater sense of their ability to regulate their actions and a stronger desire to actually carry out those activities (Noor et al., 2020; Onyango, 2016). When African SMEs perceive a high level of control over their ability to use e-commerce platforms effectively and overcome potential challenges, they will have a strong desire to actually carry out business activities electronically. Conversely, suppose SMEs perceive low control or encounter significant barriers, such as technical complexities or limited resources. In that case, they may be less motivated to adopt e-commerce or face challenges using it effectively. In several studies, PBC significantly and favorably impacted respondents' intentions to engage in online shopping (Noor et al., 2020), online shoppers' purchase intentions (Nayyar et al., 2011), and the adoption rate of solar energy technology (Bandara & Amarasena, 2018). This study proposes the following:

*Proposition 6: African SMEs that have greater confidence in their technical competence, internet literacy, self-efficacy, resources, and ease of use perception will use e-commerce.*

***5.2 Organizational Factors***

These factors are crucial in shaping organizations' readiness, capabilities, and success in adopting and leveraging e-commerce (Satar & Alarifi, 2022).

**5.2.1 Firm Size (FS)**

FS refers to the measurement or categorization of businesses based on their scale or magnitude of operations. It involves assessing a company's resources based on revenue, number of employees, or market share (Awa et al., 2011) in relation to technology adoption and implementation (Awa et al., 2017). FS influences a company's approach to adopting and utilizing online platforms and technologies (Burke, 2005). While larger enterprises often have more extensive resources, such as financial capital, dedicated IT departments, and established distribution networks, smaller ones may face unique challenges in adopting e-commerce, including limited financial resources, technological expertise, and market reach. However, SMEs can benefit from e-commerce by gaining access to new markets, reducing operational costs, and enhancing customer engagement (Awa et al., 2015). A study by Burke (2005) focused on small business information systems (SBIS) rather than e-commerce adoption and confirmed variations in the adoption patterns of different types of SBIS based on firm size. The study's results suggested that smaller firms may face challenges or have lower levels of adoption when it comes to utilizing these specific SBIS technologies. The findings from the study by Amornkitvikai & Lee (2020) suggested that larger SMEs in Thailand had a higher propensity to adopt e-commerce than smaller ones. The study proposes that:

*Proposition 7: African SMEs that possess adequate resources, including financial capital, IT infrastructure, and dedicated IT departments, will have the capacity and potential to embrace e-commerce.*

**5.2.2 Organizational Readiness (OR)**

Organizational readiness (OR), in relation to e-commerce, refers to the preparedness and capacity of an organization to effectively adopt, implement, and leverage e-commerce initiatives. It encompasses the organization's ability to align its internal processes, resources, and structures with the requirements and opportunities presented by e-commerce technologies and practices (Nguyen et al., 2022). As defined by Priambodo et al. (2021), organizational readiness involves a connection between people, processes, and systems, as well as the ability to monitor performance, which requires synchronization and coordination for the deployment of technology to be effective. OR involves several key dimensions, including technological infrastructure, human resources, organizational culture, and external relationships. The findings of these studies collectively support the notion that OR has a positive and significant influence on the adoption of e-commerce (Abed et al., 2020; Lian et al., 2022; Nurlinda & Muda, 2021; Nguyen et al., 2022; Ocloo et al., 2018; Priambodo et al., 2021; Satar & Alarifi, 2022; Yeni & Yasri, 2020). These studies suggest that organizations that are more prepared and equipped to embrace e-commerce technologies and practices will effectively utilize e-commerce platforms and strategies. Therefore, this study proposes that:

*Proposition 8: African SMEs with higher levels of technological infrastructure, a culture of innovation and digital orientation, and the ability to invest in developing the necessary IT knowledge and skills are more prepared to leverage e-commerce effectively.*

### 5.2.3 Senior Management Support (SMS)

SMS, in relation to e-commerce refers to the active involvement, endorsement, and provision of resources by top management within an organization to facilitate the successful adoption, implementation, and ongoing utilization of e-commerce initiatives (Abed, 2020). Arshad et al., (2018), top executives create an enabling environment that encourages and empowers employees to embrace e-commerce by providing management support. Organizational readiness involves several key aspects, including management's commitment, resource allocation, policy and strategy development, change management, and performance monitoring and evaluation. It helps overcome resistance to change, promotes a positive organizational culture, and encourages and empowers employees to embrace e-commerce. According to a study by Hamad et al. (2019), there was a notable and statistically significant relationship between the level of top management support and the adoption of e-commerce among SMEs in the manufacturing sector in the United States. The study by Ocloo et al. (2018; 2020) found a noteworthy and statistically significant correlation between top management support and the adoption of e-commerce among SMEs in Ghana's manufacturing sector. The study by Sujatha & Karthikeyan (2021) confirmed the significance of top management support as a statistically significant factor in the adoption of e-commerce by SMEs in India. Hussain et al.'s (2020) study found a significant and positive influence of top management support for adopting e-commerce among SMEs in Pakistan. Hence:

