AN ASSESSMENT OF THE EFFICIENCY OF INFORMATION TECHNOLOGY SYSTEMS ON BORDER MANAGEMENT OF FREIGHT TRANSPORT CLEARING IN REAL TIME. A CASE OF CHIRUNDU ONE-STOP BORDER POST.

BY

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A dissertation submitted to the University of Zambia in collaboration with Zimbabwe Open University in partial fulfillment of the requirement for the award of a Master of Business Administration degree.

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DECLARATION

I, ANGELA ELSIE MAKONI, do hereby declare that this dissertation is my own work to the best of my knowledge and that it has never been produced or submitted for any degree, diploma or other qualification at the University of Zambia, Zimbabwe Open University or indeed any other university for academic purposes. I further declare that all other works of people used in this research have been duly acknowledged.

Signed ……..... Date ……

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CERTIFICATION OF APPROVAL

This dissertation of ANGELA ELSIE MAKONI is approved as fulfilling the requirements for the award of the degree of Master of Business Administration (MBA) offered at the University of Zambia in collaboration with Zimbabwe Open University.

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ABSTRACT

This study assessed the efficiency of information technology systems on border management of freight transport clearing at Chirundu One-Stop Border Post. The principle behind was to know the information technology systems used at the border and how there are used by Zambia Revenue Authority (ZRA), Zimbabwe Revenue Authority (ZIMRA) and clearing agents and their effectiveness and efficiency on freight transport clearing in real time. Moreover, it focused on the effects of using the information systems, challenges faced when using these systems and measures which can be taken to improve border operations through the use of IT systems. Exploratory sequential mixed research methods were employed in which both qualitative and quantitative data was collected through observations, key informant interviews and questionnaires. With the use of stratified random sampling, out of a total of 970, a sample population of 291 respondents was chosen to take part in the research from Zimbabwe Revenue Authority, Zambia Revenue Authority, clearing agents and freight transport drivers. The findings revealed that various information technology systems which were categorized as software, hardware and internet, were used at the border for various purposes with regards to clearing of freight transport which include information sharing and storage, faster processing and clearing of goods, vehicle and load tracking, communication and planning among different departments/agents at the border. However, the findings also revealed that challenges were being faced as clearing is not done efficiently in real time as it takes various hours for freight transport to be cleared. The challenges included complexity of software, inadequate software and hardware, lack of training of staff, malfunctioning of systems, complexity of information, power outages and inconsistent internet connectivity. Therefore, the authorities should ensure the continuous training of border agents on the use of IT systems, increase staff working at the border specifically customs and immigration officers, increase of hardware especially scanners, desktops and printers, use of up to date software, maintenance of the IT systems, use of strong internet service providers and use of self-service IT systems which will play a role in real time clearing of freight transport.

KEYWORDS: Information technology systems, Chirundu One Stop Border Post, Freight Transport, Clearing, Real Time.

DEDICATION

This dissertation is dedicated to my parents and my in-laws. Mr. J. and Mrs. G. Makoni and Mr. E.H. and Mrs. L. Nkomozepi for their endless love, support and encouragement throughout my educational journey.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASYCUDA- Automated System for Customs Data

BMIS-Border Management Information System

CCS-Cargo Control System

CCTV-Closed Circuit Television

COMESA-The Common Market for Eastern and Southern Africa

EAC- East African Community

EATTFP- East African Transport and Trade Facilitation Project

ECTS- Electronic Cargo Tracking System

EDI-Electronic Data Interchange

GPS-Global Position System

IBM- Integrated Boarder Management

IT- Information Technology

IOM-International Organisation of Migration

NCTTCA-Northern Corridor Transit and Transport Coordination Authority

RFID-Radio Frequency Identification

RTMS-Real Time Monitoring System

TFA- Trade facilitation agreement.

UNCTAD-United Nations Conference of Trade Development

WCO- World Customs Organisation

WTO- World Trade Organization

ZIMRA- Zimbabwe Revenue Authority

ZRA- Zambia Revenue Authority

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

This chapter presents background of the study, statement of the problem, purpose, objectives, research questions, significance of the study, theoretical framework, scope, limitations and delimitations of the study as well as definition of key terms. It sheds more light on the information systems used on border management especially on freight transport clearing.

1.2 BACKGROUND

The 21st century has brought a new perspective on the essence of border management and it has become of paramount importance on each nation around the world. Globalisation, through technological developments has led to a tremendous increase in movement of people, goods and services across international and regional borders in a verge to boost trade and economic development. Arifin (2020) noted that, in as much borders provide security for nations, they are open to safeguard and share socio-economic interests and local economies and with other countries.

Border management was defined by Doyle (2017) as the controlling, facilitation and coordinating of the authorized flow of people, goods and services across a country's frontier. It is of paramount importance to note that border management requires cooperation among various agencies within a country or across countries if that is a case which include customs, immigration and security personnel. Thus, many nations have focused their attention on the management of their borders through infrastructural development, policy and regulation formulation (Arifin, 2020). Moreover, other nations have joined hands in coordinated efforts to address various challenges at the borders for seamless flow of information, people, goods and services through what is known as Integrated

Border Management (IBM), (Umezaki, 2016). The use of IBM was due to the development and establishment of what is known as a One Stop Border Post (OSBP). A One Stop Border Post was defined by Trade Law Centre (TRALAC) (2017) as single facility in which people, goods, and vehicles exit one country and enter into another following procedures stipulated by those countries. It is a contemporary approach in which many nations have adopted to ease border management through integrating border crossing procedures. The World Trade Organisation (WTO) in Article 8 of the Trade Facilitation Agreement (TFA) commended that states which cooperate can reach agreements on the importation, exportation and transit of goods through the establishment of One Stop Border Posts (UNODC,2021). In addition, World Customs Organisation (WCO) also recommended that if customs of nations cooperate and reach an agreement they can establish a joint customs office to facilitate joint controls for the efficient movement of people and goods (UNODC,2021).

One Stop Border Posts are increasingly becoming common as they facilitate border management that requires border agencies such as customs and immigration to use common standards and regulations for the legitimate cross border movement of people as goods (Doyle, 2017). Chong (2018) observed that the voluntary joining of states or nations to one stop border post has led to the seamless movement of goods either by rail or road. This was seen during the COVID-19 pandemic whereby there was easy through flow of goods and services from one country to the other especially on one border posts unlike independent border post as noted by UNODC (2021).

The concept of One Stop Border Post started in Europe in the 1920s when Belgium and France co-located border facilities which offered administrative authorities to both countries as noted by TRALAC (2017). This later led to the establishment of European Union which eliminated many border controls in Europe for efficient border management (TRALAC,2017). The concept was

also adopted in Asia through the Cross-Border Transport Agreement (CBTA) of 1998 in which the Association of Southeast Asian Nations (ASEAN) which include countries such as Malaysia, Indonesia, Singapore and Thailand only to mention a few as noted by Umezaki (2016). Moreover, in 2021 ASEAN countries adopted an ASEAN Border Management Cooperation Roadmap, a framework to improve policies and collaborations as a solution to address various challenges at border posts (Umezaki,2016).

In Africa, the OSBP concept was also introduced. The Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC) joined hands with the Northern Corridor Transit and Transport Coordination Authority (NCTTCA) and developed the East African Transport and Trade Facilitation Project (EATTFP) which initiated the development of a juxtaposed OBSPs in the region in 2004 (Zimbabwe Ministry of Industry and Commerce, 2018). This led to the establishment of the first OSBP in Africa which is Chirundu One Stop Border Post in 2009 so as to resolve barriers on the movement of people and goods (Muqayi and Manyeruke, 2015). The Governments of Zambia and Zimbabwe through a bilateral agreement launched Chirundu One Stop Border Post in December 2009 and it became operational under their respective revenue authorities which are Zambia Revenue Authority (ZRA) and Zimbabwe Revenue Authority (ZIMRA), (TRALAC,2017). This was then enacted into the both countries' legal frameworks which are One Stop Border Act Number 8 of 2009 for Zambia and One Stop Border Post Control Act (Chapter 3:04) for Zimbabwe (Zimbabwe Ministry of Industry and Commerce,2018). The main objective of the juxtaposed OSBP was to facilitate trade through reducing processing time and eliminating some procedures thereby reducing cross border transactions for the enhancement border management and economic development (Nkwemu and Lungu, 2017). Thus, this could only be achieved through the use of IT systems. These systems

were put in place for efficiency of operations through IBM among ZIMRA, ZRA and other agencies which work on border posts which include immigration and clearing and freight forwarding agents, banks, border security and health department among others (TRALAC,2017).

Monitoring and evaluation with regards to the efficiency of the Chirundu OSBP reveal that both countries through their revenue authorities have managed to achieve efficiency and effectiveness in border management (TRALAC,2017). However, the efficiency is widely seen in movement of people as operations are way faster than on goods as noted by Muqayi and Manyeruke (2015). This surely affects freight transport which always face challenges which include wrong documentation, delays and long ques and as noted by Nkwemu and Lungu (2017). With this in mind, the information systems used on border management have remained a cause of concern on Chirundu OSBP especially on freight transport.

1.3 STATEMENT OF THE PROBLEM

The Chirundu One Stop Border Post was launched in 2009 by Common Market for Eastern and Southern Africa (COMESA) with the main aim of meeting international border standards. The border is one of the busiest especially on freight transport as queues are seen on any given day on either sides, Zimbabwe or Zambia. The objective of the One Stop Border Post was to shorten waiting time. However, long waiting time has continued with the freight transport suffering a lot due to poor information systems at the border. Furthermore, despite the use of similar IT systems of Automated System for Customs Data (ASYCUDA) by both countries, the long waiting time has continued being encountered especially on clearing of freight transport in real time, hence the investigation.

1.4 PURPOSE OF THE STUDY

The purpose of this study was to assess the efficiency of IT systems used in the management of Chirundu One Stop Border Post on freight transport clearing. The principle behind was to know the IT systems used at the border and how there are used by both ZRA and ZIMRA and clearing agents and their effectiveness and efficiency on freight transport clearing.

1.5 MAIN OBJECTIVE

To examine the efficiency of information technology systems on the management of Chirundu One Stop Border Post on freight transport clearing in real time.

1.5.1 SPECIFIC OBJECTIVES

(i) To determine the information technology systems used on freight transport clearing at Chirundu One Stop Border Post.

(ii) To assess the effects and efficiency of information technology systems on border management of freight transport clearing at Chirundu One Stop Border Post.

(iii) To identify barriers to practical use of information technology systems at Chirundu One Stop Border Post with regards to freight transport clearing in real time and how can they be enhanced.

1.6 RESEARCH QUESTIONS

1. What are the IT systems used at Chirundu One Stop Border Post on freight transport clearing?
2. To what extent has the use of IT systems played a role in border management on freight transport clearing?
3. What are the challenges that are faced by freight transport on border clearing with regards to IT and how can they be enhanced?

