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DEPARTMENT OF ECONOMICS

**TOPIC: THE EFFECTS OF INFORMATION, COMMUNICATION AND
TECHNOLOGY ON SUPPLY CHAIN MANAGEMENT
PERFORMANCE. THE CASE OF SHAMVA GOLD MINE**

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TITLE PAGE

**THE EFFECTS OF INFORMATION, COMMUNICATION AND TECHNOLOGY ON
SUPPLY CHAIN MANAGEMENT PERFORMANCE. A CASE STUDY OF SHAMVA
GOLD MINE**

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**A DISSERTATION IS BEING SUBMITTED IN PARTIAL FULFILMENT OF THE
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DEDICATION

This research work is dedicated to my parents and relatives who gave me their support during the course of the research, my friends Kuda and Dexter who have been there and gave me endless support in times of complications and my supervisor Mr Chikabwi who gave his help and time in coming up with the research .

I LOVE YOU ALL.

ABSTRACT

The effects of information, communication and technology on supply chain management. For decades, the need to improve Supply Chain Management across mining organizations in Zimbabwe has attract great attention of supply chain management practitioners themselves, academia and researchers. Despite the efforts to improve performances of the supply chain function, operations in most mining institutions Shamva mine included is still marred shoddy works, poor quality goods and services. A descriptive research design was used and a sample size of 80 employees was chosen. Questionnaire were used to collect primary data. The results obtained were computed and presented in forms of tables and figures. Findings revealed that the organization invests in staff development programs and suppliers have got positive attitude towards ICT on Supply chain performance. The challenges which are being faced are lack of system integration and high introduction costs. It is recommended that managers should try to integrate ICT on Supply chain performance on their daily operations, encouraging subordinates to make use of them within the organization.

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CHAPTER I

INTRODUCTION

1.0 Introduction

Information technology's effects on supply chain management is examined in the study. The background of the study, problem statement, research aims, and questions are the main topics of the study's first chapter. Furthermore, chapter conclusions, definition of key terms, limitations, delimitations, research importance and assumptions, as well as other related topics, were also examined.

1.1 Background of the study

Over electronic or internet-based solutions, manual supply chain management systems are preferred by 93 percent of governments worldwide (Teorell, 2017). Despite the inefficiencies of manual methods, most governments continue to favor manual supply chain management systems over automated ones, according to Lindblom (2001). Concerns about the applicability

of e-supply chain management in both the public and private sectors are then raised by the earlier assertions.

According to Lysons and Farrington (2006), the primary duty of the supply chain management department continues to be the purchase of goods and services, including raw materials, finished products, parts, and services, for use in subsequent processes or for personal use. In a company, purchasing is crucial since it makes sure that the necessary commodities are delivered to the customer. The supply chain management function has been categorized as one of the supply chain activities due to the growing global rivalry. It appears that during the last few years, supply chain management has started to play a bigger role in the firm's strategy (Van Weele, 2010).

In Zimbabwe, e-supply chain management was first implemented in the early 1970s. This was made more apparent by the 2005 deployment of the Integrated Results Based Management System (IRBMS). In order to properly inform the intention to deploy ICTs in the nation, the National Economic Consultative Forum (NECF) and the deployment of ICTs in mines in Zimbabwe in 2005 launched an e-readiness survey. The national ICT policy and e-strategy, which serve as a roadmap for a knowledge society, were ultimately based on this e-readiness survey (Mhlanga, 2006). The Ministry of Information Communication Technology was founded by the Zimbabwean government in 2009 after the foundation of the Inclusive Government with the goal of promoting the use of ICT.

1.2 Statement of Problem

For decades, the needs to improve Supply Chain Management across mining organizations in Zimbabwe has attracted great attention of supply chain management practitioners themselves, academia and researchers. Despite efforts to enhance supply chain function performances, operations in most mining institutions, Shamva Mine included, are nevertheless limited by inferior workmanship and substandard goods and services.

1.3 Objectives

The general objective of this study is to investigate the effects of ICT on Shamva Gold Mine SCM. Specifically, the study seeks to:

1. Determine the effects of ICT on planning, sourcing, demand or inventory production and Return of good at Shamva Gold Mine.
2. Examine the role of ICT at Shamva mine's SCM.
3. Determine challenges of adopting ICT at Shamva mine's SCM.

4. Suggest solution against challenges of adopting ICT at Shamva mine's SCM.

1.4 Research questions

1. What are effects of ICT on planning, sourcing, demand/ inventory production and Return of good at Shamva Gold Mine?
2. What is the role of ICT at Shamva mine's SCM?
3. What are challenges of adopting ICT at Shamva mine's SCM?
4. What solution against challenges of adopting ICT at Shamva mine's SCM?

1.5 Assumptions of the study

Key assumptions to this research are that:

- Respondents would give accurate information timely.
- Covid-19 lockdown restrictions would permit the researcher to collect data.
- The research environment remains constant.

1.6 Significance of the study

The research would be of significance to the following entities:

1.6.1 Shamva Gold Mine

The organization can utilize this study as a prototype to test out its strategies. It will expose covert ICT practices, their root causes, and offer solutions or suggestions on how to satisfy SCM requirements.

1.6.2 Bindura University of Science Education

The document would serve as a knowledge resource for a range of students doing supply chain and information technology research.

1.7.2 SCM Professionals

Professionals in SCM will use the research's conclusions and suggestions to get over the obstacles in the way of implementing ICT on SCM. Additionally, it will offer crucial data for making decisions.

1.7.3 Researcher

The study enhanced the researcher's abilities and understanding on how to handle supply chain management information system difficulties. Additionally, the study will fulfill a requirement for the Bachelor of Commerce Honors in Purchasing and Supply.

1.8 Delimitations

Only Shamva mines were included in the study, which was restricted to ICT's effects in SCM. The study was carried out at the Shamva headquarters.

1.9 Limitations

In fulfilling this research, the study faces the following limitations:

- The researcher had limited access to information at some certain level due to organizational policies on privacy and confidentiality. However, the researcher requested permission to access material in a letter to the human resources manager, assuring that it was only meant for research purpose only and the researcher was authorised to conduct the study.

1.10 Definition of key terms

- i. **ICT** is ‘the study, design, development, implementation, support or management of computer-based information systems, particularly software application and computer hardware (Frenzel, 2016).
- ii. **Supply chain management** is the part of business management function that handles locating, gaining access to, and managing the outside resources that an organization requires or might need to meet its strategic goals.

1.11 Chapter Summary

As it introduced the research topic, provided background information for the study to give the reader a quick understanding of the area to be studied, a statement of the problem, objectives of the study, research questions, and the significance of the study, the chapter laid the groundwork for the entire research to be clearly understood. The literature review chapter comes next.

CHAPTER II

LITERATURE REVIEW

2.0 Introduction

The last chapter introduced effects of information technology of supply chain management. This chapter focuses on theoretical and empirical literature review. The theoretical underpinnings related to this topic and previews studies carried by other scholars would be reviewed in this chapter. The also establish the conceptual frame work of analysis as well as the research gap.

