UNIVERSITY OF CAPE COAST

TECHNOLOGY-ORGANISATION-ENVIRONMENT FRAMEWORK AND E-COMMERCE ADOPTION OF SMALL BUSINESSES IN TAKORADI DURING THE COVID-19 ERA

JUSTINA THOMPSON

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere

Candidate's Signature……. Date: ……

Name: Justina Thompson

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature:  Date: …….

Name: Dr Nick Fobih

ABSTRACT

This study delves into the intricate interplay of technological, organizational, and environmental (TOE) factors in shaping the adoption of electronic commerce (e-commerce) among small and medium-sized enterprises (SMEs) during the Covid-19 pandemic within the Takoradi metropolis. Through a primary data collection method, the study draws insight from 428 SMEs sampled using a convenient sampling technique. The data collection employed close-ended self-administered questionnaires comprising 45 items, while research method followed explanatory and quantitative approaches. Descriptive characteristics were analysed utilizing SPSS version 26, while the study employed partial least squares structural equation modeling (PLS-SEM) to assess the impact of perceived desirability in technological factors, organization's readiness in organisational factors, and competitive pressures along with government support in environmental factors on the adoption of e-commerce by SMEs. The results showed a statistically significant and positive relationship between perceived desirability, competitive pressures, government support, organisation's readiness, and the adoption of e-commerce. These findings advocate for proactive management strategies hinging on government support and the adaptability of organizations to leverage the potential of e-commerce adoption. As SMEs strive to navigate the dynamic and competitive contemporary business landscape, strategic implementation of e-commerce becomes instrumental in ensuring business continuity and growth. Policymakers and governmental bodies should proactively formulate and implement policies that foster a conducive environment for e-commerce adoption among SMEs.

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DEDICATION

To my family

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LIST OF ACRONYMS

ANOVA	Analysis of Variance
AVE	Average Variance Extracted
B2B	Business to Business
CA	Cronbach's Alpha
CFA	Confirmatory Factor Analysis
CMB	Common Method Bias
CMD	Coefficient of Multiple Determinations
COP	Competitive Pressure
CR	Composite Reliability
ECA	Electronic Commerce Adoption
GDP	Gross Domestic Product
GEA	Ghana Enterprises Agency
GOV	Government Support
HTMT	Hetrotrait – Monotrait Ratio
ICT	Information Communication Technology
IPMA	Importance Performance Matrix Analysis
IT	Information Technology
MAE	Mean Absolute Error
ORG	Organisational Readiness
PES	Perceived Desirability
PLS-SEM	Partial Least Squares Equation Modeling
RMSE	Root Mean Square Error
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences

TOE	Technological, Organisational and Environmental
VIF	Variance Inflation Factors
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

The era of the Covid-19 pandemic came with immense modification to the world, the most prominent among them being an increase in digitization (Bouaghi, 2021). Due to the transmission mechanism of the pandemic, the no/low contact policy was encouraged by the government to be adopted by businesses. Hence, there was a sharp increase in electronic commerce (e-commerce) adoption among businesses as a means to survive. However, the nature of SMEs is characterised by the non-availability of large funds to adjust to unplanned situations like the Covid-19 pandemic quickly (Gecit, 2021).

Nonetheless, many studies have postulated that SMEs adoption of technology (e-commerce) follows that of technology, organisation, and environment contexts. However, few empirical studies consider the situation where businesses had to be forced into technology adoption because of unplanned circumstances. The current study, therefore, revisited how SMEs in Ghana followed the technology-organisation-environment (TOE) framework to adopt e-commerce in an unexpected situation like the Covid-19 pandemic. Background to the study, problem statement, purpose, research objectives, and research questions are all presented in this chapter. The chapter also covers the significance of the research, its limitations, delimitations, definition of terms, and lastly, structure.

Background to the Study

In December 2019, Wuhan, China, saw the onset of the coronavirus-caused pandemic known as COVID-19. Health, the economy, business life, social life, and education have all exhibited effects on a global scale (Gecit,

2021). On March 11, 2020, the World Health Organisation (WHO) issued a pandemic declaration for COVID-19. The economic depression brought on by the coronavirus epidemic caused the closedown of thousands of small and medium-sized enterprises (SMEs). It is anticipated that there will still be more insolvencies once governmental support for firms end (Lambert & Van Reenen, 2021). The novel Covid-19 virus has changed the corporate world and how most of them function in such a significant way that thriving companies unable to adjust to the pandemic and the constraints that came with it ultimately suffered irreparable damage.

The onset of the year 2020 witnessed a profound global impact of Covid-19 on nations and their economies. Despite the pervasive pandemic, online shops remained resilient and operational (Bouaghi, 2021). However, in stark contrast, small and medium-sized enterprises (SMEs) engaged in traditional brick-and-mortar businesses faced substantial setbacks. The insights presented by Beer and Nohria (2000) emphasize that failure to respond, evolve, and align with shifts in the dynamic business landscape renders an organization vulnerable, stagnant, and non-competitive.

According to Gecit (2021), the Covid-19 pandemic has accelerated people's transition from the physical world to the internet. Physical trading has ceased since physical contact was reduced, curfews were implemented, and some businesses were partially closed (Gecit, 2021). In his analysis, Bouaghi (2021), revealed that the pandemic's arrival had no detrimental impact on electronic commerce, it rather increased the number of people moving online. The study believed that this resulted from the confinement of people to their homes, which was done to limit interaction between people and consequently,

the transmission of the virus. Thus, people were forced to turn to online shopping to meet their purchasing needs.

Business owners found themselves ill-equipped to navigate the constraints imposed by the Covid-19 outbreak and its subsequent repercussions due to their lack of foresight (Gecit, 2021). Small and Medium-sized Enterprises (SMEs) were compelled to seek remedies for the imminent danger posed by the Covid-19 pandemic, which jeopardized the safety of their proprietors and the continuity of their enterprises (Ocloo, Xuhua, Akaba, Shi, & Worwui-Brown, 2020). Traditional brick-and-mortar establishments reliant on face-to-face engagements within their premises were compelled to formulate innovative strategies, establish robust policies, and define precise management objectives in order to ensure the sustained efficiency and survival of their organizations during these unparalleled circumstances.

For the majority of SME owners, e-commerce was the obvious choice. Electronic commerce started to rapidly expand and transform several industries in the middle of the 1990s. The economy, the market, and company operations will never be the same (Chong, 2008). Due to internet commerce's influence on the corporate world since its inception, the claim made by Chong (2008), has come to pass exactly as he predicted. Businesses must take advantage of the benefits of electronic commerce since it is considered one of the factors propelling the modern corporate world. Most countries, especially those in emerging economies, depend heavily on small and medium-sized companies (SMEs) since they make up most businesses worldwide and thus contribute significantly to job the growth of the global economy.

As the name suggests, electronic commerce involves trade through numerous internet channels. E-commerce has been defined as purchasing and selling goods and services over the internet by Andonov, Dimitrov, and Totev (2021). It was created in such a way that it makes its offers available online and gives customers the option to choose and buy the needed things. After years of research, electronic commerce has tremendously affected almost every industry. Online book and music retailers like Amazon, Barnes and Noble, and Borders, to name a few, have established relationships with a sizable consumer base.

According to Jennex, Amoroso and Adelakun (2004), conducting business within an e-business setting presents a more cost-effective model, with feasible elimination of several steps of the traditional sales process. It is impossible to overstate the value of e-commerce in achieving an organisation's stated goals in a highly competitive world (Kareem, Owomoyela, & Oyebamiji, 2014). Research has provided insight into the impact that adopting electronic commerce might and can have on the performance of businesses. But for electronic commerce to be adopted and used, the decision is more often than not driven by some existing or emerging condition or factor.

The TOE framework was described by Tornatzky and Fleischer (1990) as a framework that suggests three organisational context components which impact decisions about the adoption and implementation of innovations. These three factors are the technological context, organisational context, and environmental context. The technological context identifies factors that firms consider before making adoption and innovation decisions on available

technologies and ones on the market. The organisational context looks at those factors that exist within the firm which qualify as decision making factors. Examples include firm size, structure and availability of skilled labour. The environmental context considers those factors in a firm's external environment that call for technology adoption decisions. Examples of the factors in the environmental context include, competitive pressure and government support.

Like any other country in the world, Ghana has been and is still experiencing the impact of the pandemic (Ocloo et al., 2020). The virus led to the economy, schools, businesses and daily operations that we know and are used to being shut down. It is evident from personal experiences alone the magnitude of negative waves of impact that continuously hit the country, businesses and the citizens economically, physically, psychologically and socially. These problems stemmed from the restrictions and sanctions that emerged in an effort to contain and eradicate the virus.

The development of SMEs is a priority for the Ghanaian government and the internet's explosive rise in ICT has fundamentally altered how firms conduct their operations (Ocloo et al., 2020). According to Ocloo et al. (2020), SMEs make up 92.0% of all officially registered firms in the country. SME employment makes up around 85.0% of all manufacturing employment, nearly 80.0% of the private sector, and about 70.0% of GDP (Awiagah, Kang, & Lim, 2016; Abor & Quartey, 2010). Due to the substantial importance of SMEs to the nation and its economy, research on the subject is a priority.

The vast majority of studies on the uptake of e-commerce have primarily focused on industrialized countries, mainly on developed nations and hardly at all on developing nations (Sila, 2013; Mohtaramzadeh,

Ramayah, & Jun-Hwa, 2018). The primary purpose of this study is to therefore investigate and revisit the technological, organisational and environmental (TOE) framework and how it relates to electronic commerce adoption amid the Covid-19 pandemic in Takoradi, Ghana.

Statement of the Problem

Small and medium-sized enterprise (SME) owners are confronted with the formidable challenge of upholding business continuity amid disruptions, navigating constrained finances and cash flow, balancing employee well-being and productivity, mitigating supply chain disturbances, adhering to evolving regulations, and preparing for uncertainties on the horizon. The outbreak of Covid-19 has compelled businesses to innovate measures and strategies, enabling them to persevere in a global economy grappling with recession. Under pressure to ensure the efficacy and enduring survival of these pandemic-induced solutions, companies are now tasked with achieving consistent performance (Ocloo et al., 2020).

Numerous studies have explored the potential benefits of electronic commerce adoption for astute practitioners (Oliveira & Dhillon, 2015; Sila, 2013; Quayle, 2002). Yet despite extensive research on electronic commerce and its implementation, there remains a notable gap in understanding the factors that influence business owners' decisions to embrace internet commerce during the pandemic era, a period spanning about three years since the onset of the coronavirus. Andrews and Zhu's (2021) recent research, employing the TOE framework, has shed light on SMEs transitioning to e-commerce due to contextual factors. However, the specific key determinants of this crucial decision remain elusive, indicating the limitations of existing

research. The contemporary global landscape suggests that current literature inadequately explains the motivations behind small enterprises engaging in online transactions (Andrew & Zhu, 2021). Bridging this gap is now the imperative for scholarly exploration.

Notably, empirical studies focusing on developing nations are scarce, leading to a reliance on extrapolated conclusions from more advanced countries. This lack of contextual consideration has led to an underrepresentation of underdeveloped countries in e-commerce adoption inquiries (Sila, 2013; Mohtaramzadeh et al., 2018). In the Ghanaian context, Ocloo et al. (2020) have examined the adoption of electronic commerce in the manufacturing sector and endorsed the influence of TOE factors on B2B e-commerce adoption by manufacturing SMEs. However, a distinct void persists within the landscape, necessitating an exploration of SMEs' adoption of e-commerce within specific industries, especially within the Takoradi Metropolis. Existing research has struggled to encapsulate the unique dynamics and the varying impact of TOE factors on e-commerce adoption across diverse sectors.

This study endeavors to bridge these research gaps by scrutinizing the e-commerce adoption by SMEs in Ghana, particularly within the Takoradi region, utilising the technology, organisation, and environment (TOE) framework within the context of the Covid-19 pandemic. This research aims to contribute fresh perspectives and insights to the constrained reservoir of knowledge on this subject matter. The study intends to investigate technology, organisation and environment factors on the adoption of e-commerce. Through these, this study aspires to illuminate the intricate interplay of TOE factors in

shaping the adoption of electronic commerce among SMEs in the challenging landscape of the Covid-19 pandemic.

Purpose of the Study

This study aims to probe into and understand how the TOE factors affect the electronic commerce adoption of SMEs in Ghana in the era of the Covid-19 pandemic.

Research Objectives

This study was undertaken to achieve specifically the objectives underlined:

1. To determine the effects of technological factors on e-commerce adoption.
2. To examine the effects of organizational factors on e-commerce adoption.
3. To assess the effects of environmental factors on e-commerce adoption.

Research Questions

The following research questions guided the study:

1. What are the effects of technological factors on e-commerce adoption?
2. What are the effects of organizational factors on e-commerce adoption?
3. What are the effects of environmental factors on e-commerce adoption?