1.7 SIGNIFICANCE OF THE STUDY

The African Union has played a role in putting regulations and plans for border management and among others in the Strategy for Enhancing Border Management in Africa which was adopted in 2008 with its main aim to enhance border management through the use of information, communication and technology so as to achieve continental integration of sustainable development, peace and security (TRALAC, 2017). Thus, use information technology provides standardized efficient flow and exchange of information at national borders. Doyle (2017) noted that although information technology systems are put in place there have also brought some challenges on border management.

The significance of this study will be valuable to the Governments of Zambia and Zimbabwe and their respective revenue authorities, Zambia Revenue Authority (ZRA) and Zimbabwe Revenue Authority (ZIMRA), transport and logistics companies and clearing and forwarding agencies among others. The findings of this study will go a long way to uncover critical areas in border management with regards to information technology systems so as to improve efficiency and smooth flow of traffic within national borders. With information technology praxis, this study will assist policymakers in providing solutions to challenges which are faced at Chirundu One Stop Border Post especially on freight transport. Moreover, the research may also lead to further research and serve as a reference material for researchers on information technology systems on border management with regards to freight transport.

1.8 THEORETICAL FRAMEWORK

This study was guided by a theory which was propounded by Ludwig von Bertalanffy in the early 1950s called the Systems Theory of Organisational Management and it is also known as The Systems Approach of Organisation Management (Sridharan,2022). This concept critiqued the

Classical Management Theory which regarded organisations as machines but however it went on further to argue that organisations are made up of many sub components which are related and interconnected to one another to form a whole unit or system (Sridharan,2022). The theory also notes that an organisation as a system, is found in an environment and has got inputs, processes, outputs. Teeboom (2018) also noted that this theory plays a role in management as it helps organisations to achieve their goals. Thus, for these organisations to reach their stated goals, use of IT systems used must be taken into consideration. According to Bertalanffy, an organisation is an open system which is made up of interacting and interrelated parts called subsystems (Sridharan, 2022). This shows that, for that interaction to take place there must be linkages in terms of communication and it can only be through efficient information technology systems.

IT plays a role in the management of an organisation for planning, operational and controlling purposes, (Teeboom, 2018). The Systems Theory is also underpinned in Henry Fayol's five functions of management which are planning, organizing, leading, coordinating and controlling (Krenn, 2017). Hence for all these functions to be efficient, surely there is need of IT which will assist in seamless flow of information and resource allocation in the management of an organisation. The figure below shows the Systems Theory of Organisation Management on a One Stop Border Post. In this case, the system with inputs, processes and outputs is Chirundu One Stop Border Post.

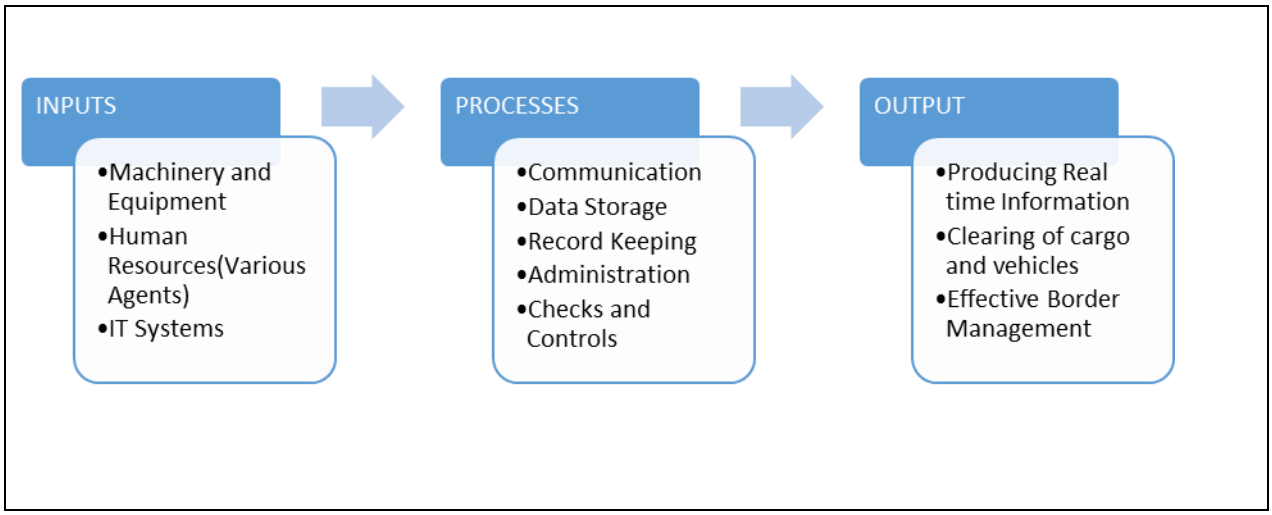

Figure 1: Systems Theory of Organisation Management on Chirundu One Stop Border Post

Applying the Systems Theory of Organisational Management on border management would view a border as a system made up of different subsystems, in this case various agencies. The agencies interact with each other either internally or externally which include revenue authorities' customs department, health department, immigration, banks, clearing and forwarding agents, only to mention a few. These interactions must result in the border management team functioning effectively and efficiently especially on the flow of goods either imports and exports or those in transit. Thus, IT is an effective tool that can be used to help in the operations of various subsystems of border management especially on producing real time information for record keeping, achieving optimum utilization of resources of stakeholders especially freight transport.

Moreover, within the subsystems there is internal management which plays a crucial role in their optimum functions and performance through the use of IT tools know as Management Information Systems (MIS), (Teeboom,2018). These are contemporary systems which use appropriate information for planning, decision making and operational purposes. The use of MIS has also led to the use of Integrated Border Management Systems(IBMS) which link countries databases for seamless flow of information for people, goods and services, (Umezaki, 2016). This plays an

important role especially on one stop border posts by reducing bottlenecks which include delays and long ques which affect freight transport.

Thus, the theoretical framework for this study was useful because it guided and provided a structured approach for examining interactions between key variables such as information systems, border management and freight transport. This helped the researcher to navigate the complexities of the study. Moreover, it facilitated an understanding of how various elements within Chirundu One Stop Border Post are interconnected and their outcomes on freight transport clearing in real time.

1.9 SCOPE OF THE STUDY

The scope of the study was limited to ZRA and ZIMRA Customs' Departments respectively, clearing and freight forwarding agents and freight transport drivers at Chirundu One Stop Border Post. This was due to the researcher being conversant with the language used in the area, limited resources availability as it was a self-sponsored research as well as its proximity and accessibility as a one stop border post.

1.10 DELIMITATIONS

The delimitations of the study were geographical and contextual. The geographic scope was limited to Chirundu One Stop Border Post. This is because it is the second busiest border post in Southern Africa and the first one stop border post in Africa (Ngarachu et al, 2019). Moreover, it is a corridor and gateway which facilitates for north and south bound movement of goods which is East and Southern Africa (Chanda, 2018).

The contextual delimitation of the study was limited to the efficiency of IT systems used on border management on freight transport. This is because due to numerous advantages of IT on border

management, freight transport has always been shortchanged by these IT systems as bottlenecks are observed.

1.11 DEFINITION OF TERMS

Information Technology
Castagna (2021) defined it as, 'the use of computers, other physical devices and infrastructure to create, process, store, secure, retrieve and exchange all forms of electronic data'.

Information Technology System
According to Butler (2018) it is, 'a communication system which include hardware, software and databases operated by a limited group of users for communication processes'.

Border Management
According to Doyle (2017) it is, 'the coordination and controlling in dealing with importation, exportation and transit of goods and people within a border following specific procedures from the government of that nation'.

Freight Transport
According to McLeod et al (2020) it is, 'the physical process of transporting bulk commodities and merchandise goods and cargo by haulage trucks, trains, airplanes and ship'.

One Stop Border Post
According to Muqayi and Manyeruke (2015), it is, 'a shared space located at a boundary crossing between two nations that enables border agencies of both nations undergo necessary controls for the entry and exit of goods, people and vehicles using stipulated legal and institutional frameworks.'

According to the Zambian Border Management and Trade Act No. 12 of 2018, it is a 'border post established under an agreement between two countries sharing a border.'

Clearing
According to McLinden (2016), it is the 'act of processing various documents following border management procedures.'

Real Time

It is a concept which describes an application which requires a programme to respond immediately, McLeod et al (2020).

According to the Merriam-Webster Dictionary, it is also known as the actual time in which something takes place.

1.12 ETHICAL CONSIDERATIONS

To conduct the study, research etiquettes were adhered to and it was the responsibility of the researcher to ensure ethics and norms are adhered to. According to Joseph (2022) ethical considerations are stipulations and conditions which enables the researcher to undertake data collection without breaching the rights of the participants. The first ethic which was done by the researcher, was to get permission to conduct the research from the University of Zambia Ethics Committee and used it to engage with the respondents and explain what the study was about. Ethical considerations which were met by the study included maintaining objectivity and integrity, voluntary participation, respecting the respondents right to privacy, protection of subjects from personal harm and preserve confidentiality. These made the participants to make informed decisions before the whole process of data collection and in the end gave unbiased results.

1.13 SUMMARY

This chapter outlined the background of the study, problem statement, objectives and research questions. It further focused on the theoretical framework and clarified on the key terms used in the study as well as ethical considerations. These elements guided the development of the next chapter which is literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW

This chapter reviews on relevant literature on the efficiency of IT in the management of borders particularly on freight transport. It also brings to light some of the studies that have been done concerning the application of IT in border management of freight transport at international/global, regional and national levels to establish the gaps which this study tried to address.

2.2 INTERNATIONAL/ GLOBAL PERSEPECTIVE

This perspective reviews literature at a global scale across continents on the available work on the research study. It highlights studies conducted in South West Asia also known as Middle East and India as well as summarizing research work and concludes by identifying gaps which the current research seeks to address.

In a research done by Chong in 2018 entitled; The use of Logistics Information Systems for increasing efficiency of transport connectivity in South West Asia, its main objective was to assess the use of logistics information system in integrated intermodal transport connectivity for South West Asia. The study focused on the Middle East countries which share borders which include Turkey, Saudi Arabia, Iran, Iraq, United Arab Emirates, Israel, Qatar, Oman, Syria, Azerbaijan and Jordan. (Chong, 2018) in his findings noted that there are various IT systems used on border management especially for freight transport and these include automated system for vehicle weight and dimension control, automatic vehicle/container recognition systems, video surveillance systems, automatic radiation systems, automatic health check equipment, vehicle smart card, automated passport control system, scanners, electronic seal and vehicle tracking systems, automatic detection and laboratory test equipment, electronic declaration and customs clearance

system, computerized systems for transit control, electronic queue management system. This was also observed by Doyle (2017) in his study in which he noted that various types of IT systems are used in border management especially on freight transport and these include computers, scanners, printers and cameras though there was lack of specifications on these systems. Thus, Chong (2018) managed to list all these IT systems used on border management of freight transport and further went on to explain how there are used by various users which include customs departments, government agencies such immigration, health and security departments as well as private agencies such as clearing agents and banks. However, in the findings the effectiveness and efficiency of these systems was not evaluated with regards to their uses.