2.1 Theoretical Literature

2.1.1 Technology Acceptance Model

Davis first put out the theory (1989). If potential users do not adopt and apply the growing supply chain information system, it will not result in increased organizational effectiveness. One of the best tools for measuring how efficiently practitioners and academics use computers is the technology acceptance model. Technology adoption is a function of a number of characteristics, including relative advantage and ease of use, according to the theory of diffusion of innovations, which is congruent with the technology acceptance model. The technology acceptance model addresses two beliefs, namely perceived usefulness and perceived ease of use. The degree to which a person anticipates that using something will be simple is referred to as perceived ease of use. The goal of the technology acceptance model is explanation, not prediction, to assist researchers and practitioners in determining why a certain situation would be unsatisfactory and taking the necessary action. When it comes to the mining industry, this theory is quite current and pertinent. The mining industry has been slow to adopt new technology.

2.1.2 Technology Diffusion Theory

Supply chain technology information system The common lens used by theorists to examine the development and adoption of new ideas is called diffusion theory. Diffusion is essentially the process through which an idea gets embraced and wins the support of community members. The adoption processes are collectively studied by the Diffusion theory, which is a complicated collection of sub-theories. According to Rogers (1995), this hypothesis contains four components, which are as follows: Innovation is defined as an idea, activity, or product that people or groups of people view as novel. Communication channels: ways for new ideas to

spread from one person to the next or from one group to another. The non-spatial time span during which a diffusion event occurs. The occasions include: Process of invention dissemination and the corresponding time it takes for a person or group to embrace an innovation and social system: a collection of connected elements that collaborate to solve problems in order to achieve the objectives. Supply chain information system The impact of the technological revolution on purchasing is evident; among the motivating factors for change in the purchasing function must be the desire to move away from paper-based transactions and toward a safe system that enables procure to pay as a goal of a world-class supply chain management, which is seen to improve the performance of the supply chain management function. The supply chain information system in order to go toward supply chain management that is of the highest caliber, the firm must follow the advice provided by the technology diffusion theory. When it comes to the mining industry, this theory is quite current and pertinent. Technology Diffusion Theory adoption has lagged in the mining industry. Based on several conditions, the researcher has identified a gap in his topic that needs to be filled. At Shamva Mine, it is still unclear to what extent e-supply chain management has been adopted in supply chain procedures and how it has affected organization performance.

2.1.2 Information system on supply chain Adoption and Use

To address today's operational challenges, managers can improve internal efficiency by improving service to customers, businesses and visitors, reducing costs and increasing productivity. We are moving to supply chain management. Executives implement a scalable communications infrastructure to drive economic development, attract new customers and businesses, and most importantly, provide superior service to consumers (Abouzeedan and Busler, 2002). In Zimbabwe, manual systems cause significant inefficiencies in functional regulation and operation. A supply chain information system must be in place for the supply chain management system to function properly. This includes not only computerization of systems, but also scaling of communication technologies. We need to extend the capabilities of Zimbabwe through globalization and internet connectivity. The old way to do business is for buyers to manage forecasts and submit requirements to suppliers by phone, fax, and email. Spreadsheets and manual reports are shared between trading partners.

These manual processes are slow and tedious. They can't support today's demand-driven enterprises. According to Thomson and Jackson (2007), supply chain management professionals spend a lot of time "putting out the fire" and dealing with everyday problems. They don't seem to find time to build strategic relationships with their suppliers and implement improved business processes that eliminate bottlenecks. Various aspects that impede supply

chain growth information systems in developing countries include infrastructure, business environment (financial, legal), social factors (poverty, illiteracy, degree of urbanization, etc.), educational factors, and culture. Environment.

Supply chain management of goods, operations and services using information systems within the supply chain is evolving globally with the potential to enable transformational processes, improve market access and promote completeness. Studies in other countries have shown that e-supply chain management is a precursor to the superior performance of supply chain management systems. For example, Kramer, Jenkins, and Katz (2009) promoted supply chain management for small businesses using the new business model by the Chilean government using electronic supply chain management, which has a positive effect on supply function. It is reported to have an impact. The chain management system had a special impact on the integration of online services into the system. Supply chain management can take many forms, from uploading selected information, such as bid notifications, to a website to a very comprehensive system that covers the entire supply chain management process. No matter how complex an electronic supply chain management system is, its use quickly opens up the possibility of making information public and widely available, thereby increasing transparency.

2.2 Information technology system and Performance

Through its integrated use in the many core and support operations of a company as well as with external business partners, information and communication technology can reach its full potential. Kearney (2004) asserts that information technology systems in supply chain management have a substantial impact on a company's success. The goal of e-supply chain management is to reduce the cost of acquisition while also assisting in the development of process efficiency and expenditure transparency. The effective execution of the supply chain management role is significantly aided by information technology systems. The interaction between e-supply chain management and supply chain management helps to improve the quality of services, but its absence or wrong use can serve as a barrier to change and may worsen the purchasing function.

2.3 Empirical Evidence

2.3.1 Implementation of e-supply chain management and its performance on organisations

In 2011, Damavandi (2011) did study on the use of e-supply chain management and its impact on shipment performance in Tehran. The study's goals were to comprehend how performance in ship management firms is impacted by e-supply chain management. Data were gathered using a qualitative research methodology. The study's conclusions, based on the data gathered, were

that employing electronic supply chain management systems helped Islamic Shipping Company cut expenses both directly and indirectly during the supply chain management process (IRISL). The outcomes demonstrate that overall e-supply chain management deployment improved performance at Islamic Republic Shipping Company. It was suggested that more research be done to determine the system's failure barriers or success elements in the event that efficiency was increased.

2.3.2 The effect of selected strategy variables on corporate performance

Awino (2013) looked into the impact of a few key strategy elements on a company's performance on an online platform for supply chain management. The study's main area of interest was supply chain management in Kenya's large private manufacturing companies. It was determined that other businesses within the supply chain that provide the necessary linkages towards the overall corporate performance of the manufacturing industry possess the majority of the e-supply chain management strategies used by significant manufacturing enterprises in Kenya. Since there hasn't been any extensive industry-specific study done, the majority of studies are actually broad.

2.3.3 Effects of Information and Communication Technology adoption on the supply chain management

E-supply chain management adoption has been supported as a new strategic vision of supply chain management (Lancioni, Schau and Smith, 2003). By applying e-supply chain management-enabled resources on supply chain management, the innovation of e-supply chain management in supply chain management systems can add value for businesses. The advantages of IT for supply chain performance have been the subject of earlier research.

2.3.4 Challenges of Information and Communication Technology in supply chain management

Saeed and Leith (2003) looked at how consumers perceived the risks associated with the adoption of e-supply chain management in supply chain management, and they came up with three dimensions: transaction risks (wrong products bought because of inaccurate or incomplete information); security risks (unauthorized access to trading platforms and failure to protect transaction-related data while being transmitted or stored); and privacy risks (inappropriate information). However, due to data theft, internet fraud, cyber vandalism, and malware and virus attacks, the rise of the internet has created significant hurdles for business (Huber et al 2004)

According to Beth et al. (2003), one obstacle to the adoption of e-supply chain management on supply chain management processes is a lack of employee competency. However, he affirms

that enterprise resource management systems perfectly give supply chain management and the management itself the chance to produce the reliable, consistent, and timely information required for achieving organizational goals. In his study, he finds that in order to effectively manage their operations, such as distribution chains and value addition within a company, supply chain management professionals must be skilled enough to use software tools.