Significance of the Study

The objective of this study was to review the technology, organisation, and environment factors that influence electronic commerce adoption of SMEs in Takoradi. With that being established, the findings of this research will provide the businesses in focus with comprehensive knowledge of the conditions that call for electronic commerce adoption in Ghana and presumably other parts of the world. The results of this study will also help top

managers or policymakers comprehend the critical aspects of e-commerce adoption and the challenges that will come up when business owners try the adoption process. This will enable top managers and policymakers to devise policies and strategies that benefit all parties involved. It will also provide governments, students and researchers with novel information and insights on electronic commerce adoption and its benefits for prospective users. This research will also prove helpful for further research as it details its limitations and recommendations for other interesting research areas. Finally, the study's findings will contribute to the knowledge on adopting electronic commerce while using the TOE framework by explaining the occurrences that necessitate it.

Delimitations of the Study

This study was conducted in Ghana, specifically Takoradi, focusing on SMEs that didn't have an online presence. Those businesses were forced to migrate online to keep their businesses afloat due to the no-contact policy precaution that came with the pandemic. Content-wise, the study focused on definitions, types of electronic commerce, the TOE framework, electronic commerce adoption, benefits that electronic commerce holds for businesses that take advantage of it and the barriers to electronic commerce adoption.

Limitations of the Study

Some firms could not complete the survey and this limited the number of responses needed to have an accurate result for the topic under consideration. Also, most of the research on the topic contributed little and often already-known information making it hard to ascertain novel and fresh views on the phenomena. Additionally, employing a questionnaire to gather

answers has some inherent issues. For instance, some of the items might not solicit the desired response because of the various meanings that respondents attach to them.

Again, some respondents felt that answering the questions would reveal too much sensitive information; therefore, they chose not to do so. This limited the collection of vital information needed for proper analysis and accurate results. However, the researcher developed a rapport of trust with the respondents, promised them anonymity and secrecy, and informed them that the information supplied would only be utilized for academic reasons to lessen the consequences of these restrictions on the study results.

Definition of Terms

Technological Factors: These are elements related to technology and its application that can influence the adoption of e-commerce. This includes the availability and accessibility of digital tools, online platforms, infrastructure, and innovations that facilitate electronic transactions and communication.

Organizational Factors: These encompass aspects within a company's structure and functioning that can impact the adoption of e-commerce. Organizational factors might include the company's leadership, management practices, internal policies, workforce skills, and the company's overall readiness to embrace technological changes.

Environmental Factors: These refer to the external conditions and circumstances in which a business operates that can affect its decision to adopt e-commerce. This includes economic factors, market trends, regulatory environment, competitive landscape, and any other external forces that could shape the company's approach to electronic commerce.

Adoption of E-commerce: This refers to the process by which businesses integrate electronic commerce practices into their operations. It involves using digital platforms for buying, selling, marketing, and interacting with customers and partners.

Small and Medium-sized Enterprises (SMEs): The study adopted SME definition of the Ghana Enterprises Agency (GEA), which states small firms have 29 employees. Micro enterprises, small enterprises generally have fixed assets of less than $100,000, excluding land and buildings, and five to twenty-nine employees. GEA established the following categories for SMEs to include small businesses typically employ six to twenty-nine people, medium-sized businesses thirty to ninety-nine, and big businesses one hundred or more. Therefore, SMEs are microbusiness with less than five workers.

Organisation of the Study

The research is structured as follows: Chapter 1 contains an overview, the study's background, a statement of the problem, study objectives, research questions, information about the significance of the study, its scope, and how the chapters are arranged. A review of the literature pertinent to the study is presented in chapter two. It examines the linked theoretical, conceptual, and empirical studies. The strategies for data collection and analysis are described in Chapter 3. The research design, population, sample, sampling method, tools employed, method of data collecting, and method of data analysis are all covered in this chapter. The findings, results and discussion are the main topics chapter four. Chapter 5 concludes with an overview of the research results and recommendations. Additionally, it offers suggestions for studies and proposes topics for subsequent investigation.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This study seeks to probe into and understand how the TOE factors affect the electronic commerce adoption of SMEs amidst the Covid-19 pandemic. This chapter describes a review of current literature related to the study. Specifically, the chapter looks at the TOE theory in detail to conceptualise TOE and relate it to the current study of the electronic commerce adoption of SMEs. The chapter also looked at thematic areas such as empirical findings and conceptual framework for the study. The theory supporting this study is first reviewed.

Theoretical Review

In the realm of research, theoretical frameworks serve as essential lenses through which intricate phenomena are comprehensively understood. Among these frameworks, the TOE theory stands as a beacon in deciphering the dynamics of technology adoption within organizational contexts. As this study embarks on an exploration of e-commerce adoption by SMEs amid the Covid-19 pandemic's challenges, delving into the essence of the TOE theory becomes imperative. With its holistic approach that intertwines technological innovations, organizational structures, and the external environment, the TOE theory resonates deeply with the study's context. It provides a strategic framework to navigate the complex interplay of factors influencing SMEs' decisions to embrace e-commerce solutions. Thus, in unveiling the theoretical underpinnings of TOE, this review not only enhances our understanding but also intertwines its core principles with the fabric of our study, illuminating

the intricate relationships that shape e-commerce adoption strategies within the pandemic landscape.

Technology, Organisational and Environment (TOE) Framework

The theoretical review sheds light on the TOE framework, that perhaps presenting the most reasonable explanation for adopting e-commerce. The Technology-Organization-Environment (TOE) Framework was initially proposed by Tornatzky and Fleischer in their 1990 paper titled "The Processes of Technological Innovation." Tornatzky and Fleischer (1990) TOE framework is a model framework that contains a general collection of variables that elucidate and forecast the probability of innovation and technology adoption. (Awa, Ojiabo, & Emecheta, 2015). The TOE framework was employed in this study because it consistently assesses the technological, internal, and external elements associated with adopting technology (Ocloo et al., 2020).

Louis Tornatzky and Mitchell Fleischer published the TOE framework in 1990. It discusses how technology adoption happens in businesses and how the environmental, organisational, and technological contexts affect how technological breakthroughs are embraced and implemented (Ocloo et al., 2020). The TOE framework explains how three crucial contexts affect adoption decisions at the organisational level (Baker, 2011). The TOE framework's critical factors are the technological, organisational, and environmental contexts. Due to their constant interactions and changing influences, they are interdependent. (Ocloo et al., 2020).

The technological environment currently comprises used and emerging technologies that greatly influence adoption decisions (Ocloo et al., 2020).

According to several studies (Awa et al., 2015; Al-Qirim, 2006; Jeyaraj, Rottman, & Lacity, 2006; Tornatzky & Fleischer, 1990; Zhu, Kraemer, & Dedrick, 2004; Sabherwal, Jeyaraj, & Chowa, 2006), the technological context of adoption is explained as the range of technologies that a business has access to, both internal and external and the decisions to adopt or not are made based on their perceived value, technological and organisational compatibility, complexity and learning curve, pilot test/experimentation, visibility and inventiveness, as well as their complexity.

According to Baker (2011), the technological factors include all relevant technologies for the company, including those presently in use there and those that are available on the market but are not yet being used. Current technologies of organisations influence the adoption process since they limit the quantity and rate of technological change an organisation can implement (Collins, Hage, & Hull, 1988). According to Baker (2011), since they demonstrate what is possible and how these technologies may help firms adjust and adapt, emerging technologies affect adoption decisions.

Baker (2011), further noted that the organisational context is related to the characteristics and resources of businesses, including employee connections, internal communication channels, firm size and the number of slack resources. Awa, Ukoha, & Emecheta (2016), unearthed descriptive measures from numerous scholars in their research. They cover the firm's business scope, top management support, organisational culture, the complexity of the managerial structure as measured by centralization, formalization, and vertical differentiation, the calibre of human capital and

their size as well as size-related issues like internal slack resources and specialization.

The macroeconomic environment, the firm's rivals, the size and structure of the industry, and the regulatory environment are all part of the environmental context (Tornatzky & Fleisher, 1990). How rapidly a corporation adopts new technology may be influenced by various factors related to the business environment. (Ocloo et al., 2020). The environment includes both operational enablers and inhibitors; competitive pressure, the preparedness of trading partners, sociocultural difficulties, government encouragement, and technical support infrastructures like access to qualified ICT consultants are prominent among them (Awa et al., 2016).

Constraints and possibilities for technological innovation are presented by these three factors (Tornatzky & Fleisher 1990, p. 154). As a result, these three settings motivate a corporation to decide if it needs new technology and whether to implement electronic commerce. Empirical research shows that the TOE helps comprehend how IT innovations are adopted. (Oliveira & Dhillon, 2015). This is why this study employed the framework to expound electronic commerce adoption in SMEs that are experiencing the aftermath of the coronavirus pandemic. A drawback of TOE noted in literature is that the model fits well for large companies. Nonetheless, the issue will not affect the current study as TOE has been employed in SME (Awa et al., 2016; Ocloo et al., 2020).

Conceptual Review

In an era marked by rapid technological advancements, evolving organizational dynamics, and dynamic external environments, the adoption of

electronic commerce (e-commerce) has emerged as a critical avenue for small and medium-sized enterprises (SMEs) to navigate challenges and secure their survival. The COVID-19 pandemic further accelerated this trend, compelling SMEs to embrace digital platforms for sustaining business operations in the face of unprecedented disruptions. To comprehend the intricacies of e-commerce adoption among SMEs, this study delves into the Technology-Organization-Environment (TOE) framework, a holistic lens through which the researcher explores the interplay of technological factors, organizational dynamics, and environmental influences in shaping the adoption of e-commerce.

Electronic Commerce

One of the definitions of e-commerce that is most frequently used is that given by Carey (2001), who defined it as an internet-based business transaction involving at least two parties. In other words, e-commerce greatly benefits from the internet (Huang, Yang, & Zheng, 2021). E-commerce is only the buying and selling of things or information carried out online, according to definitions of this nature. However, other academics contend that this explanation of e-commerce is insufficient. E-commerce is more broadly defined by Zwass (1996), as the exchanging of business information, maintaining commercial connections, and carrying out business transactions using telecommunication networks. This broader definition implies that e-commerce includes interactions between buyers and sellers that occur both before and after the actual purchase or sale of an object or piece of information takes place and is not only limited to online-based commercial transactions.

This definition of e-commerce as used in this study is therefore accepted and adopted.

Electronic Commerce Adoption

The use of e-commerce is a vital prerequisite for company development, particularly in SMEs using the internet (Sadowski, Maitland, & Dongen, 2002; Ifinedo, 2011). In terms of SME e-commerce adoption, Hart and Saunders (1998), distinguished between proactive and reactive enterprises. The former describes companies who voluntarily use e-commerce after realising the advantages it may have for their company. The latter describes businesses that implement e-commerce in reaction to outside forces like social and environmental reasons or competitive activity. This study analyses reactive SMEs that turned to e-commerce to survive and carry on business in Ghana during the nationwide lockdowns caused by the coronavirus pandemic.

Scholars have long lauded the benefits of e-commerce for small firms and emphasised how almost all SMEs may implement it today at a reasonable cost (Mazzarol, 2015). The study suggests that switching to an online platform is the ideal alternative to brick-and-mortar businesses because of how accessible and comparatively cheap it is and the advantages and opportunities it offers to SMEs in a world beset by obstacles and unrest as a result of the pandemic.

Determinant Factors of E-commerce Adoption

A plethora of deciding variables that affect whether an SME would adopt e-commerce exist. This is because owners or managers venture into e-commerce for differing reasons and under different circumstances. The study discusses some of the determining factors of adopting electronic commerce.

The perceived benefits and suitability are two aspects that might significantly impact the decision to adopt e-commerce and implement it (Ifinedo, 2011). That implies that if owners foresee the advantages of e-commerce adoption, they are more than likely to be moved to adopt the phenomenon and incorporate it into their operations. Also, if owners perceive that incorporating e-commerce into the system has a high feasibility rate and that it blends in with and suits their day-to-day operations, they are likely to adopt it.

Organisational readiness, which considers whether a business has the finances necessary to finance an investment in e-commerce and the technological know-how necessary to build and sustain an e-commerce offering, is a similar element to the compatibility of e-commerce with SMEs (Walker, Saffu, & Mazurek, 2016). Organisational readiness is about whether a corporation is financially secure enough to mobilize the finances needed to employ and leverage internet commerce. This refers to a company's financial capacity to absorb or cushion the expenditures that would inevitably arise from the decision to adopt and operate e-commerce and whether the human resource available possess the requisite skills needed to incorporate e-commerce into their operations.

The perceived complexity of implementing and managing e-commerce has also become a factor that may significantly impact SMEs' adoption decisions (Rogers, 1995). This means that an SME owner’s decision to implement electronic commerce may be significantly impacted if they consider it as challenging to use and manage, complicated, or overly technical. Customers, suppliers, and competitors' pressure to embrace e-commerce can significantly impact whether or not SMEs decide to sell online. Top

management commitment and innovation readiness are said to substantially impact small businesses adoption of e-commerce (Ghobakloo, Arias-Aranda, & Benitez-Amado, 2011; Grandón & Pearson, 2004). In a more detailed breakdown, stakeholders in a business' external environment tend to impact operations.

To maintain the satisfaction of various stakeholder groups and keep the business operating, business owners may shift online in response to pressure from customers and suppliers to digitise and streamline transactions. Additionally, the deliberate effort of firms to adapt to developments and innovations in the business sector will likely influence SMEs decisions about adopting e-commerce. Similar to this, it has been highlighted that local or national government pressure and assistance, often in the form of programs meant to encourage SMEs to adopt e-commerce are a defining factor (Scupola, 2009). The claim made by Scupola (2009), when further explained, suggests that businesses will be incentivised to take advantage of any government initiative and assistance for the adoption of e-commerce, making it a deciding factor for such decisions.

