



BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

The Department of Economics

**The impact of E-procurement on Supply Chain resilience in beverage companies in
Harare**


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**A Dissertation submitted in Partial Fulfillment of the requirements of the
Master of Science Degree in Purchasing and Supply Chain Management.**

November 2023

DECLARATION

I, Cuthbert Tsikira, declare that this research is my original work and that it has never been presented to any institution or university for the award of Degree or Diploma. In addition, I have referenced correctly all literature and sources used in this work and this work is fully compliant with the Department of Economics of Bindura University of Science Education's academic honesty policy.

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This research Project has been submitted with my approval as the university supervisor.

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ABSTRACT

The purpose of this study was to investigate the impact of e-procurement and its constructs-sourcing-tendering and e-ordering on supply chain resilience in beverage companies in Harare. Beverages companies' challenges, include rising inflation, currency volatility, depressed production of goods and services, increasing competition, and global supply chain disruptions culminating in a complex and unpredictable operating environment for beverage manufacturers and distributors. Most studies on e-procurement and supply chain resilience, have focused on companies in the global north, resulting in scant and limited knowledge on the subject relevant to companies in the global south and to Zimbabwe in particular. This study, therefore, was conducted to fill this gap.

The study followed a quantitative research approach. The target population consisted of all beverage companies in Harare. To measure the study constructs, the survey material was designed in the form of a structured questionnaire. Participants were asked to complete three four sections of the test instruments, namely, e-procurement section-sourcing section, e-tendering section e-sourcing section and supply chain resilience. A total of 160 questionnaires was distributed to managers involved in supply chain in the beverage companies and all 160 were used for data analysis. The confirmatory factor analysis (CFA) was performed to establish scale accuracy. All measures conformed to acceptable model fit and composite reliability (CR) and revealed that the scales used in this study are reliable. The reliability results confirmed that all constructs reached the generally agreed upon minimum scale range for Cronbach's alpha of 0.70. Finally, the structural model was tested and all three hypotheses were supported. Validity in this study was achieved.

The principal finding of this study reveals that e-procurement,e-sourcing,e-tendering and e-ordering have a positive and significant impact on supply chain resilience. The results conclusively demonstrated the need for embracing e-procurement as tool to bolster beverage companies in the face of the ever rising challenges to supply chain resilience. This research has contributed to literature by providing additional information on how to improving supply chain resilience in the face of ever increasing supply chain disruptions.

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ABBREVIATIONS AND ACRONYMS

E-procurement	- Electronic Procurement
SCRe	- Supply Chain Resilience
E-tendering	- Electronic Tendering
E-sourcing	- Electronic Sourcing
E-ordering	- Electronic Ordering

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

In recent years, the business environment has been characterized by turbulence, disruption and uncertainty emanating from natural pandemics such as floods, cyclones, wars, for example Russia –Ukraine war, uncontrollable veld fires and diseases, such as COVID 19 pandemic (Barman et al,2021; Koncar et al 2020; Weber, 2021 Xu et al, 2020). All these disruptions have caused unimaginable disruption to business supply chains, (Knemeyer et al 2009), and given rise to a search for solutions that guarantee supply chain resilience, in the face of these imminent disruptions. The role of electronic procurement, (e-procurement) systems in aiding and ensuring supply chain resilience has thus come to the fore, Albinkalil,(2021), Presutti Jr, W. D. (2003).

Electronic procurement, (e-procurement) is the process of purchasing goods and services through electronic means, typically through the internet. The method has become an increasingly popular method for organizations to streamline their procurement processes and improve efficiency. Due to the frequent disruptions caused by pandemics such as COVID 19, the Ukraine-Russia war, floods, Cyclones and veld fires, in recent years, there has been growing interest in the potential impact of e-procurement on supply chain resilience. Supply chain resilience refers to the ability of a supply chain to withstand and recover from disruptions. This view is shared by Tukamuhabwa et al, (2015), who define supply chain resilience (SCRes) as the adaptive capability of a supply chain to prepare for as well as respond to disruptions, thus enabling timely and cost effective recovery. They postulate that supply chain resilience should ideally result in a post-disruption state of operations that is stronger than prior to the disruption. The view resonates with Tang, (2021), who views supply chain resilience as the ability of a supply chain to anticipate, absorb, and recover from disruptions. According to Tang, (2021), supply chain resilience is a complex concept which encompasses factors such as network design, inventory management, transportation planning, and risk management.

This dissertation aims to explore the impact of e-procurement (e-sourcing, e-tendering, e-ordering) on supply chain resilience in the context of beverage companies in Harare. Harare, being the capital city of Zimbabwe is home to a thriving beverage industry, making it an ideal location for this study. Through a detailed analysis of case studies and data collected from beverage companies in Harare, this dissertation will provide valuable insights into the relationship between e-procurement and supply chain resilience.

The findings of this study will be relevant to both academics and practitioners, as they will contribute to an understanding of how e-procurement can be used to enhance supply chain resilience. Additionally, the results will provide practical recommendations for beverage companies in Harare and other similar contexts on how to effectively implement e-procurement to improve their supply chain resilience. Overall, this dissertation proposes to make a significant contribution to the body of knowledge and the field of supply chain management.

The dissertation follows the following plan: Chapter One introduces the topic while Chapter two provides a review of the literature on e-procurement (e-sourcing, e-tendering, and e-ordering) and supply chain resilience. Chapter three describes the research methodology used in this study, including data collection and analysis methods. Chapter four presents the results of the study, including a detailed analysis of the case studies and data collected from beverage companies in Harare. Chapter five discusses the implications of the findings for both theory and practice, and provides recommendations for future research and concludes by summarising the key findings and contributions of this study.

1.1 Statement of the problem

The beverage industry in Harare, is grappling with a multitude of interconnected challenges that threaten its sustainability and growth prospects. These challenges, including rising inflation, currency volatility, depressed production of goods and services, increasing competition, global supply chain disruptions, have created a complex and unpredictable operating environment for beverage manufacturers and distributors.

1.1.2 Purpose of the Study

The aim of this research proposal is to investigate the impact of e-procurement together with its construct, e-ordering, e-tendering and e-sourcing, on supply chain resilience within the context of beverage companies in Harare. E-procurement, just like its constructs, e-ordering, e-tendering and e-sourcing, has emerged as a promising tool for enhancing supply chain performance by streamlining procurement processes and improving efficiency. However, its impact on supply chain resilience, particularly in the beverage industry, remains relatively unexplored. This research seeks to fill this research gap and provide valuable insights for both academia and industry practitioners.

1.1.3 Research questions

The study research seeks to interrogate the following questions:

1. How does e-procurement, e-sourcing, e-tendering and e-ordering impact supply chain resilience in beverage companies in Harare?
2. What benefits of e-procurement can be recommended to beverage companies in Harare ?

1.1.4 Research Objectives

1. To assess the impact of e-procurement, e-sourcing, e-tendering and e-ordering on supply chain resilience in beverage companies in Harare
2. To give recommendations on the benefits of e-procurement on supply chain resilience in beverage companies.

1.1.5 Statement of hypothesis

E-procurement, (e-sourcing, e-tendering, e-ordering) has a positive impact on supply chain resilience in beverage companies in Harare.

a). Hypothesis Development

In this study the conceptual framework was made of the respective elements or constructs of E-procurement, (e-sourcing, e-tendering, e-ordering), culminating in the following hypothesis development:

b). E-Sourcing and supply chain resilience

E-sourcing is the use of electronic tools and technologies to support the sourcing process, including supplier discovery, evaluation, and selection. Supply chain resilience is the ability of a supply chain to adapt and recover from disruptions. E-sourcing can contribute to supply chain resilience in a number of ways: Chan & Qi, (2019), identify the following benefits of e-sourcing towards supply chain resilience.

Increased visibility and transparency: E-sourcing platforms provide organizations with a centralized view of their supplier networks, including supplier capabilities, performance metrics, and risk assessments. This visibility and transparency can help organizations to identify and mitigate potential disruptions.

Improved supplier collaboration: E-sourcing platforms can facilitate collaboration between organizations and their suppliers, enabling them to share information, develop contingency plans, and respond quickly to disruptions.

Reduced supplier risk: E-sourcing platforms can help organizations to identify and qualify new suppliers, and to diversify their supplier networks. This can help to reduce the risk of disruptions caused by the failure of a single supplier.

E-Sourcing can contribute to an organization's supply chain resilience in a number of ways. For example, e-sourcing platforms can help organizations to identify a wider range of potential

suppliers, including those from different countries and regions. It also enables gathering more information about suppliers' capabilities and performance; compare suppliers more easily and efficiently; negotiate better contracts with suppliers and collaborate more effectively with suppliers. A study by Ghobakhloo et al. (2023), found that organizations that use e-sourcing are more likely to have resilient supply chains. The study found that e-sourcing helps organizations to identify and mitigate supply chain risks, and to respond more quickly and effectively to disruptions.

H1 E-Sourcing positively impacts supply chain resilience.

c). E-tendering and supply chain resilience

E-tendering refers to the procurement of goods and services through electronic means. It has become increasingly popular in recent years, as it offers a number of advantages over traditional paper-based tendering processes, including:

Increased transparency and competition: E-tendering platforms make it easier for suppliers to find and bid on tenders, which can lead to more competitive pricing and better quality goods and services.

E-tendering can help to reduce the costs associated with the tendering process, such as printing and postage costs.

Improved efficiency: E-tendering can help to streamline and improve the efficiency of the tendering process, by automating tasks such as supplier prequalification, bid evaluation, and contract award.

From the fore mentioned, e-tendering improves supply chain resilience. For example, e-tendering platforms can be used to quickly identify and qualify new suppliers, which can help organizations to reduce their reliance on a single supplier. E-tendering can help organizations to diversify their supply base by making it easier to source goods and services from suppliers in different geographical locations.

H2 E-tendering improves supply chain resilience

d). E-ordering and supply chain resilience

E-ordering, as described by Iben and Laryea (2015), is an electronic method for requesting goods or services. It encompasses all stages from identifying needs to managing contracts and suppliers post-purchase. It's primarily used in the final stages of procurement, enhancing savings and efficiency (Sigh & Punia, 2011).

E-ordering can help businesses to improve their agility and responsiveness to changes in demand. For example, if a business experiences a sudden surge in demand for a particular product, they can use their e-ordering system to quickly place orders with their suppliers. This can help to ensure that the business is able to meet its customer demand without experiencing stock outs. It follows therefore that, e-ordering is a valuable tool that can help businesses to enhance their supply chain resilience. By automating and streamlining the ordering process, improving visibility and communication, and reducing reliance on single suppliers, e-ordering can help businesses to better prepare for and respond to disruptions.

H3 E-ordering positively impact supply chain resilience

The hypothesis, **H1;H2;H3** will be tested through the research proposed in this study. The research will involve collecting data from beverage companies in Harare on their current use of e-procurement, their supply chain resilience, and the factors that influence both of these variables. The data will then be analysed to determine whether there is a statistically significant relationship between e-procurement (e-sourcing, e-tendering, e-ordering) and supply chain resilience.

If the hypothesis is supported by the research, it will have a number of implications for beverage companies in Harare in terms of their adoption and application of e-procurement as a way to improve their supply chain resilience in order to withstand and recover from disruptions which will lead to improved operational efficiency and financial performance.

1.1.6 Significance of the study

The findings of this study will be relevant to both academics and supply chain management practitioners, as they will contribute to an understanding of how e-procurement can be used to enhance supply chain resilience. Additionally, the results will provide practical recommendations

for beverage companies in Harare and other similar contexts on how to effectively implement e-procurement and e-ordering to improve their supply chain resilience. Overall, this dissertation proposes to make a significant contribution to the field of supply chain management.

1.1.7 Assumptions

This research study is premised on the following assumptions:

E-procurement as evidenced through its constructs, e-sourcing, e-tendering and e-ordering is more widely adopted in larger manufacturing companies. This is because larger companies have more resources to invest in e-procurement systems and technologies.

The impact of e-procurement on supply chain resilience is greater in manufacturing companies that operate in complex and volatile business environments. This is because these companies are more exposed to supply chain disruptions.

The impact of e-procurement and e-ordering on supply chain resilience is moderated by the level of supplier integration. Manufacturing companies that have strong relationships with their suppliers are more likely to benefit from e-procurement and e-ordering in terms of improved supply chain resilience.

1.1.8 Delimitation of the study

The study is delimited to a study of the impact on supply chain resilience of e-procurement (e-sourcing, e-tendering and e-ordering) processes of beverage manufacturing companies in Harare. The study also focuses on the impact of e-procurement on the ability of manufacturing companies to respond to supply chain disruptions, or on the ability of manufacturing companies to maintain a consistent level of production despite supply chain disruptions.

The target population of the study will comprise managers involved in the procurement process for Beverage Manufacturing companies in Harare. Managers with roles such as Procurement Manager; Supply Chain Manager; Procurement officer and Finance Manager make up the population.

1.1.9 Limitations

The study may suffer the following limitations:

- i. **Data availability and quality:** It may be difficult to obtain reliable data on the impact of e-procurement on supply chain resilience, especially from manufacturing companies in Harare. This is because many companies do not have systems in place to track these metrics.
- ii. **Self-reported data:** The study may rely on self-reported data from manufacturing companies, which could be biased.
- iii. **Other factors:** There are a number of other factors that can impact supply chain resilience, such as the political and economic environment in Zimbabwe. It may be difficult to isolate the impact of e-procurement from these other factors.

1.2.0 Definition of terms

E-procurement: The use of electronic technologies to streamline and automate the procurement process.

E-sourcing: The use of electronic technologies to search for and select suppliers

E-ordering: The use of electronic technologies to search for and select suppliers and place and receive orders. The use of electronic technologies to negotiate prices and terms with suppliers.