These studies were carried out in several nations, including Kenya. The impact of information technology system advances on supply chain management optimization, however, has not been the subject of any research studies in Zimbabwe's mining industry. This gap in the literature will be filled by the researcher.

2.4 Chapter Summary

The theoretical and empirical literature on the study's topic were the main topics of this chapter. The chapter started off by going over some SCM and ICT theory. In order to fill the research gap, the chapter also evaluated earlier research on SCM and ICT. Research methodology will be the subject of the following chapter.

CHAPTER III

INTRODUCTION

3.0 Introduction

The literature review chapter came before this one. This chapter focuses on the methods and approaches the researcher utilized to carry out the investigation. The research study's design, the target demographic, and the sample strategies that were employed are just a few of the topics that are covered in this chapter. More specifically, this chapter also examines the research tools, data collection techniques, and methods for analyzing and presenting the results.

3.1 Research design

Simply said, a research design is the researcher's strategy for carrying out the study after examining the literature (Bogdan and Biklen, 2007). In an effort to meet the research's goals, the researcher decided on a descriptive survey methodology. This method was chosen because it handles issues like the distance between the researcher and the respondents' questionnaires. The design also makes it possible to generate data about respondents at the organization in context. The research's participants can also offer in-depth information.

3.1.1 Descriptive survey design

The descriptive research design addresses the relationships between variables. In management and business research, as stated in accordance with Vela et al. (2009), the description has a very defined place because the researcher is expected to go further and draw conclusions from the data being reported. According to Wilson (2013), surveys gather information at a specific moment to describe the nature of the conditions that are in place, set standards, and ascertain the relationships that exist between various variables and particular events. As a result, the researcher used a descriptive survey research design and a case study as a method.

3.2 Target population

Population refers to the entire case from which the necessary sample is drawn (Wilson, 2003). Population was defined by Vela et al. (2009) as a whole collection of components that were expressly chosen for an investigation based on research aims. All of the workers in the Shamva mine are the study's intended audience. The overall target population was 100 people, with 13 heads of departments (the general manager, his two assistants, also known as mine managers,

four functional managers, two shift managers, also known as foremen, and four supervisors) and 87 other staff members from the purchasing department, 10 departments of finance, operations, and engineering, 7 departments of human resources, 5 departments of public relations, and 50 general laborers.

3.3 Sample Size

Braun and Clarke, (2006) suggested that a representative sample size is the number of observation in a subset of the population under investigation. The researcher used Yamane equation to establish sample size. Below are Yamane equation;

The Yamane equation is
$$n = \frac{N}{1 + Ne^2}$$
 .

Where n = Sample size
N= Population size
e = Margin of error

Source: Yamane, (1967)

Since our target population to determine size is 100 and 5 % margin of error was recommended by Yamane, (1967) below will be the sample size.

Therefore, using the formula $N / (1 + Ne^2)$ the sample size equals $100 / [1 + 100 \times (0.05)^2] = 80$ participants.

Source: (primary data, 2022)

3.4 Sampling Techniques

Sampling is a subset of the population under investigation (Namey et al, 2005). There are 3 types of sampling which includes Census sample, probability and non-probability sampling.

Census Sample

If the sample size is the entire population, a census research is conducted. It is fair to include the complete population, which is typically utilized in extremely small communities. Because information is obtained on every person in the population, it is known as a census sample. The advantage of using this sample size is all characters will be collected in full and adequate data can be collected. It also increases confidence interval. However, the disadvantages are data collected might too large to process. It also limits other possible survey opportunities. It is costly would need many resources. It can be time consuming to convert the data into information. Census surveys tend to be longer than the typical survey, (Namey et al, 2005). An infinite

population makes it virtually impossible to evaluate. For example, if the government of Zimbabwe want to know how many people are in Zimbabwe they have to conduct a census.

Probability sampling

There is a known non-zero probability that each person in the population will be chosen. The likelihood increases with sample size, and vice versa. Stratified sampling, systematic sampling, and random sampling are all types of probability sampling techniques.

Random sampling

When a subset of a statistical population gives every person of the demographic an equal chance of being picked for surveys, polls, or research projects, this is known as simple random sampling. In order to offer a fair depiction of the entire group, information is gathered in this manner. The item must be destroyed in order to collect data on specific random variables. This often happens in quality control. For example, a quality control manager at a company might want to test the life span of fresh milk. This involves opening the packet of milk. Thus, a census is not appropriate under such data gathering (Braun and Clarke, 2006).

This sample has the advantages of being less expensive, making it simpler to create representative groups from the entire population, and requiring less expertise and knowledge to execute the task. Additionally, it gives every member of the population group an equal chance to be chosen. On the other hand, it can necessitate a sample size that is too large and is more dependent on the caliber of the researchers doing the study (Namey et al, 2005). Additionally, it does not guarantee that the data interpretations will be correct. Furthermore, it is unable to exclude deliberate bias from the data collection process.

Systematic sampling

Systematic sampling is a kind of probability sampling technique where sample participants are chosen from a broader population. By dividing the population size by the desired sample size, this interval, also known as the sampling interval, is computed. If every seventh individual is chosen from a group of 100 persons standing in a straight line, this is referred to as systematic sampling. While some authors contend that systematic sampling is distinct from random sample and is both easier and more direct than random sampling. According to Wilson (2019), systematic sampling is a random sampling technique that is popular among researchers due to its ease of use and periodic nature.

Additionally, it might make it easier to cover a large study region. Systematic random sampling is a fairly simple process that can be carried out manually. Additionally, the methodical sample collection process resembles an arithmetic progression. This methodology also has the benefit of avoiding the clustered selection phenomenon and having a low risk of data contamination. Systematic sampling has drawbacks such as an increased possibility of data manipulation and an over- or under-representation of specific patterns.

Stratified sampling

To create a test group using stratified random sampling, a population is first divided into subpopulations, and then random sampling or systematic sampling techniques are applied to each segment. For instance, sorting individuals by age range before selecting participants for testing systematically or at random. The advantage of stratified sampling is that it fairly represents the population under study. Additionally, a stratified sample can offer more accuracy than a simple random sample of the same size (Braun and Clarke, 2006). A stratified sample frequently just needs a smaller sample, which saves money, simply because it offers more precision.

An unrepresentative sample can be prevented with a stratified sample (e.g. a male sample from a mixed-gender population). It offers equal or higher precision than a simple random sample of the same size and has its own drop-backs of proportionate stratification. All survey measures experience increases in precision. Unfortunately, not every study can employ this research methodology (Creswell, 2007).