Another main finding was that, there is efficient use of logistics information systems in South West Asian border posts. He noted that there is seamless connectivity and the use of IT systems has played a pivotal role in border management due to rapid growth of IT applications in customs operations leading to efficient and efficient flow of information, goods, vehicles and people. IT has played a role in border management on freight transport in terms of time management, improved information and administrative services especially on the effectiveness of customs clearance processes by customs (Chong, 2018).

While the study was insightful, it was more focused on various modes of transport which included rail, road and sea as well as various port of entries of the South West Asian countries such as land and seaports. Moreover, it was aligned to user management of information systems and less on border management and real time clearing. Thus, this study dwelled on efficiency of IT systems on border management of freight transport clearing on one port of entry which is Chirundu One Stop Border Post which is the main gap it addressed.

Another study was also done in India by Siwach and Pathak in 2020 entitled, 'Evaluating the growing importance of Information Technology in the management of logistics and supply chain'. Its main objective was to examine the impact of IT on industry supply chain performance in India. The research was done through the use of a structured online questionnaire because it was during the COVID 19 pandemic era. Thus, feedback from questionnaires, which are main findings show that companies benefit significantly through implementation of various information systems which include hardware, software and internet connectivity. Siwach and Panthak (2020) noted that information technology systems are a hybrid of interlinkages among various components that play part in information processing from sender to receiver in a supply chain. Thus, as the conclusion of this study, it is important to note that ICT have been effective on border management of freight transport as emerging systems are being implemented of transporting various goods which include perishables and hazardous products, (Siwach and Panthak, 2020).

The research gap that exists in this study is its focus on two variables which are IT systems and transport and logistics companies, hence it did not cover much on real time clearing on border posts. This current study focused on various variables which include information systems used on border management, freight transport and real time clearing. Moreover, its research methodology was focused on the use of online questionnaires and convenience sampling which could lead to biased results. Hence, this study used the exploratory sequential mixed methods research design which, is a three phase design where qualitative data was collected first and analyzed with the use of themes to drive the development of a quantitative instrument which explored further the research problem.

2.3 REGIONAL / AFRICAN PERSEPECTIVE

This perspective reviews literature at a continental level on the available work on the research study. It highlights three studies which were conducted in Kenya, and Southern African countries such as Mozambique, Malawi, South Africa, Botswana, Zimbabwe and Namibia. It also concludes by identifying gaps which the current research seeks to address.

In a study done in Kenya in 2013 by Saina which was entitled, 'Effects of ICT on immigration service delivery in border towns in Kenya'. It was focused on two border posts which are Isebania and Busia Border Control Points. The main objective was to investigate the effects of ICT on immigration service delivery. The study used a descriptive research design with a target population of 185 employees working in different agencies at the border control points. The main findings of the study are that use of ICT promotes service delivery and inter-agency cooperation. This was also noted by Nkwemu and Lungu (2017) in their study that various border agencies such as customs, immigration departments and clearing agents work hand in hand through the use of ICT. Chong (2018) also noted that border management requires integration and interconnection of IT systems among various agencies for efficient flow of information and transport. Another crucial finding was that other agencies do not have adequate ICT systems. She pointed out that the Border Police at Busia Border Post do not have ICT systems such as computers as filling and documentation is done manually thus affecting the whole process of clearing in real time. Thus, the study recommended the use of ICT systems by all border agencies for a smooth flow of information and service delivery.

However, the study pointed out that service delivery of immigration department was a cause of concern but it omitted services offered as there were not clearly articulated. Moreover, it focused more on the ICT systems used at the border posts by immigration departments and less was said

on other agencies such as clearing agents and customs departments. Thus, this study addressed the issue by dwelling more on efficiency of information technology systems on border management of freight transport clearing in real time focusing on various agencies such as customs and immigration departments, clearing agents and truck drivers as users of these IT systems.

Another study was done by Doyle in 2017 which was entitled, 'Information, Communication and Border Management in Sothern Africa'. The study was done on various border posts in Southern African countries which are Mozambique, Malawi, South Africa, Botswana, Zimbabwe and Namibia. These border posts included Beitbridge, Machipanda/Forbes, Lebombo/Ressano Gracia, Alexander Bay/Oranjemund, Omahenene, Buitepos/ Mamuno, Ramokgwebane/Plumtree, Mhlumeni/Goba, Mwanza/Zobue and Chicualacuala/ Sango. The main objective of the study was to assess the importance of ICT on border management. Thus, observations, interviews and focus group discussions were conducted with the customs departments of various countries mentioned above. The findings indicated that there are various benefits of ICT usage on border posts which include data interchange, transparency, efficiency on time and revenue collection as well and cost reduction. This was also observed and indicated by Trade Law Centre (TRALAC) in its study in the same year, 2017, as it concluded that positive effects of IT systems on border management can be seen on efficient collection of revenue and clearance, improved security and trade facilitation. Saina (2013) also observed that information technology has positive effects especially on border security and improved performance.

In as much as there are benefits in the use of IT systems, challenges have been noted in this study as they pose as barriers to the effective use of IT systems on border posts especially on real time clearing. Doyle (2017) listed these barriers in the findings of his study as human resources, types of IT systems, lack of IT systems and lack of supporting infrastructure. This was also observed by

The International Trade Centre (INTRACEN), (2018), in their surveys and pilot studies that IT systems pose some serious challenges for businesses and authorities. In their findings they noted that, the extensive transactions required on BMIS demand technical and operational capabilities in the form of human resources and skills to manage the system. Thus, human resource is a barrier to practical use of IT systems in most cases there are resistant to change and incompetent to use the systems. Thus, HR plays a role as a barrier to practical use of IT systems because the systems do not operate on their own they need people to input data for the transactions to be processed. Moreover, these inputs can be prone to human errors. Doyle (2017) put across such sentiments and noted that errors usually occur when border agencies are changing shifts and this will disrupt the whole process.

Moreover, Doyle (2017) noted that in developing countries there is use of outdated technological systems as compared to developed countries and it is a barrier to practical use of IT because outdated systems pose challenges and at the end affects freight transport by increasing waiting times and costs. Lack of some IT systems can also be a barrier to freight transport clearing. This is because some systems are expensive hence there will be use of alternatives in most cases which are tedious and slow for example manual inspection on goods. Then in some cases the systems will not be functional due to lack of servicing and in the end it will a problem and barrier to use on freight transport. Doyle (2017) noted that scanning equipment is very expensive and it has led to lack of scanners on other borders which include Lebombo/Ressano Gracia, Omahenene, Buitepos/ Mamuno, Mhlumeni/Goba, Mwanza/Zobue and Chicualacuala/ Sango.

This study gave an insight on the importance of ICT on border management of various border posts in Southern Africa, focusing on customs departments and did not take other border agencies into consideration such as immigration and security departments as well as clearing agents. It

focused also on various border posts in which some are one stop border posts and some are not which is the main gap from this study. Thus, this research dwelled more on Chirundu One Stop Border Post and specifically on the efficiency of IT systems on border management of freight transport clearing in real time focusing various border agencies which are customs department, clearing agents as well as haulage truck drivers.

Trade Law Centre (TRALAC) conducted a survey in 2017 entitled One Stop Border Posts in Africa. These one stop border posts include Busai, Moyale, Nimule, Kabero, Taveta/Holili and are in countries such as Kenya, Ethiopia, South Sudan, Uganda, Burundi, Democratic Republic of Congo and Tanzania. The main objective of the study was to assess the effectiveness of African One Stop Border posts in clearing cargo and travelers as well as infrastructure development. The findings of the survey indicate that, the use of IT systems has played a pivotal role in border management in Africa due to rapid growth of IT application in customs operations leading to effective and efficient flow of information, goods, vehicles and people. However, Doyle (2017) further went on to emphasize that, with regards to border management, in developed countries the use of IT systems is too advanced through use of latest software and vice versa is true in developing countries in Southern Africa. Chong (2018) also put the same sentiments across and listed the IT systems used and noted that most of those listed are found in developed countries unlike in developing countries. TRALAC recommended that there is need for governments to reinforce agreements for one stop border posts to be efficient and effective. It also recommended that African governments must draw lessons of border management from other European and Asian countries.

The gap in research identified in this study pertains to the absence of a clearly defined research design, as it was more of a survey which focused on various one stop border posts across Africa.

Consequently, this current study provides a conceptual approach to address this gap focusing on a specific one stop border post which is Chirundu, the first one stop border post in Africa.

2.4 LOCAL/ ZAMBIAN PERSPECTIVE

This perspective reviews literature at a domestic level across Zambia on the available work on the research study. It highlights studies conducted locally on border posts such as Kazungula and Chirundu then summarizes research work and concludes by identifying gaps which the current research seeks to address.

In 2015, Muqayi and Manyeruke conducted a study entitled, 'The impact of Chirundu One Stop Border Post in addressing border protection challenges'. Its main objective was to assess the impact of Chirundu OSBP in addressing border protectionism. The study used both primary and secondary data collection methods through observations, interviews and documentary search. Thus, 25 face to face interviews were conducted on various border agencies such as ZIMRA, ZRA and immigration departments of both Zimbabwe and Zambia. In their main findings they noted that since the operationalizing of Chirundu OSBP many benefits have been observed. These include reduction of smuggling activities, reduction of administration costs and waiting time, boosting of Zimbabwe and Zambia's economy and an improvement on regionalism, (Muqayi and Manyeruke, 2015). This was also noted by TRALAC (2017) that the information systems used at Chirundu One Stop Border Post have reduced the time and number of procedures for passenger and commercial clearance, as before use of IT systems it would take up to 20days for cargo trucks to be cleared but now it is only a matter of hours. With regards to one stop border posts, efficient collection of revenue has been a positive effect as it has minimized corruption and increased accountability (Chong, 2018). This was also supported by Lewis (2017) in his paper that ICT on borders has improved governance and reduced corruption due to the reduction of interfaces among

customs officers, travelers and other agencies. According to Chong (2018) in his findings he noted that information technology has been integrated in border management as freight transport pays licenses, taxes, toll fees and other regulated fees online leading to efficiencies and transparency.