Supply chain resilience: The ability of a supply chain to withstand and recover from disruptions.

Manufacturing companies: Companies that produce goods using raw materials and machinery.

Supplier diversity: The sourcing of goods and services from a variety of different suppliers.

Inventory management: The process of managing the levels of inventory held by a company.

Risk management: The process of identifying, assessing, and mitigating risks to a company's operations.

Harare: The capital of Zimbabwe.

1.2.1 Chapter Summary.

Data for this study will be collected through a variety of methods. Surveys and interviews will be conducted with representatives from beverage companies in Harare to gather information about their experiences with e-procurement and supply chain resilience. Secondary data collected and from company records, such as procurement and supply chain performance metrics, to assess the impact of e-procurement on supply chain resilience. Additionally, secondary data sources, such as industry reports and academic literature, will also be analysed to provide context and support the findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter consists of a review of literature on electronic procurement (E-procurement together with its constructs, e-sourcing, e-tendering, e-ordering), and the concept of supply chain resilience. It also interrogates relevant theory on e-procurement, (including the relevant constructs: e-sourcing, e-tendering, e-ordering) and its impact on supply chain resilience. The review provided an analysis of earlier research on the subject, highlighting key findings, methodologies, and gaps in the existing research.

The exposure to global and local uncertainty and intermittent disruption to operations has led organisations across industries to continuously be looking for ways to enhance their supply chain effectiveness as well as resilience. This quest has given rise to wide spread adoption of E-procurement, the use of electronic platforms for procurement activities such as e-sourcing, e-tendering and e-ordering, as a promising solution to enhance supply chain resilience.

2.1 Theoretical Literature review

The theoretical framework for this study was based on the Technology Acceptance Theory, E-Technology Perspective Theory of Procurement and the E-Procurement Application Model. The Technology Acceptance Theory is credited for its popularity in understanding of the adoption of IT and innovation (Rotich, Benard & Waruguru 2015:47). The E-Technology Perspective Theory of Procurement on the other hand, views e-procurement as a broad range of business activities that facilitate the exchange of goods and services between buyers and suppliers through electronic means. It highlights the role of e-procurement in enabling increased efficiency, transparency, and

collaboration in the procurement process. These frameworks guide the implementation of e-procurement systems and processes.

a). Technology Acceptance Theory

Devis (1986), proposed the Technology Acceptance Theory, which postulates that the achievement of organisational effectiveness and performance, hinges upon the user's acceptance of change in the use of emerging technologies. The Technology Acceptance Model (TAM) suggests that the likelihood of adopting new technology depends on two factors: perceived usefulness and perceived ease of use, (Rotich et al. 2015:47). Perceived usefulness refers to the belief that the technology will improve one's performance, productivity, and efficiency. Perceived ease of use refers to the belief that the technology is easy to learn, use, control, and remember. TAM suggests that e-procurement, as an innovative strategy, requires continuous improvement to maintain user acceptance and usage.

The E-Technology Perspective Theory of Procurement.

Hammer & Champ(1993) and later on Carr(2004) and Yadev (2012), proposed the E-Technology Perspective Theory of Procurement (ETPT) which underscores the trans-formative potential of technology in procurement processes. However, it also acknowledges the challenges and risks associated with technology adoption, such as data security, system integration complexities, and resistance to change (Chopra et al., 2001).

The ETPT encompasses a broad range of business activities, including electronic sourcing, e-collaboration, and inventory management. It posits that e-procurement can enhance the efficiency and effectiveness of procurement processes by leveraging information and communication technologies (Min & Galle, 2003).

The theory asserts that e-procurement has evolved into a catalyst for end-to-end supply chain integration, enabling businesses to share pricing, availability, and performance data for optimal decision-making (Neef, 2001). However, Bartezzaghi and Ronchi (2005) argue that e-procurement adoption is still in its infancy and has not yet reached the level of e-sourcing and e-collaboration.

E-procurement systems are typically used to control the acquisition of low-importance goods and services. The adoption of e-procurement is distinguished by the division between direct and indirect procurement, with businesses typically using online systems for non-critical commodities (Min & Galle, 2003; Bartezzaghi & Ronchi, 2005).

Despite the potential benefits of e-procurement, the adoption of certain tools such as reverse auctions remain unpopular with sellers (Bartezzaghi & Ronchi, 2005). This highlights the need for strategic adaptation and significant organizational reform for successful transition to contemporary e-procurement practices.

b). The E-Procurement Application Model

The Massachusetts Institute of Technology (MIT) in the early 1990s proposed the first EPAM. The E-Procurement Application Model (EPAM) is a framework that describes the key components of an e-procurement system. The MIT EPAM is a three-tiered model that consists of a user interface, a business process layer, and a data layer. The EPAM was later developed by the Supply Chain Council in 2003, and has since become the de facto standard for e-procurement systems. It describes the key components of an e-procurement system and how they interact with each other. The E-Procurement Application Model (EPAM) views e-procurement as an online environment that unifies all of a business's purchasing requirements and connects them to its supply partners. The EPAM is based on the premise that e-procurement can be used to create a more efficient and effective procurement process by automating tasks, streamlining processes, and improving collaboration between buyers and suppliers. The use of technology in procurement processes has become increasingly prevalent in recent years. One popular technology solution in e-procurement is the use of e-design specifications and supplier performance evaluations (Biazzin et al., 2017). This technology solution allows for the entire procurement process to be conducted electronically, from the initial design of specifications to the evaluation of supplier performance. The following is a summary of the key components of the EPAM:

Business processes: The EPAM describes the core business processes that are involved in procurement, such as sourcing, supplier management, contract management, and order fulfillment.

Information systems: The EPAM also describes the information systems that are needed to support the procurement process. These systems include electronic catalogs, supplier portals, and e-purchasing systems.

Technology infrastructure: The EPAM also includes the technology infrastructure that is needed.

Benefits derived from EPAM

The EPAM offers a number of benefits to organizations, including:

Improved efficiency: The EPAM can help organizations to automate and streamline the procurement process, which can lead to significant efficiency gains.

Reduced costs: The EPAM can help organizations to reduce procurement costs by improving transparency and competition.

Increased transparency: The EPAM can help to increase transparency in the procurement process, which can reduce fraud and corruption.

Improved collaboration: The EPAM can help to improve collaboration between buyers and suppliers, which can lead to better outcomes for both parties.

Challenges of Implementing the E-Procurement Application Model

Despite the many benefits of the EPAM, there are also some challenges that organizations may face when implementing it. These challenges include:

Cost: The cost of implementing an e-procurement solution can be significant, especially for large organizations.

Complexity: E-procurement systems can be complex to implement and integrate with existing systems.

Change management: Implementing an e-procurement solution can require significant changes to the way that organizations do business. This can be a challenge for some organizations to overcome.

2.2 Empirical Literature Review

a). E-procurement.

E-procurement, defined as the utilization of electronic platforms for procurement activities, has garnered considerable attention in recent years due to its potential to bolster supply chain resilience. Corina (2011) conceptualizes e-procurement as a technology-driven approach to purchasing that amalgamates functional operations and purchase management, thereby yielding strategic benefits for organizations.

E-procurement can be employed to automate numerous manual tasks inherent in the procurement process, such as sourcing, bidding, and contract management (Shukla et al., 2016). This automation can assist organizations in reducing lead times, enhancing collaboration with suppliers, and augmenting visibility and transparency within their supply chains.

b). Supply Chain Resilience and Performance.

Supply Chain Resilience (SCR) is a complex concept that has been defined in a variety of ways. However, most definitions agree that SCR is the ability of a supply chain to withstand and recover from disruptions. Supply chain disruptions constitute a high risk for companies with a significant risk premium that can cause a costly corporate crisis (Furter, 2005:28). Disruptions can occur for a variety of reasons, such as natural disasters, political instability, and economic downturns. SCR is becoming increasingly important in today's globalized and interconnected world. E-procurement is the use of electronic technologies to support the procurement process. It has been shown to have a number of benefits for supply chains, including improved efficiency, transparency, and communication. These benefits are a measure of supply chain performance. Supply chain performance is defined as the various processes included within the company or organisation's supply chain function, (Srinivasan, Mukhejee & Gaur 2011).

Successful supply chain performance is marked by close co-operation and mutual decision making between companies and their suppliers and their trade relationships (Botta-Genoulaz, Campagne,

Llerena & Pellegrin (2010), George, Williams & Henthorne (2011). The success of a supply chain performance is reflected through cost savings, adaptability, variety and traceability. Consequently, supply chain performance is credited for the achievement of competitive advantage (Amaratunga & Baldry (2002); Das, Narasimhan & Talluri (2006); Chang et al. (2013).

Some researchers have linked e-procurement adoption and SCR to improved performance outcomes. For example, Lam, Wong, and Cheung (2017) conducted a study in the beverage industry and concluded that there is a positive relationship between e-procurement usage, SCR, and operational performance. This view is corroborated by a study by Panda and Iqbal (2020) which concluded that there is a significant association between e-procurement adoption, SCR, and financial performance indicators. Other studies that have found a positive relationship between e-procurement adoption and supply chain resilience and performance include a study by Srari and Lorentz (2019) which found that firms that invest in procurement digitalization tend to have more resilient supply chains. Likewise, Gunasekaran and Ngai (2015) found that e-procurement adoption can lead to improved supply chain performance through a number of mechanisms, including reduced costs, improved efficiency, and increased visibility.

Overall, evidence suggests that e-procurement adoption can be a valuable tool for businesses that are looking to improve their supply chain resilience and performance.

c). Organisational Performance.

Organizational performance is the ability of an organization to achieve its strategic goals (Corina, 2011). It is typically measured using a variety of metrics, such as financial performance, operational efficiency, and customer satisfaction. E-procurement, the use of electronic technologies to support the procurement process, is widely considered to have a significant positive impact on organizational performance in various ways.

One of the most significant benefits of e-procurement is its ability to improve efficiency (Rotich et al., 2015). E-procurement systems automate many of the manual tasks involved in the procurement process, such as requisitioning, bidding, and order placement (Shukla et al., 2016). This frees up procurement staff to focus on more strategic tasks, such as managing supplier relationships and developing procurement strategies.

In addition to improving efficiency, e-procurement can also help organizations to reduce costs. E-procurement systems facilitate price negotiation, mitigate fraud and errors, and streamline procurement processes. For large companies and corporations, these cost savings can be substantial.

d). Benefits of E-procurement to supply chain resilience

The benefits of e-procurement to supply chain resilience are well-documented in academic literature. For example, a study by Lam, Wong, and Cheung (2017) found that e-procurement usage is positively associated with supply chain resilience and operational performance. Similarly, a study by Panda and Iqbal (2020) found that e-procurement adoption has a significant impact on supply chain resilience and financial performance indicators.

One of the key ways in which e-procurement can improve supply chain resilience is by increasing visibility and transparency. This view is collaborated by Kacprzak and Saarinen (2016), who found that e-procurement improved supply chain visibility and trace-ability, thereby enabling companies to detect and respond to disruptions promptly. E-procurement systems can provide businesses with a real-time view of their supply chain, including inventory levels, supplier performance, and lead times. This information can be used to identify potential disruptions early on and to develop contingency plans. For example, if a business is experiencing delays from one supplier, it can use its e-procurement system to identify alternative suppliers or to negotiate new delivery terms.

Another key benefit of e-procurement is that it can improve collaboration and communication with suppliers. E-procurement systems can facilitate electronic communication between businesses and their suppliers, making it easier to share information and to coordinate activities. This can help to build stronger relationships and to create a more resilient supply chain. For example, a business can use its e-procurement system to share its production schedule with its suppliers, so that they can plan their production accordingly. This can help to reduce the risk of disruptions caused by stock outs or supply delays.

Finally, e-procurement can also help businesses to reduce their reliance on individual suppliers. This can be done by diversifying the supplier base and by using e-procurement systems to negotiate contracts with multiple suppliers. This can help to mitigate the risk of disruptions caused by

supplier failure. For example, if a business is reliant on a single supplier for a critical component, it can use its e-procurement system to identify alternative suppliers and to negotiate contracts with them. This can help to ensure that the business has a backup plan in case the original supplier fails.

e). The Role of E-Procurement in Enhancing Supply Chain Resilience

Available literature on the role of e-procurement in enhancing supply chain resilience is still relatively limited. However, the evidence suggests that e-procurement can have a positive impact. It is important to note that e-procurement is not a panacea for supply chain failures. It is therefore important for organizations to implement e-procurement carefully and to integrate it with other supply chain management initiatives.

A study by Zhang et al, (2018) found that e-procurement adoption positively impacted inventory management and supplier responsiveness, leading to improved supply chain resilience in the manufacturing sector. Similarly, Gupta and Saxena (2019) emphasized the role of e-procurement in reducing information asymmetry and enhancing transparency among supply chain partners, ultimately increasing supply chain resilience. Meng et al. (2019) found that e-procurement adoption had a significant positive impact on inventory management and supplier responsiveness, which in turn led to improved operational performance and supply chain resilience. Likewise, a study by Jabbour et al. (2021) found that e-procurement adoption was positively correlated with supply chain resilience performance in manufacturing firms. E-procurement can improve visibility and transparency into the supply chain. This allows businesses to identify potential disruptions early on and to develop contingency plans. For example, e-procurement systems can provide real-time information on inventory levels, supplier performance, and lead times. This information can be used to identify suppliers that are at risk of disruption and to develop alternative sourcing strategies (Srai & Lorentz, 2019).

E-procurement can also improve collaboration and communication with suppliers. This can help to build stronger relationships and to create a more resilient supply chain. For example, e-procurement systems can be used to share information with suppliers about production schedules,

demand forecasts, and inventory levels. This can help to ensure that suppliers are able to meet the needs of the organization, even in the event of disruptions (Gunasekaran & Ngai, 2015).

