

# Factors Influencing E-commerce Adoption by SMEs in Sudan - Qualitative Analysis

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DOI: <https://dx.doi.org/10.47772/IJRISS.2025.90300117>

Received: 23 February 2025; Accepted: 03 March 2025; Published: 03 April 2025

## ABSTRACT

E-commerce's impact on small and medium-sized firms (SMEs) has received significant attention in research. Much research on e-commerce adoption among SMEs in developing countries has been conducted. However, few studies exist to explain the success of SMEs in Sudan in adopting e-commerce systems. The paper investigates the factors which influence e-commerce adoption by SMEs in Sudan. The study used semi-structured telephone interviews as a qualitative research approach to achieve its goal. The primary qualitative data were collected to explore the factors influencing e-commerce adoption in Sudanese SMEs, and analyzed using 'Deductive Content Analysis'. Utilizing the TOE theory, this study highlighted many main factors that affect SME enterprises during e-commerce implementation. The study identified three significant challenges: technological, organizational, and environmental. The qualitative data analysis revealed a significant relationship between each of the six variables (compatibility, IT knowledge, Management Support, Perceived Cost, Competitive Pressure, and Government Support) and electronic commerce usage among small and medium-sized companies in Sudan.

**Keywords:** E-commerce, SMEs, Sudan, adoption, Qualitative analysis, TOE theory

## INTRODUCTION

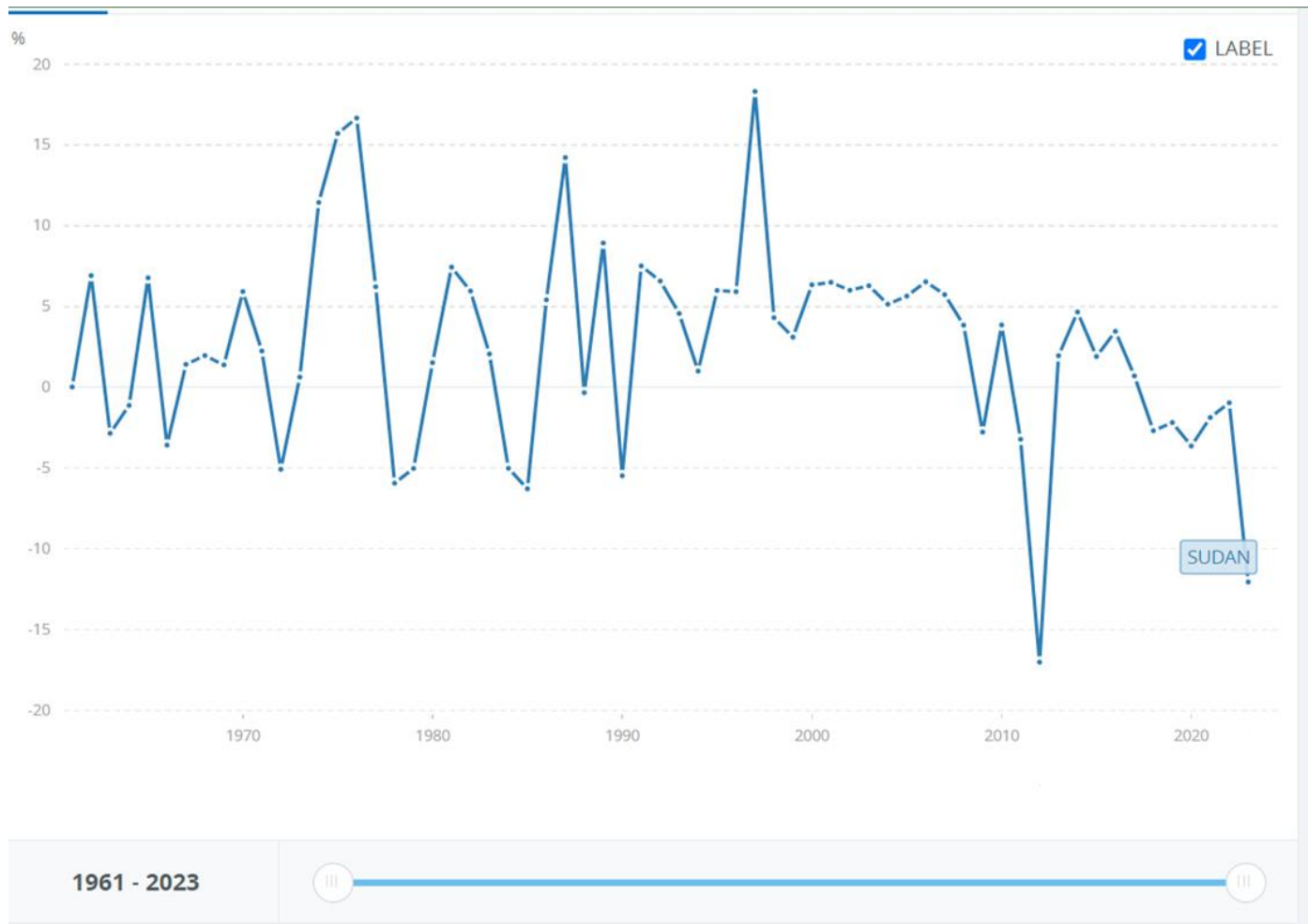
To promote sustainable economic growth and development, involving other corporate sectors besides the government is essential. Small and medium-sized businesses (SMEs) have been recognized as one of the key elements for boosting a country's economy (Salah & Ayyash, 2024). Small and medium-sized enterprises (SMEs) have made major contributions to the global economy, including GDP growth and job creation (Hendricks & Mwapwele, 2023). The advancement of technology has resulted in a significant shift in business culture around the world. Given the importance of e-commerce as a new element for firm competitiveness, e-commerce success factors are critical elements that require further investigation.