However, Muqayi and Manyeruke (2015) in their findings noted that there were diversified challenges which were affecting the operations at Chirundu OSBP which were categorized as legal issues, language and culture, health related, infrastructural, operational and ICT challenges. More emphasis was put on ICT challenges as there were severe challenges of internet connectivity due to lack of optic fiber at Chirundu, which led to slow clearance of goods, vehicles and people. Moreover, ZRA and ZIMRA resorted to individualism as their ASYCUDA systems were not linked leading delays in the clearing processes. Thus, the study recommended strategies which can be implemented to improve efficiency and effectiveness of Chirundu OSBP which include opening the border for 24 hours, improve and upgrade ICT systems and draw lessons from other OSBP from developed countries to match ever changing global standards. In their conclusion they noted that challenges which were experienced at Chirundu OSBP were as a result of poorly trained staff and there is need for regularly training of customs and immigration agents of both Zimbabwe and Zambia to keep in touch with international standards thereby leading to improved regional integration and effective trade facilitation.

This research lacked clarity on how the border is being protected as it was more focused on border management. Hence, it focused on the customs and immigration departments of Zambia and Zimbabwe but did not focus on end users such as truck drivers and other agents at the border. This study filled that gap by adopting truck drivers and clearing agents from both countries in the sampling population so as to understand better the efficiency of IT systems on border management of fright transport clearing in real time.

The National Time Release Study Working Group conducted a study on Time Release Study for Imports and Transit Cargo at Chirundu One Stop Border Post, Zambia in 2019. Its main objective was to assess the time taken by transit cargo to clear at the border post. Thus, observations and interviews were done at Chirundu OSBP for seven consecutive days (12-18 December 2019). In their main findings, the study noted that, the average time taken to clear a truck entering Zambia is 6 days 4hours and for minutes, and for transit cargo is 4 days 1 hour and 23 minutes. Moreover, time taken for issuance of insurance, licenses and certificates is 1 hour and maximum is 30 days. Another finding was that of the 15 clearing agencies working at the border only 10 were connected to ASYCUDA.

The study recommended that ZRA and other government agencies must collaborate and establish a framework which enable them to clear cargo with the help of ICT so as to exchange information, track and monitor clearance activities. Increase of working hours at the Chirundu One Stop Border Post was also recommended so as to maximize service delivery as it is one of the busiest borders in Southern Africa.

Thus, this study gives an insight on real time clearing at Chirundu One Stop Border Post, however it only focused at the Zambian Side of the border post. The current study focused on both sides of Chirundu One Stop Border Post that is Zambia and Zimbabwe so as to gain more knowledge on the efficiency of IT systems on border management of freight transport clearing in real time.

Nalishuwa (2020) conducted a research entitled, ‘An evaluation of the impact of ICT system implementation in enhancing efficiency in border operations at Kazungula Border Post’. The main aim of this study was to explore the impact of ICT system implementation on enhancing efficiency in border operations. A qualitative exploratory approach was used to collect data at a target

population of 120 staff workers of Kazungula Border Post from various border agencies such as immigration, customs, health and security.

The findings of the study reveal that all respondents agreed that use of ICT systems has improved the efficiency at Kazungula Border Post. Moreover, conclusions were made that the implementation of ICT at the border post has helped management to increase productivity, efficiency on clearing process, improved performance, integration of agencies and flow of information. Nalishuwa, (2020) recommended the regularly training of border agencies' staff so as to keep up with the ever changing technological developments.

In as much as the study focused on the efficiency of ICT, it was more focused on all government border agencies at Kazungula Border Post which can be a challenge on generalizing results. Moreover, it did not incorporate the other users of ICT systems at the border such as clearing agents and truck drivers. Thus, this study incorporated border agencies such as ZRA and ZIMRA and other end users such as truck drivers and clearing agents to attain the correct results.

In 2020, Ndonga conducted a research entitled Addressing the Challenges facing One Stop Border Posts in Africa: Lessons from Chirundu. The main aim was to assess challenges faced at Chirundu One Stop Border Post. Interviews and observations were done to various border agencies, clearing agents, truck drivers and travelers to get in depth information on the challenges they face at the border. The findings of the study categorized two main broad challenges affecting operations at Chirundu OSBP which are border management and infrastructure challenges. The border management challenges include lack of alignment of procedures and formalities at the national level between ZIMRA and ZRA, lack of shared ICT systems among border agencies, operational challenges such as corruption and other fraudulent activities. Infrastructure challenges included insufficient parking bays, insufficient rest rooms and rest bays for travelers, poor lighting,

inadequate signage, few inspection bays, poor and inconsistent internet connectivity and frequent power cuts.

He put forward recommendations to address these challenges which include use of a comprehensive approach to upgrade existing infrastructure, harmonizing border clearance through Single Window (SW) Systems and allow cross-jurisdictional integration of ICT systems. In conclusion, he noted that eliminating challenges will lead to efficient cross border clearing processes and other African countries should draw lessons from Chirundu OSBP experience.

Thus, the main difference is that the study was more focused on various challenges faced at Chirundu OSBP and the target population was on all border agencies, clearings agents, travelers, truck and bus drivers. However, this study focused merely on border agencies which are linked to freight transport clearing so as to attain comprehensive results on the efficiency of information technology systems on border management of freight transport clearing in real time.

2.5 GAP ANALYSIS

This study has taken insights from various studies and none of them dwelled specifically on the efficiency of IT systems on border management of freight transport clearing in real time. Many studies have been done with regards to Chirundu One Stop Border Post especially on infrastructure development and a little has been done in terms of the information systems used at the border especially on the management of freight transport. Thus, the studies of IT systems on border management remain underexplored and this study managed to highlight the efficiency of IT systems in clearing freight transport in real time through determining IT systems used at Chirundu OSBP, assessing effects of using the IT systems, identifying barriers to practical use of IT systems and how they can be enhanced.

2.6 SUMMARY

This chapter reviewed relevant literature on the efficiency of IT in the management of borders particularly on freight transport. It brought to light some of the studies that have been done concerning the application of IT in border management of freight transport at international/global, regional/ African and national/ Zambian perspectives to establish the gaps which this study tried to address.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 OVERVIEW

This chapter focuses on the research design, target population, sample size and sampling techniques which will be used. Moreover, it looked at the instruments of data collection, data analysis, validity, reliability as well as ethical considerations made for the study.

3.2 RESEARCH DESIGN

In this study, the exploratory sequential mixed-methods research design was used to broadly understand and explore the problem in question. According to Creswell and Creswell (2018), in an exploratory sequential mixed methods research design, is a three phase design where qualitative data is collected first and analyzed and use of themes to drive the development of a quantitative instrument in order to explore further the research problem. Moreover, there are three stages of analysis to be conducted which are after the first stage of qualitative data, after the second stage of quantitative data and at the integration stage which connects the two strands of data (Creswell and Creswell (2018). Figure 2 will give a summary of the research design. Thus, this design used both qualitative and quantitative research methods for the purpose of gaining insight on largely unknown concepts so as to provide a base for future research. A quantitative research is a study which seeks to understand the causal or correlational relationship between variables by testing hypotheses and a qualitative research is a study that seeks to understand a phenomenon within the real world through use of focus groups, interviews and observations, (Joseph, 2022). Thus, quantitative method is statistical and objective while qualitative is subjective and use respondents' feelings and perspectives.

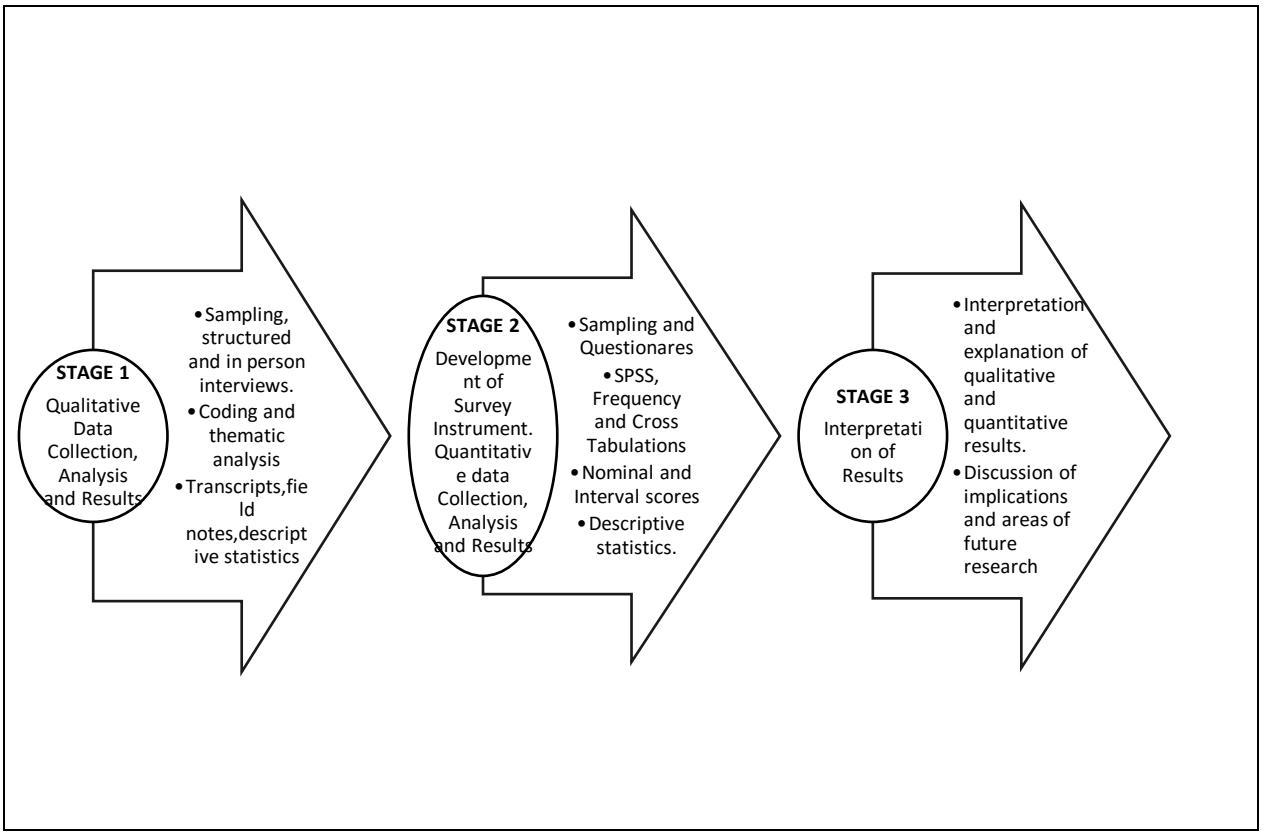

Figure 2: Exploratory Sequential Mixed Methods Research Design

The study's main aim was to assess the efficiency of information technology systems in border management of freight transport clearing at Chirundu One Stop Border Post, hence use of both qualitative and quantitative approaches was the best. In quantitative research, the researcher asked specific and leading questions so as to collect quantifiable data from participants by using questionnaires. In qualitative research, the researcher collected data from the respondents by interviewing them using broad questions to get a deeper understanding of the phenomena which was explored through using interviews and observations. Hence, use of both methods gave the researcher conclusive results.