E-procurement can help organizations to reduce their reliance on individual suppliers. This can be done by diversifying the supplier base and by using e-procurement systems to negotiate contracts with multiple suppliers. This can help to mitigate the risk of disruptions caused by supplier failure (Rotich et al., 2015).

Some of the most important ways in which e-procurement can enhance supply chain resilience are:

a). Improved visibility and transparency: E-procurement systems can provide real-time information on inventory levels, supplier performance, and other key metrics. This information can help organizations to identify and respond to potential disruptions more quickly (Srai & Lorentz, 2019). For example, an organization can use its e-procurement system to monitor supplier performance and to identify suppliers that are at risk of disruption. This information can be used to develop contingency plans, such as sourcing from alternative suppliers or increasing inventory levels.

b) Enhanced collaboration and communication with suppliers: E-procurement systems can facilitate electronic communication and collaboration between organizations and their suppliers. This can help to build stronger relationships and to improve coordination within the supply chain (Gunasekaran & Ngai, 2015). For example, an organization can use its e-procurement system to share information with suppliers about production schedules, demand forecasts, and inventory levels. This information can help suppliers to plan their production accordingly and to reduce the risk of disruptions.

c). Reduced reliance on individual suppliers: E-procurement systems can help organizations to diversify their supplier base and to reduce their reliance on individual suppliers. This can help to mitigate the risk of disruptions caused by supplier failure (Shukla, Yadav, & Khan, 2016). For example, an organization can use its e-procurement system to identify and qualify alternative suppliers for critical components. This information can be used to develop contingency plans in case a supplier fails.

2.3 Research Gap

There is limited empirical evidence on the specific effects, challenges, and benefits of implementing e-procurement systems in this particular industry and geographical area. While e-procurement has been increasingly adopted in various sectors globally, its impact on supply chain resilience, particularly in the beverage companies in Harare, remains largely unexplored. There is a need for a comprehensive study that examines the potential advantages, hurdles, and implications of e-procurement implementation on enhancing the overall resilience of supply chains in the beverage industry in Harare. Understanding these research gaps is crucial in identifying practical strategies and recommendations to effectively leverage e-procurement in improving supply chain resilience within this specific context.

2.4 Conceptual Framework.

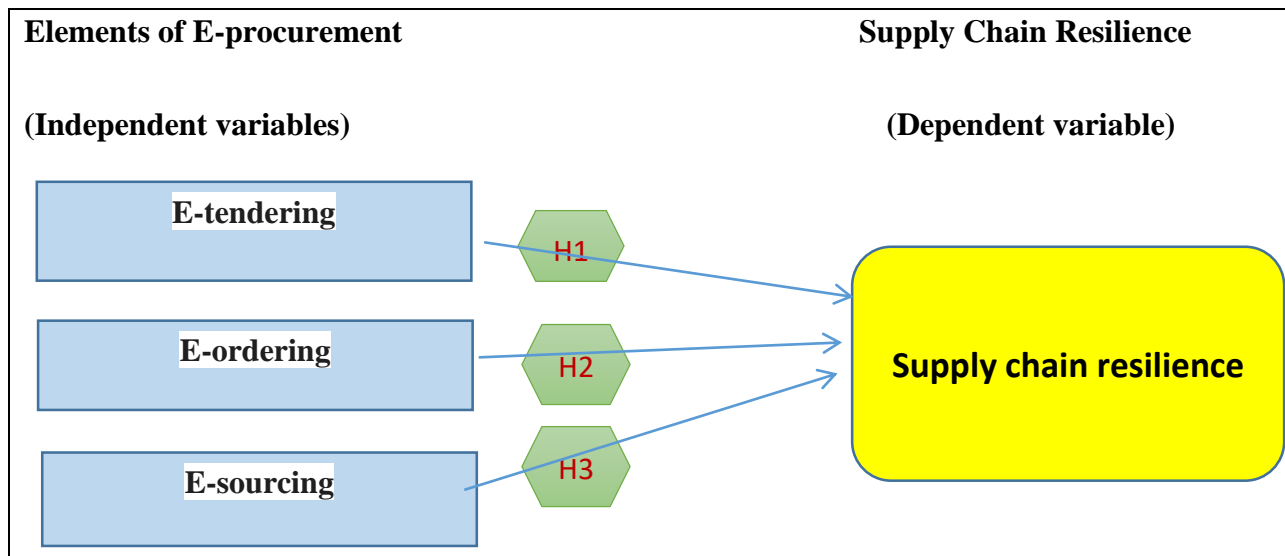


Fig 1.1: Conceptual framework, Researcher's own construct.

The diagram above, Figure 1.1, illustrates the relationship between **e-procurement as independent variable** and **supply chain resilience as dependent variable**. This highlights the proposed linkage between the constructs under investigation in this study.

A conceptual framework in academic writing is a conceptual model or structure that guides the researcher's understanding of the research problem and how it will be investigated. It is a theoretical explanation of the relationships between the key variables in the study, and it provides a road map for the research, (Cresswell & Clark, (2018); Leedy, P. D., & Ormrod, J. E. (2021). Conceptual frameworks can be developed based on existing theories, research findings, and the researcher's own knowledge and experience.

2.5 Chapter summary.

This literature review highlighted the theoretical foundation and empirical data that show the importance of e-procurement in enhancing supply chain resilience. Two concepts that were central to this investigation constituted the theoretical framework. These are the E-Technology Perspective Theory of procurement, and the Technology Adoption Model. A conceptual framework was created from the literature study to show the adoption of e-procurement-related aspects.

In the Methodology chapter that follows, the dissertation discusses data gathering techniques and research tools.

CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.0 Introduction

In the previous chapter, a review of the literature on e-procurement and supply chain resilience was provided. Key concepts for both variables were conceptualised, and a theoretical overview highlighted.

The purpose of this chapter is to provide an in-depth discussion of the research methodology used in this study. Research is a systematic process for investigating a topic, Kothari (2004). Researchers must be aware of the assumptions and criteria for selecting the most appropriate methodology and procedures for a given problem. This chapter identifies the approaches that were adopted and provides motivations for choosing them. The pre-testing of the research instrument and the pilot study was conducted. The statistical analysis and the ethical considerations followed in this study are discussed.

3.1 RESEARCH PHILOSOPHY

Research philosophy is a framework that guides how research should be conducted. It is based on beliefs and assumptions about the nature of reality, knowledge, and how we can know. According to Saunders and Thornhill (2007), research philosophy is the evolution of the research foundation, knowledge, and nature.

There are many different research philosophies, but some of the most common include:

- a) **Positivism:** The belief that reality is objective and can be understood through scientific methods.
- b). **Interpretivism:** The belief that reality is subjective and can be understood through interpretation of human experience.

c). **Pragmatism:** The belief that knowledge is best gained through practical action and problem-solving.

The choice of research philosophy should be based on the specific research question and the nature of the phenomenon being studied. For example, a **positivist approach** might be appropriate for a study that aims to test a causal relationship between two variables, while an **interpretivist approach** might be more appropriate for a study that aims to understand people's experiences of a particular phenomenon.

Research philosophy is an important consideration as it has a significant impact on the way that research is conducted and the findings that are produced.

3.1.1 Positivism

Positivism is a philosophical approach to research that assumes that reality is objective and can be understood through scientific methods. Positivist researchers believe that knowledge is gained through observation and measurement, and that research findings should can be generalised to other populations and contexts. Saunders (2003), argues that the researcher in the positivist philosophy assumes the function of an objective analyst who evaluates the data gathered and generates a suitable result in order to accomplish the goals and objectives of the research.

Positivism is often associated with quantitative research methods, such as surveys and experiments. However, positivist research can also use qualitative methods, such as interviews and focus groups, if the data is collected and analysed in a systematic and objective way.

Some of the key features of positivism in research include:

Objectivity: Positivist researchers strive to be objective in their research, meaning that they seek to minimize the influence of their own personal biases and values on their findings.

Measurement: Positivist researchers rely on measurement to collect data about the world. This data is then used to test hypotheses and develop theories.

Generalisation: Positivist research aims to develop findings that can be generalised to other populations and contexts. It strives to design studies that are representative of the larger population and that use methods that are reliable and valid.

Positivism has been a dominant paradigm in research for many years. However, it has also been criticized for its narrow view of knowledge and its focus on objectivity. In recent years, there has been a growing interest in alternative research philosophies, such as interpretivism and critical theory.

Despite its limitations, positivism remains an important and influential research philosophy. It is particularly well-suited for research that aims to test causal relationships between variables and to develop generalizable theories.

3.1.2 Interpretivism

Interpretivism is a research philosophy that emphasizes the importance of understanding the individual perspectives, beliefs, and experiences of human subjects in the external world. In contrast to positivism, which seeks to identify objective and universal laws of social behaviour, interpretivism views social reality as multiple and interpretable (Saunders et al., 2009).

Interpretivists argue that true knowledge is not attainable through any predetermined method or path, and that all meanings ascribed to social events or phenomena are acts of interpretation (Rubadeau, 2015). In practice, interpretivist researchers seek knowledge through social constructions related to human beings, such as language, communication, shared meanings, and consciousness (Rubadeau, 2015).

Interpretivism is a valuable research philosophy for understanding the complex and subjective nature of human experience. For example, interpretivist researchers have explored topics such as:

- The lived experiences of people with marginalized identities
- The social construction of gender and race
- The meaning of work and leisure

- The impact of new technologies on social relationships
- The ways in which people make sense of their lives

Interpretivism has also been used to study a wide range of social phenomena, including education, healthcare, organizations, and communities.

3.1.3 Realism

Realism is a research philosophy that assumes that reality is objective and exists independently of our perceptions and interpretations. Realist researchers believe that knowledge is gained through scientific inquiry, which involves collecting data, testing hypotheses, and developing theories about the world.

Realist research is often characterized by the following:

Objectivity: Realist researchers strive to be objective in their research, meaning that they seek to minimize the influence of their own personal biases and values on their findings.

Measurement: Realist researchers rely on measurement to collect data about the world. This data is then used to test hypotheses and develop theories.

Generalization: Realist researchers aim to develop findings that can be generalized to other populations and contexts. This means that they strive to design studies that are representative of the larger population and that use methods that are reliable and valid.

Realism is a powerful research philosophy that has been used to make significant advances in understanding of the world. However, some critics argue that realism is too simplistic and that it does not adequately account for the complexity of human experience Rorty, R. (1991). Others argue that realism is biased towards Western, scientific ways of knowing, Foucault, (1980). Despite these criticisms, realism remains an important and influential research philosophy.

3.1.4 Pragmatism

Pragmatism is a research philosophy that emphasizes the practical application of knowledge. Pragmatists believe that the best way to understand the world is to experiment with different methods and see what works best. They reject the idea that there is a single, best way to do research, and instead advocate for a pluralistic approach that integrates different philosophical stances and methodologies (Morgan, 2007).

In the context of social research, pragmatists argue that it is unrealistic to try to apply strict positivist or interpretivist principles. Instead, they favour a more flexible approach that allows researchers to use the methods that are most appropriate for the specific research question being asked.

One way that pragmatists integrate different worldviews into their research is through the use of mixed methods (Peters, 2012). Mixed methods research involves the collection and analysis of both quantitative and qualitative data. This approach can be particularly valuable for social research, as it allows researchers to gain a more comprehensive understanding of complex phenomena.

3.1.5 Justification for following Positivism

This study uses a positivist research philosophy to examine the impact of e-procurement on supply chain resilience. Positivism is an explanatory research philosophy that emphasizes the importance of testing theory-based hypotheses. Positivists believe that reality is objective and measurable, and that true knowledge can be obtained through scientific observation and measurement.

The authors chose to use a positivist approach because the data collection method is a self-administered questionnaire. This method is well-suited for positivist research because it allows the researchers to collect quantitative data in a systematic and objective way.

The author also considered the ontological, epistemological, and axiological dimensions of their research. Ontologically, the author assumes that reality is objective and exists independently of the researcher's mind. Epistemologically, the author believes that knowledge can be obtained through

scientific observation and measurement. The author is committed to conducting their research in an ethical and responsible manner.

3.2 Research Design

The research design is a plan for a research study that includes the following four key elements: strategy, conceptual framework, research questions, and data collection and analysis methods (Punch, 2005). The research design must specify the methods to be used, including how variables will be measured (Awang et al., 2012).

This study used a descriptive survey design. A survey is a method of collecting data from a sample of people about their characteristics, thoughts, and behaviors (Balnaves & Caputi, 2001). Descriptive survey studies are used to gather information from a sample of the population (Brink, 1996). The purpose of descriptive research is to accurately describe the relationships between variables or phenomena (du Plooy-Cillers et al., 2014). According to Neuman (2006) and Kumar (2011), the goals of a descriptive study are to: Systematically describe a situation or phenomenon; provide information about certain phenomena, such as the living conditions of a community and draw comparisons

A descriptive survey was chosen for this study because it is a more formal and controlled approach than phenomenology (Balnaves & Caputi, 2001; Robinson et al., 2006). Surveys have the advantage of allowing researchers to sample a large group of randomly selected people to measure their attitudes and behaviours at a relatively low cost in terms of time and money (Vanderstoep & Johnston, 2009). The research design used in this study requires that the research will test hypotheses and establish correlations between the independent variables, of the Beverages companies' E-sourcing, and E-tendering, E-ordering and E-payments systems and the dependent variable, which is supply chain resilience.

3.3 Research Approach

Of the following research methods, i.e. Quantitative Research Method, Qualitative Research Method and Mixed Research Method, the research design preferred the Quantitative Research

Method, in order to evaluate the impact of e-procurement on supply chain resilience in beverage companies in Harare.