## Study Background

The Sudanese economy is unstable and faces major economic problems, the economic growth contracted by 8 % in 2022 and by 9.6 % in 2023 (CBS, Sudan, 2024). Inflation is high and increased in med of 2023 by 114%, and the Sudanese pound continues to drop in value rapidly (International Monetary Fund IMF, 2024). Despite the importance of the industrial sector to the economy, it plays a poor role in Sudan. According to the Sudanese Central Bureau of Statistics (2023), the industrial sector's production growth rate is only 2.5 per cent, the industrial sector's contribution to the country's economy is only 2.6 per cent, with the agricultural sector contributing 39.6 per cent and the services sector contributing 57.8 per cent. Although Sudan has vast resources and enormous economic potential, it is one of the world's least developed countries, due to the lack of funds to invest in the state's resources, and it relies on the import of manufactured goods from abroad and the export of primary commodities (Mosbah & Kartiwi, 2017).

## Economic growth: the rate of change of real GDP:

Figure 1: GDP Growth (annual %)



Source: World Bank

Figure 1 depicts Sudan's economic situation from 1961 to 2023, and illustrates the annual percentage growth rate of GDP at market prices based on constant Sudan's currency, expressed in US dollars. The oil industry has made a substantial contribution to Sudan's GDP progress since 1999. The economy expanded for nearly ten years as a result of rising oil prices, increased oil production, and large inflows of foreign investment. However, in 2011, South Sudan's separation caused Sudan to decrease three-quarters of its oil production and become involved in extended social conflict. Since the economic shock of South Sudan's secession, Sudan's economy has struggled to become stable and find a solution for the problem of the loss of foreign exchange earnings (Mosbah & Kartiwi 2017). Nearly half of the population lives at or below the poverty line due to current conflicts in Darfur, Southern Kordofan, the Blue Nile states, and recently in Khartoum, as well as a lack of basic infrastructure in many areas and a large portion of the population's reliance on subsistence agriculture (Bank of Sudan 2023). In addition to implementing an austerity plan to reduce spending, the Sudanese government is working hard to diversify its economy away from oil by investing in industries like gold mining and agriculture.

## US sanctions on Sudan

The Clinton administration imposed economic sanctions on the country in 1997 as a result of its perceived status as a sponsor of Islamist terrorism. This sanction has had a significant impact on Sudan's political, economic, and social affairs (Liu et al., 2021) The goal of these sanctions was to limit foreign investment, and

exports and imports of weapon equipment, and to halt commercial activities between Sudan and other countries (Bakari & Sayef, 2017).

### **Consequences of Sanctions on the Sudanese SMEs**

Small and medium-sized enterprises (SMEs) have faced sanctions-related challenges. They lack access to the US export market, as well as essential American technology and the best management practices, which would help their companies perform better (Hossain et al., 2023). Small and medium-sized enterprises have virtually lost access to short-term international trade finance, as the majority of non-US banks are unwilling to lend to Sudanese firms. Furthermore, even local businesses that can access trade finance pay a sanction premium on loans, which is passed on to ordinary Sudanese consumers in the form of higher prices for goods and services.

### **Significance of the study**

The outcomes of this research will assist policymakers in better understanding the factors which play the main role in e-commerce adoption among SMEs. The Sudanese government plays an important role in promoting SMEs by expanding its assistance. The research will reveal some issues in government policies, this issue has hindered the adoption of e-commerce by SMEs in the country. The research will suggest suitable policies to be passed to meet the needs of the businesses, which are feasible and implementable. As such, this research will bring value to the Sudanese government policy maker in enriching their knowledge and ideas regarding e-commerce adoption by SMEs. It will help to develop new policies to attract more new enterprises to adopt e-commerce in their firms, which will generate a better return for Sudan as a whole, by giving solutions to policymakers, the problem of a decrease in output, low performance, etc., could be solved. This research may also help government officials enact various trade rules and regulations and prepare incentives for motivating the application of e-marketing.

Practical recommendations will be proposed to assist SME companies in adopting e-commerce. A new model will be constructed to guide practitioners to adopt e-commerce by SMEs. Investigating the factors influencing e-commerce adoption by SMEs can result in great value to SMEs as it can take advantage of e-commerce in promoting growth and improving efficiency in their business or firms. Finally, the findings of this study will benefit some researchers in the e-commerce practice of SMEs. It is very rare to find a study in the literature on e-commerce in Sudan. This forces many researchers to rely on foreign literature, even when researching local organizations. Therefore, the findings of this study will serve as an additional source of reference for future research. This study's findings will contribute to the existing body of knowledge on e-commerce adoption in developing countries and serve as a starting point for future researchers. The study's findings will help to close if not fill, the gap left by the lack of e-commerce literature in Sudan.

## **LITERATURE REVIEW**

### **Internet and E-commerce in Sudan**

Despite the increasing importance of electronic commerce for the development of global economics, the level of e-commerce adoption by Sudanese SMEs is very low (Hossain et al., 2023). The spread of the Internet has led to sustainable growth opportunities in developed countries, positive social change and political participation opportunities for marginalized communities (Kit & Mun, 2020). Besides, the introduction of the Internet in most developing countries provided considerable economic benefits to the largely Western technology enterprises and enhanced the relationship of dependence between the International economic structure in developed countries and its equivalents in developing economies (Hendricks & Mwapwele, 2023). Internet services in Sudan started in 1998 as a joint-stock company between the Sudan Radio and Television Corporation and the Sudanese Company for Communications "Sudatel" They provided their services through telephone lines and it followed diversity and development in service provision as the mobile phone companies provided Internet service through intermediate generation technologies. In 2007, the third-generation services were transformed, which helped in the large and intensive spread of the service throughout the country.

## Internet users and mobile connection in Sudan 2023:

Table 1: Population and Internet users and mobile connection in Sudan 2023.

	Jan-23	Change between January 2020-January 2023	Comment
Population	44.38 million	Increased by 1.0 million	35,4% of the Sudanese population lives in urban centres, while 64,6% lives in rural areas.
Internet Users	13,70 million	Increased by 323 thousand	Internet penetration in Sudan stood at 30,9% in January 2023
Mobile Connection in Sudan	33.74 million	Increased by 456 thousand	The number of mobile connections in Sudan in January 2021 was equivalent to 76.0% of the total population.

Source: Central Bureau of Statistics (CBS).

(Table 1) illustrates the Internet penetration in Sudan, which stood at 30,9% in January 2023, and the number of mobile connections in Sudan in January 2023 was equivalent to 76.0% of the total population. Even though Sudan is an advanced country in the field of telecommunications and phone networks with optical fibre, which is considered one of the most developed phone networks in Africa (Salah & Ayyash, 2024), however, Sudan still faces numerous challenges when it comes to using the Internet and joining the world of e-commerce (Hossain et al., 2023).

