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A systematic literature review on the factors influencing e-commerce adoption in developing countries

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ABSTRACT

E-commerce is a huge component of the digital economy as the business market landscape is now based on digital competition. E-commerce assists with national development through the creation of jobs and import tax. However, developing countries are lagging in e-commerce adoption due to internet challenges, trust, and security issues about online payment facilities. Despite these challenges, this study aimed at understanding the factors influencing e-commerce adoption in developing countries. The factors are built from the benefits and challenges of adoption. To address the research aim, the study identified the challenges and benefits of e-commerce adoption in developing countries using a systematic literature review methodology.

Systematic searches were carried out in 2021 in four databases (Ebsco host, ScienceDirect, SpringerLink, and Google Scholar) and Google Searches (for statistics). The included papers are 23 peer-reviewed studies and 2 reports published in English between 2014 and 2021. Thematic analysis was used to assess the papers and reports.

Our findings identified technology, environment, and customer trust as the main challenges affecting e-commerce adoption. The environment, organization, and performance are seen as benefits developing countries can leverage to boost e-commerce adoption. We found that all challenges and benefits are interconnected. However, e-commerce can only be adopted if those in management perceive and understand its benefits and values.

The research contributes to the theory by presenting a novel model of the factors influencing the adoption of e-commerce in developing countries and its ecosystem. Practically, having identified that the factors should be addressed collectively assists developing countries in identifying the strategies for eliminating e-commerce adoption challenges. The research contributes to SDG 8 and the body of knowledge on e-commerce adoption.

1. Introduction

The business market landscape has transformed from brick-and-mortar to digital-based competition due to the Fourth Industrial Revolution (4IR) demand and the presence of new and advanced technologies (Koe & Sakir, 2020); a phenomenon referred to as digitalisation. Businesses and economies are now dependent on technology to survive and thrive due to this digitalisation (Mthembu et al., 2018). Digitalisation is the process of integrating and using digital technologies (also known as information and communication technologies – ICTs (Pollitzer, 2018)) to enhance a business model and create new opportunities for producing goods and services and adding value (Gurau, 2021). ICTs have enhanced many aspects in various industries including a reduction in production and labour costs in the manufacturing industry (Rafikov & Ansary, 2020) and improved productivity and operational efficiency in agriculture (Andreoni et al., 2021) which improves the overall business sustainability (Chauhan et al., 2021).

Businesses are experiencing difficulties with adapting to ICTs, such as challenges with the implementation and integration of IT infrastructures, the change from traditional to digital-based market competition, financial resource constraints, and the uncertainty of whether these changes will bring profitability (Kiel et al., 2017). Furthermore, despite the advances in ICTs (technologies), Murthy et al. (2021) argue that digitalisation has created inequalities between developed and developing countries, such that the digital economy is experiencing unequal development as it is currently dominated by developed countries. E-commerce is argued as an ICT that can assist developing countries to leap-frog developed countries by increasing the national gross domestic product (GDP) (Kabir et al., 2020).

E-commerce is defined by Koe and Sakir (2020) as conducting business transactions in a digital form or using the Internet. E-commerce provides businesses with the opportunity to grow and flourish (Koe &

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Sakir, 2020) and has been found to positively contribute to economic growth, independent of the level of development of a country (Kabir et al., 2020; Myovella et al., 2020). Between 2018 and 2019, almost half of the top 20 economies in the world were developing economies which contributed to global e-commerce sales that increased by 11% and global GDP that increased by 4% (UNCTAD, 2019). Data shows that, when considering the compound annual growth rate (CAGR) of the 10 highest countries in retail e-commerce sales from 2023 to 2027, seven developing countries are on the list, meaning the e-commerce contribution to developing countries is higher than in developed nations (Statista, 2023).

The topic of development includes social, financial, human, and economic (Aikaeli & Mbellenge, 2016; Graham et al., 2017; Kozma, 2005; Ngwenyama et al., 2006) and the advancement in ICTs has created an impact in e-commerce. The outcome has been the creation of jobs, the creation and advancement of small and medium enterprises (SMEs), a change in livelihoods, an increase in the value of a product, and the offering of a better life, especially in developing countries (Aker & Mbiti, 2010; Graham et al., 2017). These advancements are used to address the sustainable development goals (SDGs), specifically, goal 8 on promoting sustained, inclusive, and sustainable economic growth (Waage et al., 2015). Our research contributes to policy by engaging with SDG 8.

There is a large disparity between the adoption, use, and implementation rates of e-commerce in developed and developing countries, where developing countries are lagging heavily behind (Alyoubi, 2015). E-commerce in developing countries has yet to grow out of its infancy (Makame et al., 2014; Mthembu et al., 2018). Further, the change in the market competition landscape from traditional to digital-based shows the need for businesses and organisations to adopt e-commerce to remain relevant and to survive in the competitive market (Koe & Sakir, 2020).

A study conducted in Bangladesh, a developing country, found that six factors of e-commerce adoption, which include research and development, electronic payment, accessibility, import taxation, supply chain management and creation of jobs, had a positive effect on economic growth (Kabir et al., 2020). However, developing countries typically struggle to adopt and adapt to technologies, including e-commerce, because of internet challenges, trust and security issues in online payment facilities (Mthembu et al., 2018; Murthy et al., 2021; Sila, 2019). It is beneficial to understand the factors which promote e-commerce adoption as well as those factors which hinder e-commerce adoption in this context. To this end, we pose the research question, *what are the factors influencing e-commerce adoption in developing countries?* To address the research question, we create two sub-questions; *what are the benefits of e-commerce adoption in developing countries*? and *what are the challenges facing e-commerce adoption in developing countries*?

Mthembu et al. (2018) state that the biggest challenge of adopting and using e-commerce in developing countries is infrastructural barriers which include inadequate telecommunications, such as poor network quality, internet speed quality and the cost of internet and bandwidth (Alyoubi, 2015; UNCTAD, 2019). Other challenges include customers having trust and security concerns over the use of their credit card information at online check-outs (Alyoubi, 2015; Mthembu et al., 2018), inadequate education and a lack of necessary technological skills for the development and sustainability of the e-commerce industry (Mthembu et al., 2018). A lack of managerial skills for online business environments (Sila, 2019), unfit and unreliable logistical networks and insufficient or lack of legal and regulatory policies surrounding e-commerce (Alyoubi, 2015; Cuzovic & Labovic, 2019) have been raised as possible challenges of adopting and using e-commerce in developing countries. Although these challenges are affecting the adoption of e-commerce in developing countries, it is difficult for organisations to survive in a digital-based market (Kiel et al., 2017) if they do not decide to adopt e-commerce.

A study by Lekmat (2018) categorises some success factors for assessing the e-readiness of a firm using the technological, organisational and environmental (TOE) framework. The technological context refers to the government support and legal regulations because these will eliminate barriers such as a lack of infrastructure, inadequate financial resources and insufficient IT skills which can promote the intention for e-commerce adoption (Alyoubi, 2015; Lekmat, 2018; Mthembu et al., 2018). The organisational context refers to a firm's awareness of e-commerce, as well as technical and managerial expertise (Alyoubi, 2015) because, if the benefits of e-commerce are understood by management, its adoption will more likely be supported (Lekmat, 2018).

The environmental context refers to the competitive environment in which the firm operates which is digitally based and therefore, e-commerce strategies should be employed as a competitive advantage for the firm to grow and survive (Koe & Sakir, 2020; Lekmat, 2018). Other success factors include training and education which will encourage the use of technical skills and provide the necessary technical and managerial resources for companies to adopt e-commerce, having adequate financial assets or financial support available to invest in and adopt e-commerce and the availability of reliable and efficient delivery and distribution services (Alyoubi, 2015; Mthembu et al., 2018).

Despite the many challenges developing countries experience towards adopting e-commerce, the potential benefits are many. According to Lekmat (2018) and Myovella et al. (2020), e-commerce provides the opportunity for SMEs in developing countries to gain access to international markets which allows these businesses to extend their reach. In turn, this expansion provides growth opportunities in the form of increased market knowledge which allows these businesses to develop new products or services and to expand into new markets.