3.4 Quantitative research

Quantitative research is a method of collecting and analyzing numerical data to test hypotheses and measure the findings objectively. The quantified outcomes are used to validate or reject alternative knowledge claims through theory testing (Harwell, 2011). The overall process of conducting quantitative research is similar to studies undertaken in natural science, with the goal of developing generalizable laws. In social studies, quantitative research uses pre-tested statistical models or techniques to analyze data and arrive at objective results.

3.4.1 Justification for Following the Quantitative Method

Quantitative research is a research method that collects and analyses numerical data to test hypotheses and measure the findings objectively. It is a well-established and widely used method in the field of business research, and it is particularly well-suited for studying the impact of e-procurement on supply chain resilience in beverage companies for the following reasons:

- a). Quantitative research allows for the collection of large data sets. This is important because the impact of e-procurement on supply chain resilience is likely to vary depending on a number of factors, such as the size and complexity of the beverage company, the type of products it produces, and its geographic reach. By collecting data from a large number of beverage companies, quantitative researchers can identify patterns and trends that would be difficult to discern from a smaller sample size.
- b). Quantitative research allows for the use of statistical methods. Statistical methods can be used to test hypotheses about the relationships between variables, such as the relationship between e-procurement and supply chain resilience. Quantitative researchers can also use statistical methods to control for other factors that may influence the relationship between these variables.

Quantitative research results are generalisable to other populations. This is important because the findings of a study of the impact of e-procurement on supply chain resilience in beverage companies can be applied to other beverage companies, and even to companies in other industries.

Overall, quantitative research is a well-suited method for studying the impact of e-procurement on supply chain resilience in beverage companies. It allows for the collection of large datasets, the use of statistical methods, and the generalisation of results to other populations.

3.5 Population

The population of this study comprised of selected Beverage manufacturing companies in Harare. According to ZimTrade and ZimStats, there are 10 beverage manufacturing companies in Harare. These companies produce a wide range of beverages, including beer, wine, soft drinks, and bottled water. The beverage manufacturing industry is an important contributor to the Zimbabwean economy. In 2022, the industry generated over Z\$1 billion in revenue and employed over 10,000 people. For purposes of this study, a census of all the beverage manufacturing companies was done since the population is small.

3.5.1 Sampling

Sample: A sample according to (Schiffman, 1996), is a small group of people or things that is taken from a larger group to represent the larger group.

Frame: A frame is a list of all the people or things in a population.

Sampling: Sampling is the process of selecting a sample from a population (Sudman & Blair, 1998). There are many different sampling methods, but some of the most common include random sampling, stratified sampling, and cluster sampling.

Sample size: The sample size is the number of people or things in a sample. The sample size should be large enough to be representative of the population, but not so large that it is too expensive or time-consuming to collect data from all of the sample members.

Raosoft sample size calculator and Krejcie and Morgan algorithm: These are two statistical tools that can be used to calculate the appropriate sample size for a study. The sample size calculator takes into account the population size, the desired margin of error, and the confidence level. The Krejcie and Morgan algorithm is a simpler method that can be used to calculate the sample size for a study with a limited budget and therefore for purposes of this study, the researcher preferred to use the Krejcie and Morgan algorithm.

This study focuses on 10 beverage manufacturing companies in Harare with the respective number of managerial workers who lead the supply chains as indicated below making up the total population from where this research derives the study sample.

Table 0.1: Targeted Population Group

Category (Stratum)	Average number and role for each company	Total beverage companies	Population size
General Manager	1	10	10
Distribution manager	3	10	30
Procurement Executive	3	10	30
Procurement Officers	10	10	10
Finance Executive	2	10	20
Accountant	2	10	20
Operations Manager	4	10	40
Warehouse & logistics officer	5	10	50
Total			270

3.5.2 Sampling size determination

For purposes of this study, the Krejcie and Morgan's Sample size determination table was used, resulting in a **Sample Size of 160** derived from a **population of 270** which according to the table below would ideally give a sample of **159**. This study thus used a sample of **160** as it is still a close fit according to the sample size determination.

Table 0.2: Krejcie and Morgan's Sample size determination

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

3.6 Research Instrument

The study used a structured questionnaire as the primary data source. Structured questionnaires are a robust methodological choice for data collection, enabling efficient and cost-effective collection of standardized quantitative data from a large and diverse sample. This enhances the reliability, generalisability, and statistical power of findings, covering a wide range of topics comprehensively (Bryman, 2012; Creswell, 2014).

While structured questionnaires may be less flexible and may not fully capture the complexity of participants' experiences (Joppe, 2004), these limitations can be mitigated through careful design, piloting, and data analysis. In this study, the use of a structured questionnaire disseminated via Google Forms, along with a thorough review of the literature and use of a variety of statistical techniques, ensured the accuracy and reliability of the findings.

The use of a structured questionnaire as the primary data source for this study has a number of methodological strengths. First, it allows for the collection of quantitative data in a standardized format, which facilitates data analysis and interpretation, as well as enhances the reliability and generalisability of the findings (Bryman, 2012; Creswell, 2014). Second, structured questionnaires can be used to collect data from a large number of participants efficiently and cost-effectively, which can improve the statistical power of the study and allow for the identification of subtle effects (Malhotra, 2010). Third, structured questionnaires can be used to collect data on a wide range of topics, making the study more comprehensive and informative (Dillman, 2011).

However, it is important to note that structured questionnaires also have some limitations. For example, they can be less flexible than open-ended questionnaires, and they may not be able to capture the full complexity of participants' experiences (Joppe, 2004). Additionally, structured questionnaires can be biased if they are not carefully designed and administered (Sudman & Bradburn, 1982).

Cognisant of the above, the researcher mitigated the limitations of structured questionnaires, by: developing the questionnaire based on a thorough literature review and piloted it with a small group of participants (Dillman, 2011); disseminating the questionnaire using Google Forms to collect data from a large and diverse sample of participants (Hair et al., 2019) and using a variety of statistical techniques to analyze the data, including descriptive statistics, inferential statistics, and exploratory factor analysis (Field, 2019).

This helped to ensure the validity and reliability of the findings.

3.7 Measurement Scale

The concept of a measuring scale is a way to quantify and measure a particular variable or concept. In the context of e-procurement and supply chain resilience, the Likert measuring scale could be used to measure the level of e-procurement adoption, the degree of supply chain resilience, or the impact of e-procurement on supply chain resilience.

One way to measure the impact of e-procurement on supply chain resilience in beverage companies in Harare would be to develop a measuring scale that incorporates the four variables of e-procurement: e-sourcing, e-ordering-tendering, and e-payments.

The measuring scale was developed using a variety of methods, such as developing a new measuring scale based on the specific needs of the study. The developed measuring scale was then used to collect data from beverage company employees in Harare, such as the finance manager, procurement manager, procurement officer, accountant, operation manager, distribution manager, and director.

The data collected from the measuring scale was then used to analyse the impact of e-procurement on supply chain resilience in beverage companies in Harare.

An example of a measuring scale that was used in this study to measure the impact of e-procurement on supply chain resilience in beverage companies in Harare, took into account the following beverage company employees as respondents: finance manager, procurement manager, procurement officer, accountant, operation manager, distribution manager, and director.

Instructions: Please rate the following items on a scale of 1 to 5, with 5 being the most strongly agreed and 1 being the most strongly disagreed.

E-Sourcing

1. Our company uses e-sourcing to source goods and services from suppliers.
2. E-sourcing has helped us to reduce the cost of goods and services.
3. E-sourcing has helped us to improve the quality of goods and services.
4. E-sourcing has helped us to reduce the lead time for sourcing goods and services.
5. E-sourcing has helped us to improve our supply chain visibility.

E-Ordering-Tendering

1. Our company uses e-ordering-tendering to place orders with suppliers.
2. E-ordering-tendering has helped us to streamline the ordering process.

3. E-ordering-tendering has helped us to reduce the risk of errors in orders.
4. E-ordering-tendering has helped us to improve communication with suppliers.
5. E-ordering-tendering has helped us to reduce the time it takes to place orders.

E-Payments

1. Our company uses e-payments to pay suppliers.
2. E-payments have helped us to reduce the risk of fraud in payments.
3. E-payments have helped us to improve the efficiency of payments.
4. E-payments have helped us to improve communication with suppliers.
5. E-payments have helped us to reduce the time it takes to pay suppliers.

Supply Chain Resilience

1. Our company is able to withstand disruptions to our supply chain.
2. Our company is able to recover quickly from disruptions to our supply chain.
3. Our company is able to adapt to changes in the market.
4. Our company is able to meet customer demand even in the face of disruptions to our supply chain.
5. Our company is able to maintain a competitive advantage even in the face of disruptions to our supply chain.

Data collected from the measuring scale was analysed using a variety of statistical methods, such as correlation analysis, regression analysis, and structural equation modelling. The results of the analysis was then used to draw conclusions about the impact of e-procurement on supply chain resilience in beverage companies in Harare.

3.8 Data Collection Procedure

This study used a questionnaire to collect data on demographics, e-procurement practices, and the impact of e-procurement on organizational performance. The questionnaire was distributed electronically to respondents.

3.9 Data Analysis

The data for this study was analysed using descriptive and inferential statistics. Descriptive statistics was used to analyse the respondents' biographical information and the composition of the sample. This was done by calculating frequencies and creating charts. Inferential statistics was used to test the hypotheses of the study.

The Statistical Package for Social Sciences (SPSS version 24.0) for Windows and the Analysis of Moment Structures (AMOS version 24.0) was used to analyse the data.

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) was conducted using the Analysis of Moment Structures (AMOS), version 24.0 to assess the psychometric properties of the measurement scales. Three parameters, namely reliability, validity, and model fit, were considered.

Reliability

Reliability measures the quality of the research instrument used, in this case, the research questionnaire. Reliability in this study was ascertained using Cronbach's Alpha Coefficient, the Average Variance Extracted (AVE), and Composite Reliability (CR). For the Cronbach's Alpha Coefficient and the CR, the recommended values should be greater than or equal to 0.70 for each scale. According to Fraering and Minor (2006:284), the minimum acceptable value for the AVE for each scale is 0.50. Accordingly, these thresholds were applied in this study.

Validity

Validity refers to the extent to which a research instrument measures what it is intended to measure. Validity in this study was assessed using convergent validity and discriminant validity. Convergent validity was assessed by examining the factor loadings of the items in each scale. The factor loadings should be significant and positive. Discriminant validity was assessed by examining the correlations between the different scales. The correlations should be low.

Model Fit

Model fit refers to the degree to which the data fits the hypothesized model. Model fit in this study was assessed using the following indices: Chi-square test of model fit; comparative Fit Index (CFI); Tucker-Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA)

The chi-square test of model fit is a significance test that assesses whether the model fits the data well. However, the chi-square test is sensitive to sample size, so other indices are also considered. The CFI and TLI are indices of comparative fit, which means that they compare the hypothesized model to a null model. The RMSEA is an absolute fit index, which means that it compares the hypothesized model to a perfect model.

The following values are considered to indicate a good model fit:

- a). Chi-square test of model fit: $p\text{-value} > 0.05$
- b). CFI and TLI: > 0.90
- c). RMSEA: < 0.08

Inferential Statistics

Once the measurement scales have been validated, inferential statistics was used to test the hypotheses of the study. The specific statistical tests that were used depended on the nature of the hypotheses. For example, if the hypothesis is that there is a relationship between two variables,

then a correlation test will be used. If the hypothesis is that there is a difference between two groups on a particular variable, then a t-test or ANOVA will be used.

3.10 Ethical Consideration

Due consideration of the following ethical issues was taken:

a). Consent: The researcher obtained informed consent from all participants in the study. This means that participants were fully informed about the purpose of the study, the risks and benefits involved, and their right to withdraw from the study at any time. All respondents signed a formal consent form before completing the questionnaire.

b). Confidentiality: The researchers kept all participant data confidential. This means that the researcher undertook to not share participant data with anyone without their permission.

c). Vulnerable populations: The researcher was particularly careful to protect vulnerable populations, such as employees of beverage companies. This means that researcher avoided asking participants sensitive questions that could cause them distress.

d). Impact on the beverage industry: The researcher considered the potential impact of their research on the beverage industry. All due care was taken not to publish findings that could harm the reputation of beverage companies or their employees.

3.11 Conclusion

The descriptive survey and quantitative research design is a well-suited method for investigating the impact of e-procurement on supply chain resilience for beverage companies in Zimbabwe. This is because this research method allows the researcher to:

a). collect data from a large sample of beverage companies, which is important for ensuring the generalisability of the findings;

b). collect data on a wide range of variables related to e-procurement and supply chain resilience, which is important for developing a comprehensive understanding of the relationship between these two variables and

c). to use quantitative statistical methods to analyse the data, which is important for identifying statistically significant patterns and relationships in the data.

The findings of this study will have important implications for beverage companies in Zimbabwe. By understanding the impact of e-procurement on supply chain resilience, beverage companies can make informed decisions about how to implement and use e-procurement to improve their supply chains and become more resilient to disruptions.

CHAPTER FOUR

DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.1 Introduction

In this chapter, the researcher has analysed and evaluated the data collected according to the research methodologies outlined in Chapter Three. Online responses were downloaded as an Excel document, imported into SPSS for analysis, and visually presented with bar charts, pie charts, and tables. Structural equation modeling was used to further analyze the data. The findings of this study will be discussed in detail later on.

4.2 Descriptive statistics

The following descriptive statistics give an initial analysis of the responses gathered. Further analysis will be shown through Inferential statistics that follow after.