The importance of management time and customer readiness as variables influencing small enterprises adoption of e-commerce was highlighted by MacGregor and Vrazalic (2005). While the second issue concerns whether customers would likely accept and respond favourably to embracing e-commerce, the former was discussed in the introduction. In other words, whether a small firm decides to utilize e-commerce depends on how open its clients are to embrace a novel option. An SME's decision to

implement e-commerce depends partly on its consumers' readiness to accept an innovative choice.

Hypothesis Development

As the global business landscape continues to undergo transformative shifts, the exploration of research objectives through a systematic hypothesis development process becomes pivotal in uncovering underlying dynamics and causal relationships. This phase of the study delves into the formulation of hypotheses that will serve as the backbone for empirical testing and validation, propelling us closer to a comprehensive understanding of the TOE framework's influence on e-commerce adoption among SMEs in the context of the COVID-19 pandemic.

Technological Factors and Electronic Commerce Adoption

The degree to which an invention is viewed as an acceptable and intelligent choice is described by its perceived desirability (Alsaad, Mohamad, & Ismail, 2015). E-commerce will thus be more likely to be adopted by SMEs who see it as an essential choice than SMEs that do not. The most significant factors impacting the adoption of innovations have repeatedly been recognized as relative benefit, compatibility, and complexity (Alsaad, Mohamad, & Ismail, 2017). The relative advantage measures how much adopting innovations helps organisations more than preserving the status quo (Rahayu & Day, 2015).

Compatibility refers to how well innovation are seen to mesh with prior knowledge, existing technical infrastructure, organisational values, culture, and planned business processes (Alsaad et al., 2017). Additionally, complexity is the pace wherein innovation is perceived to be rather

challenging (Rogers, 2003). Though earlier studies have conducted their research and arrived at various conclusions using either one or a few of these factors combined, perceived desirability was settled upon as it was considered the most relevant factor for the study being conducted. Hence the study hypothesises that:

H_1. Perceived desirability is positively associated with e-commerce adoption levels.

Organisational Factors and Electronic Commerce Adoption

One of the organisational contexts is the extent to which resources appear to be similar to the resources needed to embrace real innovation and sustain that specific innovation for a long time (Molla & Licker, 2005: Chwelos, Benbasat, & Dexter, 2001). How prepared a company is, is determined by the technological, human, and financial resources firms acquire, employ, and incorporate into their business operations (Grandon & Pearson, 2004; Ifinedo, 2011; Scupola, 2003). Financial resources are favourably and significantly associated with SMEs' use of e-commerce and ICT (Scupola, 2009; Mishra & Agarwal, 2010; Ghobakhloo, Hong, & Standing., 2015). Organisations with greater levels of IT human resources will adopt better information management practices, incorporate IT innovations, and provide staff with more advanced IT skills (Raghavan, Wani, & Abraham, 2018; Mishra & Agarwal, 2010; Rowe, Truex, & Huynh, 2012). According to those mentioned earlier, the organisation's readiness greatly influences a firm's propensity to embrace technology applications. Hence, the study hypothesizes that:

H_2: Organisation's readiness is positively associated with e-commerce adoption levels.

Environmental Factors and Electronic Commerce Adoption

Many factors in the business environment can influence how well SMEs adopt e-commerce. This study focused on pressure from competitors and government support. Competitive pressure refers to how quickly businesses embrace innovations due to market competition (Huo, Zhao, & Zhou, 2014). To attain a competitive advantage, businesses must continually evaluate and implement technology development. One of the critical factors influencing SME technology adoption has been competitive pressure (Gono, Harindranath, & Özcan, 2016; Ahmad, Abu Bakar, Faziharudean, & Mohamad Zaki, 2015). Competitive pressure will influence e-commerce adoption if SMEs realize that implementing such technology would increase their competitiveness and provide them with a competitive edge (Lip-Sam & Hock-Eam, 2011; Rowe et al., 2012; Hamad, Elbeltagi, Jones, & El-Gohary, 2015).

Finally, empirical data highlights the significance of government support for SMEs adoption of technology (Scupola, 2003; Awiagah et al., 2016). Governmental factors greatly influence e-commerce adoption by SMEs (Rahayu & Day, 2015; Al-Alawi & Al-Ali, 2015). Government support in financing, legislation, and technological infrastructure could significantly impact how quickly people adopt new technologies (Saprikis & Vlachopoulou, 2012; Rowe et al., 2012). Martinsons (2008), cited in Awiagah et al. (2016), discovered that government's readiness to build the essential infrastructure for e-commerce development has significantly boosted e-commerce adoption in

emerging economies. Government programmes such as flexible electronic policy, tax advantages, and affordable internet connection are helping to increase the adoption of e-commerce. According to research, the government's support for e-commerce among SMEs impacts technology adoption (Ahmad et al., 2015). The following hypotheses are thus proposed after evaluating how government assistance and competitive forces affect the amount of e-commerce adoption:

H_3: Competitive pressure is positively associated with e-commerce adoption levels.

H_4: Government support is positively associated with e-commerce adoption levels.

Empirical Review

In the quest to unravel the intricacies of technology adoption, organizational dynamics, and environmental influences within the realm of electronic commerce (e-commerce) adoption by small and medium-sized enterprises (SMEs), the empirical review phase emerges as a critical juncture. Building upon the hypotheses formulated earlier, this section delves into an empirical exploration that seeks to validate, refute, or refine these propositions through robust data analysis and interpretation. It discusses the empirical findings of similar research conducted on the variables in this study.

Effects of technological factors on e-commerce adoption

Regarding the uptake of B2B e-commerce in Iranian industrial enterprises, Oliveira and Dhillon (2015), found that: Technological readiness, education level, technology integration, competitive pressure, and trade partner collaboration are all factors that should be strengthened, according to

an analysis of the organisational culture's moderating role. Their research also shows that if the other factors included in our model are on par, smaller enterprises have the edge over more prominent firms in B2B e-commerce adoption and routinization. The TOE framework guided the study. Telephone interviews were conducted for the study with a randomly selected sample of 7,172 businesses from around Europe. As reported by the authors, the study's shortcomings are as follows. The researchers were unable to forecast how these connections would evolve due to the cross-sectional design of this study, which is the first drawback. Also, due to the lack of data, the research did not include government regulation factors in their model.

Additionally, Alsaad, Mohamad, Taamneh, and Ismail (2018), stated that their study's findings show that the fundamental driving forces for B2B use across nations are increased trade relationship complexity with the global economy and high levels of competitive pressure. The study's title was What drives worldwide B2B e-commerce usage: an investigation of the impact of trading system complexity and competitive pressure. Their sample included a pool of 143 country-year datasets collected across three years (2014-2016). The information was gathered from the Global Competitiveness Report and the Network Readiness Index Report. For evaluating hypotheses, the study used partial least squares-SEM (PLS). The use of secondary data, where the researchers used data created by the issuing authorities, resulted in limited control over the definition of variables, which was one of the study's fundamental limitations. Because we could not gather additional intriguing factors, our study's underlying variables were similarly restricted to the trading system's complexity and the pressure of competition.

Effects of organizational factors on e-commerce adoption

Mohtaramzadeh et al. (2018), found that the cost of adoption, top management support, competitive pressure, and government support affected B2B e-commerce adoption in manufacturing firms in their study on B2B adoption in Iranian manufacturing: Analysing the moderating role of organisational culture. The link between top management support and the adoption of B2B EC is negatively moderated by organisational culture. Their research involved 320 responses from managers and owners of Iranian manufacturing enterprises that were surveyed. The PLS-SEM analysis method was utilized. Relationships with the TOE framework guided the study.

In their study, "Evaluating the Critical Determinants for Adopting e-Market in Small-and Medium-Sized Enterprises," Duan, Deng, & Corbitt, (2012), found a positive link between the perceived immediate benefit, top management support, external pressure, trust, and the adoption of e-market in Australian SMEs. The most important variable was found to be top management support. However, the perceived indirect advantage, organisation preparedness, and size have little impact on how Australian SMEs utilize the e-market. The TOE framework served as the study's foundation. Based on survey data gathered from Australian SMEs, the suggested conceptual model was tested and validated using structural equation modeling. A logistic regression analysis was undertaken to determine the link between the important drivers and the adoption of the e-market in Australian SMEs.

According to Sila's (2013), perspective on the variables impacting the adoption of B2B e-commerce technology, scalability is the most crucial aspect of B2B e-commerce usage. According to the study, all contextual factors aside

from place of origin influenced certain adoption parameters. The study shows that the TOE framework—the theoretical underpinning of the study offers a robust platform for the study of B2B e-commerce. Multiple Regression and Analysis of Variance (ANOVA) were employed in the study to evaluate the hypotheses using data from 275 replies to an online survey of North American businesses. The study's shortcomings were made clear. First, given the study's focus was on B2B e-commerce adoption, it had a sample restriction because it only included manufacturing SMEs in Egypt with websites. The study's exclusion of elements like culture, industry type, globalization, and the traits of the owner/manager was another drawback.

Effects of environmental factors on e-commerce adoption

Rahayu and Day (2017), discovered that the top six e-commerce benefits perceived by these SMEs are "expanding market reach," "increasing sales," "improving external communication," "improving company image," "improving the speed of processing," and "increasing employee productivity." Their research demonstrates that SMEs with higher degrees of e-commerce adoption gain more from it than SMEs at lower levels of adoption. With 3267 SMEs still in the early stages, an online questionnaire survey was used for the study, of which 292 were entirely completed. The sample frame for the study was chosen using sources from both public and private organisations.

According to Ocloo et al. (2020), the findings show that the various contextual factors have a varied effect on the various degrees of business-to-business (B2B) e-commerce adoption. Additionally, they disclosed that the results of their study show that perceived attractiveness, organisational preparedness, and competitive pressure significantly and favourably affect the

various B2B e-commerce adoption levels. PLS-SEM was used to evaluate and assess the results of a survey of 315 samples of manufacturing SMEs in Ghana. The TOE framework served as the foundation for the study. The study used a quantitative technique based on a self-administrated cross-sectional survey to evaluate the parameters associated with different degrees of B2B e-commerce imitation adoption.

According to Oliveira & Martins' (2010) study on understanding e-business adoption across industries in European nations, businesses who use e-business see significant gains in productivity, inventory management, sales, customer relationships, new market penetration, and eventually profits. The technology-organisation-environment (TOE) hypothesis served as the basis for selecting variables employed in the study. Survey information from 6,964 firms in EU27 nations was utilized in the study (except for Malta and Bulgaria). The authors held that the cross-sectional survey only captures the respondents' perspectives, experiences, and attitudes regarding adopting B2B e-commerce at a specific period. They went on to say that these could alter over time, necessitating a longitudinal survey in a follow-up study to produce more reliable evidence that explains the factors influencing B2B e-commerce adoption levels and provides additional support for the theoretical framework in this study.

Furthermore, according to Hamad, Elbeltagi and El-Gohary (2018), the TOE framework significantly influences the various degrees of B2B e-commerce adoption by Egyptian manufacturing SMEs. Additionally, they demonstrated how the TOE framework's elements indirectly affect Egyptian manufacturing SMEs' competitive advantage. The research's principal data

were gathered through a survey approach. Additionally, the study's questionnaire underwent two rounds of pretesting to ensure that all of the questions were comprehended by the respondents. A sample of 768 manufacturing SMEs were randomly chosen from a list of small and medium manufacturers obtained in the statistics database of sector development strategies exports of small and medium-sized firms. 260 authentic, complete replies were obtained from the 768 manufacturing SMEs, giving a respectable response rate of 33.9 per cent.

Conceptual Framework

This study's conceptual framework reflects the goals that were established. The model represents a set of coherent concepts organised in a manner that makes it easy to communicate the study's argument. The figure shows the interrelationships between the variables of the study. The framework shows that TOE factors affect the electronic commerce adoption of SMEs. The framework also shows that Technological Factors were measured by perceived desirability, competitive pressure and government support measured and it also depicts that Organisational Factors were measured by organisational readiness. These particular determinants were selected based on the nature of SMEs. The conceptual framework is shown in figure one.