Koe and Sakir (2020) and Lekmat (2018) argue that SMEs adopt e-commerce as an opportunity to improve their business processes and performance. The performance, which could include financial, operational, and non-financial, lead to the company's (organisation) progress through the improvement of processes (El-garaihy et al., 2020). Issues, such as using ICT for supply chain integration, assist in a company realising its performance growth. The use of e-commerce in SMEs, therefore, fosters the growth of the business which contributes to a nation's development through tax contributions (Nantembelele & Gopal, 2018). E-commerce adoption can reduce costs while improving quality and strengthening customer relationships which enhance customer satisfaction and increase productivity, which altogether, increases sales and profits. Thus, although developing countries are lagging heavily behind in e-commerce adoption (Alyoubi, 2015; Mthembu et al., 2018; Murthy et al., 2021) and knowing that these challenges and benefits to e-commerce exist, this study aims to understand how they influence developing countries in adopting e-commerce.

Customer trust is important because it supports customers' decision to either engage in the e-commerce environment or not (Guo et al., 2020; Xiao et al., 2021). Customers who intend to engage in e-commerce are faced with several decisions to make, such as having a good credit record, acquiring a credit (or debit) card, belief in acquiring the product they will buy in good condition, and on-time, channels for returning damaged (or incorrect) orders and refunds (Guo et al., 2020; Kabir et al., 2020). All these benefits concern a customer viewing the e-commerce platform as a trustworthy option to buy from instead of buying from a brick-and-mortar store or buying online and paying cash on delivery (Halaweh, 2012; Kabir et al., 2020). For customers who do not use the credit (or debit) card system, they are faced with the challenges of using mobile money and the credibility (reputation) of both, their mobile operators and the e-commerce platform, in ensuring the system is secured when engaging with buying of items over the Internet (Xiao et al., 2021). Customer trust is therefore an important aspect for consideration in the e-commerce adoption, both in developing and developed nations as it traverses the technology, environment, and performance of the business. However, due to its infancy, e-commerce is perceived as a complex system, especially in developing nations (Nantembelele & Gopal, 2018).

Much has been explored on the challenges, and benefits of e-commerce adoption in developed countries (Makame et al., 2014; Sila, 2019), yet there is little research on the factors which affect e-commerce adoption and its usage in developing countries (Sila, 2019) and how developing countries can overcome their challenges and find benefits in

the adoption of e-commerce (Mthembu et al., 2018). In their paper, Koe and Sakir (2020) mention that the results of e-commerce adoption in developed countries are only indicative of themselves and cannot be generalised to include developing countries because their contexts are different. Thus, identifying the factors that influence the adoption of e-commerce in developing countries is the gap this paper aims to address.

Due to the fragmentation of findings in the fields of Information Systems (IS) and Information Management (IM) in developing countries (Avgerou, 2008; Ribadu et al., 2014; Wu et al., 2021), specifically about e-commerce adoption, use and its value (including live streaming e-commerce (Sun et al., 2022)), it is vital to provide a clear picture of publications in the field and a systematic literature review is well positioned to facilitate the process (Levy & Ellis, 2006; Mwamba & Qutieshat, 2021; Wu et al., 2021). Using the systematic literature review, the study therefore develops a novel model of the factors influencing the adoption of e-commerce in developing countries and its ecosystem as the contribution to theory.

The paper is structured as follows; the next section provides the research methodology followed by the findings. Thereafter, we present the discussion and conclusion where we engage with the research contributions, limitations, and areas for future research.

2. Research methodology

The research was conducted following the interpretive philosophy. Interpretivism considers the world as explained by human understanding and that multiple realities exist (Walsham, 2006). The study combines the interpretive philosophy with the qualitative method where the focus is on engaging with the context (Klein & Myers, 1999) to understand the factors influencing e-commerce adoption. Okoli and Schabram (2010) argue that the use of interpretivism and the qualitative method in a systematic literature review to synthesise studies is called interpretation, which this research intends to achieve.

A systematic literature review (SLR) was followed to select relevant publications on the adoption and use of e-commerce in developing countries. A systematic literature review assists in identifying the body of knowledge (BoK) in a field, which is an important step in advancing research (Levy & Ellis, 2006). In the field of Information Systems (IS) and Information Management (IM) research, the use of a systematic literature review assists in providing a snapshot of the field and takes into account major arguments, the direction of the field, possible issues that arise, and direction for future research (Rowe, 2014; Templier & Paré, 2018; Wu et al., 2021). A systematic literature review is a standalone research and does not require the use of theory (as done in empirical research) (Okoli & Schabram, 2010; Templier & Paré, 2018) but can contribute by developing a model or conceptual framework (Rowe, 2014). A study can follow a specific type of literature review, such as meta-analysis (Chauhan, 2017), but this research's primary goal is explanation, as argued by Rowe (2014). Therefore, this study contributes to theory by developing a model of the factors influencing the adoption of e-commerce in developing countries and its ecosystem which is a novelty.

2.1. Data sources and search terms

Electronic systematic searches were conducted using three electronic academic databases which included Ebsco Host, ScienceDirect, and SpringerLink. We also used Google Scholar to reduce the location bias. We used Google Search to acquire statistics relating to e-commerce adoption and use in developing countries. For our study, Ebsco Host, ScienceDirect and SpringerLink were chosen as they provide results from a diverse collection of academic journals and provide the researcher with the ability to apply various filters to the searches to refine them for specific results. Google Scholar was chosen as it broadened the search to more than just specific databases. Google Search was used to locate official statistical documents.

The searches were conducted between June and July 2021 and were undertaken by both authors. Papers that were published between the years 2014 and 2021 were searched. The range 2014–2021 was chosen as this paper aims to refer to the most current literature on the topic. Searches included the terms e-commerce, developing countries, factors, influences, and adoption. When searches needed to be refined to yield more or better results, the following synonyms of the original keywords were included: e-business, electronic commerce, emerging economies, developing economies, determinants, and effects. Some papers were pulled from the reference lists of the papers that were found to be relevant (backward search) and inclusive to the study as suggested by several authors (Levy & Ellis, 2006; Webster & Watson, 2002). Table 1 presents the databases that were searched, and the queries used, including the updated queries. Each row represents the refinement of the search term (query) until the final query is used to retrieve the relevant articles.

2.2. Inclusion and exclusion criteria

In the systematic literature review, it is important to delineate the inclusion and exclusion criteria used to acquire articles (papers or manuscripts) that will be used for analysis. Systematic literature reviews therefore ought to be explicit and describe what (and why) the research will include, and what will be excluded (Mulibana & Rena, 2021; Okoli & Schabram, 2010). Rowe (2014) argues that the inclusion/exclusion criteria connect with search processes, the type of sources a study will focus on, the period to which a search will be restricted, and the discipline (where necessary).

Our inclusion criteria considered papers published in English, which are peer-reviewed (either as conference or journal articles) and were published between 2014 and 2021 in electronic databases. We also considered official technical and statistical reports published between 2019 and 2021 for the relevance of the data from the reports. Further, we included studies where the subjects (or participants) are in developing countries and engage with businesses that originate from or operate in developing countries.

We excluded papers not written in the English language and papers

Table 1
Keyword and database search queries.

Database/ Source	Query
Ebsco Host	(e commerce) (adoption) (developing countries) (e-commerce) (adoption) (developing countries) (factors OR influences OR determinants) (e commerce OR e business) (adoption) (developing countries OR emerging economies OR developing economies) (e commerce OR e business) (adoption) (developing countries OR emerging economies OR developing economies) (factors OR influences OR effects OR determinants)
ScienceDirect	e commerce adoption developing countries e commerce OR e business adoption developing countries factors e commerce adoption developing countries Factors influencing e commerce OR e business adoption developing countries emerging economies developing economies
SpringerLink	factors AND e-commerce AND adoption AND developing countries e-commerce AND adoption AND developing AND countries AND (factors OR influences OR effects OR determinants) (e-commerce OR e-business) AND adoption AND (developing OR emerging) AND (countries OR economies) AND (factors OR influences OR effects OR determinants)
Google Scholar	Factors influencing e-commerce adoption in developing countries peer-reviewed English e-commerce adoption in developing countries peer-reviewed English e-commerce OR e-business OR electronic commerce adoption in emerging OR developing countries OR developing economies peer-reviewed English factors OR influences OR determinants e-commerce OR e-business OR electronic commerce adoption in emerging OR developing countries OR developing economies peer reviewed English
Google Search	e-commerce adoption in developing countries statistics

translated into English from another language due to authors being limited to the English language. We also excluded papers published before 2014. Books, editorials, letters, news articles, and non-peer-reviewed articles were excluded from our study. Lastly, we excluded duplicate studies and papers including or focused on developed countries.