4.2.1. Response rate

From a sample of 160 Google form questionnaires sent out, all 160 responses were received. This is an acceptable response rate as it represents 100% response rate. Google forms collated the responses which were submitted electronically.

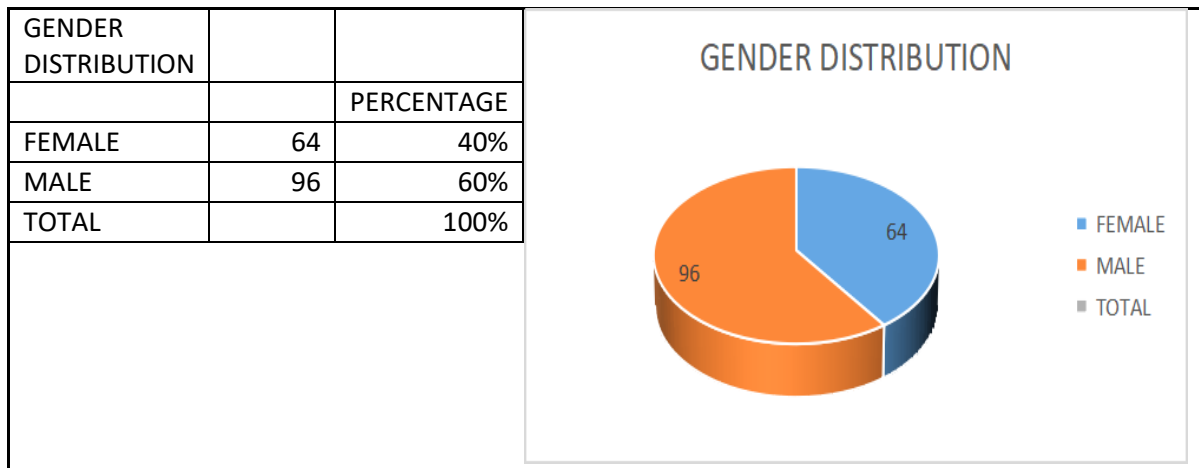
4.3 Demographics and Beverage Firms profile.

The researcher conducted a descriptive analysis incorporating the demographic information regarding the e-procurement managers and Beverage companies in Harare. A descriptive analysis of Section A, (demographics profile) is discussed in the subsequent section. The demographics profile consists of gender, age category, qualifications, and experience in the beverage manufacturing industry. The essence of a descriptive demographic was to enhance the researcher's understanding of profile of key personnel and the Beverage Companies. The main profile aspects gleaned from this section, are indicated by means of pie charts and bar graphs.

4.3.1 Gender

Figure 4.1 presents a graphical representation of the gender distribution of the sample. Males constitute 60.0 percent (n=96) and females constitute 40.0 percent (n=64) of the sample

Figure 4.1: Gender of respondents



The gender distribution of the respondents showed the research was skewed towards males (60%) and females (40%). This indicates that men dominate positions of responsibility in the Beverage industry. However, a representation of females at 40% of the sample is equally a significant enough number to influence decision making in procurement the Beverage Manufacturing industry.

4.3.2 Age of Respondents

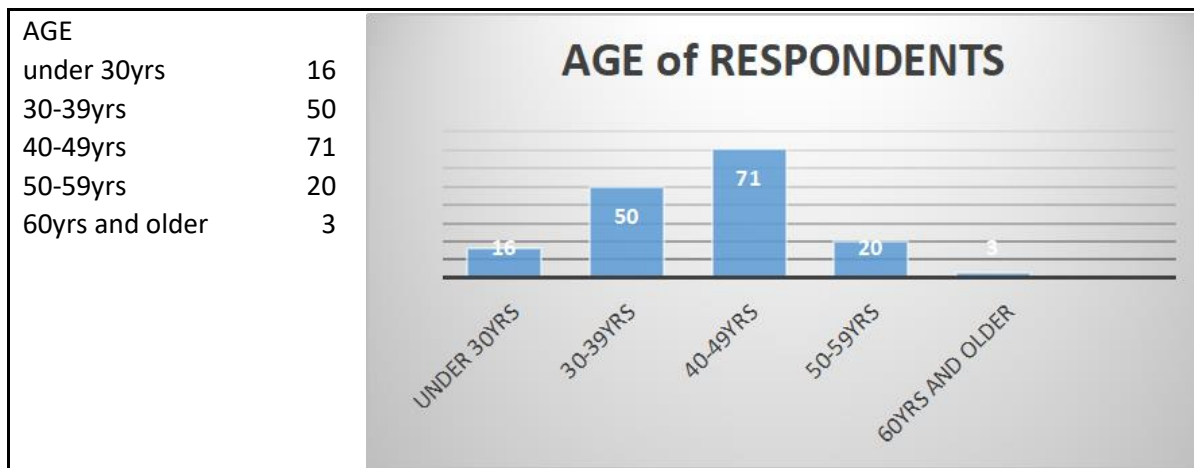


Figure 4.2: Age of respondents

Figure 4.2 shows that only 20 of the sample of 160 representing 14% of the sample are 50 years and above. The remainder of the sample, 121 (75.6%) are below 49 years old. Employees younger than 30 years (n=16) constitute 10% of the sample. An analysis of the distribution according to qualifications in the next section is instructive.

4.3.3 Qualifications

Figure 4.3 shows the distribution of respondents according to their level of education relevant to the study.

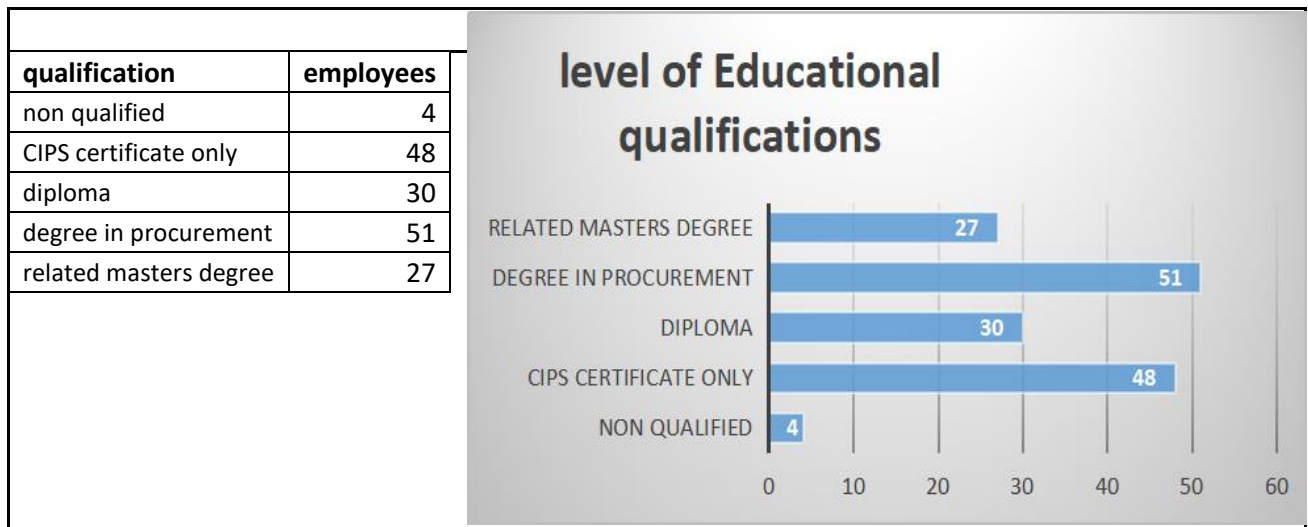
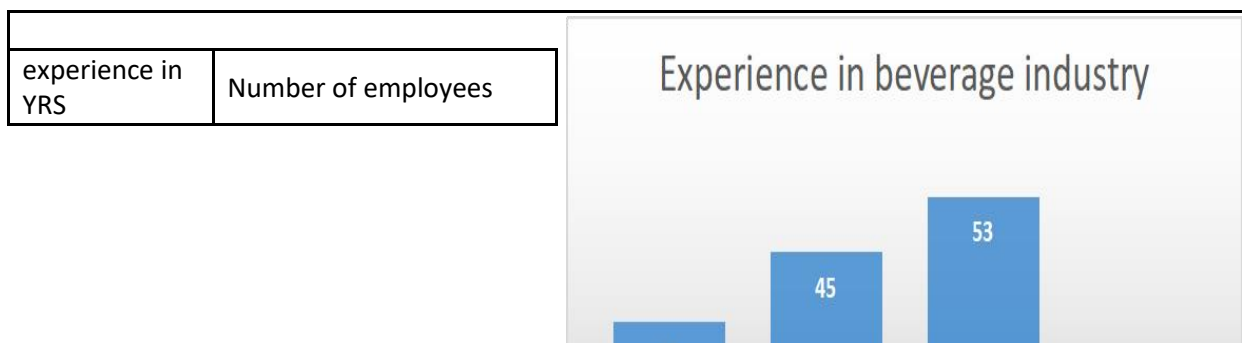


Figure 4.3 Level of Educational qualification.

Figure 4.3 shows the level of education of the respondents. The highest number of respondents, 31.6 percent (n=51) hold a degree in procurement closely followed by 30% (n=48) of respondents who hold a Chartered Institute of Purchasing and Supply Chain (CIPS) certificate. A total of 17% (n=27) respondents hold a related Master’s degree while 19 % (n=30) respondents have a Diploma qualification. On-qualified respondents constitute 2.5 % (n=4) of the total sample of 160.

The following subsection analyses the scope of experience that the respondents have in Beverage Industry supply chain.

Figure 4.4 Experience in Beverage Industry Supply chain



1-5yrs	35
5-10yrs	45
10-15yrs	53
15yrs and over	29

4.3.4 Experience in Beverage Industry

From the graphical presentation, there is a high number 33% (n=53) of respondents who fall within the experience range of 10-15 years. This is closely followed by the experience range of 5-10 years in which 28% (n=45) respondents fall in. There are 22 % (n= 35) respondents with 1-5 yearsexperience and 18% (n=29) respondents with 15 years and over of experience.

4.3.5 Indicate your role in the organization

The sample (160) for this study was made up of respondents most of whom were at senior levels, i.e., Executive Management 21.7% (n=34); Middle Management, 32.5% (n=52); Lower level Management, 29.2% (n=47) and Non Managerial 16.7% (n=27).

Significantly, 83% (n=133) of the (160) respondents were from the middle management to Executive management. Essentially, this comprises the decision makers of the Beverage Manufacturing Companies and thus their contribution to the survey material. Figure 4.5 below illustrates the respondents' roles in the Beverage Companies under study.

level in organisation	Frequency	percentage	cumulative%
Non-Managerial	27	16.70%	16.70%
Lower-Level management	47	29.20%	45.90%
Middle level Management	52	32.50%	78.40%
Executive management	34	21.70%	100%

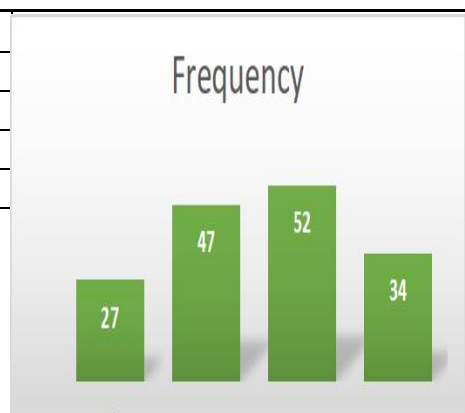


Figure 4.5 level in the organisation

4.4 Responses on E-procurement adoption and impact

4.4.1 E-procurement adoption

Respondents were asked five questions that intended to establish the extent to which Beverage companies use e-procurement in their procurement processes. On the question to whether each department shares same network platform for procurement, 42.5% and 31.7% responded in the affirmative, i.e., strongly agreed and agreed, respectively. 15.8% were neutral while 7.5% (n=12) disagreed and only 2.2% (n=4) strongly disagreed. Responses to the question whether departments within the company requests purchases from one specific department unit, 48.3% of the sample responded in the affirmative i.e. strongly agreed, while only 4.2% strongly disagreed. 1.7% marked neutral, and 9.2% disagreed. To the question seeking to establish if Beverage companies have set design that guided the purchase requirement, a high response of 45.8% (n=73) strongly agreed that there was, while 36.7% (n=59), agreed. Only 0.8% strongly disagreed while only 5.8% disagreed and only 5.0% remained neutral. Responses to the whether all procurement is done electronically elicited the following responses: 43.3% strongly agreed; 25.8% agreed; 17.5% strongly disagreed and 10.8% disagreed, while 2.5%, remained neutral.

The responses are shown in table 4.6 below:

E-PROCUREMENT		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
EP1	Each department within the company shares the same network platform for procurement requests.	2.2%	7.5%	15.8%	31.7%	42.5%
EP2	Each department within the company requests purchases from one specific department unit.	4.2%	9.2%	1.7%	36.7%	48.3%
EP3	There is a design of the purchase requirement.	0.8%	5.8%	5.0%	42.5%	45.8%
EP4	All our procurement is done electronically?	17.5%	10.8%	2.5%	25.8%	43.3%

Table 4.6 level of adoption of E-procurement

4.4.2 Impact of E-sourcing on the supply chain

Questions in this section sought to establish how e-sourcing practices in Beverage companies under study influenced the supply chain, particularly if e-sourcing had influence in enhancing supply chain resilience.

Responses elicited from the question on whether the respondents’ companies used e-sourcing to source goods and services, showed that 75% (n=120) of the respondents strongly agreed and 31.5% of the respondents agreed. Only 1% strongly disagreed as well as only 1.8% disagreed. There were 10.7% respondents who were neutral to the question.

Responses to question ES2 on whether e-sourcing has helped to reduce the cost of goods and services showed that the majority, 72.3% answered on the affirmative Just as the 43.2% who strongly agreed. Only 3.5% remained neutral while 1% disagreed and 0% strongly disagreed.