*Proposition 9: African SME management's commitment, resource allocation, strategic alignment, change management, and performance monitoring and evaluation are critical for driving e-commerce adoption.*

### 5.2.4 Attitude

According to the TPB model, attitudes are the strongest predictor of intention, which predicts behavior (Ajzen, 1991). The attitude towards a given e-commerce activity can be defined as one's feelings or opinions concerning the behavior. An individual's attitude towards a certain behavior affects their beliefs about whether or not they will perform that behavior. Attitude in relation to e-commerce refers to an individual's overall evaluation, perception, or disposition towards engaging in e-commerce activities or utilizing e-commerce platforms (Okadapau & Emaase, 2016). It reflects a person's beliefs, opinions, emotions, and behavioral tendencies regarding e-commerce. Positive attitudes towards e-commerce will likely result in higher engagement, adoption, and continued usage of e-commerce platforms and services. Conversely, negative attitudes may lead to hesitation, resistance, or avoidance of e-commerce activities. Attitude encompasses three key components, including cognitive attitudes (perceptions about convenience, cost-effectiveness, security, trustworthiness, and reliability), affective attitudes (feelings of excitement, enjoyment, and satisfaction, while negative affective responses may involve distrust, frustration, or anxiety), and behavioral attitudes (intentions to adopt e-commerce, frequency of online shopping, willingness to share personal information, and trust in online payment systems). The study conducted by Okadapau & Emaase (2016) provided empirical evidence supporting the notion that a manager's positive attitudes play a crucial role in determining the successful implementation of e-commerce among SMEs in Kenya. The findings from the study of Zirbini et al. (2022) indicated a consistent and significant relationship between attitude and the intention to make an online purchase. The study proposes that:

*Proposition 10: The combination of positive cognitive attitudes (thoughts and beliefs), affective attitudes (emotional responses), and behavioral attitudes (inclination to act) towards e-commerce significantly influences the likelihood of e-commerce adoption among African SMEs*

### 5.2.5 Subjective Norms

Subjective norms in relation to e-commerce refer to the perceived social pressures or expectations an individual holds regarding the adoption and usage of e-commerce (Fishbein & Ajzen, 1980). It reflects the perception of what significant others, such as family members, friends, colleagues, and industry peers, think or believe about engaging in e-commerce activities (Ajzan & Driver, 1991). Normative beliefs and the desire to comply are two important factors that influence subjective norms. If an SME owner perceives that their colleagues and industry peers actively engage in e-commerce and endorse its benefits, they may feel more compelled to adopt e-commerce themselves. The desire to win social approval, avoid social rejection, or seek acceptance and recognition within their social or professional groups all impact it. The extent to which someone values the opinions and approval of others affects their motivation to comply with the subjective norms related to e-commerce. Supanat (2012) reported that the study's results indicated a noteworthy influence of subjective norms on the intention to engage in e-commerce. Similarly, George's (2011) study findings revealed that social contact strongly predicted overall satisfaction with online shopping. The study proposes the following:

*Proposition 11: African SME owners who perceive that their colleagues, industry peers, or successful businesses in their community actively engage in e-commerce and consider it as a normative practice are more motivated to comply with the subjective norms and adopt e-commerce within their own businesses*

### 5.2.6 SME Owner's IT Skills

SME owner IT skills, in relation to e-commerce, refer to the level of knowledge, competencies, and abilities that SME owners possess in using information technology (IT) tools, systems, and platforms relevant to conducting e-commerce activities. SME owner IT skills encompass the following aspects: technical proficiency, digital marketing skills, data analytics and insights, and cybersecurity awareness. Proficiency in IT skills will enable SME owners to effectively manage their online presence, optimize e-commerce operations, utilize digital marketing strategies, make informed business decisions, and ensure the security and privacy of customer information. By enhancing their IT skills or seeking assistance from IT professionals or service providers, SME owners can overcome potential barriers and challenges associated with e-commerce adoption, thereby maximizing the benefits and opportunities offered by the digital marketplace. Ndonga (2012) observed that a lack of ICT expertise is a major contributor to Africa's digital divide. In the case of Africa, limited ICT expertise can hinder individuals, communities, and businesses from fully benefiting from the opportunities offered by digital technologies, including e-commerce (Okolie & Ojomo, 2018). According to the findings of Rahayu & Day (2015), the owners' capacity to innovate, their ability to use information technology, and their experience using information technology positively influenced Indonesian MSMEs' adoption of e-commerce. According to research by Muathe & Muraguri-Makau (2020), CEOs with a basic understanding of information and communications technology are more likely to embrace e-commerce. Lip-Sam & Hock-Eam (2011) discovered that owners or CEOs of businesses that use computers regularly are more inclined to embrace e-commerce. Meanwhile, the owner's proficiency in information technology had a negative impact on the e-commerce sustainability (intensity) of Thai MSMEs (Amornkitvikai & Lee, 2020). The study proposes the following:

*Proposition 12. African SMEs whose owners have proficient IT skills are better equipped to navigate and utilize e-commerce platforms, leading to higher levels of adoption and utilization of online sales channels.*

### *5.3 Environmental Factors*

Environmental context includes both internal and external factors, including market components, government role, pressure from consumers, suppliers, and trading partners, and competition from rivals, which pose threats and opportunities in determining the degree to which an organization is likely to innovate or adopt new technology (Awa et al., 2015).

### 5.3.1 Consumer Readiness

Consumer readiness, in relation to e-commerce adoption among SMEs in Africa, refers to the preparedness of African consumers to engage in and embrace online shopping and e-commerce activities. It encompasses various factors influencing consumers' ability and willingness to adopt and actively participate in e-commerce platforms (Zhu et al. 2002). Consumer readiness includes technological, informational, trust and security, attitudinal, and financial readiness. Consumers' familiarity and comfort with using digital technologies for online shopping, including basic digital skills, will enable them to navigate e-commerce platforms. Information literacy skills, such as searching for products, understanding product descriptions, and assessing the credibility of online sources, may influence consumers' ability and willingness to adopt and actively participate in e-commerce platforms. Trust factors such as secure payment options, privacy policies, reliable customer support, and positive customer reviews can build confidence in the online shopping experience. Positive attitudes towards e-commerce, willingness to try new technologies, and openness to embracing online shopping practices are important aspects of attitudinal readiness. Financial readiness pertains to consumers' financial capabilities and access to payment methods that facilitate online purchases. SMEs need to recognize and address the specific challenges and barriers that consumers face regarding technological limitations, lack of information, trust concerns, attitudinal barriers, and financial constraints. Understanding consumer readiness is crucial for SMEs in Africa, as it directly impacts the success and growth of their e-commerce initiatives (Awa et al., 2015). Multiple studies have indicated that the limited proportion of households with personal computer access is the predominant obstacle impeding the growth of online business in Africa (Boateng et al., 2021; Dhabi & Benmoussa, 2019; Makame et al., 2014; Mthembu et al., 2018; Nazir & Roomi, 2020; Okolie & Ojomo, 2018). However, the increasing availability and affordability of personal computers with Asian brand names have significantly increased consumer readiness to use e-commerce platforms (Awa et al., 2015). The study proposes that:

*Proposition 13: African SMEs that prioritize building consumer trust through secure payment options, privacy policies, reliable customer support, and transparent communication are more likely to attract and retain customers, leading to increased e-commerce adoption.*

### 5.3.2 Competitive Pressure

Regarding e-commerce, competitive pressure (CP) refers to the influence of market competition on businesses to adopt and successfully engage in e-commerce practices. It refers to the external forces and dynamics that compel

organizations to embrace e-commerce as a strategic response to remain competitive in the digital marketplace (Lertwongsatien & Wongpinunwatana, 2003). CP can arise from various sources, including industry rivals, changing consumer preferences, market trends, and technological advancements (Awa et al., 2015). In a highly competitive business environment, businesses are more inclined to implement new ideas, approaches, and technologies in order to stay competitive. Businesses face pressure from competitors who are already leveraging e-commerce effectively. As consumer behavior and preferences evolve, businesses are increasingly expected to provide convenient and seamless online shopping experiences. Customers increasingly prefer the convenience, accessibility, and wide range of choices e-commerce platforms offer (Sin & Sin, 2020).

In their study, Sin et al. (2016) discovered a significant positive relationship between CP and the adoption of e-commerce among SMEs in Malaysia. In their study, Awa et al. (2017) observed a significant positive relationship between CP and the adoption of e-commerce among SMEs in Nigeria. The study by Hussain et al. (2020) revealed a noteworthy and positive correlation between CP and the extent to which Pakistani manufacturing SMEs adopt e-commerce. Meanwhile, a study by Aswar et al. (2021) observed a detrimental impact of customer/supplier pressure on the level of e-commerce adoption among SMEs in Indonesia. Similarly, Chang (2006) found a negative influence of competition intensity in Taiwan's SME sector on e-commerce adoption. However, the study proposes that:

*Proposition 14: African SMEs that face increasing market competition, changing customer preferences, or industry trends favoring e-commerce have a high propensity to adopt it to remain competitive.*

### 5.3.3 Government Support

Government support, in relation to e-commerce, refers to the actions and initiatives undertaken by government authorities to facilitate and promote the adoption, growth, and success of e-commerce activities within a country or region. It involves the implementation of policies, programs, and regulations to support online businesses, foster innovation, and ensure a level playing field for all participants in the digital marketplace (Hussain et al., 2020). Government entities are well-known contributors to the innovativeness of SMEs. Key aspects of government support for businesses in relation to e-commerce include policy framework, infrastructure development, financial incentives, skill development and training, market access and international trade, digital transformation initiatives, and consumer awareness and protection. However, companies subject to stringent rules set by the government are statistically less likely to adopt information technology, implying a negative correlation between government regulations and IT adoption by companies (Wang et al., 2020). Scupola (2003) argues that government support is one of the most significant determinants of e-commerce adoption. Hussain found an insignificant impact of government support on e-commerce adoption by manufacturing SMEs in Pakistan. The study proposes that:
*Proposition 15: African SMEs that receive substantial government support, including financial incentives, training programs, and infrastructure development, will be willing to transact their business digitally.*

## 6. Conclusion and Implications

The study concludes that various technological, organizational, and environmental factors play a significant role in either facilitating or hindering the adoption of e-commerce among African SMEs. By understanding and addressing these facilitators and barriers, policymakers, industry stakeholders, and SMEs themselves can develop targeted interventions and strategies to promote e-commerce adoption and unlock the potential benefits it offers for African SMEs.

The study's findings have several practical implications for African SMEs aiming to adopt e-commerce. These findings can be used to assess their readiness for e-commerce, identify potential facilitators and barriers, and develop effective strategies to overcome challenges and leverage opportunities. African SMEs should focus on building trust in technology by ensuring secure and reliable e-commerce platforms, implementing robust data protection measures, and providing transparent information about the safety and privacy of online transactions. They also need to offer guarantees and warranties to instill confidence in customers. African SME owners and potential adopters must be educated about the benefits and advantages of e-commerce, such as increased market reach, cost savings, improved customer engagement, and access to a global customer base. E-commerce adoption is not limited to large firms. Hence, targeted support programs must be developed tailored to smaller SMEs' specific needs and capacities, including financial assistance, training programs, and mentorship initiatives by various stakeholders, including government agencies, industry associations, financial institutions, and e-commerce platforms and service providers.

African SMEs should educate and engage consumers about the benefits and safety of e-commerce and address any concerns or barriers they may have, such as online payment security or trust in online sellers. They should also collaborate with industry associations, government bodies, and consumer protection agencies to establish trust-building initiatives and consumer awareness campaigns. African SMEs must advocate for government policies and initiatives that support e-commerce adoption among SMEs. Governments, industry

associations, and educational institutions can tailor capacity-building programs to address the identified facilitators and barriers, focusing on enhancing digital skills, adopting technology, and addressing trust and security concerns. The study highlights the role of consumer readiness and market factors in driving e-commerce adoption. This understanding can guide SMEs in targeting market segments with higher readiness for online purchasing and developing strategies to build trust, improve customer experiences, and capitalize on market opportunities.

The proposed integrated TOE e-commerce adoption framework, empirical evidence, and the 15 propositions have several implications and contributions to the field of e-commerce adoption among African SMEs. The 15 propositions provide specific statements that summarize the relationships between key variables and e-commerce adoption. These propositions offer clear directions for further research and can serve as a basis for developing strategies and interventions to promote e-commerce adoption among African SMEs.

### 7. Contributions, Limitations, and Recommendations

The review identified several key facilitators and barriers to e-commerce adoption. Facilitators include PEOU, PU, SU, PBC, compatibility, organizational readiness for change, external support, security and trust, market and competitive pressures, access to reliable internet connectivity, social and cultural factors, economic factors, government policies, and education and training. Barriers include perceived technology trust, perceived relative advantage, firm size, senior management support, attitude, SME owners' IT skills, consumer readiness, etc. This comprehensive list of factors provides a foundation for future research and informs strategies to overcome barriers and leverage facilitators. The study utilizes a systematic review approach, which relies on existing literature. While this provides valuable insights, it may introduce biases or limitations inherent to the selected studies. Future research could complement the systematic review with primary data collection methods, such as surveys or interviews, to gather more detailed and context-specific information on e-commerce adoption factors. The study's findings are based on the existing literature up until 2022. The e-commerce landscape constantly evolves, with emerging technologies, changing consumer behaviors, and evolving regulatory frameworks.

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