2.3. Bias

While the researchers endeavoured to reduce bias, we acknowledge that bias is available in the research per the interpretive philosophy and that the study is not bias-free (Okoli & Schabram, 2010; Sotiriadou et al., 2014). Instead of focusing on avoiding bias, we embrace it as part of increasing trustworthiness and authenticity which are measures of rigour in interpretive studies (Boell & Cecez-Kecmanovic, 2014; Sotiriadou et al., 2014; Walsham, 2006). We identified and engaged in review design bias, location bias, selection bias and synthesis bias (Drucker et al., 2016; Egger & Smith, 1998; Templier & Paré, 2018).

Review design bias was addressed by ensuring that a clearly defined, structured and objective research question was developed before engaging with the academic databases and Google searches (Smith & Noble, 2014). The research question is not leading nor indicative of any specific conclusion. All factors are considered whether positive (benefits), negative (challenges), or neutral. Studies conducted in any developing country, from any region were considered. We addressed the bias by cross-referencing findings to ensure that there are no one-sided conclusions.

Location bias was addressed by limiting the search to only papers written in English and only peer-reviewed articles. Grey literature, such as official statistical documents were also searched, and hence, the use of Google search. Multiple, relevant databases were searched to ensure a wide range of literature was located and available for use.

Selection bias was addressed by ensuring that this paper is reviewed by both authors to ensure that the content has not been limited to the understanding of any single author alone (Smith & Noble, 2014). Key concepts are explicitly defined and clearly stated to ensure that they are unambiguous in their meaning.

Synthesis bias was addressed by ensuring that a specified protocol was used. All types of statistics, methods, samples, and sample sizes were considered. All outcomes were considered – different types of findings enhance the argument of the research question to respond to every angle of the question (Seo & Kim, 2012; Smith & Noble, 2014). Further, the use of thematic analysis ensured that the themes identified were across several papers and by both authors and assisted in eliminating author-centricity.

2.4. Data extraction

The initial data extraction process began in June 2021 and concluded in July 2021 and was conducted by the authors. All three online databases were searched using various combinations of the search terms (query) to yield as many results as possible. In Ebsco Host and ScienceDirect, the advanced search was used where individual terms connected with Boolean operators “AND” and “OR” were used. The researchers noticed that the terms “e-commerce” and “e-business” had to be used without the connecting dash - “e commerce”, “ecommerce” and “e business” - because the dash indicated the Boolean Operator “NOT” which yielded irrelevant results. However, in SpringerLink and Google Scholar, the full search “e-commerce” and “e-business” was used as the dash did not interfere in these databases. Searches were similar and repeated between the databases to assess whether the databases would return different or the same results. The researchers found that the searches had returned many duplicates between the queries and across the databases. Thus, the duplicates were avoided during the initial searches, however, some duplicates were still found during the identification process.

In Ebsco Host, the initial search included the terms ‘e commerce’, ‘adoption’ and ‘developing countries’ and then for each search thereafter, more search terms were added to it such as ‘e business’, ‘influences’, ‘factors’, ‘effects’, ‘determinants’, ‘emerging economies’ and ‘developing economies’ to refine the search further. Each search in Ebsco Host was refined by the period 2014–2021, peer-reviewed articles, conference proceedings and English.

In ScienceDirect, the initial search was typed as the phrase “e commerce adoption developing countries” and then for each search thereafter, more search terms were added into the initial phrase such as ‘e business’, ‘influences’, ‘factors’, ‘effects’, ‘determinants’, ‘emerging economies’ and ‘developing economies’ to refine the search further. Each search in ScienceDirect was refined by the period 2014–2021, research articles, conference info, Open Access, and Open Archive.

In SpringerLink, the initial search was also typed as the phrase “factors e-commerce adoption developing countries,” which the database reconfigured into separate search terms connected by Boolean operators. Thereafter, more search terms were added to the initial search such as ‘e business’, ‘influences’, ‘factors’, ‘effects’, ‘determinants’, ‘emerging economies’ and ‘developing economies’ to refine the search further. Each search in SpringerLink was refined by the period 2014–2021, article, conference paper and English.

In Google Scholar, the initial search was typed as a phrase which included two of the filters as the only filter option is to refine by time, thus the phrase was “Factors influencing e-commerce adoption in developing countries peer-reviewed English”. Thereafter, additional search terms were added to the initial search such as ‘e business’, ‘influences’, ‘effects’, ‘determinants’, ‘emerging economies’ and ‘developing economies’ to refine the search further. Each search included the words “peer-reviewed” and “English” at the end to filter the results, as well as the period of 2014–2021 was applied.

In Google Search, the phrase “e-commerce adoption in developing countries statistics” was entered. No filters were used as the results were provided in order from the most recent and grey literature being searched for.

Approximately 8000 studies in total were returned from searches on all five databases. However, the 8000 includes overlaps where most searches returned duplicates from other searches and thus the 8000 total is not an accurate amount, rather it is a rough estimation. Mulibana and Rena (2021) conducted a systematic literature review and started with 2774 articles and only analysed 44. Hauge et al. (2010) used a systematic literature review and started with a population of 24289 papers but only analysed 112 papers. Ibidunni et al. (2022) started the systematic literature review search on SMEs with 52430 papers and analysed 127 articles. Thus, a systematic literature review may start with a higher number of articles identified in the collective first search but may arrive at a limited number of articles to analyse. The importance of using PRISMA is that researchers reduce the risk of reading excessive articles that may not contribute to their study (Ibidunni et al., 2022; Siddaway et al., 2019; Sousa et al., 2019; Templier & Paré, 2018). The use of PRISMA increases research transparency.

Specific filters were applied to the searches to limit them to only journal articles and conference papers, to a specific time frame between 2014 and 2021, to those written in English and those that are peer-reviewed. From these results, 92 located studies were produced. If either one or more of the keywords existed in the title, the study remained for the time being as to not unnecessarily exclude studies based only on the title and not the contents.

After the collection of the 92 studies, they were reviewed for duplicates and six duplicates were found. Once the duplicates were removed, the abstracts, and occasionally the findings (if the abstract was not sufficient) of the remaining 82 studies and four reports were reviewed and those that did not mention either e-commerce or developing countries in the abstract or findings were excluded. This was done to ensure that the full-text articles could be evaluated for relevant information and to not exclude any relevant studies due to selection bias.

After this evaluation, 42 records were excluded, and 44 full-text articles' content and findings were assessed for eligibility. Of the 44 full-text articles that were reviewed again by content and findings, 19 records were further excluded based on the findings being irrelevant to the research sub-questions and 25 final records were found to include research based on the factors that affect the adoption of e-commerce in developing countries. The summary of how we arrived at the final 23 articles and two reports for analysis is found in Fig. 1. The 25 included papers that were manually downloaded in pdf format and saved in a shared folder to which both researchers had access.

2.5. Data analysis

This paper follows the qualitative research method to provide richer explanations based on evidence from the 25 papers that we analysed (Boell & Cecez-Kecmanovic, 2014; Okoli, 2012; Rowe, 2014). Within the qualitative research method, we use thematic analysis to analyse the papers. Thematic analysis was chosen because it focuses on identifying themes or patterns that pertain to a specific lifestyle or behaviour, and then analysing them with reflexivity as an important aspect (Aronson, 1994; Clarke & Braun, 2013). The purpose of this paper is to identify the factors which influence the adoption of e-commerce in developing countries by identifying the benefits and challenges thereof.

We followed thematic analysis with the six steps as argued by Braun and Clarke (2006). First, we became familiar with the data by reading all 25 papers. Each researcher loaded all the papers to Atlas.ti 9 in preparation for step 2. In the second step, we started to code each of the papers individually and to discuss the common codes. The coding included sentence coding and paragraph coding. After reading the first paper, we agreed with 95%. We then proceeded to code the remaining 24 papers and would discuss when challenges emerge. While it was a tedious task, we viewed the initial coding as crucial not only to understanding our data but also to agree.

In the third step, we created themes by collating related codes. We then evaluated the data and grouped the findings into sub-codes, based on their overarching themes. The sub-codes or themes were first assessed by counting how many articles had mentioned that theme. Themes that were mentioned by three or more articles were included and themes that were only mentioned by one or two articles were placed as miscellaneous. The process is intended to eliminate review design bias, to ensure data is not one-sided or author-centric and that the data has been confirmed by other researchers which affords authenticity of the data.

The sub-codes or themes were then assessed, based on their relevance to the research questions and whether they support/answer the research questions. This resulted in sub-codes or themes being combined or further separated which was part of step four which included creating internal homogeneity and external heterogeneity. The first author shared the project bundle created in Atlas.ti 9 with the second author and the two projects were merged. The intercoder mode was enabled by the second researcher and the agreement was at 98%. The researchers had an in-person meeting where the difference was discussed, and a revisit of step four was conducted.