The claim on statement ES3 that E-sourcing has helped to improve the quality of goods and services elicited the following responses: 68.3%=strongly agree, 34.8% agree, 9.7% neutral, 1.3% disagree and 5.9% strongly disagree.

Question ES4 on E-sourcing has helped us to reduce the lead time for sourcing of goods and services, responses were skewed towards strongly agree, 70.3% and agree, 31.4%. Likewise the final question ES5 on E-sourcing has helped us to improve our supply chain efficiency, 66.9% strongly agreed while 31.6% agreed with 9.4%strongly disagreeing and 3.5% disagreeing.

Table 4.7 below, illustrates the responses.

E-SOURCING		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ES1	Our company uses e-sourcing to source goods and services from suppliers.	1	1.8	10.7	31.5	75.0
ES2	E-sourcing has helped us to reduce the cost of goods and services	0	1	3.5	43.2	72.3
ES3	E-sourcing has helped us to improve the quality of goods and services.	5.9	1.3	9.7	34.8	68.3
ES4	E-sourcing has helped us to reduce the lead time for sourcing goods and services	3	2	11	33.7	70.3
ES5	E-sourcing has helped us to improve our supply chain efficiency.	9.4	3.5	8.6	31.6	66.9

Table 4.7 responses on impact of e-sourcing on supply chain

4.4.3 Impact of E-tendering on the supply chain

This section presents responses to questions seeking to establish the impact of E-tendering on the supply chain. Responses to question ET1 on whether the company uses E-tendering to place orders with suppliers, 54.5% strongly agreed and 33.8% agreed. There was a 15% neutrality; 8.5% disagreement and 8.2% who strongly disagreed. On whether E-tendering helped to streamline the ordering process, 68.1% strongly agreed, while 40.2% agreed.10.7% were neutral and 1% agreed. There was no strongly disagreeing.

Response to the statement that E-tendering has helped to reduce the risk of errors in tender processing, 71.1% strongly agreed, while 26.7% agreed.15% were neutral; 1.3% disagreed and 5.9% strongly disagreed. On whether E-tendering has helped to improve communication with suppliers, responses show that 70.3 %(n= 112) strongly agreed that it has while 23.7%agreed. Neutral responses were 21%; 3% strongly disagreed while 2 %(n=3) disagreed.

Responses to question ET5 on whether E-tendering has helped to reduce the time it takes to place orders, 13%(n=21) strongly disagreed as opposed to 60.6%(n=97) who strongly agreed. 31.6 %(n=51) agreed as opposed to3.2 %(n=5) disagreed.11.6% were neutral.

The results are shown in Table 4.8 below:

E-TENDERING		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ET1	Our company uses E-tendering to place orders with suppliers.	8.2	8.5	15	33.8	54.5
ET2	E-tendering has helped us to streamline the ordering process.	0	1	10.7	40.2	68.1
ET3	E-tendering has helped us to reduce the risk of errors in tender processing.	5.9	1.3	15	26.7	71.1
ET4	E-tendering has helped us to improve communication with suppliers.	3	2	21	23.7	70.3
ET5	E-tendering has helped us to reduce the time it takes to place orders.	13	3.2	11.6	31.6	60.6

Table 4.8 responses on impact of e-tendering on supply chain

4.4.4 Impact of E-ordering on the supply chain

In this section of the questionnaire, respondents were asking questions to elicit responses on the impact of e-ordering on the supply chain and the following were responses as per figure 4.7 below: On question EO1, on whether the Beverage companies document past purchasing information in an electronic format, 43.3% (n= 69) strongly agreed and 30.15 agreed, as opposed to 18.4%(n=29) who strongly disagreed and 13.2% who agreed. 15% were neutral. Question EO2 on company having a supplier base and utilising it in the purchasing process, 63.1% strongly agreed and 20.2 % agreed. On the other hand, 21% strongly disagreed while 9% disagreed and 6.7% were neutral. Question EO3,-the evaluation of supplier performance is done using an online information system, got 71.1% responses strongly agreeing and 23,4% agreeing .On the other extreme, the same question saw only 3% strongly disagreeing and 14% disagreeing while 18% were neutral. The final question, EO3 on E-ordering reducing lead times for the companies and their suppliers, 59.4% strongly agreed while 31.2% agreed and 13%strongly disagreed; 5.3% disagreed and 11.1% were neutral. The remainder of the questions, EO4 and EO5 are highly skewed towards the affirmative with 71.1% strongly agreeing that the evaluation of supplier performance is done using an online information system, and 61.6% strongly agreeing that e-ordering has helped to reduces lead time for Beverage companies and their suppliers.

E-ORDERING		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
EO1	Our company documents past purchasing information in an electronic form.	18.4	13.2	15	30.1	43.3
EO2	Our company has a supplier database and utilises it in the purchasing process.	21	9	6.7	20.2	63.1
EO3	The evaluation of supplier performance is done using an online information system.	5.3	1.3	15	27.3	71.1

EO4	E-ordering has helped us to reduce the time it takes to place orders.	3	14	18	23.4	61.6
EO5	E-ordering reduces lead times for us and our suppliers	13	5.3	11.1	31.2	59.4

Table 4.9 responses on impact of e-ordering on supply chain

4.4.5 Impact on supply chain Resilience

This section sought to find out the benefits of e-procurement to beverage companies in Harare. Overall, response to the questions were skewed towards the affirmative with high percentage responses pointing towards agree to strongly agree on the Likert Scale: i.e. question SCR1 =60.5%; SCR2 =63.1% SCR3=77.6%; SCR4= 61.6% and SCR5=52.3%. Responses to all the questions showed low percentage of responses pointing towards strongly disagree: question SCR1=7.2%; SCR=15%; SCR3=5.1%; SCR4=3% and SCR5= 13%.

Table 4.10 below shows these responses to the questions.

SUPPLY CHAIN RESILIENCE		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
SCR1	Implementation of e-procurement led to cost savings?	7.2	13.2	9	30.1	60.5
SCR2	E-procurement improved supplier relationships?	15	9	2.7	30.2	63.1
SCR3	E-procurement improved supply chain coordination and collaboration	5.1	3	13	21.3	77.6
SCR4	E-procurement guarantees raw material availability during disruptions e.g. floods	3	14	18	23.4	61.6

SCR5	Not using E-procurement can disrupt our beverage supply capabilities	13	13.9	11.1	29.7	52.3
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Table 4.10 responses on impact of e-procurement on supply chain

4.5 Inferential statistics

The researcher used the SPSS software to conduct statistical analysis of the data that was presented. Reliability tests, correlation, hypothesis testing and structural equation modelling was all carried out using the tool.

4.5.1 Reliability and Validity Tests

Reliability and Validity of the data was assessed using Indicator reliability (Factor loadings), Cronbach's alpha, Average Variance Extracted (AVE), Composite Reliability (CR). Cronbach's alpha measures the degree to which the items in an instrument are related (Vanderstoep & Johnston 2009:63). For the Cronbach's alpha coefficient and the CR, the recommended values should be greater than or equal to 0.70 for each scale (Hair, Bush & Ortinau 2000:44; Babbie 2013:49). An alpha of 0.70 or higher is often considered satisfactory for most research purposes (Vogt 2007:115). Table 6.19 reveals that the Cronbach's alpha coefficients were between 0.71 and 0.89 for all the eight research latent variables. Thus, the Cronbach's alpha values for all the research variables used in this study were above the acceptable threshold value of 0.7 (Mujis 2011:131).

As shown in the table below, the data satisfied the minimum thresholds.

Indicator reliability: Reflective indicator loadings which are greater than 0.5 show that the item is a good measurement of a latent construct (see Hulland, 1999). Accordingly, all the indicator loadings were greater than 0.5 (see Table 4.9).

Internal consistency reliability: Composite reliability (CR) and Cronbach's alpha (α) can be used to assess internal consistency reliability. According to Gefen, Straub, and Boudreau (2000), a CR value of at least 0.7 indicates adequate internal consistency reliability. Hair *et al.* (2017) suggested

that Cronbach alpha (α) values of between 0.60 and 0.70 are widely considered desirable in research to indicate internal consistency reliability. As shown in Table 4.9 below all the constructs satisfied the threshold values for the Cronbach alpha and Composite Reliability.

Convergent reliability: Convergent reliability is the extent to which a measure correlates positively with alternative measures of the same construct (Hair *et al.*, 2017). Convergent reliability is assessed using the Average Variance Extracted (AVE). According to Chinomona and Pretorius (2011:179), “the average variance extracted estimate reflects the overall amount of variance in the indicators accounted for by the latent construct. The minimum acceptable value for the AVE for each scale is 0.50 (Fornell *et al.* 1981:39; Fraering & Minor 2006:284; Sarsted *et al.* 2014:109). The AVE should be greater than 0.5 (see Bagozzi, 1986; Hair *et al.*, 2016). The AVE for all the constructs in this study was greater than 0.5 (see Table 4.9 below) thus the measurement scales showed good convergent reliability.

Table 4.11 Reliability and Validity

			Factor Loading	Cronbach Alpha	Average Variance Extracted	Composite Reliability
E-Sourcing	ES1	Our company uses e-sourcing to source goods and services from suppliers.	0.76	0.916	0.69	0.92
	ES2	E-sourcing has helped us to reduce the cost of goods and services	0.75			
	ES3	E-sourcing has helped us to improve the quality of goods and services.	0.53			
	ES4	E-sourcing has helped us to reduce the lead time for sourcing goods and services	0.71			

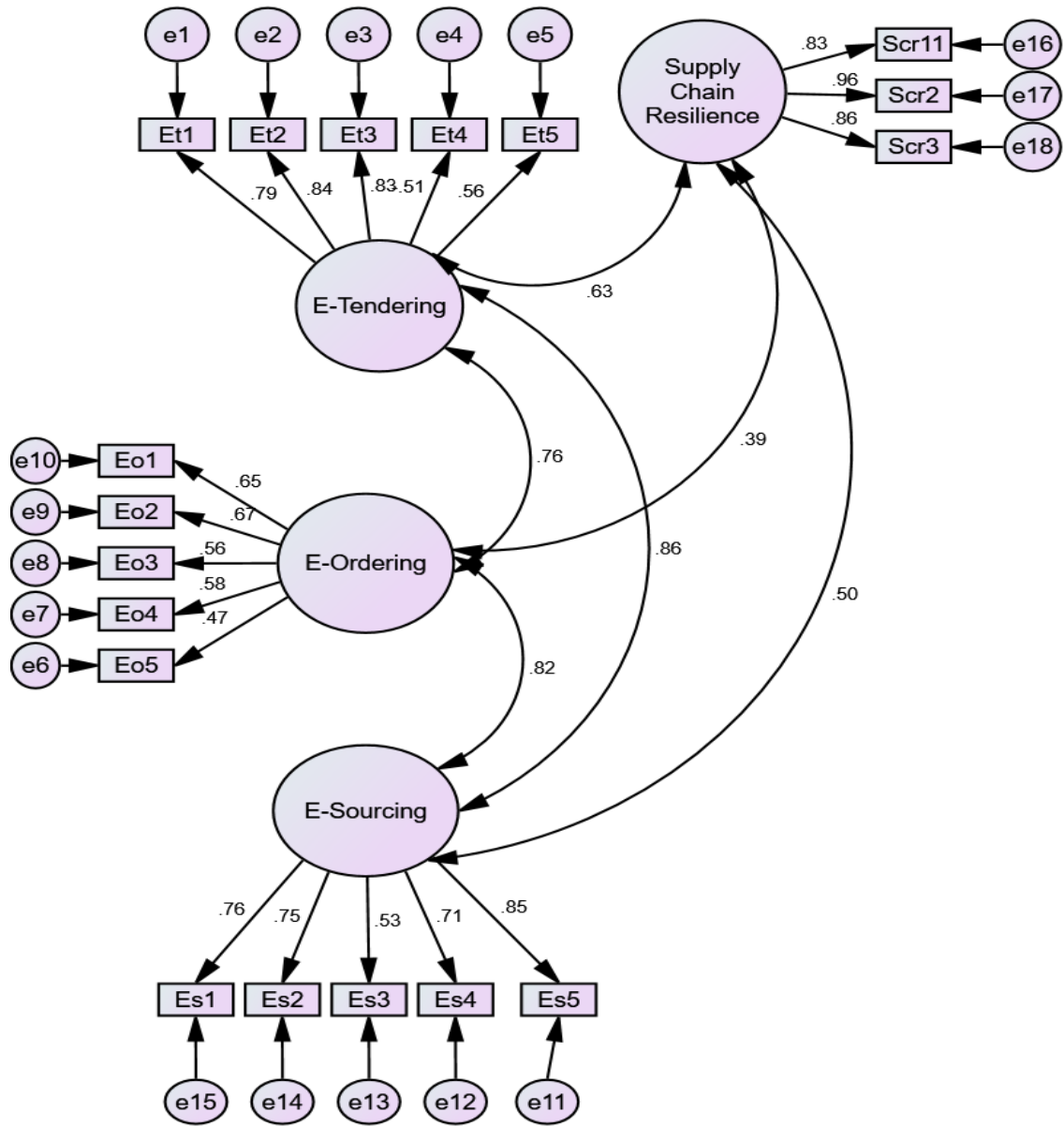
	ES5	E-sourcing has helped us to improve our supply chain efficiency.	0.85			
E-tendering	ET1	Our company uses E-tendering to place orders with suppliers.	0.79	0.862	0.57	0.86
	ET2	E-tendering has helped us to streamline the ordering process.	0.84			
	ET3	E-tendering has helped us to reduce the risk of errors in tender processing.	0.83			
	ET4	E-tendering has helped us to improve communication with suppliers.	0.51			
	ET5	E-tendering has helped us to reduce the time it takes to place orders.	0.56			
E-ordering	EO1	Our company documents past purchasing information in an electronic form.	0.65	0.860	0.56	0.87
	EO2	Our company has a supplier database and utilises it in the purchasing process.	0.67			
	EO3	The evaluation of supplier performance is done using an online information system.	0.56			
	EO4	E-ordering has helped us to reduce the time it takes to place orders.	0.58			
	EO5	E-ordering reduces lead times for us and our suppliers	0.47			
	SCR1	Implementation of e-procurement led to cost savings?				