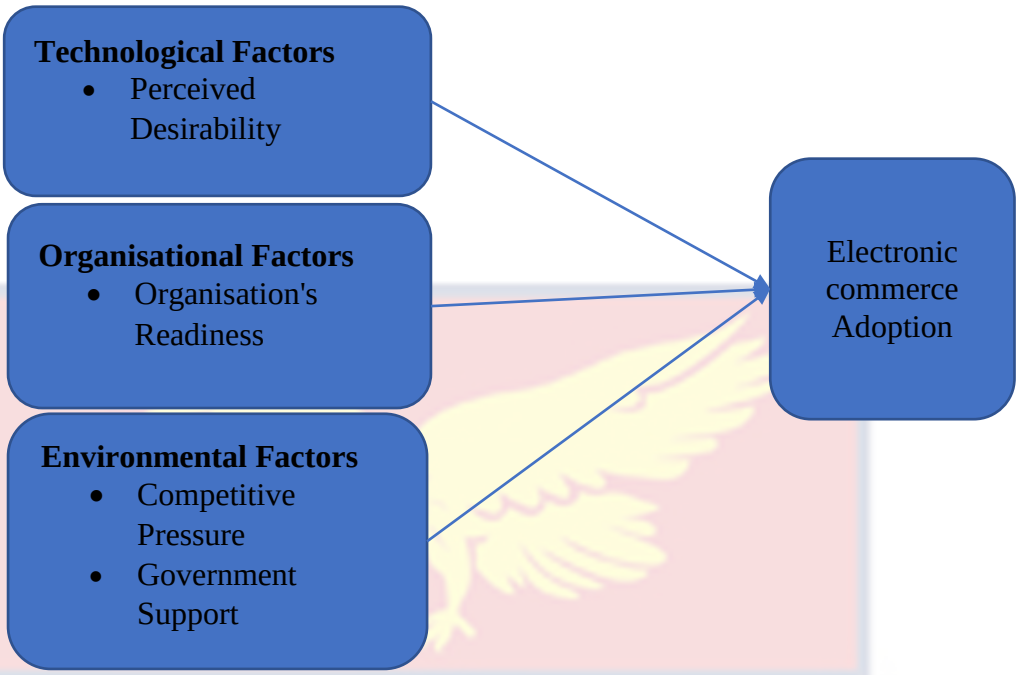

Figure 1: The TOE framework for E-commerce adoption by SMEs in Ghana

Source: Thompson (2022)

Chapter Summary

The reviewed literature considered a theory of electronic commerce adoption: the TOE framework and its effect on e-commerce adoption decisions in SMEs. The chapter further reviewed the concept of electronic commerce, electronic commerce adoption, benefits of electronic commerce adoption to SMEs, the determinant factors of electronic commerce adoption, and the factors that make up the technological, organisational and environmental contexts, and how they affect electronic commerce adoption decisions.

The reviewed literature shows that TOE factors are essential in SMEs electronic commerce adoption decisions. It is also clearly depicted by various studies that firms that employ e-commerce stand to reap some form of benefit. As such, SMEs in Ghana who have been conducting business through physical infrastructures up until the emergence of the pandemic have to be reactive to

rake in the potential advantages that e-commerce holds. The reviewed empirical studies suggest that the level of awareness of SMEs on electronic commerce and its benefits is very high and that managers or owners of these organisations need to take advantage of it to ensure continued performance and survival of their businesses.

CHAPTER THREE

RESEARCH METHODS

Introduction

The chapter explains the methods and techniques employed in collecting and analysing field data. According to Kothari (2004), research technique is a helpful strategy for solving a research problem. It describes the processes, tools, and strategies used in data collection and analysis to meet the research objectives. It critically analysed the population, sample, sampling methodology, and research design. Additionally covered in this chapter were the data processing tool, data analysis strategy, and ethical issues. The chapter began with the study design's description, describing and justifying why the Takoradi metropolis was selected as the study area. The subsequent section explains the methods for data collection and analysis. Along with reflecting on the field experience and difficulties encountered while conducting the fieldwork, a quick review of the validity and reliability of the data is elucidated in the chapter. The chapter concluded with a description of the ethical consideration of the study.

Research Approach

The research used a quantitative survey approach. Collecting, analysing, and using statistical text are all part of quantitative research (Sarantakos, 2013). It is a method for putting theories about the relationships between variables to the test. Graphs are typically used to show relationships between quantitative variables. The research strategy used in a study is crucial in choosing the best study design to produce more reliable statistical findings. For this study, the researcher employed a quantitative research strategy.

Compared to qualitative research, quantitative research offers advantages in terms of administration efficiency, time and cost management. Additionally, it eliminates concerns related to interviewer consistency and interviewer effects. Furthermore, participants have the convenience of completing the survey at their own pace (Bryman & Bell, 2003).

This strategy was employed because it facilitates the numerical analysis of data acquired through surveys and questionnaires (Babbie, 2010). Collecting, analysing, and using statistical text are all part of quantitative research (Sarantakos, 2013). It is a method for putting theories about the relationships between variables to the test. Graphs are typically used to show relationships between quantitative variables. Another type of study, quantitative research, uses correlational statistics to explain and assess the degree to which two or more variables or sets of scores are related so that numbered data can be analysed using statistical techniques (Sarantakos, 2013).

Closed-ended responses are typically included in quantitative data (Creswell, 2014). Quantitative research delivers accurate, trustworthy, and numerical data to generalise findings and acquire and analyse data more cheaply. To generalize findings and acquire and analyse data more cheaply, quantitative research was employed for the study. Quantitative research delivers accurate, trustworthy, and numerical data. Using statistical software also saves data collection and processing time (Sarantakos, 2013).

Research Design

In alignment with Creswell's framework (2014), the research design serves as a strategic roadmap guiding the inquiry into the adoption of electronic commerce (e-commerce) within the realm of small and medium-

sized enterprises (SMEs) amid the challenges posed by the Covid-19 pandemic. This design encapsulates both quantitative and qualitative methodologies, adhering to an explanatory research design approach that seeks to unravel the multifaceted interplay of Technology-Organization-Environment (TOE) factors.

At the core of this study's design lies the explanatory research approach. Drawing inspiration from Avella (2016), the research design operates as a masterplan, providing the structure necessary to address the central research question while accommodating the nuances inherent to the study's context. The choice of an explanatory research design is underpinned by several considerations. This alignment resonates with the study's context, research problem, potential constraints, and the fundamental paradigm that informs the research. A notable facet of the explanatory research design is the integration of a descriptive research approach. As highlighted by Atmowardoyo (2018), the descriptive methodology occupies the space between exploratory and explanatory paradigms. It serves as the foundational layer upon which the explanatory dimensions are built.

Within this descriptive framework, the survey design takes a pivotal role. It functions as a transformative tool, turning intricate data into comprehensible forms. As articulated by Cowman, Björkdahl, Clarke, Gethin and Maguire (2017), survey designs offer structured mechanisms to glean insights from complex data, a particularly crucial endeavour given the intricacies of TOE factors in the e-commerce landscape. While the descriptive survey design offers distinct advantages in data organization and summarisation, it's important to acknowledge potential limitations, as

highlighted by Zikmund, Babin, Carr and Griffin (2000). These include susceptibility to biases and the investment of time and effort required for data collection.

The explanatory research design, deeply embedded within the TOE framework, intricately weaves the descriptive approach and survey design. This fusion culminates in a comprehensive understanding of the intricate web of TOE factors, their interrelationships, and their collective impact on the e-commerce adoption trajectory of SMEs. As the study endeavours to navigate this complex landscape, it seeks to offer fresh insights that contribute to the evolving discourse surrounding e-commerce adoption within the dynamic context of the Covid-19 pandemic.

Study Area

The study was conducted focusing on SMEs in the Takoradi Metropolis, Western Region, Ghana. An SME in Ghana is described as a company, venture, initiative, or economic activity with up to 100 employees and a total asset base valued at less than the cedi equivalent of $1 million, excluding land and buildings. According to the Ghana Enterprises Agency (GEA), small firms have 29 employees. Micro enterprises, small enterprises generally have fixed assets of less than $100,000, excluding land and buildings, and five to twenty-nine employees. GEA established the following categories for SMEs to include small businesses typically employ six to twenty-nine people, medium-sized businesses thirty to ninety-nine, and big businesses one hundred or more. A microbusiness with less than five workers.

There are several definitions of SMEs, however for the study, the researcher adopted the definition provided by the Ghana Enterprise Agency.

The Takoradi metropolis was selected because it is one of the biggest Metropolises in Ghana, with a more significant number of SME firms. Also, most studies on e-commerce adoption in Ghana focused on other areas besides Takoradi. This study would add the feature of Takoradi SMEs in e-commerce adoption to advance the literature on e-commerce adoption. Finally, Takoradi was chosen because it is one of the cities that help international business in the country. The port in the city serves as a doorway to other economies. As such, during the COVID-19 pandemic, firms had to come up with means to satisfy their customers. The populous nature of the businesses at the Takoradi Metropolis represents the majority of Small and medium-scale firms and retail shops. The study therefore focused on SMEs firms in the Takoradi Metropolis.

Population of the Study

A population is a group of individuals, objects, or things from which samples are taken to perform measurements (Kombo & Tromp, 2006). The population is the target audience for whom the researcher gathers data and derives conclusions, according to Leedy and Ormrod (2010). A population is a group of people, events, or objects that researchers study by observing certain qualities (Saunders, Lewis, & Thornhill, 2009). The target population of this study was all SMEs in Takoradi. However, the accessible population is SMEs who had the essential requirement of this study: the internet. Thus, a unit of analysis was the owner/manager of the SMEs.

The population of SMEs in Ghana, specifically Takoradi, is unknown as there are countless SMEs in the Takoradi locality. This classification framework offers a clear and standardized way to categorize businesses according to their workforce size, ensuring consistency in our study and

facilitating a comprehensive analysis of the diverse range of enterprises within these defined categories. Therefore, the population was unknown at the time of the study's conduct. This makes the population meet the requirement of an Unknown but large population, as posited by (Smith, 2013).

Sampling and Sampling Procedure

A sample is the proportion of respondents chosen from a population to represent the entire group (Saunders et al., 2009). The term "sampling method" refers to selecting a sample to represent the entire collection of units (Mugenda & Mugenda, 2003). A portion of the population is chosen as the sample size to reflect the entire population (Garson, 2012). As posited, the population is unknown; therefore, the research followed a general sample size determination formular. This was taken from the formula postulated by Cochran (1977) and reiterated by Adam (2020).

$$n = \frac{Z^2_{\alpha/2} \times p \times q}{e^2}$$

Where n denotes the sample size, and e denotes the maximum acceptable error from estimation, set at 5% when data is considered categorical, following the recommendations of Krejcie and Morgan (1970); p denotes the population proportion, denoting the probability of success, which is set at 0.50 per the recommendation of Krejcie and Morgan (1970), to ensure a maximization of the variance, resulting in the generation of (Z-table.com.). The minimum sample size chosen for the study is 385, which is required for a large but unknown population.

- **n**: This represents the desired sample size for a research study. It indicates the number of participants or data points needed to achieve a

certain level of statistical significance and precision in the study's results.

- **Z_(α/2)**: This term refers to the critical value from the standard normal distribution, corresponding to the desired level of confidence. It is often used in the calculation of confidence intervals. The subscript "α/2" signifies that you're looking for the critical value that corresponds to the level of significance (α) divided by 2. This is commonly used in cases of symmetric confidence intervals.
- **p**: This symbolizes the estimated proportion of the population that possesses a certain characteristic or exhibits a particular behavior. It is an important parameter that helps determine the required sample size.
- **q**: This represents the complement of the estimated proportion p. In other words, if p is the proportion with the characteristic or behavior, q is the proportion without it. Since p + q = 1, you can often calculate q as 1 - p.
- **e**: This stands for the desired margin of error or level of precision in your study. It signifies the maximum acceptable difference between the sample estimate and the true population parameter you're trying to estimate.

The convenient sampling technique was employed to select particular owners/managers of SMEs at Takoradi. A sample is taken from a population segment near at hand in convenience sampling, a type of non-probability sampling. The convenient sampling technique was introduced because of the respondents' presence and the study's setting. This is because it was hard for distribution firms to get them. The essence of using this approach is that it

includes meagre costs and no need for a list of population components. This method was chosen to allow the researcher to obtain critical and quality data from respondents who are in a position to provide the appropriate information for the study and who have explicit knowledge of the issues under investigation.

After the data collection, the researcher received 428 responses. The larger-than-anticipated sample size of 428 responses has proven to be an invaluable asset in bolstering the integrity and comprehensiveness of this research endeavour. With a sample size exceeding the minimum requirement of 385, this study's capacity to derive meaningful insights from the data has significantly increased. The larger sample size bestows greater statistical power, elevating the study's ability to detect even subtle effects or relationships that might have gone unnoticed with a smaller sample. This enhanced power for statistical significance translates to findings that are more robust, credible, and reliable, instilling confidence in the validity of the study's conclusions.

Additionally, the enlarged sample size has paved the way for finer levels of precision in the analysis, leading to reduced margins of error and more accurate estimations of population parameters. Furthermore, the ample dataset offers the opportunity for more nuanced analyses, including explorations of subgroup dynamics and intricate patterns within the data. Ultimately, the larger sample size underscores the commitment to thoroughness in research and fortifies the study's potential to contribute significant and applicable insights to the field.

Data Collection Instruments

There are two primary data sources. Both primary and secondary sources are these. The study's data came from primary sources. The data-collecting tool used to acquire information from respondents was a self-administered questionnaire. The questionnaire's sentence pattern was closed-ended. The thorough literature research and the study's unique goals made adopting this instrument necessary. The researcher had to administer the data collection instrument manually to the respondents. This was to ensure a high response rate for the study. The questionnaire was precise and concise. Compared to other survey tools like interviews and observation, a questionnaire is thought to offer greater advantages for data collection (Sarantakos, 2013). The questions were adopted and modified for other studies (Alsaad et al., 2015; Grandon & Pearson, 2004; Chwelos et al., 2001; Gibbs, Kraemer, & Dedrick, 2003; Elbeltagi, Hamad, Moizer, & Abou-Shouk, 2016; Kuan & Chau, 2001). These items measure the four TOE-related factors as shown in Appendix A

The survey was divided into sections A, B, and C. Section A included demographic information about the respondents, Section B included inquiries on e-commerce drivers, and Section C concentrated on e-commerce adoption. Five-point Likert-scale questions ranging from strongly agree to disagree strongly were adopted (strongly agree=5, agree=4, undecided=3, disagree=2, strongly disagree-1). A structured questionnaire was utilized as a research tool, which improved the detection of statistically significant outcomes from the data analysis technique (Zikmund, Babin, Carr, & Griffin, 2010). It was anticipated that it would take 30 minutes to finish the questionnaire survey.