The finalised themes, step 5, were assessed for connections between them, whether they relate to others, and how they relate to one another. The themes were then explained by naming them and providing a detailed description of each theme. Included in these descriptions are explanations of their connections to one another. The key themes our study found are technological factors, organisational factors, environmental factors, customer trust factors and performance factors. A further explanation of how we arrived at these five themes is provided in section 3.1. The themes and connections that are found to contribute significant and valuable understanding were used to generate the final report (this manuscript) of findings by interpreting them to create an argument that will provide comprehensive answers to the research question as step 6.

3. Findings

3.1. General findings

The findings for this paper are extracted and detailed, using a comprehensive matrix analysis found in Table 2. In the table, the abbreviation EC was used to refer to e-commerce and the term barriers to

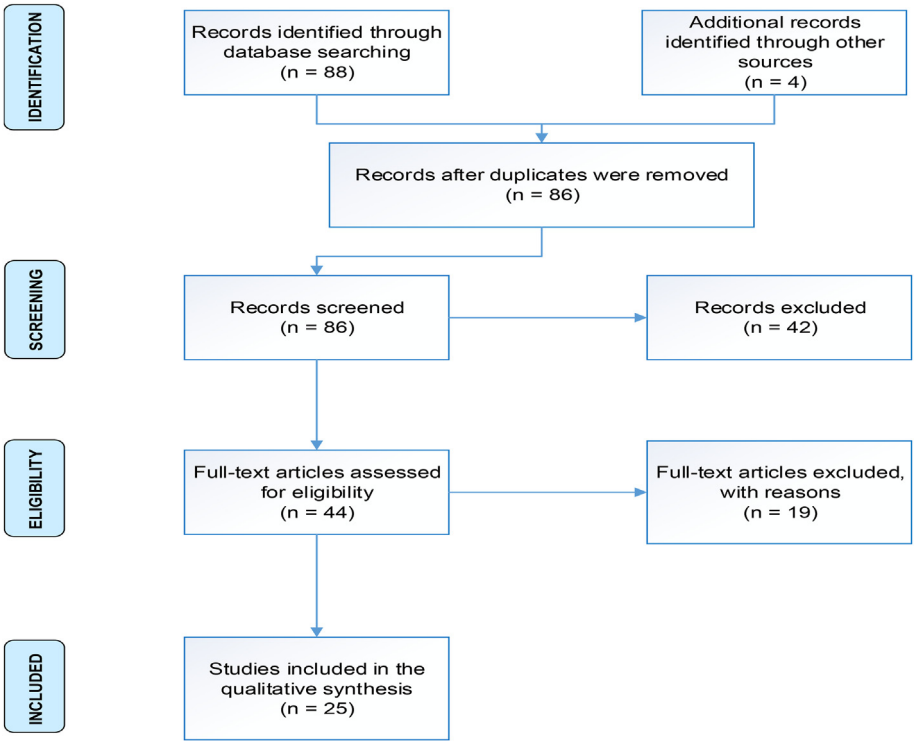

Fig. 1. Prisma flowchart.

Table 2
Summary of key arguments in the papers.

No.	Author and year	Major findings
1.	Said (2017)	Factors that influenced e-commerce adoption: Technological – cloud-computing compatibility Organisational – firm size, awareness, resources Environmental – supporting industries, government support, and market forces. The adoption of EC depends on TOE factors to a great extent. Awareness of opportunities, benefits and threats affects the decision to adopt. The study is quantitative and follows the survey strategy. The sample was IT organisations in Egypt and the sample size includes 175 responses.
2.	Ahmed and Hasan (2016)	Barriers that affect e-commerce adoption: Infrastructural – lack of online security; lack of available online payment methods, problem returning products online; unreliable logistics; unstable Internet network; lack of qualified EC personnel; poor Internet connection speed. Cognitive – lack of awareness; lack of knowledge of EC benefits; lack of excellent quality Arabic online. Political, legal, and economic variables are not major barriers – less important than social, cultural and infrastructural inhibitors which are hindering EC growth in Syria. Syria suffers from inadequate infrastructure to adopt EC. The study is quantitative and follows the survey strategy. The sample is Internet users in Syria aged 15 and above and included 550 respondents.
3.	(S. Z. Ahmad et al., 2015)	Two most significant factors that affect e-commerce adoption: External change (e.g., government). Perceived compatibility (e.g., EC technology compatibility with existing infrastructure). Perceived relative advantage – managers will only adopt EC if they perceive its benefits of it. Management attitude toward EC. The government is instrumental in EC adoption among SMEs by providing incentives and assistance. Only the Organisational context had all its factors been significant towards EC adoption. The study used the TOE framework. The study is quantitative and follows the survey strategy. The sample was SMEs in Malaysia and included 307 respondents.
4.	Lekmat (2018)	Technological factors: Perceived benefits – SMEs believe there are potential benefits and opportunities of EC, and they will adopt it. Government Policies and Supports – government support eliminates resource and skills barriers. Government infrastructure provides e-readiness. Organisational factors: Organisational IS competence – managers' knowledge and awareness and employees' IT skills impact EC adoption. Management commitment and support – promote EC acceptance. Environmental factors: Competitive pressure – SMEs use EC strategies to stay competitive as an essential for survival and growth. Financial resources availability – SMEs with better financial availability tend to accept EC more than SMEs with fewer resources. TOE elements affect EC adoption, which in turn, affects performance. EC adoption in response to environmental challenges tends to improve SMEs' performance. EC helps companies increase productivity, which improves quality and enhances customer satisfaction which increases sales and profits. The study used the TOE framework. The study is qualitative, and data was collected using interviews. The sample was CEOs or managers of Thai SMEs and included nine participants.
5.	Mohtaramzadeh et al. (2018)	Technological factors: Perceived relative advantage – no significant effect on EC adoption. Companies may know the benefit of EC but their knowledge of it may be limited. Cost of technology adoption – barrier to EC adoption. Fixed broadband and Internet costs are high. Lack of financial resources to invest in technology. Organisational factors: Top management support/dependence on top managers to make strategic decisions. Innovative managers are more inclined to adopt EC. IT infrastructure not significant – limited IT knowledge and skills. Environmental factors: Competitive pressure positively influences EC adoption – to maintain a competitive position, strengthen the supply chain and be influenced by competitors. No relationship between legal infrastructure and EC in manufacturing companies. Companies are positively influenced by government support. Could increase productivity and co-ordination along the value chain leading to improved performance. The study used the TOE framework. The study is quantitative and follows the survey strategy. The sample was managers, CEOs and owners of manufacturing companies in industrial cities in Iran. The study included 320 respondents.
6.	Rondović et al. (2019)	Environmental external factors have the most significant influence on e-business diffusion across all sectors. ICT infrastructure is the least significant factor. Finance sector: biggest influence is IT infrastructure and IT integration. External support has insignificant effect. Public sector: external support has an enormous influence. Telecommunications sector: management and organisational readiness is the single most crucial factor. Trade and tourism sector: organisational characteristics are the single most crucial factor. Good IT infrastructure combined with legislative support and less dependence on external support leads to higher diffusion of e-business. The effects of factors are different in different sectors. The study used the TOE framework. The study is quantitative and follows the survey strategy. The sample was employees in the IT and marketing sector of 330 companies. The sample size included 703 respondents.
7.	Chawla and Kumar (2021)	Lack of trust in products and their suppliers is a barrier to people not using EC. Guarantees, warranties and customer service are key factors for trust. Website UI and UX is also a key factor for EC consumer confidence.