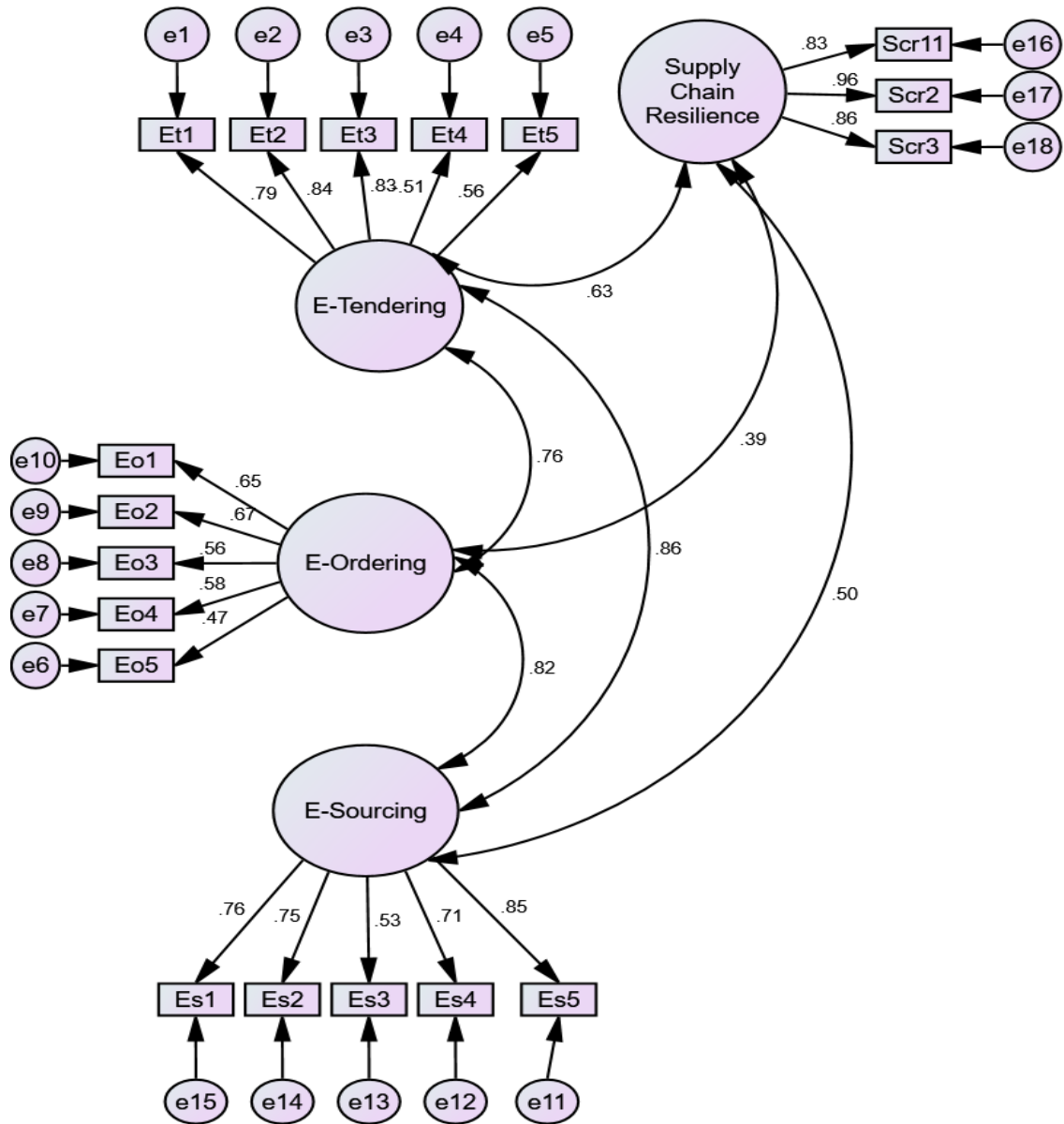
Supply Chain resilience			0.55	0.826	0.50	0.81
	SCR2	E-procurement improved supplier relationships?	0.56			
	SCR3	E-procurement improved supply chain coordination and collaboration	0.82			
	SCR4	E-procurement guarantees raw material availability during disruptions e.g. floods	0.59			
	SCR5	Not using E-procurement can disrupt our beverage supply capabilities	0.77			

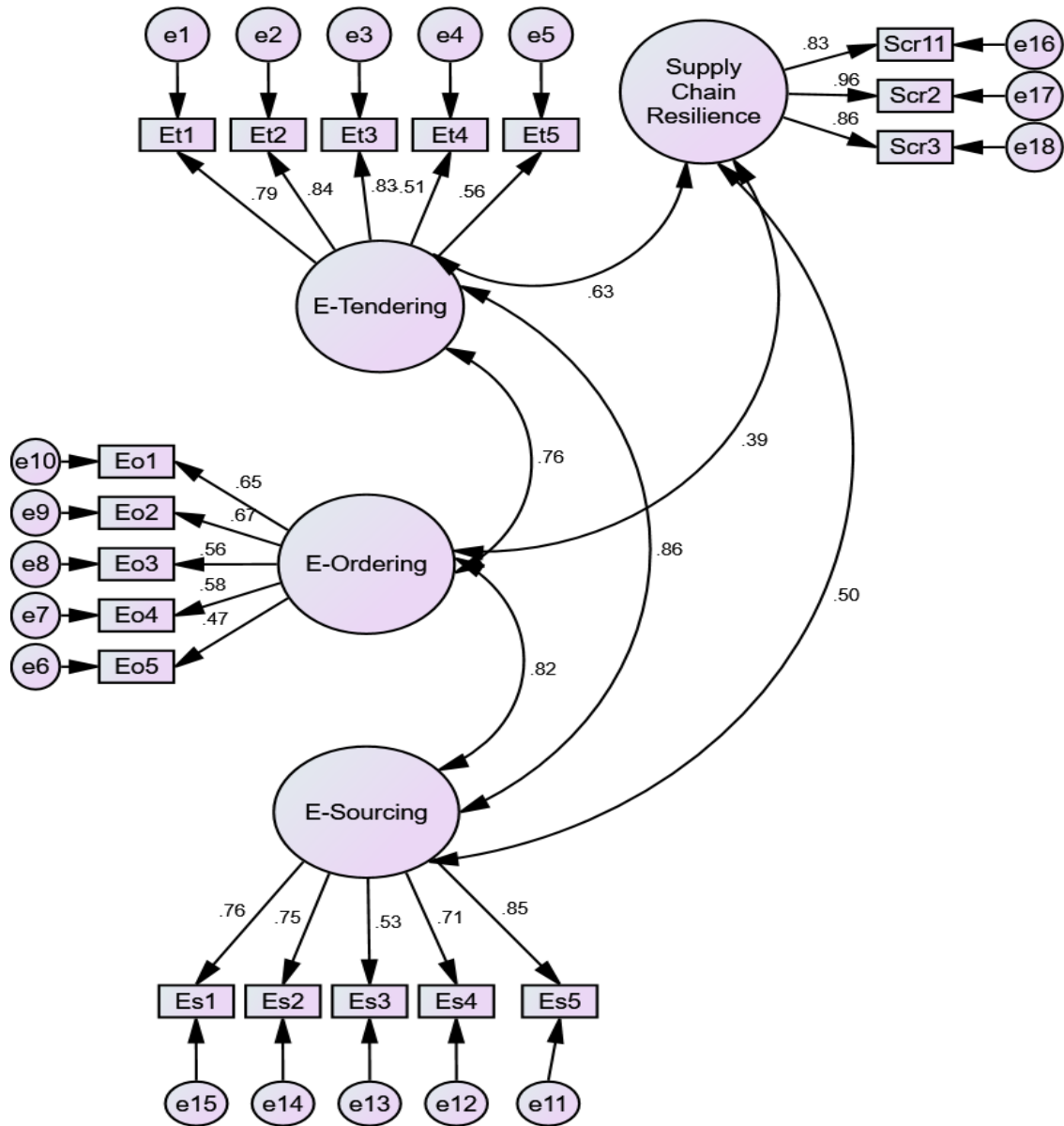
4.5.2 Confirmatory Factor Analysis

After running the confirmatory factor analysis for the model, the results indicated that the model was good because it fitted to the data. The model fit indices that were obtained from the confirmatory factor analysis are as follows: CMIN=1.8; p=0.000; IFI=0.924; RMSEA=0.080.

Figure 4.12 : Confirmatory Factor Analysis







4.5.3 Structured Equation Modelling

The researcher conducted structured equation modelling (SEM) to test the hypotheses of the study.

Table 4.13 below shows the outcome of SEM analysis

	Value	Recommended value
CMIN/DF	1.8	$1 < \text{CMIN/DF} < 3$
CFI	0.910	> 0.90
IFI	0.924	> 0.90
RMSEA	0.080	< 0.08

Table 4.13: Model summary and results

The results were within the recommended range of values. Hu and Bentler, (1999) stated that RMSEA ranges between 0.05 and 0.10 to be a fair fit. Hair et al (2010) recommended a CFI of >0.9 as a satisfactory fit. Bollen, (1989, cited by Glen, 2023) noted that an incremental fit index of 0.09 means a satisfactory.

4.5.4 Hypothesis Testing Results

The outcome of hypothesis testing using SPSS statistical software are shown in figure 4.12 and table 4.14 below

Figure 4.14 Hypothesis testing diagram

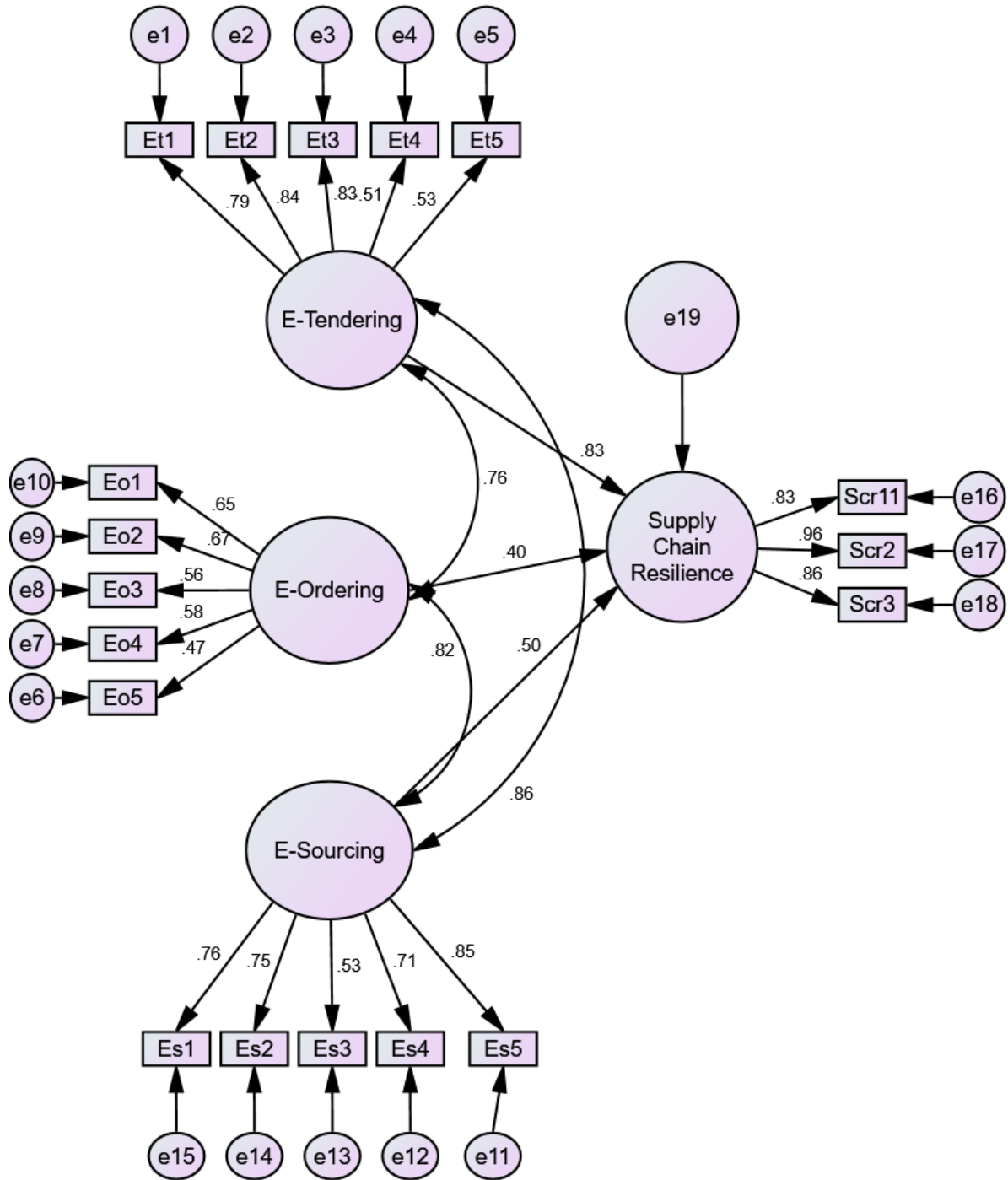


Table 4.15 Hypothesis Tests Results

Path	Result (β)	Probability value (p)	Decision
H1: E-Sourcing positively impacts supply chain resilience.	+0.50	+0.00	Accept
H2: E-tendering improves supply chain resilience	+0.83	+0.00	Accept
H3: E-ordering positively impacts supply chain resilience	+0.40	+0.00	Accept

4.6 Discussion of results

Hypothesis testing results illustrated in table 4.15 above show that E-sourcing positively impacts supply chain resilience (+0.50) and that E-tendering improves supply chain resilience (+0.83). Results also show that E-ordering positively impacts supply chain resilience (+0.40)

The principal finding of this study reveals that e-procurement,e-sourcing,e-tendering and e-ordering have a positive and significant impact on supply chain resilience.The results conclusively demonstrated the need for embracing e-procurement as tool to bolster beverage companies in the face of the ever rising challenges to supply chain resilience.The decision therefore, is to accept H1, H2 and H3.