Cluster Random Sampling

Each cluster in the population has a profile that is comparable to every other cluster's. For sampling, clusters are chosen at random. To create a representative sample of the population, the sampling units within the randomly chosen clusters may also be randomly chosen (Namey et al, 2005). It is frequently employed in situations where there is a sizable population dispersed over a sizable geographic area. The cluster sampling method comes with a number of advantages which includes it is more feasible and requires fewer resources but it is prone to higher sampling error and biases.

Non-probability sampling

Researchers utilize non-probability sampling approaches, in which individuals are chosen consciously, conveniently, or arbitrarily, when using probability sampling is impracticable or impractical. Cases are chosen for non-probability sampling based on availability and

interviewer discretion (Flick, 2016). In exploratory research, non-probability samples might be helpful to get a first idea of the properties of a random variable being studied. Convenience sampling, quota control sampling, snowball sampling, and judgemental sampling are all examples of non-probability sampling.

Convenience sampling

Careless, unorganized, accidental, or opportunistic sampling are some names for convenience sampling. The sample is chosen based on a sample drawn for the researcher's convenience (Flick, 2016). For instance, choosing employees from a single company to speak with may be more convenient than choosing employees from a variety of companies. The researcher chooses certain units that are convenient for him. The choice of products needs to be made without prior forethought. Convenience sampling makes ensuring that the units are accessible and that the source list is readily available. A high number of samples are from convenient sampling, which is not scientific (Creswell, 2007).

Quota sampling

Purposive sampling and stratified sampling are combined in quota sampling. A certain number of observations are taken from each segment of the population, which is separated into groups. According on one or more parameters, each field worker is given a certain number of units to include in the shipment. The field worker may be given instructions to contact every fourth house and interview one individual until the quota is met in order to boost the representativeness of a quota sample (Flick, 2016). The convenience of carrying out sampling studies is guaranteed by quota sampling. It is also less expensive, quicker, and does not require a lot of time to gather data using this method. In the meantime, quota sampling has drawbacks such as bias in the selection of sample units and the need for multiple investigators. No two people can possess equal competence. Therefore, the conclusions drawn from the study may not be consistent.

Judgement or Purposive Sampling

One of the non-probability sampling techniques, according to Creswell (2007), is judgment sampling. By choosing a group from the population based on the facts at hand, judgement sampling is done. It is utilized when you require the opinions or evaluation of individuals having extensive understanding of the subject field. In this context, expert sampling is a straightforward subtype of purposive sampling. Its benefits include saving money and time on sample preparation, but estimates are subject to uncontrolled variability and bias (Flick, 2016).

Snowball Sampling

Participants in snowball sampling research refer the researcher to other study participants. Cold calling or referral sampling are other names for snowball sampling. Typically, it is hard to calculate the sampling error or draw conclusions about populations from the acquired sample (Braun and Clarke, 2006). When participants may be difficult to locate, this strategy is especially helpful. For instance, a research on active heroin addicts or prostitutes. The sample size would be reduced if the referral is unable to bring in another responder. The researchers utilized their own discretion to select volunteers rather than using probability, as would be the case with, say, simple random sampling. It makes it possible to conduct studies in situations where doing so might otherwise be impossible due to a shortage of volunteers. You might learn things about a population that you didn't know it had by snowball sampling.

Sampling used

In conclusion the researcher used purposive sampling because the study is specialised, not everybody would provide valued information on SCM if given equal opportunity to be chosen.

3.5 Data Collection Procedures

3.5.1 Data Validity and Reliability

Possibly the most crucial factor in determining a test's quality is validity. Whether or not a test measures what it purports to measure is referred to as validity. Items on a test with high validity are closely related to the test's intended topic. To find out how the sample's two participants felt about responding to the questions, a pilot interview was conducted with them.

The degree to which results are constant throughout time is what is meant by reliability, according to Joppe, cited in Golafshani (2015). According to Sanderson and Thornhill (2000), qualitative research needs to be credible and reliable. The four requirements for trustworthiness in social research—credibility, transferability, dependability, and conformability—must be met by the researcher. Another indication of reliability is how consistent a person's responses are over time. The tool that was employed was accurate and suitable for the research that was being investigated. By encouraging and making sure the informants were at ease and free to answer all of the questions without fear or intimidation, the researcher was able to acquire validity and reliability. In addition, the questions were clarified and made easier to understand. The researcher gave the respondents adequate time to respond by approaching them at the right time when they weren't rushing. In addition, important informants were targeted for interviews since they are the ones who are most directly impacted by the research problem.

3.6 Data sources

3.6.1 Primary data source

By distributing questionnaires and conducting interviews with respondents in the Shamva mine, the researcher was able to collect primary data. As opposed to secondary data gathering, which uses second-hand information, primary data collecting allows the researcher to start with in-depth knowledge. Furthermore, since they provide a thorough understanding of the researcher's study, data taken straight from the primary source should be trusted (Moorehead and Griffin, 2002).

3.6.2 Secondary data source

Simply said, secondary data is information that has been obtained in advance and with a specific goal in mind. In other words, according to Van Weele (2010), secondary data is historical in character because it has already been obtained especially for a certain project and is always available when needed. The researcher also used secondary data from academic textbooks, online publications, journals, and Shamva mining business records in addition to the main material. Saving money and time on research is made possible by using secondary data to obtain information.

3.7 Data collection Instruments

3.7.1 Questionnaires

A list of questions addressing the goals and hypothesis of a research project is known as a questionnaire (Saunders et al, 2007). According to Best and Khan (2006), a questionnaire reformulates a collection of questions to which participants in a study are asked to provide their answers. To provide a thorough and comprehensive data collection, the questionnaires utilized in this study included both open-ended and closed-ended items. In order to collect respondents' personal information and information about the company in relation to the study, a set of questions was constructed in ascending order and divided into two portions. These were sent by email to 80 participants, in accordance with the sample size, in accordance with Covid 19 rules.

3.7.2 Interviews

In conjunction with questionnaires, the researcher also conducted interviews. Due to Covid-19, the interviews were done through skype video call. The researcher was helped by speaking with the respondents to gain greater clarity on other topics addressed in the questionnaire. The researcher interviewed the general manager, his 2 deputies also called mines managers, 4 functional managers, 2 shift managers also called foreman and 4 supervisors.

3.8 Data validity

The questionnaire was pre-tested in order to identify places that needed modifications so that the participants would not experience any issues, ensuring that the data collected is valuable. Additionally, the researcher carefully chosen the participants, ensuring that their comments were insightful and provided valuable data. Members of the buying department, engineering and flight operations, human resources, finance, and the information technology department were among the responders to this study. Since they used the e-supply chain management software on a regular basis, these members also included the supervisors of these functions, who could provide knowledgeable information about it.

More specifically, the researcher gathered pertinent data for the literature review from certified researchers as well as from SAP online modules and publications in order to strengthen and empower the validity of the data in this study.

3.9 Presentation of data and analysis procedures

According to Lapin (1988), the process of presentation and analysis of data involves clearing, examining, coding, organizing, and interpreting data before it is displayed in the form of graphs, tables, and other representations. To present data, the researcher employed tables, pie charts, and graphs. The results of the interviews conducted and the questionnaires provided to the respondents served as the basis for the data presented and the analysis.