Even though specific demographic questions were requested at the outset of the survey, all respondents completed the identical questions, and all survey responses for SMEs were considered entirely anonymous. There were 45 questions in all for the responders to answer. The appendix contains more information on the questionnaire.

Data Collection Procedures

To guarantee a high response rate, the researcher personally gathered the data using a self-administered questionnaire. Each responder received the same question when data from the surveys were standardised. The fieldwork lasted for 6 working days, with the 1st of September 2022 starting date of the 9th of September 2022. The questionnaire's instructions were explained to the respondents, who were instructed to answer the questions as accurately as possible. This gave respondents a certain amount of time to answer the questions. After a set amount of time, the researcher returned to the respondents and properly collected their completed questionnaires. By 12th September 2022, the researcher had taken all the data needed for the study.

Data Processing and Analysis

Data analysis is the process of editing, purging, modifying, and modelling data and is used to extract relevant information, provide findings, and assist in decision-making (Ader, Adèr, & Mellenbergh, 2008). The surveys were coded before inputting the information for analysis into the Statistical Package for Social Sciences (SSPS version 25.0). Strongly Disagree was represented by 1, Disagree represented by 2, Neutral represented by 3, agree by 4 and Strongly Agree represented by 5. According to Cooper and Schindler (2008), data analysis is the act of reducing and compressing

gathered data to a manageable size, producing summaries, searching for trends, and using statistical methods.

Descriptive statistics and structural equation modeling (SEM) were carried out on the data gathered for this inquiry using SPSS and SmartPLS version 4. Descriptive statistics like frequency, percentages, mean, and standard deviation were created to explain the phenomenon under study. The SEM provides a unified and suitable environment for statistical study by including a range of well-known multivariate techniques, including factor analysis, multiple regression analysis, discriminant analysis, and canonical correlation (Haenlein & Kaplan, 2004). All the research objectives were analysed as follows were analysed with a structural equation modelling.

1. Objective one: To determine the effect of technological factors on electronic commerce adoption.
2. Objective two: To examine the effect of organisational factors on electronic commerce adoption.
3. Objective three.: To examine the effect of environmental factors on electronic commerce adoption.

Structural Equation Modelling

A statistical technique of the second generation, SEM, allows researchers to incorporate unobservable aspects evaluated indirectly via indicator variables (Sarstedt, Hair Jr., Matthews, Matthews, & (2017). To reduce the residual variance of the endogenous components, PLS-SEM was employed to predict the eidolons of the path model, according to Lowry and Gaskin (2014). The two main components are measurement equations (via confirmatory factor analysis), SEM (by path analysis), and structural

equations. Path analysis demonstrates the relationships between study components, whereas confirmatory factor analysis (CFA) models are utilised for concept validation and scale improvement.

The path model nexuses in PLS-SEM are chosen to maximize the R2 values for the endogenous constructs (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Because the constructions caused all indicators, the current study used a reflective measurement scale. Jeon (2015), posited that the latent variables used by SEM enable several indicators to gather structures precisely and consistently. Second, SEM highlights the causal equation model between latent variables more clearly than regression does. Finally, SEM enables you to perform a regression analysis on one or more dependent variables using one or more independent factors. PLS is immune to flaws like skewness, multicollinearity of indicators, and incorrect structural model specification (Cassel, Hackl, & Westlund., 1999). SEM makes the simultaneous use of regression, correlation, and confirmatory factor analysis possible.

Validity and Reliability

Data reliability and validity cannot be ignored when evaluating a research instrument to match the correct characteristics of the study issue. Subject or participant error, bias, and observer error are three primary risks to the validity of data gathering, according to Robson (2002). Thus, the validity of the questionnaires was assessed using the construct validity approach. An instrument is regarded as trustworthy if it can be counted on to deliver an accurate and consistent measurement of a constant value, according to Bless, Higson-Smith and Kagee (2006). The reliability of the collection instrument

means it is transparent and clear that the readers can either employ the same method themselves or produce the same results. According to Saunders, Lewis and Thornhill (2012), internal consistency is comparing each questionnaire question's replies to those of the other questions.

Saunders et al. (2009), contend that the effectiveness of a research tool in eliciting the notion it is intended to determines the validity of the data collecting instrument. The researcher investigated additional pertinent literature that supported the responses obtained utilising the questionnaire to guarantee the validity of surveys (Saunders et al., 2009). In addition, researchers would evaluate data from earlier documents, summaries, and reports to enhance the data-collecting techniques. Additionally, researchers would make the questionnaire's questions more objective by removing any prejudicial judgment or viewpoint. Before submitting the created questionnaire to respondents for replies, the project supervisor reviewed, approved, and corrected it.

Cronbach's Coefficient Alpha test

Cronbach's Coefficient Alpha, an evaluation of the validity of the test items, was also made available by the software used to evaluate the findings. Cronbach's Alpha test is one appropriate method for evaluating internal consistency (McCrae, Kurtz, Yamagata, & Terracciano, 2011). The stronger the Cronbach's alpha, the higher the correlation between the test items. The consensus is that a reliability coefficient with a Cronbach's alpha score of 0.7 is good and acceptable (Imna & Hassan, 2015).

When the instrument's internal consistency was calculated, it was found that the full scale had a Cronbach's Alpha value of 0.894 (with 45

items), indicating that it was statistically trustworthy because it was higher than the minimum cut-off point of 0.7. Once more, the study's components related to competitive pressure had a Cronbach's Alpha of 0.870 (with 5 items). The construct is regarded as credible because this number was higher than the minimum criterion established by Cronbach (as quoted in Pallant, 2005). Perceived Desirability (7 items) also had a Cronbach's Alpha Value of 0.939, which indicates that the construct was statistically reliable because it was higher than the minimal criterion of 0.7 recommended by Cronbach (as cited in Pallant, 2005). The internal consistency of the construct for organisational readiness was found to have a Cronbach's Alpha of 0.875 (5 items), while government support had a Cronbach's Alpha of 0.898. As a result of the E-commerce adoption's Cronbach alpha of 0.939, it was determined that the construct is highly dependable because the value achieved was higher than the 0.7 cut-off point suggested by Pallant (2005). According to Saunders et al. (2009), internal consistency is the correlation of each questionnaire question's replies with those of the other questions.

The relevance of the research was decided by the nature of their research topic and their judgment, and the researcher investigated additional pertinent material that provided evidence and supported the responses discovered utilising the questionnaire (Saunders et al., 2012). This supports the claim made by (Zickmund et al., 2013) that, in contrast to exploratory research, descriptive studies are carried out only once the researcher thoroughly understands the issue being investigated. Before being given to the respondents, the prepared questionnaire was also given to the project manager for review, approval, and modification.

For evaluating PLS-SEM model structures, there are many different criteria. Generally, a two-step approach is used to apply the various criteria systematically., (1) the assessment of the measurement model and (2) the assessment of the structural model.

Assessment of Measurement Models

In reflective measurement models, internal consistency and individual indicator reliability are evaluated using composite reliability, whereas convergent validity is evaluated using average variance extracted (AVE). Cross-loadings and the Heterotrait - Monotrait Ratio (HTMT) are additional tools used to evaluate the discriminant validity (Hair, Ringle, & Sarstedt, 2013). Cronbach's alpha is a less useful indicator of internal consistency than composite dependability (Rossiter, 2002). More dependability is indicated by higher ratings on the composite reliability scale, which ranges from 0 to 1. Cronbach's alpha is usually used to interpret this value.

In an exploratory study, composite reliability values of 0.60 to 0.70 are acceptable, while 0.70 to 0.90 may be considered appropriate in subsequent research phases (Nunally & Bernstein, 1994). Hair, Sarstedt, Matthews and Ringle (2016), state that factor loadings must be 0.70 or higher to demonstrate convergent validity. An AVE of 0.50 or greater indicates that a concept often accounts for more than half of the variation in its indicators. On the other hand, a value of the AVE that is less than 0.50 indicates that the items are typically more erroneous than the variation that the construct can accommodate. Heterotrait - Monotrait Ratio (HTMT) is a method for evaluating the discriminant validity of a PLS-SEM model. According to

Henseler, Ringle and Sarstedt, (2015), a latent construct has discriminant validity when the HTMT ratio is less than 0.850.

Assessment of the Structural Model

The coefficient of multiple determinations (CMD) calculates the explained variance of a latent variable for its overall variance. Hair et al. (2014), suggested weak, moderate, and significant. Structural models had coefficients of determination (R2) of 0.25, 0.5, and 0.75. The regression coefficients between the confirmed latent variables are examined in the following step in the evaluation of the structural model. The magnitude of a regression coefficient represents the degree to which two latent variables are related. To demonstrate significance, regression coefficients must be significant at the 0.05 level (Bradley & Tibshirani, 1993).

Another aspect that has to be evaluated is the anticipatory power of the structural model. The Stone-Geisser Q2 statistic is applied to evaluate the predictive significance of the structural model (Stone, 1974). The structural model's reflecting endogenous latent variable Q2 values greater than zero demonstrate the predictive significance of the path model for this construct. Values of 0.02, 0.15, and 0.35 show that an external construct has a low, medium, or high predictive significance for a specific endogenous construct when used as a relative measure of predictive importance (Hair et al., 2016). Measuring each endogenous component independently of the exogenous variable is also necessary. Calculating the effect size is used to achieve this (f2). According to Cohen (1988), the exogenous latent variable has f2 values of 0.02, 0.15, and 0.35, which correspond to its small, medium, and large influences, respectively.

Common Method Bias

VIF scores and the Harman single factor test (Podsakoff & Organ, 1986) can both be employed to assess common method bias (CMB) (Kock & Lynn, 2012). According to Podsakoff and Organ, (1986), one distinct component would show up in a factor analysis, or one general factor would explain the bulk of the covariance in the independent and criterion variables if CMB were a critical concern.

Ethical Considerations

According to Singleton and Singleton (2010), ethical consideration is a moral and responsible action. It also entails comprehending and examining the sources, significance, and guiding principles of moral behaviour. The rules or standards of conduct that serve as a moral compass for our interactions with others and behaviour are known as ethics (Cooper & Schindler, 2008). Research ethics focuses on how we conduct our research, from developing the research subject to sharing the findings morally and responsibly. According to Malhotra and Birks (2007), ethical concerns for the respondents and the wider public should be your top priority when doing research. The researcher carefully adhered to the ethical guidelines to protect the respondents and avoid an unethical situation. The researcher followed the University of Cape Coast's ethical guidelines and obtained participant agreement and institutional approval before beginning the study. This was done to protect the responders from harm and prevent moral dilemmas. All participants received an explanation of the study's goal, and their confidentiality was guaranteed. After, it was explained to the respondents that their answers to the questions were not required and that they might leave the research at any moment. The relevant

SME heads later provided assurances of permission. They were urged to engage entirely in the survey. Additionally, the questionnaire was created to preserve respondents' privacy.

Chapter Summary

The study was conducted to investigate the e-commerce adoption of SMEs in Ghana, specifically Takoradi using the TOE framework in the era of the Covid-19 pandemic. A self-administered questionnaire was given to each respondent as part of a descriptive survey design, and respondents were chosen using a convenience sample approach. Descriptive statistics were further analysed using SPSS version 25.

CHAPTER FOUR

RESULTS AND DISCUSSION

The preceding chapters discussed the background and research problem, followed by a review of literature that included a theoretical, conceptual, and imperial review of similar studies. In addition, the research methodologies used to fulfil the study's aims have been discussed. The overarching goal of this study is to to probe into and understand how the TOE factors affect the electronic commerce adoption of SMEs in Ghana in the era of the Covid-19 pandemic. The study was led by three key objectives in order to attain the ultimate goal. This section of the study focuses on the results and the discussion of the findings of the analysed data. The first part looks at the demographic information of respondents, whilst the subsequent section focuses on the analysis of the field data for the three objectives under research, which were analysed using structural equation modelling (SEM) via the partial least square (PLS) approach.

Demographic Characteristics of respondents

The demographic information of the respondents was examined with frequency and percentages. Respondents were asked for their gender, type of industry, highest degree of education and age. Hence, Table 1 below shows the results on the demographic characteristics (gender, type of industry, firm size, educational level and age).