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Table 2 (*continued*)

No.	Author and year	Major findings
		People gain confidence when online shopping if they feel it is safe and secure. Consumer rights protection is vital to EC growth. The study is quantitative and follows the survey strategy. The sample was online consumers in India and included 432 respondents.
8.	Alyoubi (2015)	Barriers to EC growth: Lack of managerial skills to implement EC strategies. Cost, quality, and speed of Internet connectivity. Lack of effective branding. Trust issues. Lack of adequate logistical networks. Absence of a comprehensive regulatory environment for EC. Inadequate infrastructure. Pre-conditions for EC adoption: Customer readiness, which includes trust. Technical and managerial expertise. Relevant legislation. E-payment and banking systems. Reliable logistical networks. Success factors of e-commerce adoption: Training and education. Supportive regulatory environment. The digital divide has revealed that EC has the propensity to function as a tool to reduce this gap for developing countries. The most important aspect to make this happen is to have dedicated legislative support i.e., customised national policies and strategies for EC development. The study used the qualitative method.
9.	Kurnia et al. (2015)	Perceived benefits: no considerable influence on EC adoption. The barriers may be greater than the benefits. Lack of understanding of EC benefits. Perceived organisation resources and governance: a positive association with EC adoption. Perceived Industry structure and standards: not a noteworthy influence for EC adoption. Limited understanding and awareness of EC technologies. Perceived supporting services: negatively influence EC adoption. Perceived environmental pressure: the greater the environmental pressure, the more likely SMEs will adopt EC. This could be to keep up with their competitors, and technological changes, and meet customers' needs. The study used a multi-level framework. The study is quantitative and follows the survey strategy. The sample included SMEs in the grocery sector in Malaysia. The sample size was 125 respondents.
10.	Agarwal and Wu (2015)	Factors affecting EC in emerging economies on a Global level: Multilateral agreements – can reduce the cost of transactions and co-ordination for firms conducting business activities internationally. Strategic behaviour of firms – imitation and convergence of firms for competitive purposes could result in greater EC adoption. Technological innovations – the better the technological innovation and entrepreneurship in a developing country, the faster the adoption of EC. On a national level: Government policies and regulations – that are favourable in developing countries lead to greater and faster adoption and growth of EC. Legal environment – the greater the lack of relevant laws and enforcement, the slower the adoption and growth of EC in a developing country. Infrastructure – the better the financial, physical, and social infrastructures in a developing country, the greater the level of understanding and exploitation of the value of EC. Culture – the rate of EC adoption may be slow in developing countries with a collectivist culture as they do not trust the system if it does not involve a human interface. Transactional-level factors: The integrity of transactions – EC adoption will be slower if there is a lack of trust in online transactions. Online intermediaries – EC adoption and growth can increase if the use of online intermediaries increases. Network externalities and value clustering – can increase the adoption and growth of EC if firms harness the benefits better. The study used the N-OLI framework.
11.	Hussein et al. (2020)	Technological factors: Compatibility significantly influences the intention to use B2B EC. If compatibility between the EC and the system in question is low, the level of adoption will be low and have no influence. Organisational factors: Information intensity does not significantly affect the intention to use EC. Outsourcing IT has a considerable influence on the intention to use B2B EC. Outsourcing provides support to those enterprises that lack the necessary IT infrastructure, employees, and knowledge for B2B EC adoption. Security has no significant influence as most of the SMEs in the study have a low level of B2B EC adoption and thus, do not make use of online transactions. The study used the TOE framework and combined it with DOI theory. The study is quantitative and follows the survey strategy. The sample was SMEs in the manufacturing sector in the Amman chamber of industry in Jordan. The sample size was 245 respondents.
12.	Kartiwi et al. (2018)	EC adoption benefits: SMEs who adopt EC to provide better online customer service enable the SMEs to retain customers and improve business partner and supplier relationships. EC can reduce the cost of transactions. How businesses can achieve EC benefits: Findings emphasise the importance of SMEs' adaptability to technology. Emphasises the importance of SMEs' response to competitors' actions to optimise the benefits of EC adoption. Emphasises the importance of continuous government support, specifically training and awareness on how to address pressure from customers and competitors. Emphasises the importance of SMEs strategising the use of EC in business and understanding the potential benefits thereof. The study is quantitative and follows the survey strategy. The sample was SMEs in the retail sector in Malaysia and the sample size was 181 respondents.
13.	Jena (2018)	Barriers to EC adoption in India and their relationships: Technological barriers – influenced all other barriers, thus technological barriers need to be addressed first to minimise all the others. Legal and regulatory barriers – also highly influence other barriers. Influences technological barriers the most.

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Table 2 (*continued*)

No.	Author and year	Major findings
		Social and cultural barriers – also highly influence other barriers. Economic barriers – highly influence other barriers. Organisational barriers – low influence on other barriers i.e., other barriers would need to be addressed first to minimise their barrier effects. Political barriers – highly influence other barriers. The study used the DEMATEL framework. The study followed the qualitative method and used open-ended questionnaires. The sample included experts with various experiences and backgrounds. The sample size was 22 participants.
14.	Astuti and Nasution (2014)	SME owners have a medium level of technology readiness. SME owners who earn more have a higher level of optimism when it comes to EC adoption because they have experienced the benefits. The study used the TRI framework. The study is quantitative and follows the survey strategy. The sample was entrepreneurs of SMEs in Bandung city in Indonesia. The sample size was 190 responses.
15.	Kabir et al. (2020)	Six factors of EC which positively influence economic growth: Accessibility (strongest relationship). Electronic payment. Research and development. Import taxation. Supply chain management. Creating job sectors. The study is quantitative and follows the survey strategy.
16.	Kordic (2014)	Opportunities for developing countries as producers of EC: Access to new domestic and foreign markets. Overcoming distance. Participating in value chains. Providing offshore services. Opportunities for developing countries as users of EC: Access to products and services at lower prices. Increased competition. Access to knowledge and technology.
17.	Koe and Sakir (2020)	Transforming businesses from traditional to EC businesses is vital for businesses to remain competitive. The fourth industrial revolution has transformed the competitive landscape from traditional to online and digitised. A meaningful relationship between competence and EC adoption – being aware and knowing the knowledge of ICT motivated entrepreneurs to adopt EC. Thus, training and development for entrepreneurs are essential to keep them competitive. A meaningful relationship between motivation to adopt EC and autonomy - more freedom and less government intervention for entrepreneurs because EC requires innovation and government intervention may cause too many regulations that would suppress creativity and prevent entrepreneurs from adopting EC. A significant and positive relationship between relatedness and motivation to adopt EC – building relationships between entrepreneurs for trade associations to build environments to support each other in adopting EC to share successes and relevant information that may be useful to others. The study is quantitative and follows the survey strategy. The sample is SME entrepreneurs (owners) registered in the directory of the Ministry of International Trade (MITI) under the digital free trade zone initiative. The sample size was 273 respondents.
18.	Lim et al. (2018)	Medium-sized SMEs tend to adopt EC more than smaller SMEs. Technical challenges are not a threat to EC adoption. Competitive pressure – EC will assist in increasing channel distribution and improve communications and prove to competitors that they possess technical capabilities, which will improve their market position by proving their technological innovations. The study used the TOE framework. The study is quantitative and follows the survey strategy. The sample was SME manufacturers from western Malaysia. The sample size was 217 respondents.
19.	Mthembu et al. (2018)	Infrastructural barriers to EC: Internet security – internet infrastructure is vital for EC adoption and operation and for the protection of EC sites. Customers do not feel safe performing online transactions. Broadband connectivity and high access costs – the cost, quality, speed, and accessibility to the Internet are barriers that prevent EC adoption. Educational system – a lack of the necessary skills to support the growth of EC. Socio-economic barriers – a significant role in determining whether EC succeeds or fails in a country. EC adoption is expensive for companies in developing countries. Logistics – fundamental aspect to promote EC adoption. Inefficient and unreliable logistic networks make it difficult to achieve some of the benefits of EC adoption, such as customer convenience, which is important for retaining customer trust. Payment method – online payments are essential to EC because it is based on the use of a credit card, but online customers are afraid of inputting their card details in case of fraud. Socio-cultural barriers – accommodating cultural differences play a significant role in sustaining EC practices because it depends on the customer's propensity to adopt EC which is influenced by their background. Customer Trust – vital to EC adoption success. The lack of trust could be from a lack of confidence due to hesitancy to use online payment methods and make online transactions. Understanding local conditions – essential for businesses in other local markets to work with locals to understand that market. This is essential to succeed in that market. Personalisation – assists in retaining customer trust and loyalty. Institutional environment: Government policies and regulations – allow for the sustainability of EC practices and growth. The lack thereof creates barriers for businesses. Support from investors – who are willing to accept the trading loss but understand the benefits of the growth of the business. Cognitive barriers: English – running a business in markets that use English as the main language is vital for EC adoption. Understanding the core business – managers should have technical skills and understand the strategic purpose that leads EC in the business. The study used the qualitative method with semi-structured interviews with 12 participants at top-level management at Company Z.
20.	Oluwaseun (2016)	Benefits of adopting EC: Lower prices online mean higher cost savings. Security.