Many difficulties are facing the growth of electronic commerce in Sudan such as the high cost of the internet service, the limited role of the online payment system, and the weak internet networks in rural areas (Elikem et al, 2020). Socially, relative poverty and a lack of knowledge about the use of IT, hardware, and software (Salah & Ayyash, 2024). The need for security in purchasing through the Online platform is an addition to these challenges (Hendricks & Mwapwele,2023). Furthermore, the adoption of electronic commerce by Sudanese SMEs will eventually contribute to the Sudanese economy in the future. therefore, this study represents an attempt to highlight the factors that affect the adoption of e-commerce by SMEs.

## Problem Statement

Small and medium-sized enterprises (SMEs) in developing countries have not fully utilized the Internet to launch their businesses on the global stage (Pahlawansah et al., 2023). SMEs continue to lag behind larger corporations in introducing e-commerce due to differences in motivation, strategy, and resources (Elikem et al, 2020). The SME sector in Sudan is of great importance to the Sudanese economy, with a total of 22,460 SME companies, representing 93.1% of the total number of 24,114 enterprises in the country, according to the latest estimates of the industrial statistical survey conducted by the Central Bureau of Statistics in Sudan, (2023). While SMEs make up the majority of firms, they are left far behind in adapting to innovative technology (Adam et al.,2020), which brought a more significant problem where the rate of firm performance is poor.

In contrast, developed countries have a higher rate of adoption of e-commerce activities, with the European Union (EU) contributing over 99% of European productions and providing 85% of all new job creation, according to the Eurobarometer Report (2023). Furthermore, SMEs that use e-commerce report higher turnover and employment growth (Pahlawansah et al., 2023). According to the findings of the UK economy, the Gross Value Added of SMEs is €673 billion, or 59.8% of the UK economy (European Commission, 2023). In the United States of America (USA), SMEs account for 98% of the total US economy. The world e-commerce market is reported to be increasing rapidly, with the balance from high-income countries such as the USA (39%), the UK (28%), Japan (19%), and China (20%) (UNCTAD, 2023). Whereas, in 2022, the World Bank surveyed to investigate the problems and issues faced by SMEs in Sudan, the survey found that e-commerce is below 5%. The Sudanese companies have adopted e-commerce; however, most of the SME

companies are still in the early stages of adoption because of the special economic situation and political system, for example, the US economic sanction on Sudan for 27 years (Mosbah, 2018). Many studies have already been conducted to investigate the factors influencing e-commerce adoption (Mohtaramzadeh et al., 2017, R Roberts et al., 2021). However, considering the consequences of SMEs' non-adoption of e-commerce, there is a need to focus on factors that contribute to SMEs' intention to use e-commerce.

### Small and Medium Enterprises SMEs

There is no distinct method for identifying small and medium-sized businesses (SMEs). The European Union (EU) provides more precise definitions, classifying a small-sized enterprise as one with fewer than 50 employees and a medium-sized enterprise as one with fewer than 250 employees (Elikem et al, 2020). In addition to small and medium-sized businesses, some micro-businesses employ up to ten people. According to (Pahlawansah et al., 2023), small and medium-sized enterprises (SMEs) are businesses with revenues, assets, or a certain number of employees that fall below a certain threshold and each country has its own definition of what it means to be a small or medium-sized business (SME). However, there are two ways to define small and medium-sized enterprises: the financial turnover-based definition, and the second definition focused on the number of employees (Nguyen et al., 2024). Financial turnover definitions are confusing as it is difficult to assess and differ by industry (Puklavec et al., 2018). Moreover, with inflation, financial turnover can vary with time (Mputle, 2020). Definitions based on several employees are more common and widely used by decision-makers and researchers (Salah & Ayyash, 2024). Employment is generally considered more transparent and accurate than turnover (Elikem et al, 2020).

### SMEs Definition in Sudan:

Table 2. Small and Medium-Sized Business Definition in Sudan

		<b>Total Capital Size</b>
<b>Type of Firms</b>	<b>Labour Size</b>	<b>SDG Sudanese Pound</b>
Micro Firms	10 workers	5,000,000
Small Firms	10-50 workers	50,000,000
Medium Firms	50-250 workers	100,000,000

Source: Bank of Sudan

In most developing countries, SMEs usually play an important and significant role (Alsaad et al.,2017, Mosbah & Kartiwi, 2017, Hamad et al., 2018). SMEs generally boost the economic development of a country, and contribute significantly to the growth and productivity of the economy (Elikem et al, 2020). The importance of small and medium enterprises is represented in contributing to increasing the national product, reducing the unemployment problem, reducing poverty, and playing the role of feeding large industries and having a positive role in developing exports (Nguyen et al., 2024).

Small and medium-sized businesses (SMEs) face a variety of challenges in many countries. Recent studies have identified some of the barriers to the development of SMEs, for example; (Hamad et al., 2018); (Elikem et al., 2020); and (Xli et al., 2021), specifically highlighted a lot of difficulties confronting SMEs in the competitive market. In Sudan, SMEs face many obstacles including Political instability and international isolation (Hussain et al.,2023). These constraints have an impact on smaller businesses which are more negatively impacted than larger ones (Mosbah, 2018). The negative impact represents high unemployment rates, a lack of financial resources, a lack of managerial competencies, and poor access and availability of innovation and technology (Mosbah & Kartiwi, 2017).

Although there is no independent law regulating the work of these projects, there is a set of guidelines that control the work of the sector and differ according to the activity that is practised (Mosbah, 2019). There is also the "Regulation for the Organization of Microfinance Institutions for the Year 2011" issued by the Central



Bank of Sudan that is concerned with setting up controls specific to financing for SME institutions. Many difficulties are facing the growth of electronic commerce in Sudan such as the high cost of the internet service, the limited role of the online payment system, the weak internet networks in rural areas, social, relative poverty, lack of knowledge about the use of IT, technology hardware, and software and the need for security in purchase through the Online platform is an addition to these challenges. (Mohamed et al., 2021). Despite the increasing importance of electronic commerce for the development of global economics, the level of e-commerce adoption.