Table 1: Demographic Details of respondents

		Frequency	Percentage (%)
Gender	Male	198	46.26
	Female	230	53.74
	Total	**428**	**100**
Type	Tourism	15	3.50
of Industry	Health	37	8.64
	Hospitality	48	11.21
	Banking	26	6.07
	Agricultural	81	18.93
	Telecommunication	39	9.11
	Food	112	26.17
	Pharmaceutical	41	9.58
	Entertainment	31	7.24
	Total	**428**	**100**
Education	Secondary Level	194	45.33
	Tertiary Level	97	22.66
	Postgraduate Level	59	13.79
	Professional Level	30	7.01
	Total	**428**	**100**
Age(years)	Less than 30 years	182	42.52
	30–39 years	124	28.97
	40–49 years	84	19.63
	50 years and above	38	8.88
	Total	**428**	**100**

Source: Thompson (2022)

The study from table 1 above show that majority of the respondents were female, forming 230 (53.7%) of the 428 respondents. Males were 198 representing 46.2%. This finding solidifies the findings of Mahajar and Yunus (2012), who found that female-owned SMEs grow about twice as fast as all firms in their study. Most respondents (112) found themselves in the food industry, representing 26.1%. Those followed them in the Agricultural

industry 81 (18.9 per cent). Those in the hospitality industry were 48 representing 11.2% of the respondents. Out of the 428 respondents, those who found themselves in the pharmaceutical industry were 41 (9.50%), followed by those in the telecommunication industry, 39, representing 9.10%. Moreover, the next group found themselves in the health industry. This group comprised 37 respondents depicting 8.6% of the respondents. Respondents from the entertainment industry comprised 7.2% (31). Twenty-six respondents representing 6.0%, were from the banking industry. Lastly, the remaining 15 (3.5%) respondents were from the tourism industry.

Regarding the Educational level of the respondents, the majority (194 representing 45.3%) hold secondary-level qualifications. The study found 97 (22.6%) of the total respondents for those with tertiary-level qualifications. Again, those who found themselves at the postgraduate level were 59 representing 13.7% of the total respondents. Last but not least on, the educational level of the respondents was those with professional-level qualifications. They make up 30 (7.0%) of the respondents. Most of them are young, with only a few in their old age. 182 out of 428, depicting 42.52 per cent of respondents that forms the majority were of ages less than 30, followed by those within the age bracket 30 – 39. They were 124, representing 28.97 per cent of the respondents. Eighty-four representing 19.63% of the respondents, were between the ages of 40-49. Lastly, those aged 50 and above were 38, representing 8.88%.

Findings of Research Objectives

This section presents the main research outcomes in relations to the three research questions outlined in the first chapter. The study employed

PLS-SEM inferential technique. The evaluation is a two-way process: firstly, providing the measurement model and then specifying the structural (Path) model (Hair, Hult, Ringle, & Sarstedt 2022). "The measurement model illustrates the connection between constructs and the indicators or measures that go with them, while the structural model depicts the hypothesised connections between constructs" (Hair et.al., 2022).

In view of the above assertion, the researcher vividly described the measurement and structural models in the proceeding sections of the study. Yellow rectangles represented the indicators and blue Circles are the latent variables. The measurement model was first accomplished by evaluating the PLS-SEM algorithm model. The study documented and discussed the results for each research aim after the measuring model's evaluation.

Measurement model assessment

This entails evaluating the measuring items to confirm that they fulfil the primary metrics to ensure the robustness of the model (Hair et al., 2022). According to Hair et al. (2022), the key areas that are examined for reliability and validity such as: indicator reliability, internal consistency reliability, convergent and discriminant validity. A summarised version of the minimum threshold for each test statistic is presented in Table 2

Table 2: Measurement Threshold Criteria

Measurement criteria	Recommended	Reference
Indicator loading	≥ 0.70	Hair et al., (2022)
Composite reliability (CR)	≥ 0.60	*Hair et al., (2022)*
Average Variance Extracted (AVE)	> 0.50	Henseler et al., (2016)
rho_A	≥ 0.70	Dijkstra & Henseler (2015)
HTMT Ratio	*< 0.90*	Henseler et al., (2016)
Cronbach's Alpha (CA)	≥ 0.70	Henseler et al., (2015)
Variance inflation factors (VIF)	≤ *3.3*	Kock (2015)

Source: Adapted from Hair et al., (2022)

Item Loadings

The measurement model was reflective so the first step was to examine the indicator loadings. Factor loadings indicate how closely items in a particular correlation matrix are related to a specific main component; loadings range between -1.0 and 1.0 where a higher value, in absolute terms, suggest a high correlation with a given factor (Pett et al., 2003). According to Vinzi, Chin, Henseler, and Wang (2010), item loadings of over 0.70 0.708 is recommended, loadings below 0.708 are acceptable in studies that explore underlying relationships to add to theory (Hair, Sarstedt, Ringle, & Gudergan, 2018). However, for quality purposes, items that did not load well (with factor loadings < 0.70) were removed from the construct unless they did not affect the model's reliability.

For Perceived Desirability, one item (Pes 8) was removed, whereas, for E-commerce adoption, four items (Eca 12, Eca 13, Eca 14 and Eca 15) were. Following Table 3, the reliability of the indicators used in the study was confirmed – the factor loadings exceeded 0.5 and ranged between a minimum

and a maximum of 0.716 to 0.870 respectively, with significance at $p < 0.001$. Finally, as shown in Figure 2 below, the final model extracted served as a basis for subsequent assessment of the PLS-SEM.

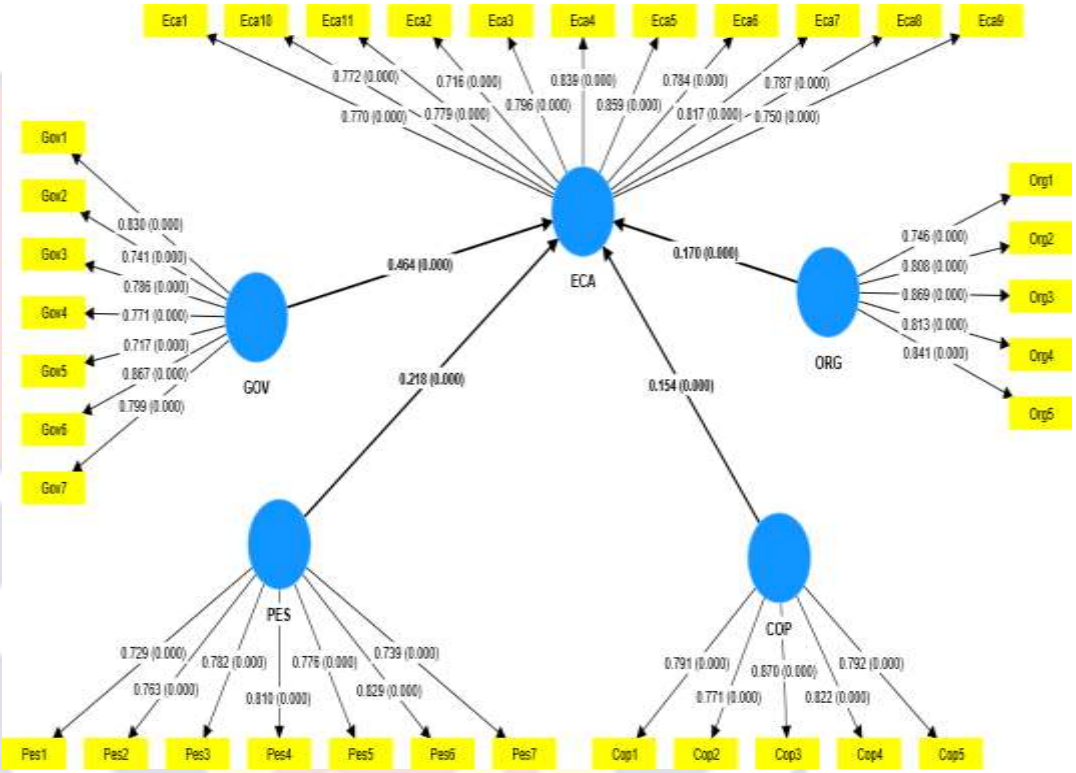

Figure 2: Final Model Extracted
Source: Thompson (2022)

Validity and Reliability of Constructs

A construct is reliable when it can consistently produce the same findings by employing the same procedures under the same conditions. A construct is valid when it accurately measures what it tends to measure (Heale & Twycross, 2015). The reliability and validity of the instruments, items and responses were subjected to bootstrapping estimation procedures of 5000 subsamples with observations randomly selected from the original data set. Table 3 below gives data on outer loadings, Variance Inflation Factor (VIF), Cronbach Alpha, composite reliability, rho_A, rho_C and AVE.

Table 3: Significance of the Model

	Outer loadings	VIF	Cronbach's alpha	Rho_A	Rho_C	AVE
Competitive Pressure (COP)			0.870	0.880	0.905	0.656
Cop1	0.791	1.847				
Cop2	0.771	1.975				
Cop3	0.870	2.461				
Cop4	0.822	2.872				
Cop5	0.792	2.901				
E-commerce Adoption (ECA)			0.939	0.941	0.948	0.623
Eca1	0.770	2.700				
Eca10	0.772	2.543				
Eca11	0.779	2.460				
Eca2	0.716	2.216				
Eca3	0.796	2.771				
Eca4	0.839	4.053				
Eca5	0.859	3.490				
Eca6	0.784	3.318				
Eca7	0.817	2.802				
Eca8	0.787	2.814				
Eca9	0.750	2.488				
Government Support (GOV)			0.898	0.901	0.920	0.622
Gov1	0.830	2.570				
Gov2	0.741	2.157				
Gov3	0.786	2.323				
Gov4	0.771	2.101				
Gov5	0.717	1.711				
Gov6	0.867	3.255				
Gov7	0.799	2.344				
Organisation's Readiness (ORG)			0.875	0.887	0.909	0.667
Org1	0.746	1.763				
Org2	0.808	1.844				
Org3	0.869	2.523				
Org4	0.813	2.456				
Org5	0.841	2.709				
Perceived Desirability (PES)			0.890	0.892	0.914	0.602
Pes1	0.729	1.955				
Pes2	0.763	2.120				

Pes3	0.782	2.300
Pes4	0.810	2.560
Pes5	0.776	2.289
Pes6	0.829	2.985
Pes7	0.739	2.378

Source: Thompson (2022)

Multicollinearity of Indicators

Following Fornell and Bookstein (1982), the study employed the variance inflation factor (VIF) statistic to evaluate the collinearity in the indicators in Table 3. A collection of multivariate regression variables' multicollinearity is quantified by the VIF factor (Kim, 2019). VIF is calculated as the difference between the variance of a model with one term and the variance of a model with several terms when estimating a parameter. (O'Brien, 2007). The threshold for VIF is either high, set at 10 (Hair et al., 2016) or wary, set at 5 (Asthana, 2020; Gomez et al., 2016; Alauddin & Nghiemb, 2010). Asthana (2020), states that multicollinearity is present when the VIF is in excess of the rule of thumb 10. The indicator VIFs presented in Table 3 suggest that all the values of VIF reported were below 5.00, as prescribed by Hair et al. (2016). Hence, all indicators did not suffer from the issues multicollinearity, hence they can be used for further analysis.

Internal Consistency Reliability

An indicator is reliable if it is stable and consistent and could aid replication in different contexts for the same outcomes. The Cronbach alpha was used in assessing the reliability of the constructs. The recommended value for Cronbach's alpha should be below 0.70, indicating an acceptable internal consistency. Indicating a satisfactory level of internal consistency between the constructs, the Cronbach alpha for all structures varied from 0.710 to 0.869.

The Cronbach's alpha score exceeded the acceptable construct reliability standard of 0.70. (Nunnally, 1978).

Like Cronbach's alpha, composite reliability measures the internal consistency of a scale item (Netemeyer, Bearden, & Sharma, 2003). According to Brunner and Süß (2005), it is similar to the complete real score variation to the overall scale score variance. Higher values above 0.6 are typically seen as favourable, while Hair et al. (2018) advocate a minimum of 0.7. From Table 2, the value of composite reliability ranges from 0.880 to 0.941 for all constructs – satisfying both the Brunner and Süß (2005) and Hair et al. (2018) criteria for a good and reliable construct. Raykov's rho (Rho_A) ranges between 0 and 1. The reliability of the item scale increases with its value. A rho value greater than 0.8, which is the limit of adequacy, denotes good internal consistency (Cicchetti, 1994). Hence, all measures of reliability yielded reliability statistics greater than the threshold of 0.70 suggested by in literature as presented in Table 2.

Convergent Validity of Constructs

Convergent validity is the degree to which different indicators agree or converge in measuring the same construct (Mussel et al., 2018). As such, there should be a large covariance between two or more indicators of a single construct for them to be valid measurement indicators for the construct, as defined by Bagozzi, Yi and Phillips (1991). The study then assessed the construct validity using The AVE and compared the variation that a construct captures with the variance that results from measurement error. An AVE of 0.50 or above is highly recommended. (Hair Jr, Howard, & Nitzl, 2020). AVE greater than or equal to 0.50 indicated that the construct explains more than

50% of the items that make up the construct. The structural model may be evaluated using the measurement model evaluation, demonstrating excellent quality.