3.3 PHILOSOPHICAL PARADIGM

The philosophical paradigm for this research adopted a pragmatic approach. A pragmatic philosophy was defined by Legg (2018) as an approach that evaluates theories or beliefs in terms of the success of their practical application. Moreover, it views language and thought as tools for problem solving, action and prediction of a phenomena. This paradigm uses both qualitative and quantitative research methods as it is an approach that suggest that there are many different ways of interpreting the world and conducting research to investigate reality. Hence, it deals with facts and practical results.

The research values the perspectives and experiences of individuals who use information systems at Chirundu OSBP which are customs agents, freight transport drivers and clearing agents. It sought to understand the efficiency of IT systems used at the border post as practical results are considered important in pragmatism with regards to clearing in real time.

3.4 STUDY AREA

This is a map which shows where the study was conducted.

Plate 1: Chirundu One Stop Border Post (Zambia-Zimbabwe)

Source: Google Earth (2023)

3.5 TARGET POPULATION

Population was defined by Mason and Lind (2015) as a collection of all possible objects, individuals or measurements of interest. The study was conducted at Chirundu One Stop Border Post on both Zambia and Zimbabwe sides thus the target population was centered on officials from ZRA and ZIMRA Customs Departments, clearing and forwarding agencies and freight transport drivers. Selection of this target population was based on the fact that it comprises of key individuals who are involved with the use of IT systems at the border post, hence it informed the research accurately. Statistics form both ZRA and ZIMRA revealed the total number of border management agents at Chirundu One Stop border post which are 75 and 90 respectively. According to the

National Time Release Working Group (2020) there are 15 clearing and forwarding agencies at the border at Zambian side. Ndonga (2020) noted that there are 20 clearing and forwarding agencies at the border (Zimbabwean) side and on average trucks which pass per day at Chirundu One Stop Border Post into Zambia are 420 and 350 into Zimbabwe. The table below (Table 2) shows the target population of the study.

Target Population of the Study

Target Population	**Frequency**
ZRA (Customs)	75
ZIMRA (Customs)	90
Clearing Agents (Zambian Side)	15
Clearing Agents (Zimbabwean Side)	20
Truck Drivers (Zambian Side)	350
Truck Drivers (Zimbabwean Side)	420
Total	**970**

Table 1: Target Population of the Study

3.6 SAMPLE SIZE

A sample size was defined by Sidhu (2014) as a subset of elements in a research to represent a population. Thus, the sampling size can be found through a formula by Cochran for known size of the population as noted by Creswell and Creswell (2017). The formula is as follows;

$$\cap = \frac{z^2 pq}{e^2}$$

Where;

z = 95% confidence level which is 1.96 using z score

p = estimated part of the population which has common attributes

q = 1-p

e = margin of error which is 5% or 0.05

Thus $\cap = \frac{z^2pq}{e^2}$

$\cap = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2}$

$\cap$=384.

Thus since the population is known, where N is the target population

$$n = \frac{\cap}{1+\frac{\cap-1}{N}}$$

$n = \frac{384}{1+\frac{384-1}{970}}$ $n = \frac{384}{1.3945}$ $n = 275$

However, according to Creswell and Creswell (2017) for populations under 1000, a minimum ratio of 30% is advisable to ensure representativeness of the sample and since 275 respondents are below the 30%, 291 respondents were selected which are 30% of 970.

Target Population and Respondents of the Study

Target Population	**Frequency**	**Respondents**
ZRA (Customs)	75	23
ZIMRA (Customs)	90	27
Clearing Agents (Zambian Side)	15	5
Clearing Agents (Zimbabwean Side)	20	6
Truck Drivers (Zambian Side)	350	105
Truck Drivers (Zimbabwean Side)	420	125
Total	**970**	**291**

Table 2: Target Population and Respondents

3.7 SAMPLING TECHNIQUE

The technique which was used to arrive at the sample size was stratified random sampling because the researcher had prior knowledge of characteristics of the population. It was used because proportional sampling preserves relative representation of the population thereby reducing sampling errors. For example, to get the strata of ZIMRA it was 90/970 x 291=27, meaning 27 members from ZIMRA participated in the study. However, purposive sampling was used on key informants especially from ZIMRA AND ZRA as they have in depth knowledge of border management on freight transport clearing.

3.8 INSTUMENTS FOR DATA COLLECTION

In research, data collection instruments are also known as tools and they play a role in getting more information about the study (Joseph, 2022). This research used both qualitative and quantitative tools which are key informant interviews, questionnaires, observations. However, the research instruments were used on one side of the border that is Zimbabwean side to conduct and test them. Once its observed that certain parts needed to be adjusted, adjustments were done and research continued on the other side of the border which is Zambian side. This is because (Joseph,2022) reiterated that in research instruments must be used first in a pilot study to determine their reliability and validity. Moreover, secondary data sources were used to collect data.

3.8.1 Questionnaires

The study used research questionnaires through self-administering to freight transport drivers, clearing and forwarding agents, ZIMRA and ZRA respondents. Creswell and Creswell (2017) noted that in a quantitative research, a questionnaire is the most appropriate tool. A questionnaire is a research instrument used for interviewing participants who respond to a set of questions laid down in a printed format (Mason and Lind, 2015). This questionnaire was blended with open and closed-ended questions. Since the study involved a relatively larger population of respondents

especially truck drivers, this research instrument was appropriate through saving time and guaranteeing confidentiality. Moreover, questions were simplified as possible in terms of language and length. The questionnaires were administered orally and this enabled the researcher to clarify and rephrase questions which the respondent find difficulties in. As an example, questionnaires for freight transport drivers captured data which included demographic information, waiting time, customs clearing procedures, IT systems used and challenges encountered.

3.8.2 Interviews

In depth interviews were conducted by interviewing key informants from ZIMRA and ZRA. In this case, interview guides comprising of a list of open ended questions were used. The researcher also used a recorder to record these interviews.

3.8.3 Observation

An observation is a research tool that yields information about an actual behavior (Mason and Lind, 2015). The researcher carefully watched and recorded things as they occur. The aim of the study was to assess the efficiency of IT systems on border management of freight transport at Chirundu One Stop Border Post, hence the researcher observed the types of IT systems and their use on freight transport clearing. This is because observations are very valuable as they ascertain validity and accuracy of some of the primary data which was acquired through key informant interviews and even secondary sources.

3.8.4 Secondary Data Sources

This involves gathering information from written sources such as journals, textbooks, government publications and internet websites only to mention a few. Literature has been reviewed and it played an important role in the study in determining what has been happening as well as identifying some loopholes in the area of study.

3. 9 DATA ANALYSIS

The collected data was systematically arranged for analysis purposes. This is because data analysis is the combining of data gathered from respondents to determine emerging trends, themes and categories (Mason and Lind, 2015). The study used a pragmatic research philosophy which use both qualitative and quantitative data. Quantitative data was suitable for statistical analysis and this was done through software analysis, by entering data manually into the data package Statistical Package for Social Scientists (SPSS) which was used to analyse the data. For qualitative data, the responses were numerically codified and also analysed through descriptive analysis. In descriptive analysis, data was classified in terms of mean, median and mode thus presented in tables or figures.

3.10 VALIDITY AND RELIABILITY

According to researcher no research tool is perfectly reliable and valid thus each study issues of validity and clarity must be noted. Validity was defined by Creswell and Creswell (2017) as the property of a research instrument that measures its relevance and accuracy. Reliability is the capacity of an instrument to produce consistent results when repeated, (Joseph, 2022). To ensure that this research was valid and reliable, the questionnaire which was used, was first subjected to a pilot study and modifications were made.

3.11 SUMMARY

This chapter presented the research methodology which was used to undertake the study. In the methodology it pointed out the research design, study area, target population, sample size, sampling technique, instruments for data collection and data analysis which was used. Validity and reliability were also articulated in this chapter.

CHAPTER 4

PRESENTATION OF FINDINGS

4.1 OVERVIEW

This chapter presents the findings of the study. Data presented in this chapter was obtained using research instruments which included interviews and questionnaires and presented in accordance with generated themes and also in the form of charts, tables and diagrams. As this chapter presents data both quantitatively and qualitatively; for qualitative data, the researcher ensured that the actual words said by the respondents (verbatim) while other words have been paraphrased and the results have also been presented in figures for quantitative data. The purpose of the study and research questions are reviewed, followed by an overview of qualitative questions asked during individual interviews. Analysis is provided of the qualitative data and followed by an overview of quantitative survey instrument construction and administration and an analysis of quantitative data.

4.2 INTRODUCTION

The purpose of this study was to assess the efficiency of IT systems used in the management of Chirundu One Stop Border Post on the clearing of freight transport. The first phase of the research was a qualitative exploration of research questions through individual interviews with two Heads of Customs Departments at Chirundu One Stop Border Post, one from ZIMRA and the other one from ZRA. Emergent themes from these interviews were utilized to develop a survey instrument which is the questionnaire used for other respondents which are customs officers, haulage truck drivers and clearing agents.

4.3 QUALITATIVE PHASE- INDIVIDUAL INTERVIEWS

In the first phase of the research, individual interviews were conducted with two Heads of Customs Department, ZIMRA and ZRA respectively from the sample for qualitative phase. The interviews took place in the interviewees offices at their convenient time. Interviews were approximately one

hour in length and were audio-taped and transcribed verbatim. The participants commented more on an individual basis about their own work experiences at the Chirundu One Stop Border Post and IT systems in clearing freight transport in real time. This helped the researcher to gain a clear and deep understanding of IT systems which are used at the border post to clear freight transport.

4.3.1Analysis of Individual Responses

A synopsis of individual interview responses is provided here. The responses are also referenced in Chapter Five throughout the implications section as a means to illustrate or augment points made in the interpretation of findings of the research.

Question #1: ***Kindly tell me about yourself and what you do, for the sake of anonymity do not mention your name.***

Both interviewees talked of their educational backgrounds, work experiences and their roles and duties as Head of Customs Departments of both ZIMRA and ZRA at Chirundu One Stop Border Post. They both reported having Masters Degrees, though the other respondent is pursuing a PhD. They both have worked for the revenue authority for many years and got promoted due to their hard work and experience. However, one respondent has worked at Chirundu One Stop Border Post for many years and the other has worked at various borders. They both noted their roles which include management of the administration at the border, oversee customs and trade compliances, determining customs classifications and regulatory requirements and assist in formulating and implementation of new customs and trade legislations.