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Table 2 (*continued*)

No.	Author and year	Major findings
		Convenience. Challenges of adopting EC: On-time delivery. Prescription issues. Response to complaints. Lack of examination of products before they are sent for delivery. Inadequate quality of products. Poor product durability. The study used the rational choice theory. The study is quantitative and follows the survey strategy. The sample was civil servants in the governments of Lagos state, Oyo state and Ogun state in Nigeria. The sample size was 263 respondents.
21.	Rahayu and Day (2017)	A low level of EC adoption was found and further, the majority only adopt simple websites. Many SMEs cannot afford to hire IT specialists due to a lack of financial resources. The majority of SMEs use EC for marketing activities. Top six EC adoption benefits: Extended market reach. Increased sales. Improved external communication. Improved company image. Improved speed processing. Increase in employee productivity. The higher the level of EC adoption, the more benefits SMEs will realise. The study is quantitative and follows the survey strategy. The sample was SME owners (or managers) in Indonesia and the sample size was 292 respondents.
22.	Makame et al. (2014)	National policy initiatives have a considerable influence on perceived ease of use, perceived usefulness, technology infrastructure and online trust of e-commerce transactions. Thus, national policy initiatives are important for developing trust and necessary technology infrastructure in developing countries. Technology infrastructure has a great influence on customer trust, which affects customer intention to use EC. Thus, the necessary technological infrastructure, including good quality internet and security. is important to increase customer trust. Trust is important for customers to get involved in EC transactions. The study used the TAM theory. The study is quantitative and follows the survey strategy. The sample was higher education students and workers from private and government institutions in Tanzania. The sample size was 111 respondents.
23.	Sila (2019)	Technological factors influencing EC adoption: Perceived benefits – SMEs adopt EC because they realise the potential benefits for their business. Benefits of EC adoption include – lowering costs, increased market and business knowledge, improved business processes, extending to new markets, strengthening customer relationships, development of new products and services and increased sales. Government policies and support – helps eliminate barriers such as lack of resources, IT knowledge and IT skills. Will also help develop e-readiness. Organisational factors influencing EC adoption: Organisational IS competence - manager's awareness and knowledge of EC along with the business's IT skills influence EC adoption. However, the lack thereof has hindered businesses' ability to realise the full benefits of EC technologies. Management commitment and support – can assist in promoting EC acceptance in SMEs. Environmental factors influencing EC adoption: Competitive pressure – EC strategies are used by SMEs as a source of competitive advantage to remain competitive in the market as it is essential for business survival and growth. Financial resources availability – SMEs that have better financial assets usually accept EC more than SMEs with fewer resources. How EC benefits firm performance: SMEs who adopt e-commerce in response to environmental challenges can realise the benefit of enhanced business performance as EC helps businesses to improve productivity, increase quality, enhance customer satisfaction and thus, increase sales and profits. The study used the TOE framework.
24.	UNCTAD (2021)	The availability of legislation for the digital economy is inadequate in developing countries which creates barriers, such as with exports, which is disadvantageous to developing countries.
25.	UNCTAD (2019)	Barriers to digital platform adoption in developing countries: Unreliable and poor-quality bandwidth Inefficient payment systems Low propensity from customers and employees to adopt the technology. Logistical (delivery services) barriers Lack of digital innovation platforms lack suitable fundamental technological infrastructure for innovation. If global digital platforms keep innovating, and developing countries lag, their chances of catching up may become smaller. Underdeveloped financial infrastructures.

refer to challenges. All 25 included articles have been thoroughly read, analysed, and recorded in the table consisting of the article's citation, the research method and data collection method, the sample population description, the sample size used for analysis, the framework employed and the major findings of the study.

During analysis, we found that not all findings correlated to either benefits or challenges of e-commerce adoption in developing countries as the only factors. It was also found that 11 of the 25 included studies that have no specified framework, whilst eight of the included studies use the TOE framework and the remaining six studies use a variety of other frameworks. However, within the 11 studies without a framework and the six studies with frameworks other than TOE, it was found that most of the findings could be categorised under either technological factors, organisational factors or environmental factors and the remaining factors could be categorised into three extra categories which include infrastructural factors, performance factors and customer trust factors. Thus, a further coding procedure was implemented to tabulate the findings from Table 2 under each of the six themes: infrastructural, technological, organisational, environmental, performance and customer trust.

Once this coding procedure was completed, during a review of the

themes we noticed that the infrastructural falls within the technological factors (see Lautenbach et al., 2017; Oliveira & Martins, 2011) and thus these two themes were merged to form a single theme under technological factors. Therefore, each of the five categories discussed below is considered a theme of the research topic and will be explained individually.

Table 2 not only presents the summary of the articles the researcher read but also provides data in the form of articles analysed for the research (Ahmad et al., 2020; Hauge et al., 2010; Siddaway et al., 2019; Wang et al., 2020). Systematic literature reviews ought to produce tables that summarise the papers researchers read in the same way empirical research presents tables and data extracts (Siddaway et al., 2019). The table is then used to guide the concept-centric discussion conducted in the findings (Boell & Cecez-Kecmanovic, 2014). Researchers also use either a concept matrix or a matrix analysis to present the analysed research papers (Pozzi et al., 2014).

3.2. Technological factors

Technological factors refer to the aspects of technology infrastructure which are necessary for the adoption of e-commerce in developing countries. One of the most common factors found in the literature is the perceived compatibility and level of adaptability of e-commerce technology within an organisation's or country's existing systems and infrastructures (S. Z. Ahmad et al., 2015; Hussein et al., 2020; Jena, 2018; Kartiwi et al., 2018; Rondović et al., 2019). This factor could be seen as the most important technological factor as, without the necessary infrastructure, other factors such as internet connectivity (Mthembu et al., 2018) and electronic payment methods (Kabir et al., 2020; Mthembu et al., 2018; UNCTAD, 2019) would not have the necessary platforms through which to operate. This is currently a challenge for developing countries as their infrastructures tend to be under-developed and inadequate for the use of e-commerce (Alyoubi, 2015; UNCTAD, 2019). In addition, Mthembu et al. (2018) mention that internet infrastructure is especially vital for e-commerce adoption and operation and protection of e-commerce sites.

Three major technological and infrastructural challenges of e-commerce adoption in developing countries are unstable and low-quality internet networks, connections and speed along with high internet access costs (Ahmed & Hasan, 2016; Alyoubi, 2015; Mthembu et al., 2018; UNCTAD, 2019), a lack of adequate and reliable logistical networks (Ahmed & Hasan, 2016; Alyoubi, 2015; Oluwaseun, 2016; UNCTAD, 2019) and the high costs associated with the adoption of e-commerce technologies (Mohtaramzadeh et al., 2018). The high cost associated with the adoption of e-commerce is because of the challenge of developing countries' lack of financial resources to afford these technological investments (Mohtaramzadeh et al., 2018; Rahayu & Day, 2017; UNCTAD, 2019).

3.3. Organisational factors

Organisational factors refer to factors that affect organisations or businesses, their management, and their performance. Major organisational factors are the attitude, commitment, support and motivation of management towards e-commerce adoption (S. Z. Ahmad et al., 2015; Lekmat, 2018; Mohtaramzadeh et al., 2018; Sila, 2019) which promote the acceptance of e-commerce technologies in organisations (Lekmat, 2018; Sila, 2019), and the technical awareness and competence of the organisation, such as IT knowledge and technical skills (Alyoubi, 2015; Koe & Sakir, 2020; Lekmat, 2018; Said, 2017; Sila, 2019). However, the challenge with these two factors (IT knowledge and technical skills) is that the lack of them in developing countries has been shown to hinder organisations' ability to realise the organisational benefits of e-commerce technology adoption (Koe & Sakir, 2020; Sila, 2019) such as increased productivity, improved company image and increased sales (Rahayu & Day, 2017).

Another major challenge is a lack of the necessary managerial and e-commerce skills to implement e-commerce (Alyoubi, 2015; Mthembu et al., 2018) in conjunction with the lack of qualified e-commerce personnel (Ahmed & Hasan, 2016) to maintain the growth of e-commerce in organisations (Mthembu et al., 2018). Koe and Sakir (2020) emphasise that training and development of e-commerce knowledge and skills are essential to the adoption and growth of e-commerce in organisations.