3.10 Summary

This chapter provided a thorough explanation of the research study's methodology. This included a description of the research design, the population that was to be studied, the sample size, and the methods used for sampling. This chapter also described the tools used for gathering data, the methods utilized to get it, the validity and dependability of the data, and how the data was to be evaluated and presented. As a result, the chapter that follows examines data presentation, analysis, and interpretation.

CHAPTER IV

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

This chapter presents data in the form of tables, pie charts. After presentation the data is analysed to give light on the studied area. The results are also interpreted and discussed by comparing them with available literature.

4.1 Response Rate

The response rate for this study was as follows

Table 4. 1: Response Rate

Research Instrument	Distributed	Response	Rate
Questionnaire	80	50	62.5%
Interviews	13	10	76.9%

Source: Primary Data, (2022)

The above table 4.1 shows response rate which was 62.5% and 76.9% for questionnaire and interviews respectively. Some of the people which were interviewed also participated in questionnaire. According to Gay (1995) 50% response rate is acceptable and therefore the response found in this study was sufficient to proceed data analysis and interpretation.

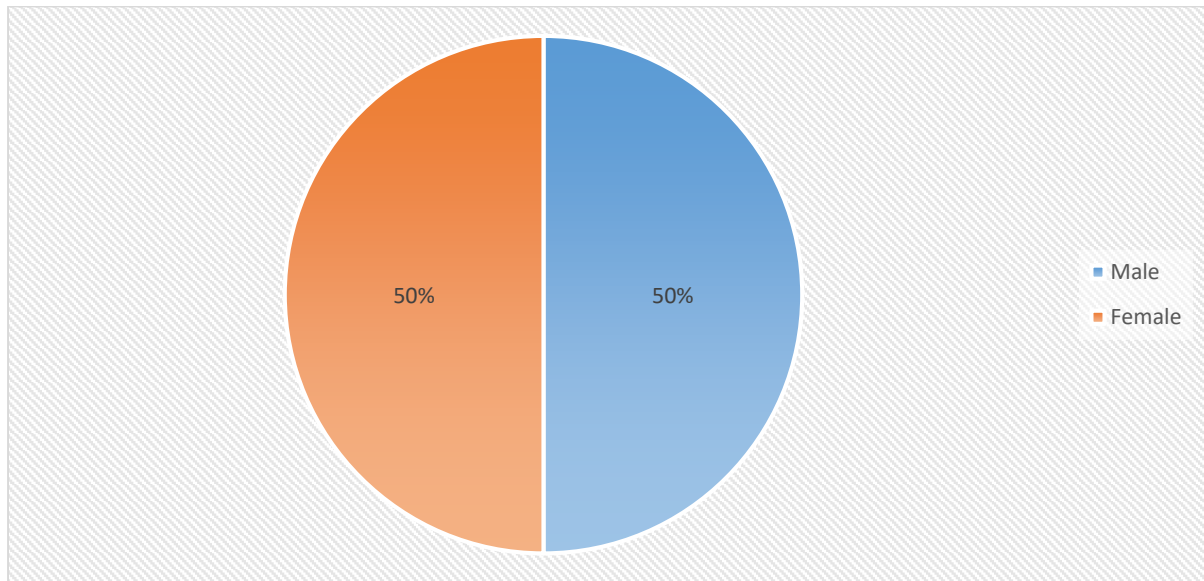
4.2 Demographic Information

This part illustrates personal information about respondents. The objective of this section is clarify is the right respondents were used to collected data.

4.2.1 Respondents' Gender

The respondents were asked to give their gender identity and data was collected as below;

Figure 4. 1: Gender

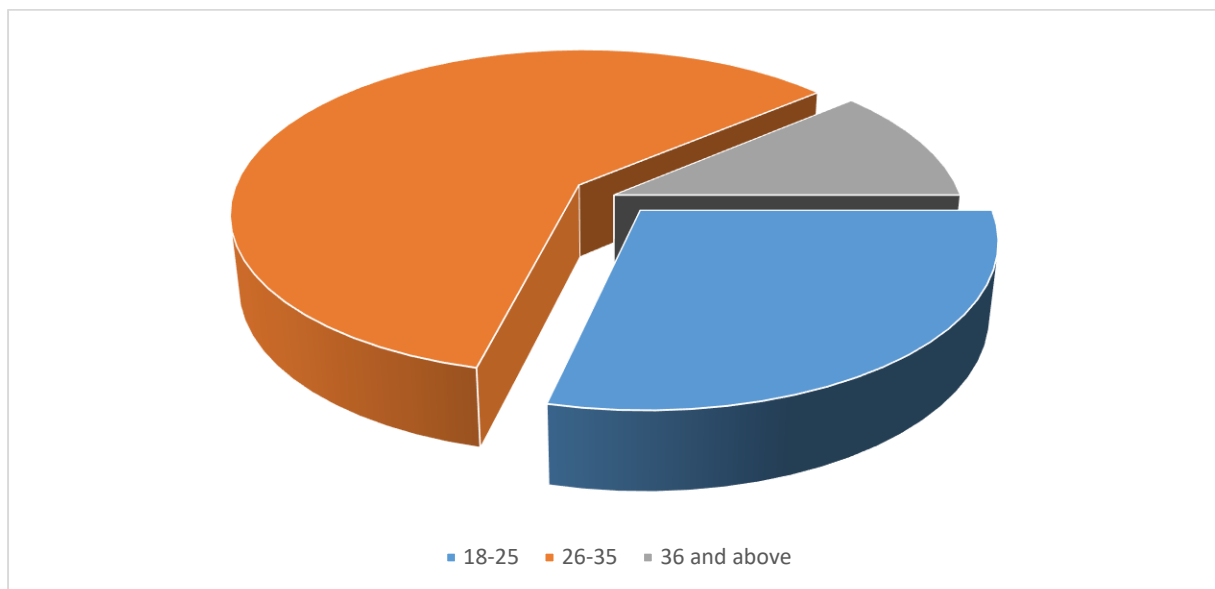


Source: Primary Data, (2022)

As shown on the above chart both genders participated equally. This means equal views from both genders were collected.