## **SME in Sudan**

SMEs are widely considered the basis of any economic development (Fong, 2011)., Mohammed Hassan, 2018)., Hanell et al (2019)., Hoekman, (2020). SMEs in developing countries still lagged behind those in developed countries (Adam et al., 2020). The SME sector in Sudan is of great importance to the Sudanese economy, representing 95% of the total number of enterprises in the country, according to the latest estimates of the industrial statistical survey conducted by the Central Bureau of Statistics in Sudan (2023). SMEs play a significant role in the country's economic growth and serve as the hub of the country's industrial development (Hussain et al., 2022). According to the Sudanese Central Bureau of Statistics (2023), SMEs account for 83.8 per cent of manufacturing organisations. They contribute 26.8 per cent of value-added production, 28.3 per cent of overall manufacturing production, 24.6 per cent of capital assets, and 39.9 per cent of the labour force in the country. Furthermore, by the end of 2023, value-added products from SMEs are expected to be worth around SDG 123 billion, or at least 52% of total manufacturing production (CBS Annual Report, 2023). Most of the Sudanese SME industrial companies are located in the country's central regions and focus on industries such as food and beverages, textiles, cement, cotton ginning, agricultural products, and leather tanning products (Bank of Sudan, 2023). Small and medium-sized businesses (SMEs) face a variety of challenges in many countries. Recent studies have identified some of the barriers to the development of SMEs, for example; (Hamad et al., 2018); (Elikem et al., 2020); and (Xli et al., 2021), specifically highlighted a lot of difficulties confronting SMEs in the competitive market. In Sudan, SMEs face many obstacles including Political instability and international isolation (Hussain et al., 2022). These constraints have an impact on smaller businesses which are more negatively impacted than larger ones (Mosbah, 2018). The negative impact represents high rates of unemployment, a lack of financial resources, a lack of managerial competencies, and poor access to and availability of innovation and technology (Mosbah & Kartiwi, 2017). Although there is no independent law regulating the work of these projects, there is a set of guidelines that control the work of the sector and differ according to the activity that is practised (Pahlawansah et al., 2023). There is also the "Regulation for the Organization of Microfinance Institutions for the Year 2011" issued by the Central Bank of Sudan that is concerned with setting up controls specific to financing for SME institutions. SME enterprises in Sudan depend on a set of financing sources, while domestic financing is considered self-resources and credit granted by banking and non-banking institutions and the Ministry of Finance (Bank of Sudan, 2019). There is still a low level of support for SMEs by the Sudanese government that led to a strongly negative effect on the level of SME development and new technologies diffusion (Hussain et al., 2020). Sudan is also suffering a regular change of government of distinct races (conflicts of interest), which makes the laws and norms change regularly (Hamad et al., 2018). SMEs face many problems including global market, economic change, competitive pressures, reductions in the product lifecycle, customer needs shifts and accelerated technological progress (Puklavec et al., 2018). Many difficulties are facing the growth of electronic commerce in Sudan such as the high cost of the internet service, the limited role of the online payment system, the weak internet networks in rural areas, social, relative poverty, lack of knowledge about the use of IT, technology hardware, and software and the need for security in purchase through the Online platform is an addition to these challenges. (Mohamed et al., 2014).

## **E-commerce**

Electronic commerce (e-commerce) is a business model that allows businesses and individuals to buy and sell goods and services over the Internet (Kangning Zheng et al., 2020). According to (Gary D. Gregory et al., 2019), e-commerce has aided businesses, particularly those with a limited market reach, such as small

businesses, in gaining access to and establishing a larger market presence by providing cheaper and more efficient distribution channels for their products or services. E-commerce is one of the most important topics discussed in business today (R. Roberts et al 2021). It is already reshaping customer and supplier relationships and streamlining business processes (Pahlawansah et al.,2023). And in some cases, reorganizing the entire industry (Okadapau, 2016). E-commerce is also the most effective way to do business as communications provide more options for contacting customers, eliminating paper-based documents and all operational costs and the administration costs associated with it (Nwosu, 2017). E-commerce has the power to change the way companies compete with one another, as new technology influences the organisations' strategic plans, and it provides competitive advantages at the local and international levels (Mputle, 2020). Zwass's concept of e-commerce is adapted for this research concentrating on Internet-based technology. This definition is generally trusted and it is used to analyse e-commerce by many academics. According to (Zwass,1996), e-commerce is defined as follows: "E-commerce is sharing of business information, maintaining business relationships and conducting business transactions through Internet technology".

### **Benefits and Barriers of E-Commerce Adoption in SMEs**

Research conducted by Alsaad & Taamneh, (2019) to define the advantages and obstacles of e-commerce adoption. Adopting. The study shows that the advantages that can be achieved by implementing technology are: Entry to new markets, competitiveness enhancement and cost advantage. Another study conducted (Tamimi, & Jaradat, 2019) Found the advantages to be: access to a broader variety of markets, greater scope for opportunities, Management and contact, accessibility, awareness, enhanced customer services, updating of Data, lower transaction costs, product and service differentiation, and ability to join the supply chain for Larger Enterprises. Pahlawansah et al (2023) evaluated a framework consisting of three independent variables (customer loyalty, retention of customers, and attraction of new customers) representing the relationship between a customer and a company and a dependent variable representing e-commerce adoption, the results indicate that customer loyalty is one of the advantages of e-commerce adoption. Customer retention and the ability to attract new clients have been found to have a limited influence on the adoption of e-commerce. (Moses et al. 2016) proposed that one of the most significant factors for e-commerce adoption is trust. Once trust is built, it is possible to conduct the transaction. (Stephen T. Sharretts, 2020) found that increasing service quality is one of the advantages of adopting e-commerce.