4.7 Conclusion

In chapter four, the study's findings were analysed and presented. This included addressing all of the stated research hypotheses and providing demographic data about the 120 participants. The results were visualized through graphs, charts, frequency tables, and figures. The reliability of the

study was also assessed, using confirmatory factor analysis (CFA) to ensure the accuracy of the scales. Overall, the study maintained a high standard of validity and reliability.

Chapter five, the final chapter, will focus on evaluating the research objectives, drawing conclusions from the findings, and offering recommendations. It will also discuss the study's contribution, possible avenues for future research, and any limitations to be considered

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the research, conclusions, and the contributions of the research to the body of knowledge, organization, recommendations and areas for more research.

5.1.0 Summary of findings

The study sought to achieve the following objectives:

1. To assess the impact of e-sourcing on supply chain resilience.
2. To ascertain the impact of e-tendering on supply chain resilience.
3. To examine the effect of e-ordering on supply chain resilience.

5.2.0 Research conclusions

The research made the following conclusions about the research objectives:

5.2.1 E-Sourcing and Supply Chain Resilience.

This study concluded that E-Sourcing has a positive impact on supply chain resilience ($\beta = 0.50$, $p = 0.00$).

This result means that one-unit increase in the usage of E-Sourcing will result in Supply Chain Resilience increasing by 0.5%. Thus, the findings of this study suggest that majority of firms surveyed are employing E-Sourcing to improve their supply chain resilience. The findings of the study indicate that E-Sourcing has a positive and significant impact on Supply Chain Resilience ($\beta = 0.50$, $p = 0.00$). This suggests that organizations that adopt E-Sourcing practices are likely to experience a more resilient supply chain.

The study's findings are consistent with previous research (Dutta, D., & Ghosh, S. K. (2015); Handfield, R. B., & Nichols, E. L. (1999), that has shown that E-Sourcing can lead to a number of benefits for organizations, including increased transparency, improved communication, and reduced costs. These benefits can in turn help to improve supply chain resilience by making it easier for organizations to identify and respond to disruptions.

Therefore, hypothesis H1 is accepted.

5.2.2 E-Tendering and supply chain resilience.

This study concluded that E-Tendering positively impacts Supply Chain Resilience ($\beta = 0.83$, $p = 0.0$).

The findings of the study indicate that E-tendering has a strong and significant positive impact on Supply Chain Resilience ($\beta = 0.83$, $p = 0.00$). This suggests that organizations that adopt E-tendering practices are likely to experience a more resilient supply chain.

The study's findings are consistent with previous research, (Galloway (2003); Ahmed, F. N., & Ofori, G. (2018)), that has shown that E-tendering can lead to a number of benefits for organizations, including increased transparency, improved efficiency, and reduced costs. These benefits can in turn help to improve supply chain resilience by making it easier for organizations to identify and respond to disruptions.

Therefore, hypothesis H₂ was supported by the findings and results after applying the structural equation modelling and this has been accepted.

5.2.3 E-Ordering and Supply Chain Resilience.

The research results showed that there is a positive relationship between E-Ordering and Supply Chain Resilience ($\beta = 0.40$, $p = 0.00$).

This study investigated the impact of E-Ordering on Supply Chain Resilience. The findings of the study indicate that E-Ordering has a significant positive impact on Supply Chain Resilience ($\beta = 0.40$, $p = 0.00$). This suggests that organizations that adopt E-Ordering practices are likely to experience a more resilient supply chain.

The study's findings are consistent with previous research (Benton, W. C., & Jennings, T. L. (2005); Gunasekaran, et al (2012)) that has shown that E-Ordering can lead to a number of benefits for organizations, including increased transparency, improved efficiency, and reduced costs. These benefits can in turn help to improve supply chain resilience by making it easier for organizations to identify and respond to disruptions. E-Ordering can also help to improve supply chain resilience by:

- I. Reducing the time and effort required to place orders with suppliers
- II. Increasing the accuracy of orders
- III. Making it easier to track the status of orders
- IV. Providing a centralized repository of order information

These benefits can help to improve supply chain visibility, which is essential for identifying and responding to disruptions.

The hypothesis (H3) is therefore accepted.

5.3 Recommendations

5.3.1 E-Sourcing and supply chain resilience

The study's findings have a number of implications for organizations. First, organizations should consider adopting E-Sourcing practices as a way to improve their supply chain resilience. Second, organizations should focus on developing E-Sourcing strategies that are tailored to their specific needs and requirements. Third, organizations should invest in training and education for their employees to ensure that they are able to effectively use E-Sourcing tools and technologies.

Overall, the findings of this study suggest that E-Sourcing is a valuable tool for improving Supply Chain Resilience. Organizations that are able to effectively implement E-Sourcing practices are likely to be better prepared to deal with disruptions and maintain a competitive advantage in the global marketplace.

5.3.2 E-tendering and supply chain resilience

The study's findings have a number of implications for organizations. First, organizations should consider adopting E-tendering practices as a way to improve their supply chain resilience. Second, organizations should focus on developing E-tendering strategies that are tailored to their specific needs and requirements. Third, organizations should invest in training and education for their employees to ensure that they are able to effectively use E-tendering tools and technologies.

Overall, the findings of this study suggest that E-tendering is a valuable tool for improving Supply Chain Resilience. Organizations that are able to effectively implement E-tendering practices are likely to be better prepared to deal with disruptions and maintain a competitive advantage in the global marketplace.

5.3.3 E-ordering and supply chain resilience

The study's findings have a number of implications for organizations. First, organizations should consider adopting E-Ordering practices as a way to improve their supply chain resilience. Second, organizations should focus on developing E-Ordering strategies that are tailored to their specific needs and requirements. Third, organizations should invest in training and education for their employees to ensure that they are able to effectively use E-Ordering tools and technologies.

Overall, the findings of this study suggest that E-Ordering is a valuable tool for improving Supply Chain Resilience. Organizations that are able to effectively implement E-Ordering practices are likely to be better prepared to deal with disruptions and maintain a competitive advantage in the global marketplace.

5.4 Implications

5.4.1 Theoretical Implications

E-procurement, as evidenced through e-sourcing; e-ordering, and e-tendering is an important enabler of supply chain resilience. The study's findings support the theoretical notion that e-procurement as evidenced through e-ordering; e-sourcing and e-tendering can play a significant role in enhancing supply chain resilience. These digital technologies can help beverage manufacturing organizations to improve communication and collaboration among supply chain partners, increase supply chain visibility, and enable real-time decision-making.

Supply chain resilience is a multidimensional construct. The study's findings suggest that supply chain resilience is a complex and multifaceted construct. The study identified three key dimensions of supply chain resilience: adaptability, responsiveness, and recoverability. These dimensions are interrelated and need to be addressed simultaneously to achieve a resilient supply chain.

The impact of e-procurement, e-ordering, and e-tendering on supply chain resilience varies depending on the context. The study's findings suggest that the impact of e-procurement, e-ordering, and e-tendering on supply chain resilience can vary depending on the specific context of the organization. Factors such as industry, firm size, and organizational culture can influence the effectiveness of these digital technologies in enhancing supply chain resilience.

5.4.2 Managerial Implications

Organizations should adopt e-procurement, e-ordering, and e-tendering practices to improve their supply chain resilience. The study's findings provide strong evidence that e-procurement, e-ordering, and e-tendering can contribute to a more resilient supply chain for beverage companies in Harare. Organizations should consider implementing these digital technologies as part of their broader supply chain management strategies. Organizations should develop e-procurement, e-ordering, and e-tendering strategies that are tailored to their specific needs and requirements. There is no one-size-fits-all approach to implementing these technologies, and organizations need to consider their own unique circumstances when developing their strategies.

Organizations should develop a comprehensive supply chain resilience strategy. The study's findings suggest that organizations need to take a holistic approach to supply chain resilience. This involves identifying and assessing supply chain risks, developing mitigation strategies, and implementing continuous improvement initiatives.

Organizations should invest in training and education to support the adoption of e-procurement, e-ordering, and e-tendering practices. The study's findings suggest that organizations need to invest in training and education to ensure that their employees are able to effectively use e-procurement, e-ordering, and e-tendering technologies. This will help organizations to maximize the benefits of these technologies in enhancing supply chain resilience.

5.4.3 Methodological Implications

The study's findings provide support for the use of structural equation modelling (SEM) in supply chain resilience research. The study utilized SEM to analyse the relationships between e-procurement, e-ordering, e-tendering, and supply chain resilience. SEM is a powerful statistical technique that is well-suited for analysing complex causal relationships.

The study's findings highlight the importance of using a multidimensional measure of supply chain resilience. The study utilized a multidimensional measure of supply chain resilience that captures the various dimensions of this construct. This approach provides a more comprehensive understanding of the impact of e-procurement, e-ordering, and e-tendering on supply chain resilience.

5.5 Areas for Further Research

The study's findings suggest the need for further research on the impact of e-procurement: e-sourcing, e-ordering, and e-tendering on supply chain resilience in different contexts. The study focused on the context of a single industry, the beverage manufacturing companies. Further research is needed to investigate the impact of these digital technologies in other industries and across different firm sizes and organizational cultures.

5.6 Chapter summary

Chapter 5 discussed the research conclusions and recommendations from the research results. Contributions of the research were also discussed in three aspects namely managerial, methodological and theoretical. Areas for future research were suggested by the researcher.

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APPENDIX A

SURVEY QUESTIONNAIRE

Introduction and Participant Information

Introduction:

This study seeks to establish The Impact of electronic procurement (E-procurement) on Beverage companies in the Harare Metropolitan province. This research is purely for academic purposes only. Your responses will be treated in the strictest confidence and it is important that you answer as truthfully as possible.

Section A: Demographic Information

In this section we would like to find out a little more about yourself and the profile of your company. Please place a cross (x) in the appropriate block.

A0						
	Gender		(1) Male		(2) Female	
A21	Age	(1) Under 30 years	(2) 30-39 years	(3)40-49 years	(4)50-59 years	(5)60 years and above

A2	Level of education	Non-qualified	CIPS Certificate only	Diploma	Degree in Procurement	Related Master's Degree
A3	Work experience in beverage industry	1-5years	5-10years	10-15 years	15years and over	
A4	Your role in the company	Non-Managerial	Lower-Level Management	Middle Management	Executive Management	

SECTION B: E-procurement

We would like to find out a little more about your perceptions of E-procurement in your company. Please indicate the extent to which you agree or disagree by encircling the corresponding number between 1 (Strongly disagree) and 5 (Strongly agree)

E-PROCUREMENT		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
E-procurement						
EP1	Each department within the company shares the same network platform for procurement requests.	1	2	3	4	5
EP2	Each department within the company requests purchases from one specific department unit.	1	2	3	4	5

EP3	There is a design of the purchase requirement.	1	2	3	4	5
EP4	All our procurement is done electronically?	1	2	3	4	5
E-sourcing						
ES1	Our company uses e-sourcing to source goods and services from suppliers.	1	2	3	4	5
ES2	E-sourcing has helped us to reduce the cost of goods and services	1	2	3	4	5
ES3	E-sourcing has helped us to improve the quality of goods and services.	1	2	3	4	5
ES4	E-sourcing has helped us to reduce the lead time for sourcing goods and services	1	2	3	4	5
ES5	E-sourcing has helped us to improve our supply chain efficiency.	1	2	3	4	5
E-tendering						
ET1	Our company uses E-tendering to place orders with suppliers.	1	2	3	4	5
ET2	E-tendering has helped us to streamline the ordering process.	1	2	3	4	5
ET3	E-tendering has helped us to reduce the risk of errors in tender processing.	1	2	3	4	5
ET4	E-tendering has helped us to improve communication with suppliers.	1	2	3	4	5
ET5	E-tendering has helped us to reduce the time it takes to place orders.	1	2	3	4	5

E-ordering						
EO1	Our company documents past purchasing information in an electronic form.	1	2	3	4	5
EO2	Our company has a supplier database and utilises it in the purchasing process.	1	2	3	4	5
EO3	The evaluation of supplier performance is done using an online information system.	1	2	3	4	5
EO2	E-ordering has helped us to reduce the time it takes to place orders.	1	2	3	4	5
EO3	E-ordering reduces lead times for us and our suppliers	1	2	3	4	5
Supply chain resilience						
EBP1	Implementation of e-procurement led to cost savings?	1	2	3	4	5
EBP2	E-procurement improved supplier relationships?	1	2	3	4	5
EBP3	E-procurement improved supply chain coordination and collaboration	1	2	3	4	5
EBP4	E-procurement guarantees raw material availability during disruptions e.g. floods	1	2	3	4	5
EBP5	Not using E-procurement can disrupt our beverage supply capabilities	1	2	3	4	5