Question #2: ***Which IT systems do you use for freight transport at Chirundu One Stop Border Post?***

The two participants noted that Information technology systems vary as they are classified into various components of hardware, internet and software. Thus, they reported that IT systems used for freight transport which are common are internet, various software programs and technological

devices (hardware) such as desktops, printers, telephones, video surveillances, scans and scanners are commonly used. The views of the participants, for example (P1) included the following as indicated in transcribed verbatim:

'*The IT Systems used for freight transport at the border are broadly categorized into four, that is internet, database, hardware and software. Hardware include desktops, laptops, printers, video surveillance cameras, scans, scanners and printers only to mention a few. Software include Automated System for Customs Data (ASSYCUDA), Cargo Control System, Migration Information and Data Analysis System (MIDAS), and the Personal Identification Secure Comparison and Evaluation System (PISCES), Electronic Cargo Tracking System (ECTS). Databases are used by various border agents which have their own exclusive databases for storing information and customs department uses what is known as the Oracle Master Database is and linked with other border posts and the Headquarters of ZIMRA in Harare. Internet is provided mainly by NetOne, which is a parastatal in Zimbabwe and other private service providers such as Econet and ZOL.'*

Question #3*: Of the IT systems that you mentioned, what are their purposes?*
The participants responded that the IT systems mentioned above play a role in data and information storage, declaration and clearing of cargo, immigration services and passport control, information sharing, vehicle and load tracking, health controls and safety measures. The responses of the participant (P2) noted that:

'*The IT Systems at Chirundu One Stop Border Post are used for linkages among various agencies at the border which include Immigration Department, Health Departments, Home Affairs Department, Vehicle Inspection Department, clearing agents and banks only to mention a few. Thus, these IT systems has various purposes which include passport control, information sharing among stakeholders, information storage and record keeping, safety measures, health control and clearing of goods and vehicles.'*

Question #4: How does the use of IT systems play a role in border management of freight transport clearing?
In response to this question both participants noted that IT systems play a pivotal role in clearing cargo as there are various steps and procedures to be followed when clearing freight transport. The responses of participant (P1) noted that:

'The use of IT Systems plays a pivotal role in providing transparency, risk management, accessibility of information and sharing of relevant information on border management procedures among stakeholders at the border. Moreover, IT systems improve greater efficiency of customs clearance processes of freight transport leading to reduction of waiting time and flawlessness of procedures.'

Question #5: What are the effects of using IT systems on border management of freight transport with regards to real time clearing?

Both respondents noted that the effects of using IT systems are advantageous to all stakeholders at the border and to freight transport so as to clear in real time.

Participant (P1) noted that:
'The effects include faster processing of passports, immediate dissemination of information, processing of enormous data, client satisfaction and efficiency on vehicle and goods clearing.'

Participant (P2) noted that:
'The automation of the Chirundu One Stop Border has led to easy accessibility of information from one department to another or from one border agent to the other. For example, the use of mobile devices such as laptops means that customs staff and other border agents can access information at any time they require it and not just during office working hours and they can go ahead with the clearing process of freight transport in the comfort of their homes.'

In point form, both respondents said the effects of using IT systems on border management of freight transport with regards to real time clearing are:

(i) Efficiency on administration.
(ii) Efficiency on revenue collection.
(iii) Improved security.
(iv) Facilitation of trade.
(v) Linkages with other stakeholders.
(vi) Effectiveness on vehicle and goods clearance.
(vii) Reduced waiting time.

Question #6: What challenges are you facing when using IT systems on freight transport in terms of real time clearing?

The respondents noted that IT Systems come with various challenges which affect the real time clearing of freight transport.

Participant (P1) noted:

'Challenges we face when using IT systems at Chirundu One stop border post vary but there are more aligned to the complexity of software, inadequate software and hardware and even malfunctioning of the systems.'

Participant (P2) noted that:
'Poor training on usage of systems, inconsistent internet connectivity, complexity of information and power outages are some of the challenges faced when using IT systems at the border on freight transport with regards to real time clearing.'

Question #7: Is there anything that you can do or that you have done differently in your quest to eliminate the barriers faced when using IT systems in the management of the border especially on freight transport with regards to real time clearing?
The participants noted that there are some things they have done to eliminate the barriers faced when using IT systems.

Participant (P1) noted that
'As the Head of Customs for ZRA at Chirundu One Stop Border Post, in my own capacity I have managed to eliminate the challenge of power outages by advocating and implementing an efficient strategy of an automatic back up mega generator. This has helped the clearing of freight transport to be efficient.'
Participant (P2) noted that:
'One thing I can do differently if authority and power is vested in me is to use an efficient internet service provider to eliminate the challenge of inconsistent internet connectivity. However, as the head of customs, I have played a role in the trainings of our staff so that they work efficiently if new software and hardware are put in place and this has helped in clearing of freight transport as well as border management.'

However, they both noted that in some instances they do not have the capacity of doing things differently because the border is a national asset/entity and governments and international organisations/bodies such as International Migration Organisation (IMO), Common Market for Eastern and Southern Africa, African Union (AU), East African Community (EAC), Southern Africa Development Community (SADC), Northern Corridor Transit and Transport Coordination Authority (NCTTCA) have a final say on other issues especially on software and hardware to use.

Question #8: How can the application of IT systems on border management be enhanced especially on freight transport real time clearing at Chirundu One Stop-Border post?

The responses given were hinged on three important things which are people, processes and systems. Both respondents reiterated on the training of customs staff and other stakeholders such as clearing agents and other border agencies on how to use the IT systems efficiently and the use of user friendly IT systems leading to a shorter clearing process.

Participant (P1) noted that:

'The application of IT systems on border management can be enhanced through continuous training of customs staff and other users and beneficiaries of the systems. Moreover, the IT systems especially software and hardware must be put in place and regularly updated to meet the international standards and efficiently flow of information, goods and freight transport in real time.

Participant (P2) noted that:

'There is need for the border to have self-service IT systems which will play a role to improve customer services and automate all critical processes for clearing of freight transport in real time and to achieve efficiency and reliability.'

Question #9: 4. Are they any issues, comments and suggestions you may wish to raise so that they can be captured in this research study?

Participant (P1) asserted that:

'Much has been done and more must be done as we are in a digital era and Chirundu One Stop Border Post must draw lessons from other One Stop Border Posts across the globe.'

In conclusion, emergent themes from these interviews were utilized to develop a survey instrument which was the questionnaire used for other respondents which are customs officers, haulage truck drivers and clearing agents.

Summary of Emergent Themes

THEMES	SUBTHEMES	CODES
Types of IT Systems	-Hardware	- Laptops, Desktops, Printers, Scanners, Video Surveillance, Databases.
	-Software	-ASSYCUDA, Cargo Control System, MIDAS, PISCES, Electronic Cargo Tracking System, Databases Server.
	-Internet	-Internet Service Providers, Internet Connectivity
Functions/Uses of IT Systems	-Administration	-Information Storage, Information Sharing, Communication, Revenue Collection.
	-Control	-Immigration/Passport Control, Health Control.
	-Vehicle Management	-Vehicle and Load Tracking, Vehicle and Load Weight Dimension control.
	- Clearance	-Declaration of goods, Clearance of vehicles and goods.
	-Safety	-Safety and Security Measures.
Effects of Using IT Systems	-Efficiency	-On administration, revenue collection, vehicle and goods clearance.
	-Security	-Improved security (on theft, smuggling and fraud)
	-Effectiveness	-Facilitation of trade, reducing waiting times, linkages among various agents and departments

Challenges Faced when Using IT Systems	-Complexity -Inadequacy -Malfunctioning -Power -Internet -Users of IT Systems	-Of Software and information. -Of software and hardware. -Of hardware and software -Power Outages. -Inconsistent internet connectivity and incompetent service providers. -Lack of training on customs officers, immigration officers, clearing agents and other border agents.
Solutions for eradicating these challenges	- Political Will -Use of user friendly software and hardware. -Use of other power systems -Training of Users -Use of efficient internet service providers.	-Governments, International Organisations & Bodies - Use of Self-service hardware, use of up to date software and hardware. -Use of generators and solar systems - Periodic training of border agents e.g customs and immigration officers and clearing agents. -Use of Service providers which offer highly competitive and efficient internet transmissions.

Table 3:Emergent Themes on Qualitative Data

4.4 QUANTITATIVE PHASE- QUESTIONNAIRES

A total of 289 questionnaires were distributed to the respondents and only 268 were returned. This shows 93% overall success rate for the study. Mungenda and Mungenda (2016) noted that a range from 90 -99% is a good enough overall success rate in a research study which can give valid and reliable results. Thus, the rest of the data analysis, all results are presented with 268 participants representing 100% of the respondents.

4.4.1 Demographic Data

4.4.1.1 Gender Distribution of the Respondents and Response Rate

Respondents were asked to indicate their gender as shown below.

Gender	ZIMRA Customs Officers	ZRA Customs Officers	Haulage Truck Drivers	Clearing and Forwarding Agents	Frequency	Percentage
Males	13	10	212	7	242	90.3%
Females	9	8	6	3	26	9.7%
Total	221	18	218	10	268	**100%**

Table 4: Gender Distribution and Response Rate

Table 4 above shows that the majority of the respondents, 90. 3% were male and only 9.7% were female. The study was not designed to have more males than females meaning that the number of female is very low at the border as there are few females working for customs and clearing agents. Moreover, in the cross border transportation the number of female haulage drivers is very low as compared to males. Thus, the table shows the representation which is fairly weighted on the total number of participants who were targeted.

4.4.1.2 Ages of Respondents

Respondents were asked to indicate their age range as shown below.

Age Range	ZIMRA Customs Officers	ZRA Customs Officers	Haulage Truck Drivers	Clearing and Forwarding Agents	Frequency	Percentage
20-30 years	10	7	42	6	65	24%
31-40 years	6	7	53	4	70	26%
41-50 years	3	3	61	0	67	25%
Above 50years	3	1	62	0	66	25%
Total	221	18	218	10	268	**100%**

Table 5:Ages of Respondents

The ages of the participants were categorized into four, 20-30, 31-40,41-50 and above 50 years. From the table 5 above, many respondents (26%) were between the ages of 31-40, but however variations were noted. For example, many ZIMRA and ZRA Customs officers were from the age range of 20-30 years and a few from those above 50 years. This is in contrast with haulage truck drivers in which a few are from the age range 20-30years and many are above 50 years. However, for clearing agents many were from the age range 20-30 and none from 41 years and above.

4.4.1.3 Highest Level of Education

The respondents were asked to indicate their highest level of education and the responses are shown below.