4.2.2 Age

Figure 4. 2: Age

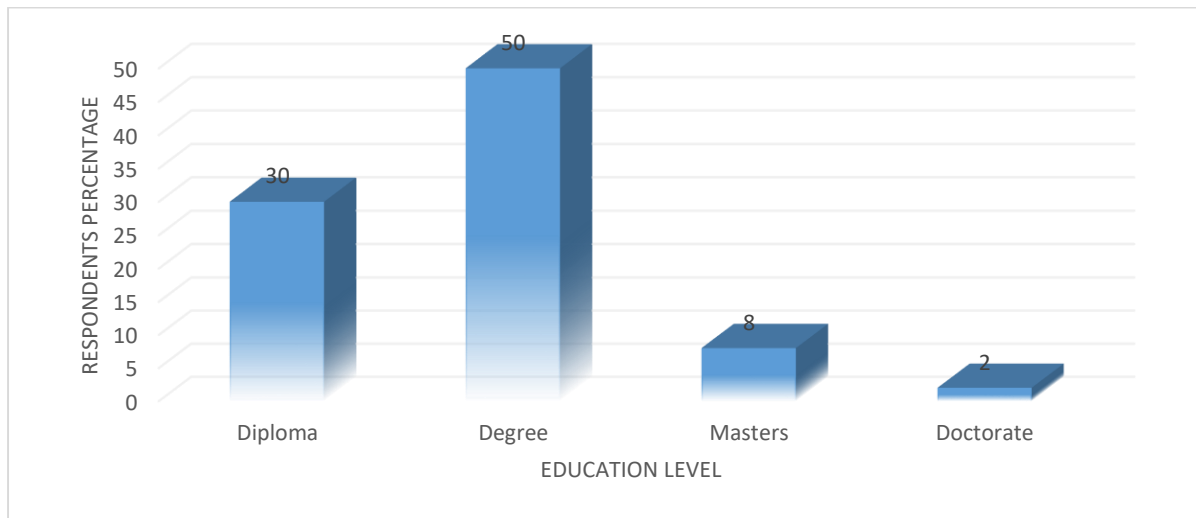


Source: Primary Data, (2022)

The above figure 4.2 shows age ranges of participants. The most prevalent age range is 25-35 years old these are seen by Sander, 2018 as mature participants. Therefore, this study has mature responses.

4.2.2 Education status

Figure 4. 3: Respondent's Education Status



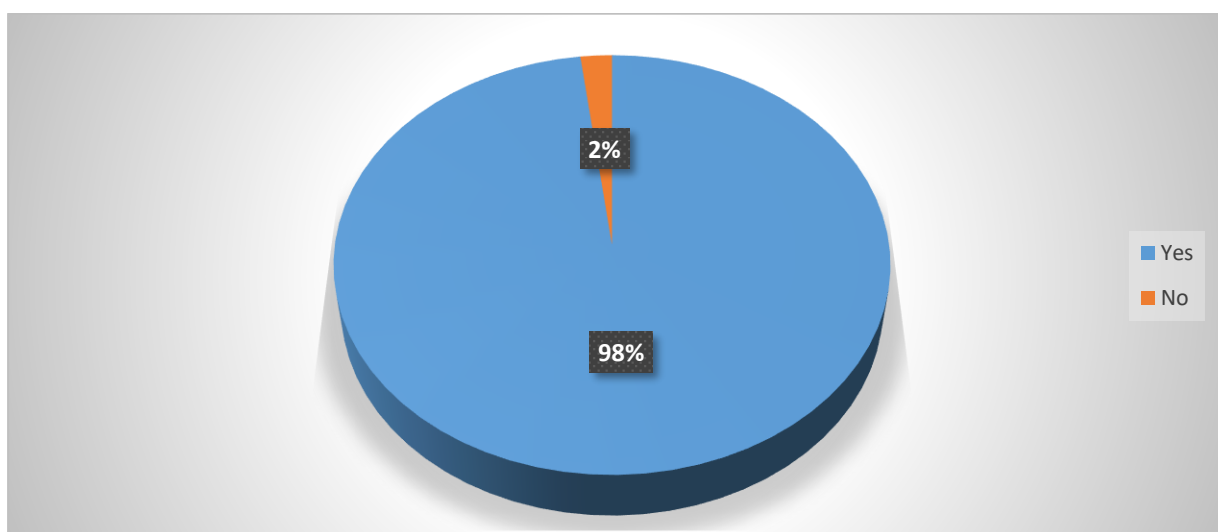
Source: Primary Data, (2022)

From the above figure 4.3 all respondents are literate. There are higher chances that the participants had in-depth knowledge of the studied area and they also understand what they were asked since they are all literate.

4.2.3 Formal ICT training

All though all respondents were educated the participants were being asked if they had any formal training in ICT and below was the response;

Figure 4. 4: Formal ICT training



Source: Primary Data, (2022)

The above diagram show response after participants were asked if they had contacted formal ICT training all respondents ticked yes except for one. This indicated that this study gathered data from participants who knew about ICT in terms of its relevance, applicability and were they might find glitches.

4.2.4 Participants involvement with the use of ICT devices

Table 4. 2: Case Processing Summary^a

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Involvement with ICT Devices	50	100.0%	0	0.0%	50	100.0%

a. Limited to first 100 cases.

Source: SPSS Output data, (2022)

Table 4. 3: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Involvement with ICT Devices	50	2.00	5.00	4.0600	.86685
Valid N (listwise)	50				

Source: SPSS Output data, (2022)

The above table 4.2 and 4.3 shows Case Processing Summary and Descriptive Statistics of respondent's involvement with the use of ICT devices respectively. The first table shows 100% involvement and the respondents starts from a little involved in the use of ICT devices to highly involvement. Those who are highly involve are said by Robeson et al, (2020) to know more about benefits and backdrops of using ICT thus they will give information. In this case everyone was involved mean data collected was reliable.

4.3 SECTION B: ICT APPLICATIONS IN SCM PROCESS

An investigation was conducted to determine the ICT systems utilized in the organization's supply chain management process and how they have facilitated it. The obtained results are computed and shown in table 4.4 below.

Table 4. 4: ICT systems used in Supply Chain Management process

Description	Frequency	Percentage
Electronic supply chain management system	30	60
Electronic Mail	50	100
Websites	30	60

Source: Primary data, (2022)

Caldwell, (2009) has encouraged the use of various ICT application systems, specifically the electronic supply chain management system, websites, and e-mail. In analyzing and comparing prices, he claims that the use of online forms, emails, and new software technologies has made the process efficient while also providing transparency, accounting, and a decrease in errors and omissions.

4.3.1 ICT tools usage in supply chain management processes in the organization

To determine how much ICT was employed in their organization's supply chain management process, a survey was conducted. The results were calculated and shown in table 4.5 below.

Table 4.5: ICT employed in supply chain management process

Description	N	Minimum	Maximum	Mean	Std. Deviation
Need identification	50	1	4	2.6000	.93218
Need specification	50	1	4	3.5000	.98027
Sourcing Options	50	1	4	3.6333	.76489
Evaluations	50	1	4	3.3000	.95231
Order awarding	50	1	4	3.6000	.81368
Delivery	50	1	4	2.0667	1.04826
Expediting	50	1	4	3.3333	.99424
Invoice approval and payment	50	1	4	3.5000	.82001

Source: SPSS Output data, (2022)

ICT is mostly employed in the processes of sourcing, order granting, need specification, invoice approval, and payment since it saves time and money. Cost savings are related to less paperwork, which translates into fewer errors and a more efficient purchase process. ICT is facilitating the purchasing process and improving the entire purchasing cycle. By incorporating ICT into supply chain management procedures, new centralized controls are established to provide more consistency, increase supply chain effectiveness, and, ultimately, union with other departments.

4.3.2 Role of ICT on Supply chain performance

The respondents were asked to indicate the role of ICT on Supply chain performance at Shamva Gold Mine. The results were computed and presented in table 4.6 below.