Despite the benefits of e-commerce, the adoption of e-commerce by SMEs is still significantly low, possibly because small and medium-sized enterprises have specific features. According to Nazir, (2019), a limited number of management teams, powerful owner control, absence of staff in specialized fields such as digital technologies, multipurpose administration, small market share, low turnover of staff, unwillingness to make the change and rejection of advanced technologies or apps. Such factors can make the adoption of technology very difficult for small and medium enterprises and make it more difficult to take advantage of the opportunities of new technologies as well as large corporations (Yang et al.,2015). J Eduardsen et al., (2023), in their study, divided the e-commerce barriers into internal and external barriers. The internal obstacles are benefiting recognition, global markets, lack of financial resources, incorporation of the supply chain and e-environment understanding. External obstacles are a lack of awareness of the needs of SMEs, the absence of the technology standard, and industry e-skills. Many academic articles on e-commerce issues have explored how these barriers could be resolved. Firms that were ready to digitize needed to introduce new management methods, follow various workforce management procedures, and develop new facilities that enabled them to adopt the new strategy (Yang et al.,2015). In developing and less developed countries, technological infrastructure is one of the difficulties that face e-commerce adoption, as these countries have not yet been prepared to sustain the rapid growth of electronic commerce. They had to fully renovate their information technology systems and their communication facilities, to take advantage of this new digital era (Sherah, et al, 2015).

### **Previous Studies on E-commerce Adoption by SMEs**

Past researchers have made several attempts to investigate how various factors influence the adoption of e-commerce. In 2024, a study by Himawan et al. analysed the factors that influence the adoption of electronic

commerce by small and medium-sized businesses in Bogor Regency. This study utilised an online survey methodology. The study found that perceived benefits, external forces, and attitudes towards e-commerce adoption are critical factors in increasing adoption. Regarding perceived ease of use, technical and organisational readiness do not influence attitudes towards e-commerce adoption. Another study uses the technology acceptance model (TAM) approach to evaluate and analyse the impact of actual E-commerce use on SMEs in Malang City. A quantitative survey of SME business actors who have used one of the e-commerce platforms, namely Shoppe, Tokopedia, Lazada, Blibli, and Bukalapak, with 106 samples, was conducted using quota sampling. The results of this research show that there is a significant positive contribution between perceived Usefulness towards Attitude Towards Using, there is no considerable contribution between Perceived Ease of Use towards Attitude Towards Using, there is a substantial contribution between Perceived Ease of Use towards Perceived Usefulness, there is a positive and significant contribution between Perceived Usefulness to Behavioural Intention to Use. A study conducted by Setiyani & Rostiani 2021. Their research aims to investigate e-commerce adoption among SMEs in Karawang Regency, Indonesia. The technology-organization-environment (TOE) framework was used as a variable to assess e-commerce adoption. Data was collected using a questionnaire survey delivered to SMEs in Karawang Regency, with 301 responses. The findings of data gathering via Smart PLS, together with the results of the technological elements, have no significant effect on the intention to adopt e-commerce. However, the organisational and environmental aspects do. All technological indicators, including compatibility, perceived usefulness, complexity, security concern, and relative advantage, have been shown to have a substantial impact on technology's intention to use e-commerce. Organisational variables, such as cost, preparedness, culture, size, and top management support, have been shown to impact organisations' intentions to implement e-commerce substantially. Meanwhile, environmental indicators such as government backing, competitive pressure, environmental uncertainty, and vendor quality substantially affect the environment when considering e-commerce adoption.

According to a recent study, the owner or manager's decision to implement e-commerce is influenced by their knowledge of the new technology (Almunawar et al., 2022). However, Nasution et al. (2021), who used the resource-based theory (RBT) and 131 questionnaires on SMEs in Indonesia, discovered that entrepreneurial orientation's innovativeness and proactiveness have a significant relationship with e-commerce adoption, whereas entrepreneurial orientation's risk-taking is insignificant. Although risk-taking and proactiveness were highly associated with the knowledge management process, entrepreneurial orientation innovation was not. Furthermore, the knowledge management process significantly mediates the relationship between risk-taking and proactiveness of entrepreneurial orientation and e-commerce adoption. In contrast, it has no significant effect on the relationship between entrepreneurial orientation's innovativeness and e-commerce adoption. Finally, it has been observed that dynamic capabilities and e-commerce adoption have a strong correlation. The previous study found that adopting new technology depends on the owner/manager's expertise in the latest technology.

## Underpinning Theory

Tornatzky and Klein's (1982) three-context paradigm, Technology-Organization-Environment (TOE), identifies key elements influencing innovation deployment. Many researchers used this theory to explain the adoption of EC in SME businesses. It demonstrated the consistent association between the TOE framework and 'adoption behaviour' (Carayannis and Turner, 2006; Jeon et al., 2006). Many empirical researches on innovations have explored this model (Lila and Yeny, 2021). The technological context points to the organization's external and internal technology, which includes both, the company's devices and its procedures (Shalini and Karippur, 2018). The organizational factor contains the company's resources and features, including existing employees, the size of the company, the legal and administrative situation of the company, the organizational structure, and relations between staff (Amanuel et al., 2021). The environmental context contains the regulatory environment, the competitive forces, the size and market structure, and the national economic context (Tornatzky and Fleisher 1990). TOE defined its variables as having a high degree of freedom and this can indicate why it is commonly used in the innovation method (Hart et al., 2017).



This study categorised the elements affecting EC adoption in SMEs into three contexts: organisational, technological, and environmental.

### Technological context

Technologies appear to be one of the most important factors influencing the decision to implement an innovation system. Tamimi & Jaradat, 2015, identified five innovation elements that influence organisational innovation adoption: relative advantage, complexity, compatibility, observability, and trialability. Tornatzky and Klein (1982) studied the five innovation elements and discovered that the attributes of relative advantage, compatibility, and complexity had a greater influence on innovation adoption than the other two attributes, observability and trialability. Prior research has shown that there is a positive relationship between technological contexts and the implementation of E-commerce (Saffu, Walker & Mazurek, 2012; Fang et al., 2016; Hendricks & Mwapwele, 2023) Thus, the hypothesis is proposed as below:

### Organizational context

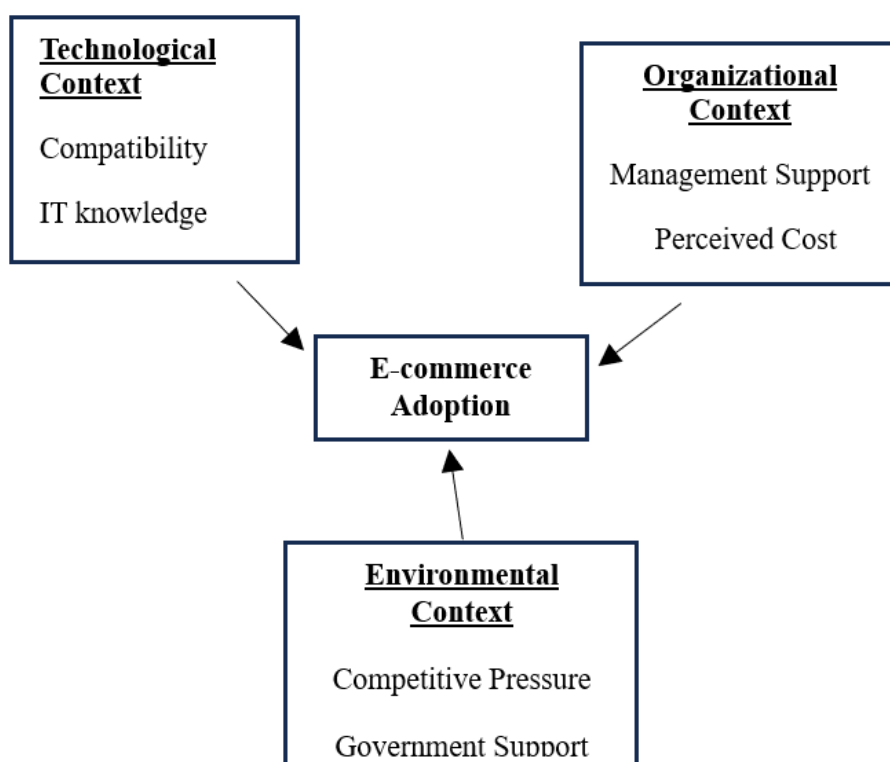
The most frequently used factors to investigate the effect on the decision to adopt innovation were organisational factors. Several studies investigated organisational context factors such as organisational size, resources and compatibility as factors of innovation adoption. The majority of previous researchers found a positive relationship between organisational context and E-commerce adoption. (Liao& Huang, 2021).

### Environmental Context

Environmental Context is defined as the arena in which a company conducts its business and is considered an external factor (Tamimi & Jaradat, 2015). Environmental context factors such as competitive pressure, government support, and technology vendor support may all have an impact on e-business adoption (Hendricks, Mwapwele, 2023). The majority of previous researchers, such as (Somali et al., 2015), demonstrated that environmental context had a positive relationship with e-commerce.

### Research Framework:

Figure 2: Proposed framework adopted from TOE theory.



## RESEARCH METHODOLOGY

This study involves exploratory research conducted qualitatively. Using a qualitative methodology, this study provides an in-depth insight into e-commerce adoption in Sudanese SMEs. After conducting literature research and categorising related factors influencing electronic commerce in SMEs, a qualitative study was conducted employing semi-structured interviews to collect valuable data to highlight the most relevant factors that affect the e-commerce adoption by SMEs in Sudan. The qualitative research strategy focused on the respondent's unique history, thoughts, and experiences (A Priya, 2021). This facilitated reconsidering the factors in the relevant literature for these unique SMEs in Sudan. Deductive analysis of semi-structural interviews with expert persons provides an understanding of the adoption of EC in Sudanese SMEs, highlighting their unique characteristics. The article explains the actual condition of e-commerce adoption in Sudanese SMEs and suggests methods to utilise resources of greater effectiveness for long-term growth. Interview questions were developed based on the contributions of TOE theory. The interview questions are listed in Table 2. Furthermore, at the end of each interview session, respondents were given free time to add more information or comments if they wanted to.

### Sample and Data

Purposive sampling was found to be the best strategy for conducting qualitative interviews. Due to the qualitative nature of the study, a small concentrated and well-selected sample was chosen to be interviewed. (A Priya, 2021) encouraged using purposive or judgmental sampling in qualitative studies to identify and select information-rich examples while maximising limited resources. The samples for this study were drawn from the Ministry of Industry and Trade's list of SMEs because the governmental entity always considered one of the most acceptable and accessible. Moreover, the Ministry of Industry and Trade database is organised by size, activity, ownership, and services. The current study selected five respondents with qualified CEOs as knowledge-people as its samples. All five selected owner-managers agreed to participate in this research. five interviews with experienced practitioners were done by phone. Before the interviews, participants were notified by email, which included some contextual information about the subject and research goal.

Before proceeding, authorization for note-taking was obtained. To begin the interview, background questions about the interviewee's job title and responsibilities were asked.

Table 4: The Sample Demographic Profile:

Company Code	(Business Category)	Number of Employees	Participant's Position	Level of Education	Number of Years of using an e-commerce website (If any)
	Type of organisation sector				
C1	Agricultural Services	85 (medium firm)	CEO	Bachelor's Degree	10 years
C2	Food Industry	39 (small firm)	Owner	Doctoral Degree	6 years
C3	Import & Export Services	153 (medium firm)	Marketing Manager	Master's Degree	15 years
C4	Food Industry	210 (medium firm)	Owner	Bachelor's Degree	8 years
C5	Car services	43 (small firm)	CEO	Diploma	-

Source: developed by the researcher.

### **The Interview questions:**

1. Is changing a company's policy and organisational structure necessary to adopt e-commerce?
2. Do you believe e-commerce will be compatible with your firm?
3. Does e-commerce fit well with the way our company work?
4. Dose e-commerce is compatible with our firm vision, mission and values.
5. Does your organisation have employees who are professionals and knowledgeable in IT and e-commerce technologies?
6. Is your organisation well computerised using a local area network?
7. Does your firm have an excellent internet connection?
8. Do senior managers have an interest in e-commerce and encourage employees to use new technology regularly?
9. Does senior management offer the necessary resources to develop e-commerce within the company?
10. Is top management aware of the advantages of e-commerce for the company's performance?
11. Will conducting business via the Internet reduce your costs?
12. Is your company concerned about the costs of establishing an online channel and continuous maintenance?
13. Does e-commerce adoption use a greater share of available financial resources?
14. Will using e-commerce improve your company's competitive position?
15. Do you believe your market competitors drive your organisation to utilise e-commerce?
16. do you believe you will lose your customers to competitors if you do not adopt e-commerce?
17. Does the government provide incentives to use e-commerce in SMEs?
18. Do the government policies and rules help businesses to adopt e-commerce easily?
19. Do you think the existing legal system is strong enough to shop online?