3.4. Environmental factors

Environmental factors refer to both the internal and external political, economic, legal and market factors of a developing country. The most important and most mentioned environmental factor is the existence and support of adequate governmental policies, regulations, initiatives and incentives for e-commerce adoption (Agarwal & Wu, 2015; S. Z. Ahmad et al., 2015; Alyoubi, 2015; Jena, 2018; Kartiwi et al., 2018; Lekmat, 2018; Makame et al., 2014; Mohtaramzadeh et al., 2018; Mthembu et al., 2018; Rondović et al., 2019; Said, 2017). Alyoubi (2015) and the UNCTAD (2021) argue that the challenge with this factor is that there is a lack of it in developing countries which creates barriers for businesses (Mthembu et al., 2018; UNCTAD, 2021) and, as found by Agarwal and Wu (2015), the greater the lack of a regulatory environment, the slower the adoption and growth of e-commerce will be in a developing country. However, with the implementation of government infrastructure for e-commerce adoption, the benefits would include resource and skill barriers being eliminated (Lekmat, 2018; Sila, 2019), the development of technological readiness (Lekmat, 2018) and assisting in preparing for e-commerce adoption in the country and allowing for the growth and sustainability of e-commerce practices (Mthembu et al., 2018).

The other major environmental factor is competitive pressure (Kartiwi et al., 2018; Koe & Sakir, 2020; Lekmat, 2018; Lim et al., 2018; Mohtaramzadeh et al., 2018). E-commerce is a source of competitive advantage and helps to improve a company's market position in today's digital-based competition environment (Lim et al., 2018) and is essential for the survival and growth of the business (Sila, 2019). In a study by Kurnia et al. (2015) on SMEs in a developing country, it was found that the greater the perceived environmental pressure felt by a company to keep up with competitors, technological changes, or customers' needs, the more likely they are to adopt e-commerce. The presence of the environment includes suppliers and other stakeholders that are crucial for organisational success and boosting the country's gross domestic product (GDP).

3.5. Customer trust factors

Customer Trust factors pertain to the readiness of a customer to adopt e-commerce and involve the extent to which customers trust and feel comfortable with e-commerce methods (Agarwal & Wu, 2015; Alyoubi, 2015; Mthembu et al., 2018). However, UNCTAD (2019) has found that there is a low inclination for customers and employees to adopt technology and this was also addressed by Alyoubi (2015) who found that customer readiness to adopt e-commerce is a challenge.

Other major challenges of customer trust include a lack of trust in the quality of products sold online (Chawla & Kumar, 2021; Oluwaseun, 2016) and a lack of trust in performing online transactions with concerns about the integrity and security of transactions as customers are afraid of fraud when using their credit cards (Agarwal & Wu, 2015; Mthembu et al., 2018). Agarwal and Wu (2015) argue that the greater the lack of trust in online transactions, the slower e-commerce adoption will be because online transactions are a vital aspect of conducting e-commerce (Koe & Sakir, 2020) and without it, e-commerce transactions would not be able to take place.

Customer trust is vital to the success of e-commerce adoption (Mthembu et al., 2018) and this argument was raised in a study by Makame et al. (2014) which showed that trust is a crucial factor to get

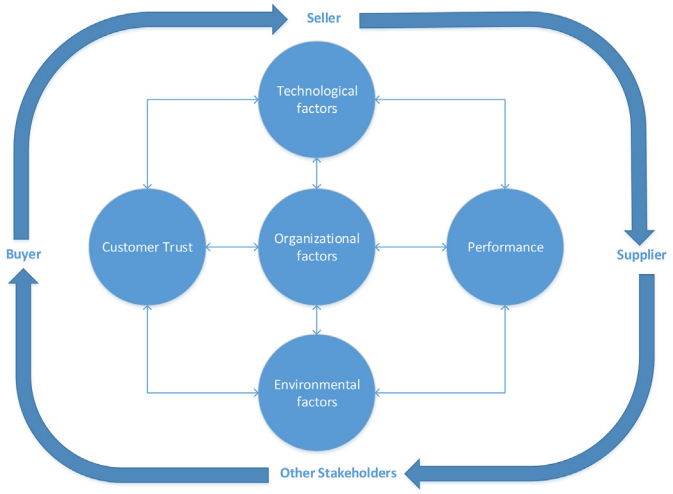

Fig. 2. Factors influencing e-commerce adoption in developing countries.

customers involved in e-commerce transactions, specifically about environmental and technological factors. In the study, it was found that government policy initiatives, an environmental factor, are an important aspect in building the necessary technology infrastructure, a technological factor, to gain the trust of customers in e-commerce (Makame et al., 2014).

3.6. Performance

Performance improvement has not necessarily been mentioned as a challenge that affects e-commerce adoption, but rather it is seen as a benefit of successful e-commerce adoption. Lekmat (2018) mentions that e-commerce adoption in response to environmental challenges tends to improve SMEs' performance. Mohtaramzadeh et al. (2018) mention that companies could be positively influenced when they have the support of the government for the adoption of e-commerce which could also lead to improved performance.

This shows that performance is seen as a benefit of e-commerce adoption in developing countries as e-commerce adoption helps to improve productivity (Lekmat, 2018; Rahayu & Day, 2017; Sila, 2019). Productivity increases co-ordination and quality along the value chain (Lekmat, 2018; Mohtaramzadeh et al., 2018; Sila, 2019), enhances customer satisfaction and thus increases sales and profits (Lekmat, 2018; Rahayu & Day, 2017; Sila, 2019). The advancement of these factors leads to improved performance (Lekmat, 2018; Mohtaramzadeh et al., 2018; Sila, 2019).

Fig. 2 presents a model of the factors influencing e-commerce adoption in developing countries. The model presents the novelty and contribution of this research to theory as it departs from the TOE framework by adding customer trust and performance as important factors in the discussion on the adoption of technologies (in this case, e-commerce). The model also depicts the different stakeholders, such as buyers, sellers, suppliers, government entities (tax offices), logistical companies and telecommunication operators, to name a few, and the ecosystem in which they operate where one stakeholder influences others.

The arrows are purposively positioned as bidirectional because each factor affects the other and is in return, affected. For example, customer trust is affected by the presence of unreliable internet connections and sufficiently reliable online payment platforms in developing countries which in turn, makes customers lose trust in using e-commerce to acquire commodities online and therefore hinder its adoption.

4. Discussion

To understand the influence of the five factors explained, we grouped them based on the challenges and benefits they impose on e-commerce adoption in developing countries as an approach to answering the research question. The challenges were meant to assess pertinent issues and hinder the adoption and growth of e-commerce in developing countries. The benefits are areas from which other developing countries can learn.

4.1. The challenges of e-commerce adoption in developing countries

Within each of the five themes found across the literature, challenges were identified that pertained to each theme. Under technological and infrastructural factors, the major challenges found were inadequate and under-developed infrastructures (Alyoubi, 2015; UNCTAD, 2019), unstable and low-quality internet and high internet access costs (Ahmed & Hasan, 2016; Alyoubi, 2015; Mthembu et al., 2018; UNCTAD, 2019). Further, the technological challenges include inadequate and unreliable logistical networks (Ahmed & Hasan, 2016; Alyoubi, 2015; Oluwaseun, 2016; UNCTAD, 2019) and high technology adoption costs (Mohtaramzadeh et al., 2018).

Under organisational factors, major challenges included a lack of the necessary technology awareness, IT skills, IT competence and management support needed to implement e-commerce adoption and a lack of qualified e-commerce personnel to maintain the growth of e-commerce (Koe & Sakir, 2020; Lekmat, 2018; Mthembu et al., 2018). The major challenge found under environmental factors is a lack of adequate government infrastructure, such as policies and regulations which creates barriers for businesses (Agarwal & Wu, 2015; Kartiwi et al., 2018; Sila, 2019). Lastly, a lack of customer readiness, a lack of trust in the quality of products sold online and a lack of trust in performing online transactions are the major challenges found under customer trust factors (Alyoubi, 2015; Chawla & Kumar, 2021; Oluwaseun, 2016).

When looking at the factors and challenges influencing e-commerce adoption in developing countries, several studies looked at the relationship between the factor or challenge and e-commerce adoption. This is illustrated by Koe and Sakir (2020), who found that there is a significant relationship between competence and e-commerce adoption; Kurnia et al. (2015) found that perceived organisation resources, governance and perceived environmental pressure each have a positive relationship with e-commerce adoption, and Mohtaramzadeh et al. (2018) who found that competitive pressure has a positive relationship with e-commerce adoption. Further, evidence is found in Agarwal et al. (2015) who found a positive relationship between the level of technological innovation in a developing country and the adoption of e-commerce.

However, during the process of categorising the factors by theme, it was found that these themes and their factors or challenges are interconnected and cannot be seen in isolation from one another as some studies identified relationships between the factors. In a study by Jena (2018), the relationships between barriers (i.e., challenges) to e-commerce adoption in India were identified and it was found that technological barriers influenced all other barriers and thus needed to be addressed first to reduce all other barriers. However, it was also found that technological barriers were highly influenced by legal and regulatory (environmental) barriers and thus the legal and regulatory barriers should be addressed first to reduce technological barriers, which in turn, will reduce all other barriers (Jena, 2018). Organisational barriers were found to have a low influence over other barriers which means that other barriers should be addressed first to minimise the effects of organisational barriers (Jena, 2018).