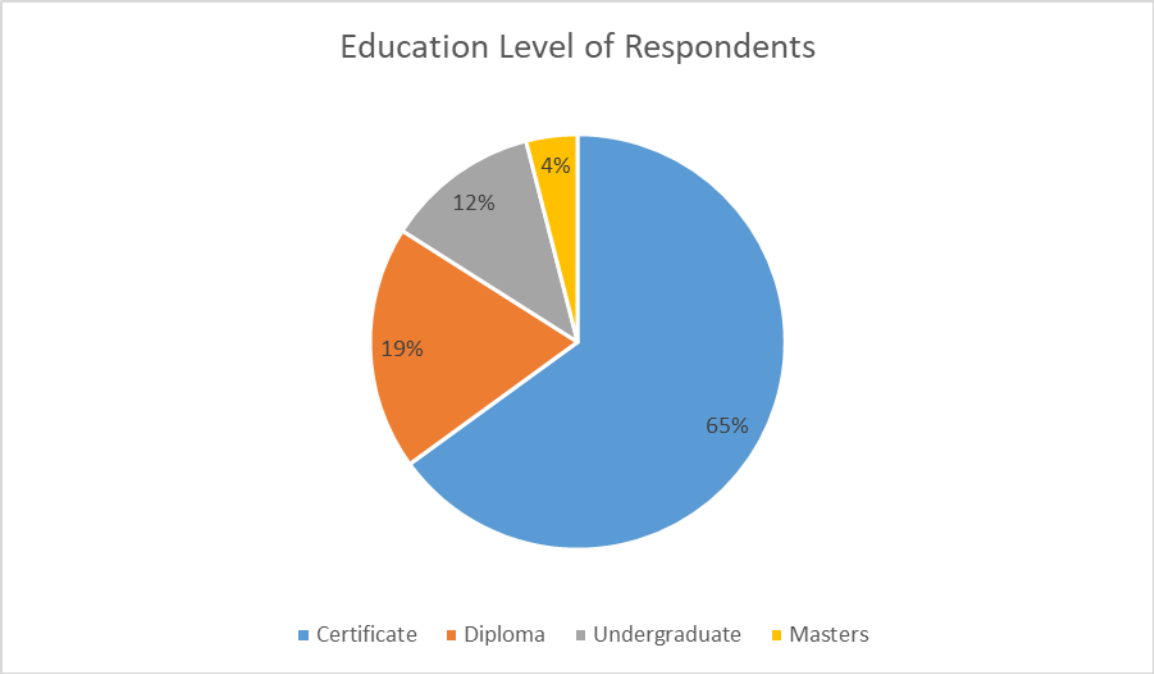

Figure 3: Education Level of Respondents

As shown above in Figure 3, the lowest level of education was a certificate and the highest being Masters' degree. The results show that 65 % of the respondents had a certificate and these range from Grade 7 to Ordinary Level Certificate, 19% had diplomas, 12% had undergraduate degrees and 4% Masters' degree. The aim of this question was to see if the respondents' capability of understanding information systems and efficiency and its impact on real time clearing of freight transport. Thus, due to their highest level of education, the respondents could understand research questions and answer them within the correct context which made the research findings to be reliable and conclusive.

4.4.1.4 Computer Literacy

The respondents were asked to indicate their level of computer literacy and the responses are shown below.

Level of Computer Literacy	Customs Officers	Haulage Truck Drivers	Clearing and Forwarding Agents	Frequency	Percentage
Illiterate	0	60	0	60	22%
Basic	0	124	0	124	47%
Immediate	0	34	0	34	13%
Advanced	20	0	6	26	9%
Proficient	20	0	4	24	9%
Total	40	218	10	268	**100%**

Table 6: Computer Literary Levels of Respondents

As shown in Table 3 above, 19% of the respondents are computer illiterate and are haulage truck drivers. For those who are computer literate, their level of literacy ranges from basic, immediate, advanced and proficient; the lowest level being basic and the highest being proficient. Therefore, 60% of the respondents, have basic and immediate knowledge of computers and these are haulage truck drivers whereas customs officers and clearing agents have advanced and proficient levels of computer literacy at 9% respectively. The aim of this question was to see if the respondents' capability of understanding and using information systems and its efficiency on real time clearing of freight transport. Thus, due to the highest level of computer literacy from both customs officers and clearing agents, it showed that clearing of freight transport was efficient looking at the context of the users of the IT systems at Chirundu One Stop Border Post.

4.4.1.5 Duration of Service

In order to understand the efficiency of IT systems on border management and real time clearing of freight transport, it was important to find out how long the respondents have been in service and particularly at the border especially customs officers and clearing agents. It would take someone who has been through manual and digital system to understand the efficiency of IT systems at the border for real time clearing of freight transport. The results on the duration of service were;

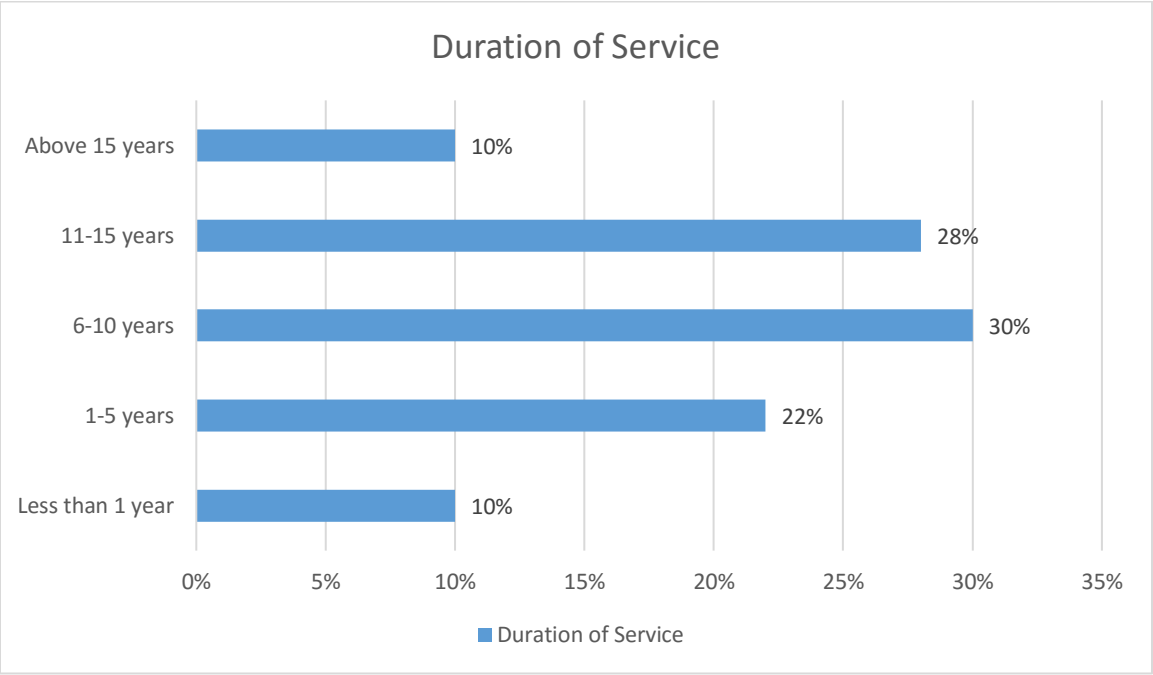

Figure 4: Duration of Service of Respondents

The findings show that the majority of the respondents 30% had served for about 6-10 years in their respective jobs. The results also showed that those who had served for less than 1 year and those who served above 15 years had the same figure 10%. Moreover, 22% had served between 1-5 years and 28% had served between 11-15 years. Thus, seeing the implementation of IT systems at the border which have been in use since 2009, it can be inferred that most of the respondents have experienced real time clearing of freight transport and the efficiency of the IT systems at the

border. This gave them enough credence on answering the questions on the efficiency of IT systems on border management of freight transport in real time clearing.

4.4.2 TYPES OF IT SYSTEMS

The respondents were asked if they agree or disagree on the type of IT systems used at Chirundu One Stop Border Post and their application on the clearing of haulage trucks.

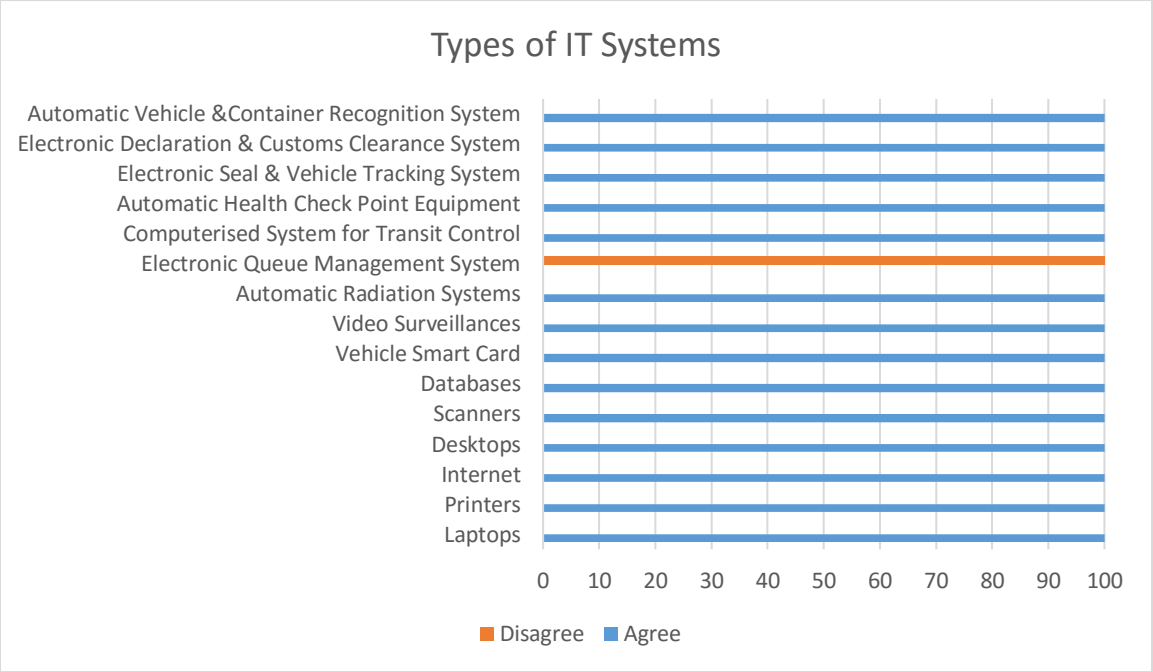

Figure 5: Types of IT Systems used at the border

The findings from the respondents indicate that all 268 which translate into 100% are in agreement that various IT systems are used at the border for clearing of freight transport which are laptops, desktops, printers, scanners, video surveillances, internet, automatic radiation systems, automatic vehicle and container recognition, automatic health checkpoint equipment, vehicle smart card, electronic seal and vehicle tracking system, electronic declaration and customs clearance system and computerized system for transit control. However, they all (100%) disagreed to the use of electronic queue management system.