### **Data Analysis**

To analyse the data, a deductive technique was used in three steps: preparation, organising, and reporting. The analysis resulted in a comprehensive interpretation that revealed the factors impacting EC adoption in Sudanese SMEs. The repetition of significant points evaluated the classification structure. The unit of analysis in this section was clearly stated. Data was gathered by reading and rereading the original interview transcripts to gain a feeling of 'what is going on'. The structure of the analysis and data was then determined based on the proposed factors. Correspondence comparisons were used to evaluate content validity to determine relevant factors influencing e-commerce adoption among Sudanese SMEs. Participants' direct quotes were also used to clarify ideas as well.

## **RESULTS AND DISCUSSION**

### **Compatibility:**

The compatibility factor has been mentioned as a crucial element impacting SMEs' adoption of e-commerce (Hendricks, SD wapwele, 2023; Dahbi & Ben Moussa, 2019; Rahayu & Day, 2015). The interviews conducted with SME enterprises revealed that the compatibility variable was significant, AS stated by the owner of one of the companies (Our company faces issues integrating e-commerce technology with its current business procedures and facilities). This can be attributed to many factors, such as the absence of technical expertise within the organisation to properly integrate and maintain the e-commerce systems, limited financial resources to invest in the necessary infrastructure and educational programmes, and general resistance to making changes among SME owners and staff members. To address this issue, SMEs must deeply look at the compatibility of e-commerce systems with their current processes and carefully consider product features. and make the required improvements to enable full integration. This study's findings on compatibility are consistent with previous research, for example (Hendricks, Mwapwele, 2023)

**IT knowledge:**

Interviewees identified IT knowledge as a key motivator for utilising e-commerce, according to the company B CEO (our staff members have shown a strong interest in e-commerce education and awareness-raising. They see them as critical factors for the adoption of e-commerce by SME firms). According to interviews, five organisations reported good information technology knowledge and appropriate support for e-commerce adoption. However, supporting infrastructures like telecommunications and internet connection could be better. Interviews revealed that IT skills are essential for effective e-commerce adoption. Staff turnover may be challenging, especially for experienced employees. High turnover among employees might make adopting e-commerce difficult without proper training.

**Management Support:**

According to all five firm responses, the adoption process cannot be completed without management support. This matches Thong's research indicating that CEO support increases the chance of IS adoption. Some participants believe that the upper management of the organisation played a vital role in the adoption of e-commerce activities, however, due to inadequate skills and financial resources, the administration may not be interested in adopting e-commerce. According to interviewees, senior managers have an interest in e-commerce and encourage employees to use new technology regularly also, they offer the necessary resources to develop e-commerce within the company

**Perceived Cost:**

Previous research indicates that cost considerations are often problematic in adopting e-commerce in SMEs (Nguyen et al., 2024; Esfahbodi et al 2022) Interviews revealed that implementing e-commerce requires significant investment, which is needed for equipment, and staff training. Small and medium-sized enterprises (SMEs) should provide a large budget for technological facilities and internet costs, as the owner of company C stated (It's challenging to establish an e-commerce system. It is noticeable that there are lots of needs, such as training programmes, computer networks, and so on, that must be fulfilled before e-commerce can be properly implemented). In company A e-commerce adoption is planned in phases based on available funding. Interviewees indicate that this factor may impact the adoption of EC by Sudanese SMEs. The participant also mentioned how the high cost of ICT maintenance impacted the organisation's e-commerce adoption policies. Maintaining ICT and e-commerce tools in small businesses was impossible because of the low ICT budget and an absence of ICT experts.", however, most of the respondents find that conducting business via the Internet reduces the costs

**Competitive Pressure:**

It is generally assumed that competition improves the chance of innovation adoption (Hendricks, SD Wapwele, 2023). Most of the participants agree that competition creates environmental uncertainty, which drives innovation adoption. As the CEO of Company C3 stated (In a competitive environment, businesses may face high pressure to use e-commerce to gain an advantage. However, a corporation in a less competitive climate would not experience a push to be creative). Most of the participants agreed that they may lose their customers to competitors if they do not adopt e-commerce.

**Government Support:**

All participants believe that the government must hold educational activities to increase e-commerce popularity and help individuals comprehend how e-commerce works and its advantages. Most of those interviewed emphasise the problem of client trust in online activities, which is one area where government support may be required because people always have high trust in anything that comes from the government. The CEO of company NO B stated (Some firms have been in e-commerce for years, but they are still far behind smaller enterprises in Europe or America. We are now working to obtain certificates from trustworthy



organisations to develop trust with our customers). In this case, there should be a government-approved certification agency that states that this company has been certified by the local government and that you can purchase from them. Another support required from the government is to sponsor the e-commerce solution "taking care of the systems, searching for problems and solutions, and leading towards development". This encourages entrepreneurs and customers to conduct their transactions online.

## CONCLUSION

This study attempts to provide an outline of e-commerce usage among Sudanese SMEs and the factors influencing their company's environment. To develop the framework, the TOE model was used to define adoption variables in technological, organisational, and environmental contexts. This study examined the difficulties SMEs encounter while adopting e-commerce in five firms. This study identified two characteristics that explain the technological context: compatibility, complexity, and IT knowledge. Both have a significant effect on e-commerce adoption among SMEs in Sudan. perceived cost and management support variables that describe organisational aspects were also found to strongly influence the adoption of e-commerce by SMEs in Sudan. Environmental factors, namely competitive pressure and government support, have a significant impact on e-commerce adoption among SMEs.

## LIMITATIONS

This study has two limitations that should be acknowledged and addressed. The first limitation is retailers' unwillingness and difficulties in attracting respondents to complete the interviews. As a result, the number of interview participants was limited. The original plan was to conduct interviews with 7 to 10 firms; however, due to this problem, the number of interviewees is only 5. The second limitation is a shortage of access to data about respondent companies because the relevant employees were unhelpful in addressing this issue. Callers are directed to official websites that have no relevant information about retailers, or that are out of date or incomplete. As a result, the sample population studied in this research cannot be guaranteed to be representative of all firms in Sudan.