These relationships are further illustrated in other studies, such as Makame et al. (2014) who mention that national policy (an environmental factor) is important for developing the necessary technology infrastructure to implement e-commerce in developing countries and that the necessary technological infrastructure, such as good quality internet and online security, is especially important for gaining customer trust in e-commerce. This connection is further supported by Rondović et al. (2019) who found that the combination of good IT infrastructure and

legislative support leads to higher e-commerce adoption.

This indicates that factors and challenges should be addressed in conjunction with all other affected factors and challenges to address them most effectively and beneficially. Thus, by not only understanding the challenges of e-commerce adoption in developing countries but also understanding the relationships between them, developing countries would be able to determine the best strategies for overcoming and eliminating these challenges to take full advantage of the value and benefits e-commerce adoption has to offer.

4.2. The benefits of e-commerce adoption in developing countries

Not all themes had corresponding benefits as the benefits of e-commerce adoption are more general to e-commerce adoption rather than conforming to a specific theme or aspect of e-commerce adoption. The major benefits of e-commerce adoption identified are extended market reach (Kordic, 2014; Rahayu & Day, 2017; Sila, 2019), increased market and business knowledge (Kordic, 2014; Sila, 2019), reduced transaction costs (Kartiwi et al., 2018; Sila, 2019), increased competition (Kordic, 2014; Lim et al., 2018), increased employee productivity which improves quality along the value chain (Lekmat, 2018; Mohtaramzadeh et al., 2018; Rahayu & Day, 2017). These factors enhance customer satisfaction (Lekmat, 2018) which leads to increased sales and profits (Lekmat, 2018; Rahayu & Day, 2017) and thus improves performance (Lekmat, 2018; Mohtaramzadeh et al., 2018; Sila, 2019).

One of the conditions noted is that, if the management of businesses and organisations in developing countries does not perceive the benefits and advantages of e-commerce adoption, they may not be able to realise the benefits of e-commerce adoption. Perceived benefits and perceived relative advantage are two overlapping factors of e-commerce adoption that refer to whether managers and organisations believe that adopting e-commerce will have tangible benefits for them and these are the technological factors. Ahmad et al. (2015), Lekmat (2018) and Sila (2019) mention that managers will only adopt e-commerce if they realise and understand the potential benefits for their business and this is supported by a study by Kartiwi et al. (2018) who emphasises the importance of SMEs understanding the potential benefits of using e-commerce strategies to achieve the benefits.

However, Kurnia et al. (2015) and Mohtaramzadeh et al. (2018) found that perceived relative advantage had no significant effect on e-commerce adoption because organisations may know the benefits of e-commerce but their knowledge and understanding of it may be limited or their challenges are greater than the potential benefits and thus, they do not see e-commerce as a worthy adoption. Thus, for a business to adopt e-commerce and realise its benefits, it needs to consider technological, organisational, environmental, and customer trust as these are the factors that will lead to increased performance.

5. Conclusion

This paper aimed to identify the factors influencing e-commerce adoption in developing countries and achieved that by determining the challenges and benefits of e-commerce adoption in developing countries. This was done through the approach of thematic analysis by systematically analysing and thematically synthesising all relevant literature on the topic from four academic journal databases (Ebsco host, SpringerLink, ScienceDirect and Google Scholar) and a Google search for reports. Through this process, five main themes were found in the literature including technological factors, organisational factors, environmental factors, customer trust factors and performance. The factors identified within these themes included perceived compatibility and adaptability, internet connectivity, electronic payment methods, management attitude and support, existence and support of government infrastructure, competitive pressure, customer trust, readiness, and performance.

The major challenges identified include inadequate infrastructures, low-quality internet connections, high access costs, unreliable logistical networks, lack of technology awareness, IT skills, IT competence, management support and qualified e-commerce personnel, lack of adequate government infrastructure, lack of trust in the quality of products sold online and lack of trust in performing online transactions.

Some of the major benefits identified were found to have a domino effect that led to improved performance. The general benefits include extended market reach, increased business knowledge, reduced transaction costs and increased competition. The benefits that have a direct relationship between them are increased employee productivity which improves quality along the value chain and enhances customer satisfaction which leads to increased sales and profits and thus improves performance.

In addition, the findings of this study have various practical and theoretical implications (contributions). Several practical implications are identified in the study, such as the findings from the challenges indicated that several studies from the literature looked at the relationship between the factor and e-commerce, whilst fewer studies looked at the relationship between factors. The findings from the benefits identified that although there are benefits to e-commerce adoption, if the management of organisations or the government in a developing country does not believe that e-commerce will be valuable and beneficial to them, then they may decide not to adopt it and thus cannot realise any of its benefits.

From a practical perspective, the identification of the relationships between factors could assist developing countries in determining the most constructive strategy for resolving the challenges of e-commerce adoption for them to exploit its value and realise the benefits. Further, the practical implications of the lack of management's perspective on the benefits of e-commerce adoption could push governments to put initiatives in place that will encourage organisations to gain a deeper understanding of the value and benefits of e-commerce so that they may decide to adopt it.

Theoretically, this study contributes by presenting a novel model of technology adoption that departs from TOE by adding the customer trust factor and performance factor which is a first presentation and unique to developing countries. The model also considers the eco-system from which any business operates and affords developing countries a consideration of the stakeholders in e-commerce adoption and use. This study contributes to policy by engaging with SDG 8 through the advancement of ICTs and the different development facets they manifest, such as the creation of jobs (and eradicating youth unemployment), and high value-addition.

The study contributes to the body of knowledge on e-commerce adoption by offering a unique view of the influential factors in developing countries. Further, this study answered questions about the challenges and benefits of e-commerce adoption, which not many previous studies had done. Previous studies either only identified general factors, only challenges or only benefits and very few had done all three or identified both challenges and benefits. Most previous studies had also only used existing theoretical models to identify factors affecting e-commerce adoption and the remaining did not use any specific model at all whilst the thematic structure in this study allowed all the findings from previous literature to be categorised and made them easily identifiable. Although this study used a unique way of identifying factors from existing theoretical models, the findings were consistent with that of previous literature.

The limitations identified in this study are the number of databases used, the period of the study, the number of studies included for comprehensive analysis, the language, the timeframe between which the studies were chosen and the countries from which the included studies were conducted. Only four databases were selected to search for relevant literature due to the time limitation of this study and thus further relevant literature may have been excluded that may have been potentially valuable in this study. This further affects the number of included studies, as having the ability to search many more databases could have offered a wider range of literature that may have provided a greater number of

relevant studies and even more comprehensive findings.

Another limitation is the timeframe of 2014–2021 between which literature was taken. This timeframe was chosen to provide the most recent and current literature on the topic; however, this limited the number of studies included as the topic has been studied before 2014. Including studies from before 2014 back to 2000 could have also provided the opportunity for this study to track whether factors affecting e-commerce adoption in developing countries have changed or evolved and to identify patterns of how e-commerce adoption could be affected in the future.

A similar limitation is that the inclusion criteria limited the searches to articles published in English and excluded those written in other languages and those translated into English from other languages. This too limited the number of studies included in this paper which could have also provided a broader perspective on the topic. The final limitation identified in this study is that some of the studies were specific to certain countries and not all developing countries were represented in the included literature, thus the findings may not have been generalisable to all developing countries or the collective of developing countries.

From the findings and limitations of this study, future research has been identified that can be used to steer the field of e-commerce adoption in developing countries. As the findings identified that not many studies have researched the relationship between the identified factors, this could be recommended as an area for future research and how those relationships can be exploited to improve e-commerce adoption in developing countries by providing empirical data to support the developed model. As it was identified that the timeframe this study used was limiting, future research could include literature from the time that e-commerce adoption was first introduced in developing countries up until current literature to find whether and how factors of e-commerce adoption have changed or evolved for developing countries and how these patterns could affect e-commerce adoption in developing countries in the future. Another potential future research aspect could look at practical solutions for eliminating the challenges of e-commerce adoption, such as developing a structure that could be used as a guideline for developing countries to follow that would be customisable to their unique characteristics to assist in reducing the challenges they face. Future research could also compare e-commerce development between developing and developed countries with a focus on opportunities and challenges.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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