Discriminant Validity

In assessing the discriminant validity of the constructs, the study analysed the Heterotrait-Monotrait Ratio (HTMT). It is to note that, the HTMT ratio is regarded as a better and quality measure of discriminant validity (DV) as compared to the Fornell and Larcker's (1981) criterion (Hair et al., 2014). The HTMT measures the latent variables' similarity. Although there are several means of assessing the constructs' discriminant validity, the study on adopting HTMT was based on Henseler et al. (2015). Henseler et al. used a Monte Carlo simulation analysis to compare the novel method to the Fornell-Larcker criterion and evaluate (partial) cross-loadings. They found that HTMT performed better. If the HTMT score is less than 0.90, it is advised that discriminant validity between two reflective constructs be established.

Table 4: Heterotrait-Monotrait (HTMT) ratio

	COP	ECA	GOV	ORG
ECA	0.784			
GOV	0.746	0.927		
ORG	0.823	0.841	0.851	
PES	0.710	0.819	0.803	0.720

Source: Thompson (2022)
Note: COP - Competitive Pressures; ECA – E-commerce Adoption; GOV – Government Support; PES – Perceived Desirability.

All constructs were good in distinguishing themselves from each other (with ratios less than 0.85 or 0.90 as prescribed by Kline (2011) and Henseler et al. (2015), except for the relationship between GOV and ECA. GOV and

ECA had an HTMT ratio of 0.927, as shown in Table 4. This is a clear indication that each construct was truly distinct from the other. Hence, the HTMT statistics also confirmed the discriminant validity of the constructs used in the study. After these basic assessments, the study followed up with the analysis of the research objectives in the next sections.

Assessment of the Structural Model

After the measurement model was assessed to ensure that it meets the PLS-SEM criterion, the study presented the results of research objectives of the study. The structural model was evaluated using the path coefficients (β), the R Square, cross-validated redundancy (Q^2), and effect size (f^2) of the recommended research framework. The study framework and hypothesised associations were calculated using 5000 iterations as recommended by Hair et al. (2014), and the bootstrap method was used to assess the statistical significance of each structural path using 5000 resamples. Additionally, the model is evaluated by looking at the Q^2 predictive relevance to analyse the R^2. A specific endogenous construct's Stone-Gesser Q^2 value greater than zero indicates how well the model predicts that construct (Sarstedt et al., 2017; Hair, Randolph, & Chong, 2017). Additionally, effect size values of 0.02, 0.15, and 0.35, respectively, show the path coefficient's small, medium, and large effects (Cohen, 1988). In light of above, the findings of the three broad objectives of the study were reported in the tables that ensue.

Table 5: Significance of the study

	Beta	T-test	P value	2.5%	97.5%	F^2
COP -> ECA	0.154	4.479	0.000	0.090	0.225	0.051
GOV -> ECA	0.464	8.425	0.000	0.351	0.568	0.356
ORG -> ECA	0.170	4.178	0.000	0.091	0.249	0.050
PES -> ECA	0.218	6.379	0.000	0.155	0.288	0.105
	R-square	**R-square adjusted**	**Q^2 predict**	**RMSE**	**MAE**	
ECA	0.806	0.804	0.800	0.449	0.324	

Source: Thompson (2022)

Note: Predictive relevance (Q^2) of 0.02, 0.15 and 0.35 indicates small, medium and large effects, while $0.02 \leq f^2 \leq 0.15$ is a weak effect, $0.15 \leq f^2 \leq 0.35$ is a moderate effect $f^2 \geq 0.35$ shows a strong effect respectively. "Competitive Pressure (COP); Government Support (GOV); Organisational Readiness (ORG); Perceived Desirability (PES); E-Commerce Adoption

The t-stat values recommended by Hair et al. (2014) were used to present the results. They advised that p-values of 0.05 should be used for t-stat values above 1.96 and vice versa. Additionally, Cohen (1988), discussed the path coefficients in light of the criterion. According to (Cohen 1988), the correlation coefficient ranges from -1.00 to 1.00 with r=.10 to .29 or r=–.10 to –.29 considered small, r=.30 to .49 or r=–.30 to –.4.9 considered to be medium and r=.50 to 1.0 or r=–.50 to –1.0 considered large.

As shown in Table 4, All the predictive variables have a significant and positive relationship with the dependent variable (p = 000).

On research hypothesis one which is to Perceived desirability is positively associated with e-commerce adoption in Ghana. The study found that PES has a significant influence on ECA ($\beta = 0.218$, $t = 6.379$, $p < 0.01$). Therefore, the study concludes that PES significantly impacts ECA. Hence, the hypothesis is supported.

On the second hypothesis, the researcher examined that Organisation's readiness is positively associated with e-commerce adoption in Ghana. The study concludes that ORG has a positive significant influence on ECA ($\beta = 0.170, t = 4.198, p < 0.01$).

The third hypothesis examined that Competitive pressure is positively associated with e-commerce adoption in Ghana. The study found that COP has a positive significant influence on ECA ($\beta = 0.154, t = 4.479, p < 0.01$).

The last hypothesis the researcher examined was Government support is positively associated with e-commerce adoption in Ghana. The study found that GOV has a positive significant influence on ECA ($\beta = 0.464, t = 8.425, p < 0.01$).

The effect size is used to measure each external construct's impact on the indigenous construct's R^2 figures and mostly the Cohen's (1992) f^2 is mostly used in calculating the effect size. When an exogenous variable is taken out of the model, the F-Square is the change in R-Square. (Pangesti, Sumertajaya, & Sukmawati, 2016). F-square measures the effect size of the explanatory variables on E-Commerce Adoption ($f^2 \geq 0.02$ is small; $f^2 \geq 0.15$ is medium; $f^2 \geq 0.35$ is large) (Cohen, 1988). From table 4, GOV had the largest effect on ECA (f2 = 0.356), whereas COP, ORG, and PES had f squares 0.015, 0.050, and 0.105, respectively, indicating a small effect on ECA.

The Coefficient of determination (R^2) assesses the total variations in the dependent variable explained by the independent variable(s). R Square statistics explains the variance in the endogenous variable explained by the exogenous variable(s). R^2 values range from 0 to 1, where higher values indicate high predictive accuracy. Since R^2 values increases with number of

predictors, adjusted R^2 is recommended because it controls for complexity in model and useful when comparing models. Table 7 the R^2 *adj*. values are mostly recommended for comparison. The R square of 0.806 shows that about 80.6% of the total variation explained in the dependent variable was dependent variables.

The predictive relevance (Q^2) results show that the independent variables have relatively higher effects on the dependent variable. When the Q-square exceeds zero, the model is predictively relevant, and your values have been accurately recreated. (Hair et al., 2016). The study from table 5 summarises the findings and shows whether the various hypothesis was rejected or failed to be rejected.

Robustness

This section provides the direct impact of COP, GOV, ORG and PES on B2B E-Commerce Adoption (ECA). The importance-performance and total effects tests support this. It can be seen from Figure 5 that GOV has the most impact on ECA.

Table 6: Robustness IPMA

	Total Effect	Performance
COP	0.154	56.570
GOV	0.464	61.196
ORG	0.170	56.284
PES	0.218	59.498

Source: Thompson (2022)

Note: Competitive Pressure (COP); Government Support (GOV); Organisational Readiness (ORG); Perceived Desirability (PES); E-Commerce Adoption (ECA)

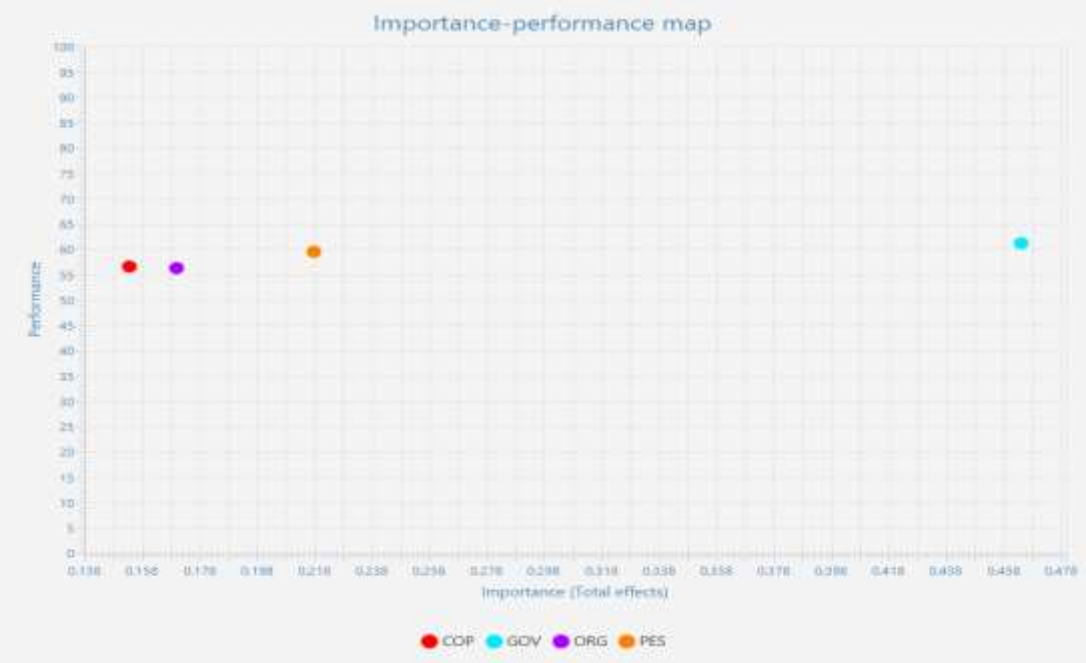

Figure 3: Importance performance map on the effect of COP, GOV, ORG and PES on ECA
Source: Thompson (2022)

Table 7: Summary of Results

Hypothesis	Beta	p-value	Remarks
COP -> ECA	0.540	0.000	Maintained
GOV -> ECA	0.630	0.000	Maintained
ORG -> ECA	0.199	0.000	Maintained
PES -> ECA	0.098	0.000	Maintained

Source: Thompson (2022)
Note: Competitive Pressure (COP); Government Support (GOV); Organisational Readiness (ORG); Perceived Desirability (PES); E-Commerce Adoption

The study on the first objective seeks to determine the effect of technological factors on e-commerce adoption; as shown in table 4 (β = 0.1218, t = 6.379, p < .001, f2 = 0.105), perceived desirability is statistically significant (at 10% significance level) and positively influence the adoption of B2B E-Commerce. On "the perceived desirability and firm's intention to adopt B2B E-Commerce", Alsaad et al. (2015), proposed Perceived Desirability to affect firms' intention to adopt B2B E-Commerce directly. The study agrees

with Ocloo et al. (2020). He discovered that perceived desirability considerably and favourably influenced the adoption of B2B e-commerce. This analysis reveals that perceived desirability influences SMEs' adoption of B2B e-commerce, which is in line with the findings of Alsaad et al. (2015) but in contrary to Oliveira and Dhillon (2015).

According to the study, organisational readiness positively and significantly affects the uptake of B2B e-commerce. ($\beta = 0.170$, $t = 4.178$, $p < .001$, $f^2 = 0.050$) (Table 4). Its effect on B2B E-Commerce Adoption. Organisational readiness has a smaller effect on B2B E-Commerce adoption; however, it is statistically significant. Similarly, several types of research have shown that an organisation's financial resources have favourable and significant links to SMEs' adoption of ICT and e-commerce (Ghobakhloo et al., 2015; Scupola, 2009; Mishra & Agarwal, 2010). Moreover, in their findings, Ocloo et al. (2020), revealed that organisational readiness positively and significantly affects E-Commerce.

The third objective examines the effect of environmental factors on E-Commerce Adoption. The study's results showed that government support positively and significantly influences the adoption of B2B E-Commerce. ($\beta = 0.464$, $t = 8.425$, $p < .001$, $f2 = 0.356$). f2 of 0.356 indicates that government support greatly influences the adoption of B2B Adoption. This conclusion is reinforced by Ocloo et al. (2020), who discovered that adopting e-commerce had a favourable and substantial association with government support. Government support in the form of technological infrastructure, regulations, and financing may substantially impact the uptake of new technologies (Rowe et al., 2012; Saprikis & Vlachopoulou, 2012). Numerous studies have shown

that governmental variables significantly impact SMEs' adoption of e-commerce (Rahayu & Day, 2015; Al-Alawi & Al-Ali, 2015).

The study results show that competitive pressure positively and significantly impacts adopting e-commerce. ($\beta = 0.154$, $t = 4.479$, $p < .001$, $f^2 = 0.051$). As a result, the study did not successfully refute the hypothesis (H1) that B2B e-commerce positively correlates with competitive pressure. The results are consistent with several studies showing that the partners' readiness to use the technologies in their business operations jointly determines the success of adopting B2B e-commerce. (Lip-Sam & Hock-Eam, 2011; Hamad et al., 2018). The adoption of B2B e-commerce is confirmed to be influenced by several competitive forces, such as coercive and normative demands from suppliers, partners, and customers (Ghobakhloo et al., 2011). E-Commerce Adoption is positively and significantly impacted the study of Ocloo et al. (2020) on "The determinant elements of business to business (B2B) E-commerce adoption in small- and medium-sized manufacturing firms."

Chapter Summary

The chapter analysed data collected from the respondents using the SPSS V. 26 and Smart PLS Version 4. The demographic characteristics were analysed using the SPSS, and various relationships between the construct were analysed using PLS-SEM. A total of 428 respondents were employed for the study using convenient and stratified sampling. The study further assessed the quality of the items and constructs before drawing conclusions based on the study's results. The study found GOV, PES, ORG and COP have a positive and significant effect on ECA.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The study overviews the general and specific research objectives and methodologies employed. The chapter subsequently presents a summary of the study's findings and a discussion of the study's results. The research also makes recommendations for further studies based on the findings and conclusions of the study.