## REFERENCES:

1. Abdelaziz Musbah, Mira Kartiwi, 2017, Factors Hindering the Adoption of Business-to-Consumer (B2C) in Developing Countries: A Case Study of Sudan. *Information Management and Business Review* (ISSN 2220-3796) Vol. 9, No. 4, pp. 28-33, August, International Islamic University Malaysia, Malaysia
2. Al-Somali, S. A., Gholami, R., & Clegg, B. (2015). A stage-oriented model (SOM) for e-commerce adoption: a study of Saudi Arabian organisations. *Journal of Manufacturing Technology Management*, 26(1), 2-35.
3. A Priya, 2021, Case study methodology of qualitative research: Key attributes and navigating the conundrums in its application - [journals.sagepub.com](https://journals.sagepub.com).
4. Alsaad, A., Taamneh, A., (2019), The effect of international pressures on the cross-national diffusion of business-to-business e-commerce. *Technology in Society*, ELSEVIER/Journal of Business Research.
5. Bakari, Sayef (2017): Appraisal of Trade Potency on Economic Growth in Sudan: New Empirical and Policy Analysis, [mpra.ub.uni-muenchen.de](https://mpra.ub.uni-muenchen.de)
6. Central Bureau of Statistics (Sudan). City. Khartoum. Country. Sudan. Website. <http://www.cbs.gov.sd>
7. Chosniel Elikem Ocloo, Hu Xuhua, Selorm Akaba, Junguo Shi & David Kwaku Worwui-Brown (2020) The Determinant Factors of Business to Business (B2B) E-Commerce Adoption in Small- and Medium-Sized Manufacturing Enterprises, *Journal of Global Information Technology Management*.
8. CQ Nguyen, AMT Nguyen, P Tranm, 2024, Assessing the critical determinants of cross-border E-commerce adoption intention in Vietnamese small and medium-sized enterprises: PLS-SEM algorithm - *Journal of Open Innovation*, Elsevier.
9. European Commission, [https://commission.europa.eu/strategy-and-policy/strategy-documents/commission-work-programme\\_en](https://commission.europa.eu/strategy-and-policy/strategy-documents/commission-work-programme_en)

10. F Hamad, S Farajat, A Hamarsha - Global Knowledge, 2018, Awareness and adoption of mobile technologies in the delivery of services in academic libraries in Jordan: a library staff perspective, emerald.
11. G Pang, L Peng - Journal of Digital Economy, 2022, Determinants of consumers' adoption intention for blockchain technology in E-commerce, A Esfahbodi, – Elsevier.
12. H Pahlawansah, CS Oitiva, H Muafiqie, 2023, Measurement Analysis of the Level of E-Commerce Adoption Readiness in SMEs Using Technology Readiness Index Method, Jurnal Sistim Informasi - jsisfotek.org.
13. International Monetary Fund IMF. <https://www.imf.org/en/Home>
14. K. A. M. A. Tamimi, M. S. Jaradat, “The role of small medium enterprises in reducing the problem of unemployment in Jordan”, International Journal of Development and Economic Sustainability, Vol. 7, No. 2, pp. 28-36, 2019.
15. MB Hossain, N Dewan, AA Senin, CB Illes, 2023, Evaluating the utilization of technological factors to promote e-commerce adoption in small and medium enterprises, Springer.
16. Min Liu, Shi Min, Wanglin Ma, Tianjun Liu. The adoption and impact of E-commerce in rural China: Application of an endogenous switching regression model of Rural Studies. Journal of Rural Studies. April 2021, Pages 106-116
17. Moeuf, A., Lamouri, S., Pellerin, R., Tamayo-Giraldo, S., Tobon-Valencia, E., & Eburdy, R. (2020). Identification of critical success factors, risks and opportunities of Industry 4.0 in SMEs. International Journal of Production
18. Moeuf, A., Pellerin, R., Lamouri, S., Tamayo-Giraldo, S., & Barbaray, R. (2018). The industrial management of SMEs in the era of Industry 4.0. International Journal of Production Research.
19. M Liu, S Min, W Ma, T Liu - Journal of Rural Studies, 2021, The adoption and impact of E-commerce in rural China: Application of an endogenous switching regression model – Elsevier.
20. Moses Odeo Okadapau, Elijah Omwenga, Robert. Boroko, 2016, State and Extent of Electronic Commerce Adoption among SMEs in Kenya, Journal of Emerging Trends in Computing and Information.
21. OH Salah, MM Ayyash, 2024, E-commerce adoption by SMEs and its effect on marketing performance: An extended TOE framework with AI integration, innovation culture, Journal of Open Innovation: Technology, Market ..., 2024 – Elsevier
22. Princely Ifinedo, 2017, An Empirical Analysis of Factors Influencing Internet/E-business Technologies Adoption by SMES In Canada, International Journal of Information Technology & Decision.
23. Ramdansyah, D. A., & Taufik, H. E. R. (2017). Adoption model of E-commerce from SMEs perspective in developing country evidence—A case study for Indonesia. European Research Studies Journal, 20(4), 227-243.
24. Rahayu, R., & Day, J. (2017). E-commerce adoption by SMEs in developing countries: evidence from Indonesia. Eurasian Business Review, 7, 25-41
25. Seyed, Kaveh, Jamali, 2015, Factors Influencing Electronic Commerce Adoption: A Case Study of Iranian Family SMEs, International Journal of Business and Social Science.
26. S Hendricks, SD Mwapwele, 2023, A systematic literature review on the factors influencing e-commerce adoption in developing countries - Data and Information Management, Elsevier.
27. Sujatha, R., & Karthikeyan, M. S. (2021). Determinants of e-commerce adoption: Evidence from small and medium-sized enterprises in India. International Journal of Business and Society, 22(2), 574-590.
28. UNCTAD, <https://unctad.org/publication/trade-and-development-report-2023>
29. World Bank, <https://www.worldbank.org/en/home>
30. YK Arici, MM Ozkan, Z Kocabas, 2023, Effects of multicollinearity on type I error rate and test power of binary logistic regression model: A simulation study.