Table 4.6: Supply chain management performance

Description	n	Minimum	Maximum	Mean	Std. Deviation
Supply chain management performance on cost reduction, enhanced profitability, assured supplies, quality improvements and competitive advantage.	50	1	4	3.600	0.77013

Source: SPSS Output data, (2022)

The respondents generally agreed that measuring the performance of the supply chain management function results in advantages for firms, including cost savings, improved profitability, supply assurance, improved quality, and competitive advantage. ICT in supply chain management has a substantial impact on the company's success, according to Kearney (2004). According to Kearney (2004), the goal of ICT is to enhance the development of process efficiency and expenditure transparency while also reducing the cost of supply chain management.

4.3.3 ICT and supply chain management related challenges

The frequency and prevalence of the difficulties encountered in the adoption and usage of ICT in supply chain management were investigated. The findings were calculated and shown in the table 4.7 below.

Table 4.7 Challenges in implementing ICT for supply chain management processes

Description	n	Minimum	Maximum	Mean	Std. Deviation
High introduction cost	50	1	4	3.2667	1.08066
Suppliers were slow to link up with supply chain management system	50	1	4	3.5000	1.15045
Lack of user- acceptance	50	1	4	2.9333	.98027
Lack of system integration and standardization	50	1	4	2.9545	1.17422
Lack of employee competence	50	1	4	1.6000	.96847
Employee resistance to new solutions	50	1	4	1.4667	.73030

Source: SPSS Output data, (2022)

More respondents concurred that implementing and utilizing ICT in supply chain management is difficult since suppliers are slow to connect with the system. Different ICT platforms,

configurations, and issues with system functionality are issues that suppliers must deal with. This is consistent with Angeles and Nath's (2007) claim that the majority of suppliers will be forced out of business due to a lack of prerequisites for using the new system as well as the expense associated with purchasing the new system and associated training expenses.

The respondents largely concurred that using ICT in supply chain management is difficult due to a lack of system integration and standards. Angeles and Nath (2007) provided evidence for this by examining the obstacles to ICT adoption in supply chain management and identifying three key problems, including a lack of system integration and standards and difficulty connecting ICT with other systems.

According to the research, additional significant problems included a high introduction cost and a lack of consumer adoption. Where ICT use in supply chain management is not required, contracting authorities' adoption seems to have been delayed.

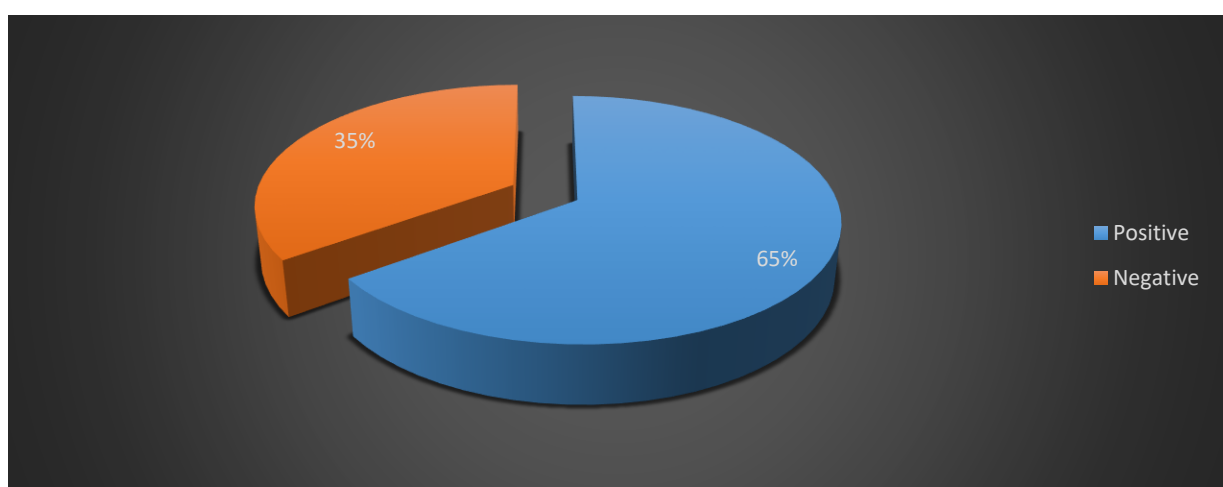
This can be attributable to the expense of internal system reorganization and low knowledge of the benefits. According to Gebuer (2011), the intricacy of the new system will necessitate periodic training for the organization's staff in order to ensure that any system updates are communicated to them.

Employee resistance to innovative solutions and a lack of employee proficiency were rated as having a modest or no impact.

4.3.4 Attitude of suppliers on ICT adoption.

To learn about suppliers' attitudes on ICT adoption, a survey was conducted. The calculated and displayed results are shown in figure 4.4 below.

Figure 4. 5 Attitude of suppliers on ICT in supply chain management



Source: Primary data, (2022)

The data gathered suggests that suppliers have a favorable view toward the company's implementation of ICT in supply chain management. A smaller number of respondents claimed that suppliers had a bad opinion of the use of ICT in supply chain management optimization.

4.4 Discussion

An important research conclusion is that operational cost savings are the main benefit of ICT adoption in supply chain management procedures. These findings are consistent with those of Sigala (2003), who found that the use of ICT in supply chain management functions can aid firms by lowering operational expenses, enhancing geographically distinct markets, and enhancing synchronization between collaborating parties. The use of ICT alone in supply chain management, according to Ellram (2001), does not guarantee greater performance because organizational resources will be invested in collaborative process capabilities.

A further discovery was that Shamva Mines is struggling with a lack of system integration. The data from Tanner (2006) study lend weight to these conclusions. He stated that one of the major challenges to efficiently utilizing appropriate ICT solutions is the sluggish integration of suppliers into the supply chain management system, which is cited by 54.8% of the organizations surveyed.

Additionally, when attempting to integrate new ICT advancements in supply chain management, large introduction costs are frequently encountered. This is consistent with the findings of Tanner (2006), who found that high initial costs were highlighted by 61.3 percent of the enterprises included in the study as the main obstacle to ICT adoption in supply chain management operations. Results from Tim (2005), which many companies in Europe remark that the advantages and possibilities of new ICT solutions are difficult to evaluate, are in line with this.

4.5 Chapter summary

The chapter discussed the presentation, interpretation, and analysis of data. The analysis of the data revealed that Shamva Mines' supply chain management optimization has been impacted by ICT improvements. The research overview, findings, and recommendations will be covered in the following chapter.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of findings, conclusion and recommendations.

5.2 Summary of research findings

The main study topics focused on the effects of supply chain factors on supply chain management, the impact of ICT on supply chain optimization, and the difficulties in adopting and utilizing ICT in supply chain management.