Overview

The general research objective was to probe into and understand how the technological, organisational, and environmental (TOE) factors affect the electronic commerce adoption of SMEs in the era of the Covid-19 pandemic. The specific objectives that guided the research were;

1. To determine the effect of technological factors on e-commerce adoption.
2. To examine the effect of organisational factors on e-commerce adoption.
3. To examine the effect of environmental factors on e-commerce adoption.

The study employed the convenience and stratified sampling technique in selecting a total of four hundred and twenty-eight (428) respondents. Data was collected with the help of self-administered closed-ended questionnaires. Items on questionnaires were measured using the 5 – point Likert scale. After collecting data from respondents, structural equation modelling using partial least squares was used to analyse the data.

Summary of findings

This study delves into the influence of technological factors on the adoption of e-commerce, unravelling the intricate web of relationships between innovations, digital tools, and businesses' strategic choices in the digital era. The study's premise was that perceived desirability positively correlates with e-commerce adoption based on the first goal, "identify the influence of technological factors on e-commerce adoption." Based on its results, the study found perceived desirability to positively and significantly affect E-Commerce Adoption. Hence failing to reject the null hypothesis. The research reveals that adopting e-commerce will enable organisations to achieve specific tasks more efficiently and improve work performance. The business strategy of the firms, as well as their culture and value, were found to be compatible and consistent with e-commerce adoption.

This research investigation delves into the impact of organizational factors on the adoption of e-commerce, exploring the intricate interplay between business structures, management practices, and the strategic embrace of digital platforms. The organizational factors taken into account was organisational readiness. The study found organisational factors (Organisational Readiness) to positively and significantly affect e-commerce adoption. This finding then reveals that the firms have the necessary expertise, skills, and financial resources to support the adoption of e-commerce. Again, the firms have a dedicated financial allocation and technical infrastructure that can easily incorporate e-commerce technology. Management of the various organisations must ensure they provide their employees with an updated job

description to help them understand the organisation, its structures and doings to support the adoption of e-commerce.

To conclude, the study on the third objective examines the effect of environmental factors on e-commerce adoption. Competitive pressure and Government support were the factors in the study. The study hypothesised that competitive pressure and Government support are positively associated with e-commerce adoption. Based on the results, the study failed to reject the hypotheses and conclude that competitive pressure and Government Support positively and significantly impact e-commerce adoption. The research supports the firms' perception that failing to adopt e-commerce will result in losing partners, customers and suppliers. The government should be more helpful by formulating beneficial laws and regulations and providing IT infrastructure.

Additionally, the government ought to provide tax incentives for technological products like computers, servers, and website layouts that may speed up the adoption of e-commerce. Regarding policy, the government should create a robust regulatory framework to encourage the use of B2B e-commerce and shield companies and clients from fraud and hacking. Government organisations and technology providers must increase IT knowledge, particularly of the benefits of technology adoption for trade partners and suppliers of manufacturing SMEs.

Conclusion

The study concludes that technology, organisation and environment factors positively and significantly influence the e-commerce adoption of SMEs during the Covid-19 pandemic.

The research findings conclude that perceived desirability (a technological factor) has a significant relationship with e-commerce adoption; therefore, management must pay keen attention to it. Before adopting e-commerce, management must ensure that some critical regions, like their business strategy, are well-documented to be compatible with e-commerce. In most organisations, the values and culture determine the behaviour of their employees, their way of life and their thought about the situation. Amid such a global pandemic, it is prudent for organisations to re-evaluate their cultural values to fit into the new pandemic environment even before the adoption of e-commerce. Management should ensure that staff (in any) undergo training and development processes as it seeks to adopt e-commerce. Training is crucial as e-commerce requires a lot of skilled labour.

The study also concludes with the second objective that organisational factors positively and significantly influence e-commerce adoption. Before adopting e-commerce, management should assess its environmental factors to ensure its efficient and effective institution. Management should make sure there is the necessary and sufficient expertise and skills to enhance e-commerce adoption. Any policy or strategy of new SBUs in the organisation depends mainly on available financial resources. Management must ensure the firm has enough finance to institute and manage e-commerce. E-commerce deals with integrating information and communication technology (ICT) in buying and selling, like online marketing. However, the employees must be proficient with computer hardware and software applications. The management of the firms should organise in-service and on-the-job training for their staff before and after the adoption of e-commerce. Management

should also ensure a flexible technical infrastructure that can easily house the e-commerce technology.

Finally, the study concludes with the third objective that environmental factors positively and significantly affect e-commerce adoption. The environmental factors adopted for the study were competitive pressure and government support. Business partner pressure is an essential factor influencing SMEs' adoption of e-commerce. Moreover, government interferences also pose a threat to the adoption of e-commerce. Therefore, management must ensure that the factor in the influence of government when formulating their strategic management plans. The support from the government may include the provision of tax exemptions, ICT infrastructures, affordable internet services and public infrastructures that support electronic payments and transactions. These policies that the government would roll out should also be considered before and after adopting e-commerce.

Recommendations

The current era is marked by the pervasive adoption of information technology, particularly in the realm of e-commerce, reshaping the landscape of global communication. This transformative shift has not only revolutionized how businesses and individuals disseminate information across international boundaries but has also been propelled by the deepening interconnectedness among nations. This heightened interdependence, driven by the currents of international commerce, has served as a catalyst for technology adoption, impacting both developed and emerging economies. In this evolving context, the study's findings lead to a series of pragmatic recommendations, illuminating pathways for future action.

At the heart of these recommendations lies the strategic imperative of policy formulation and execution. The efficacy of e-commerce initiatives in any organization is intrinsically linked to adept management. Thus, a clarion call resonates for the establishment of visionary policies that can effectively guide the trajectory of e-commerce endeavours. These policies must extend beyond mere operational frameworks, embodying foresight to navigate unforeseen challenges and shifts in the technological landscape. The formulation, implementation, and evaluation of such policies become instrumental in steering e-commerce initiatives towards success.

Cultivating an organizational culture that seamlessly integrates with the dynamism of the digital age stands as another vital recommendation. Management plays a pivotal role in fostering a culture that is not just responsive but anticipatory. An adaptable culture that remains attuned to evolving industry trends is paramount. This entails an environment that welcomes change, embraces innovation, and harmonizes established values with the demands of the digital era. Through this culture, organizations can harness the transformative potential of e-commerce while staying agile in an ever-evolving landscape.

Furthermore, as organizations consider the adoption of e-commerce, a comprehensive understanding of environmental factors becomes crucial. Delving into both the benefits and challenges inherent in e-commerce adoption empowers firms to make informed decisions. Beyond economic considerations, this understanding extends to the profound implications of e-commerce on global dynamics and the environment. By comprehending these

nuances, organizations can strike a delicate equilibrium between harnessing globalization's potential and mitigating its ecological impact.

In essence, these recommendations extend beyond the study's immediate scope, serving as beacons guiding strategic endeavours. The call for visionary policy frameworks, an adaptive organizational culture, and nuanced environmental insights collectively propels e-commerce adoption into a sustainable and transformative trajectory. By heeding these recommendations, organizations can navigate the ever-changing currents of technological evolution, ensuring that their voyage through the realm of e-commerce remains both impactful and harmonious with the broader global context.

Suggestions for further studies

The adoption of e-commerce has recently increased due to globalisation. As such, there is a need for firms to work effectively and efficiently. Based on the finding, the study makes the following recommendations for further studies. The study investigates how technological, organisational, and environmental (TOE) factors affect the electronic commerce adoption of SMEs in the era of the Covid-19 pandemic. The study's findings are generalised to the SMEs in Ghana, although situations might differ in every industry. There would be a need to assess the effect of technological-environmental-organisational theory on e-commerce adoption on industry bases.

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APPENDIX

QUESTIONNAIRE

Dear respondent,

To introduce myself, my name is Justina Thompson, an MBA student in the Department of Management, at the University of Cape Coast. As part of the requirements for graduating in my programme, I am seeking empirical data on my research topic entitled 'Re-visiting the Technological-Organisational-Environmental (toe) Framework for E-commerce Adoption during Covid-19: Evidence from SMEs in Takoradi.' As part of the information gathering process for the study, I am requesting for your permission to share your opinion on the subject. I will greatly appreciate if you could kindly take a few minutes of your time to complete the ensuing questionnaire in support of my research.

Your participation is voluntary and you are free to withdraw from the study as you may deem appropriate. If you choose to participate in this research, please answer all questions as honestly as possible. To respond to questions on this questionnaire, please, tick (✓) the selected response or circle it. By completing and submitting this questionnaire, you indicate your consent to participate in this research study. This survey is based on high ethical standards, and every information provided is purely for academic purposes only. For the purpose of anonymity, your responses will be held in strictest confidence.

Thank you for your cooperation.

SECTION A: Personal Data of Respondents

These statements are about you. Kindly tick in the box the answer that best describes your response in each of the states.

1. Gender: Male ☐ Female ☐
2. Type of industry……...
3. Firm size

   ☐ 2-29 employees ☐ 30-99 employees
4. Education

   ☐ Secondary level ☐ Tertiary level

   ☐ Postgraduate level ☐ Professional level
5. Age

   ☐ Less than 30 years ☐ 30–39 years

   ☐ 40–49 years ☐ 50 years and above

SECTION 'B': Drivers of Electronic commerce

The following statements measure the **Drivers of Electronic commerce adoption.** Please indicate the extent to which you agree to each statement by ticking [√] one number of each item;

1- Least level of agreement, 5- the Highest level of agreement

s/n	Statement	1	2	3	4	5
	Perceived desirability (Pes)					
1.	The adoption of e-commerce will enable our firm achieve specific tasks more easily					
2.	The adoption of e-commerce will improve our work performance					
3.	The adoption of e-commerce is consistent with our business strategy					

4.	Our existing hardware and software are compatible with e-commerce adoption					
5.	The adoption of e-commerce is compatible with our firm's culture and values					
6.	The adoption of e-commerce is too difficult to be incorporated into our business activities					
7.	The adoption of e-commerce requires a lot of mental effort					
8.	The adoption of e-commerce will allow us to enhance our business productivity					
	Organisation's readiness (Org)					
1.	Our firm has the necessary expertise and skills to support e-commerce adoption					
2.	Our employees are proficient in computer hardware and software applications					
3.	Our firm has enough financial resources to adopt e-commerce					
4.	Our firm has dedicated financial allocations to adopt e-commerce					
5.	Our firm has a flexible technical infrastructure that can easily incorporate e-commerce technology					
	Top management support (Top)					
1.	Our top managers actively articulate a vision for the firm's adoption of e-commerce					
2.	Our top managers formulate a strategy for the firm's use of e-commerce					
3.	Our top managers define goals and standards to monitor e-commerce use					
4.	Our top managers believe incorporating e-commerce practices is a very important way to gain competitive advantage					
	Competitive pressure (Cop)					
1.	Our firm thinks we will lose our trading partners if we do not adopt e-commerce					
2.	Our firm considers that e-commerce has an impact on competition in our industry					
3.	Our firm is under pressure from competitors to adopt e-commerce					
4.	Our firm assumes that we will lose our customers/suppliers if we do not adopt e-commerce					

5.	Some of our competitors have already started using e- commerce					
	Business partner's pressure (Bus)					
1.	Our firm depends on trading partners that are already using e-commerce					
2.	Our suppliers and trading partners are pressuring us to adopt e-commerce					
3.	Our suppliers demand us to use e-commerce for doing business with them					
4.	Our customers are ready to do business over the website					
	Government support (Gov)					
1.	The government has provided public infrastructure readiness that support electronic payment					
2.	The government has developed ICT infrastructure to support e-commerce initiatives					
3.	The government is offering tax incentives to SMEs to boost e-commerce development					
4.	The government has provided various educational programs to train entrepreneurs and staff in the use of e-commerce					
5.	The government has provided support to ensure affordable Internet services for the use of e-commerce					
6.	The government has initiated technology vendor support (IT consultancy services) for the use of e-commerce					

Section 'C': E-commerce adoption

The following statements measure **to what extent your firm adopts e-commerce**. Please indicate the extent to which you agree to each statement by ticking [√] one number of each item;

1- Least level of agreement, 5- the Highest level of agreement

s/n	Statement	1	2	3	4	5
1.	Providing general information about the company					
2.	Promoting the company's products and services					
3.	Communicating and responding with suppliers and/or customers by e-mail					
4.	Seeking out new customers and/or suppliers					
5.	Responding to customer and/or suppliers' enquiries and feedback					
6.	Placing and managing orders with suppliers					
7.	Receiving and managing orders with customers					
8.	Offering customers' after-sales service					
9.	Receiving electronic payments from customers					
10.	Making electronic payments to suppliers					
11.	Negotiating contracts (price and volume) with suppliers and/or customers					
12.	Using management information systems to enhance quality assurance					
13.	Using extranet to communicate with key suppliers					
14.	Transferring documents and technical drawing to suppliers					
15.	Tracking products (purchased and sold) during transportation					