- The investigation revealed that operational compatibility and the degree of collaboration are two of the factors that play a determinant role in the adoption of e-business and its impact.
- The research found that most respondents recognized that ICT applications like EDI, email, and ICT were in use in the organization and had influenced the ICT in supply chain management. According to the study, a significant portion of the suppliers had favorable opinions regarding the use of ICT in supply chain management. Since suppliers are aware of the benefits of ICT for supply chain management, they are willing to accept and apply it in their organizations.
- The purpose of this study was to identify obstacles that Shamva Mine might face in its adoption of ICT for supply chain management. According to the survey, all supply chain actors must set up the information systems in order for ICT to be easily deployed. Structures and procedures will need to be standardized and harmonized, requiring investment. High startup costs for new solutions, such access to enterprise resource management systems and bandwidth, which are essential for adopting e-business, were one of the difficulties discovered in the research. Therefore, firms that are interested in implementing ICT should invest in the structures and procedures required for ICT in supply chain management.

5.3 Conclusion

ICT studies in the past have concentrated more on identifying projected benefits than on determining the precise impact of adoption. In light of this, the researcher came to the following conclusions:

- The study makes it abundantly evident that resources are not the only factor in determining whether ICT applications are adopted. On the other hand, operational compatibility and the degree of collaboration are two of the elements that determine improved ICT effect and adoption.
- Therefore, managers and practitioners should be ready to prioritize strengthening their connections with their suppliers prior to putting common ICT investments into practice. They should also make an effort to improve the partners' commitment to using these applications.
- According to the study, more frequent use—and not necessarily the deployment of more complex applications—has a greater influence on supply chain management procedures. Therefore, managers must make an effort to include ICT applications into their regular tasks, making e-business a part of their job.

5.4 Recommendations

From the findings of this study the following are the researcher's recommendations that Shamva mine has to adhere to in order to maximize benefits of ICT in supply chain management

- Paperwork must be reduced and use modernized ICT systems.
- Training workshops must be continuously provided to enhance skills and knowledge level on ICT in supply chain management.
- Managers should try to integrate ICT applications in their daily operations, encouraging subordinates to make use of them within the organization.
- Senior management commitment is needed when formulating the policies and strategies to put ICT in supply chain management initiative in place.

5.5 Suggestions for further studies

This analysis has room for development in the future. Shamva Mine was the sole subject of the study. As a result, the researcher would advise future research on the subject of how ICT adoption affects sustainable supply chain management in firms. Additionally, it is critical to comprehend how to control the system after installation and operation.

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APPENDICES

The Questionnaire

I am Obright Kadondo from BUSE studying Honours degree in Purchasing and Supply 4th year and would like you to assist with respond giving information on below mentioned questions related to the following topic; “THE EFFECT OF INFORMATION, COMMUNICATION AND TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT PERFORMANCE. A CASE STUDY OF SHAMVA GOLD MINE.”.

All the responses provided are used for academic purposes only. Your cooperation is greatly appreciated.

Instructions

- Please either tick your answer in the box or fill the spaces provided
- Do not write your name anywhere on this questionnaire
- There is no right or wrong answer.
- Your participation in this research must be voluntary and you are also allowed to quit participation at any time you feel like.
- If you have any questions or concerns about completing the questionnaire or the research, feel free to notify the researcher.

For more information, contact **Obright Kadondo** on tel: 0779514877,
email:obiekadondo@gmail.com

SECTION A: PERSONAL INFORMATION (Please tick where appropriate)

1. Gender:

❖ Female []

❖ Male []

2. Highest Attained Educational level:

Secondary []

Diploma []

Degree []

Post graduate []

3. Do you have any formal training in ICT? Yes [] No []

4. To what extent does your work involve the use of ICT devices?

No extent [] A little extent [] Moderate extent [] Great extent [] Very Great extent []

SECTION B: ICT APPLICATIONS IN PURCHASING PROCESS (Please Rank by placing a tick in the appropriate place)

1. Rate the extent to which ICT is employed in the following purchasing process in your organization?

1= No extent, 2= Low extent, 3= Moderate extent and 4= Great extent

	Description	No extent	Low extent	Moderate extent	Great extent	Very Great extent
A1	Assessing the needs of purchasing					
A2	Risk assessment in purchasing					
A3	Specification					
A4	Approval mechanism					
A5	Selection of method of purchasing					
A6	Prequalification of bidders					
A7	Bidding document preparation					
A8	Invitation to bid					
A9	Issue of bid documents and opening of bids					
A10	Evaluation of bids					
A11	Award and signing of contract					
A12	Contract administration					

2. To what extent do you agree with the supply chain performance in relation to information system application?

1= No extent, 2= Low extent, 3= Moderate extent and 4= Great extent

SECTION C: ICT AND PURCHASING PROCESS.

3. To what extent do you use ICT and internet in purchasing process in your department?

1= No extent, 2= Low extent, 3= Moderate extent and 4= Great extent

	Description	No extent	Low extent	Moderate extent	Great extent	Very Great
C1	Transfer of data					
C2	Placing and tracking orders online					
C4	Quick response and JIT Replenishment					
C5	Suppliers access to internal data					

To what extent do you agree with the following ICT purchasing process in your organization?

1= No extent, 2= Low extent, 3= Moderate extent and 4= Great extent

	Description	No extent	Low extent	Moderate extent	Great extent	Very Great
D1	Your business benefits through e-procurement initiatives like closer supply chain relationships, improved information flow.					
D2	Increased efficiencies and the strategic use of purchasing staff					
D3	ICT purchasing process helps realize significant reductions in both the cost of purchased items and the actual cost					

	of processing a purchase order in the organization.					
D4	ICT purchasing process brings closer relationships with suppliers					

INDIVIDUAL USER FACTORS IN PURCHASING PERFORMANCE

4. Would you say that this organization is committed to providing its staff with the necessary competencies and skills to ensure the success of ICT on purchasing?

Yes ☐ No ☐

5. To what extent do you rate staff competencies as a factor in ICT adoption in purchasing optimisation by this organization?

No extent ☐ Small extent ☐ Moderate extent ☐ Great extent ☐ Very Great extent ☐

ICT AND PURCHASING PROCESS CHALLENGES

6. What challenges does your company face in implementing ICT in purchasing processes?

1= Very Great extent, 2= Great extent, 3= Moderate extent 4= Small extent 5=Not at all

Description	Very Great extent	Great extent	Moderate extent	Small extent	Not at all
High introduction costs for new solutions					
Suppliers were slow to link up with the purchasing system					
Difficult in judging usefulness and potential of new ICT solutions					
Lack of user-friendliness					

Lack of user-acceptance of solutions					
Lack of qualified staff who can work with modern purchasing system					

7. In your opinion what are the possible solutions to challenges faced by your company in implementing ICT for purchasing processes?

1= Very Great extent, 2= Great extent, 3= Moderate extent 4= Small extent 5=Not at all

Description	Very Great extent	Great extent	Moderate extent	Small extent	Not at all
Capital investment on technology					
Early supplier involvement and capability development					
Employee training					
Encourage user acceptance and readiness					
Senior management commitment					
Efficiency supply chain risk management					

8. What is the attitude of your suppliers on ICT adoption on purchasing optimization?

1. Positive ()

2. Negative ()

9. What type of relationships does your organization currently have with its suppliers?

1. Close () 2. Moderate () 3. Distant () 4. No Relation ()

11. What are the information systems used and how they have eased the purchasing process in your organization?

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Thank you for your cooperation