4.4.2.1. Uses of IT Systems on Freight Transport Clearing

The respondents were asked if they agree or disagree on the use of IT systems on freight transport at the border with regards to real time clearing.

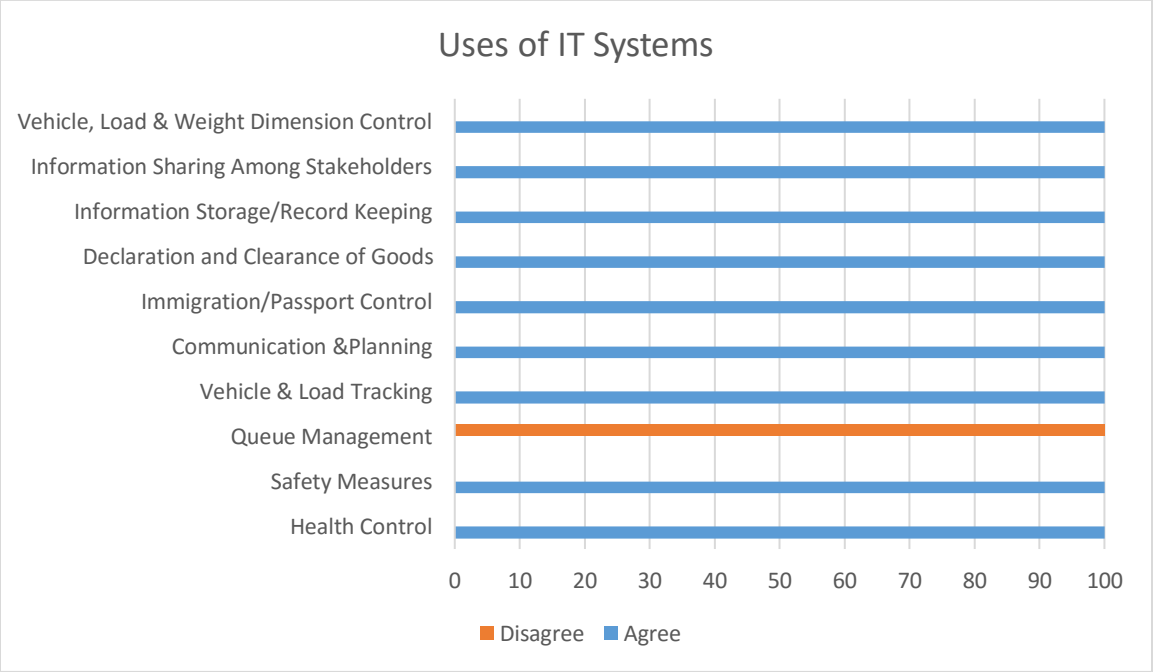

Figure 6:Uses of IT Systems

The findings from the respondents indicate that all 268 which translate into 100% are in agreement that there are various uses of IT systems at the border for freight transport clearing which include health control, safety measures, vehicle and load tracking, communication and planning, passport control, declaration and clearance of goods, record keeping, information sharing and vehicle load and weight dimension control. However, they all (100%) disagreed to the use of queue management.

4.4.3 EFFECTS OF USING IT SYSTEMS

The respondents were asked on the effects of the use of IT Systems to clear freight transport at Chirundu One Stop Border Post. The responses are shown below.

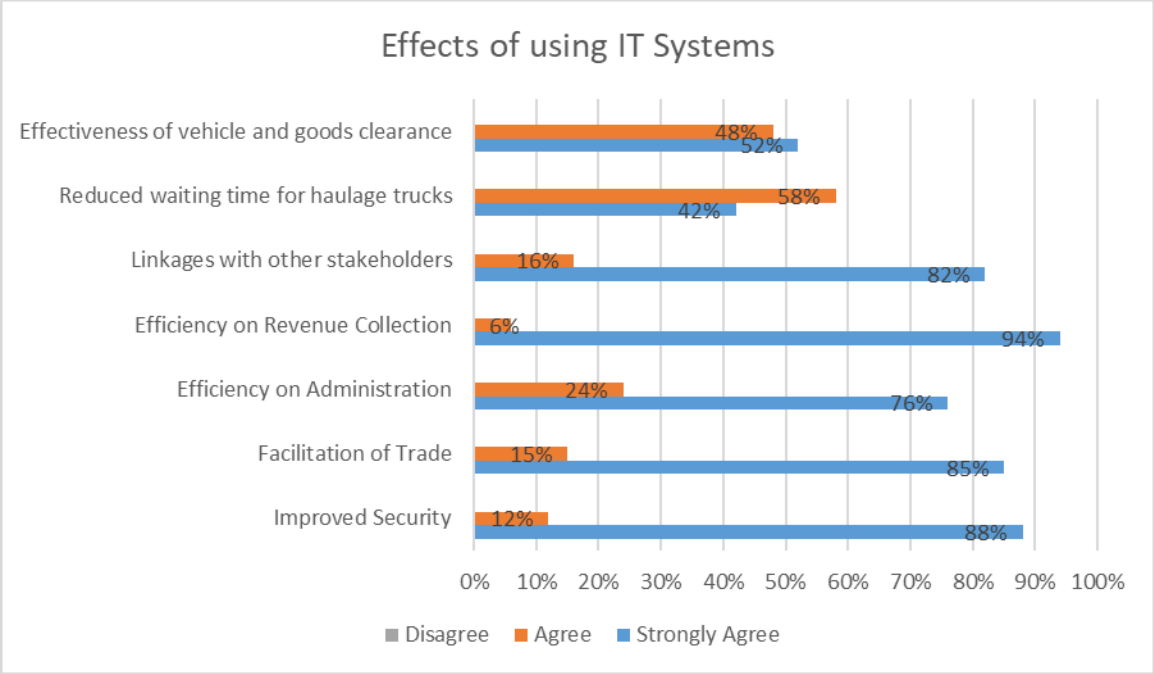

Figure 7: Effects of Using IT Systems

The findings show that the respondents are in agreement with the effects of using IT systems at the border though they have variations as others strongly agree and others just agree. In terms of improved security 88% strongly agreed and 12% agreed, and on facilitation of trade 85% strongly agreed and 15% agreed and with regards to efficiency on administration 76% strongly agreed and 24% agreed. Moreover, in terms of efficiency on revenue collection 94% strongly agreed and 6% agreed and on linkages with other stakeholders 82% strongly agreed and 16% agreed. With regards to reduced waiting time, 42% strongly agreed and 58% agreed and on effectiveness of vehicle and goods clearance 52% strongly agreed and 48% agreed. Thus, it shows that no one disagreed on the effects of using IT systems mentioned above.

4.4.3.1. Time Taken to Clear Freight Transport at Chirundu One Stop Border Post

4.4.3.1.1 Minimum Time Taken to Clear Freight

The respondents were asked on the minimum time taken to clear freight transport at Chirundu One Stop Border Post. The responses are shown below.

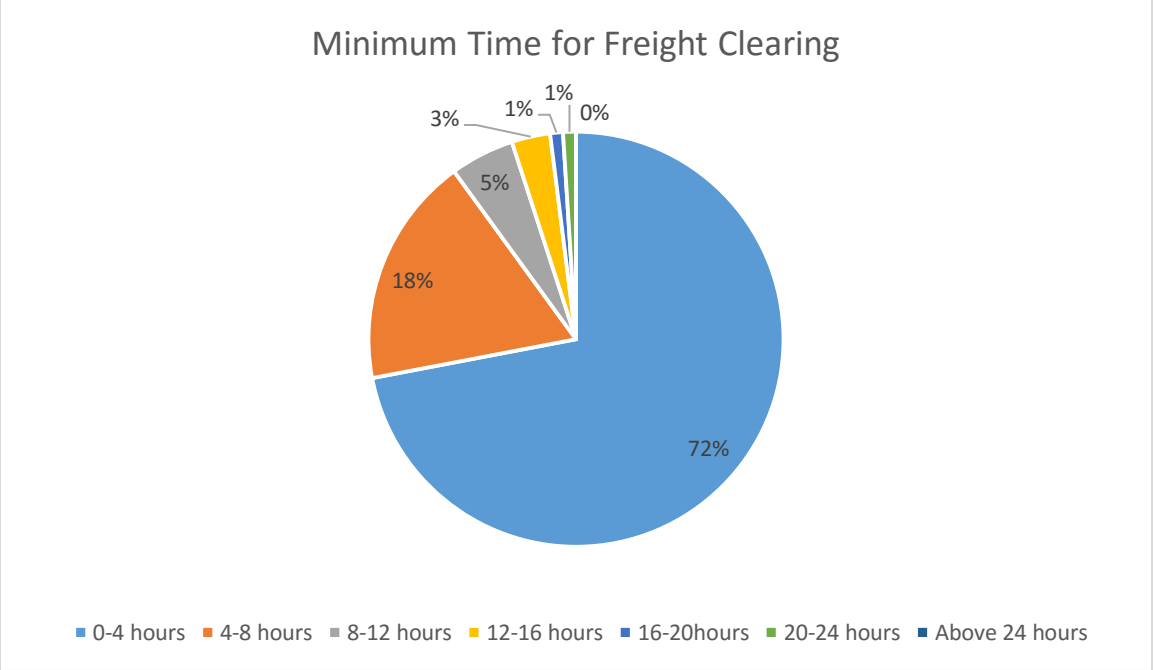

Figure 8: Minimum Time for Freight Clearing

The findings show that the majority of the respondents 72% noted that the minimum time for clearing freight ranges from 0-4 hours The results also showed 18% noted that the minimum time ranges form 4-8hours, 5% noted that it ranges from 8-12 hours, 3% noted that it ranges from 12-16 hours, 1% noted it ranges from 16-20hours, another 1% noted that it ranges from 20-24hours and none above 24 hours. Thus, it shows that the minimum time take for clearing freight ranges between 0-24 hours.

4.4.3.1.2 Maximum Time Taken to Clear Freight

The respondents were asked on the maximum time taken to clear freight transport at Chirundu One Stop Border Post. The responses are shown below.

Figure 9: Maximum Time for Freight Clearing

The findings show that the majority of the respondents 42% noted that the maximum time for clearing freight ranges from 36-48 hours. The results also showed 30% noted that the maximum time ranges form 48-72hours, 18% noted that it ranges above 72 hours and 10% noted that it ranges from 24-36 hours. Thus, it shows that the maximum time taken for clearing freight takes days and even weeks.

4.4.3.1.3 Efficiency of IT Systems

The study sought to find out the level of efficiency using performance indicators of how well the IT systems perform in freight transport clearing.

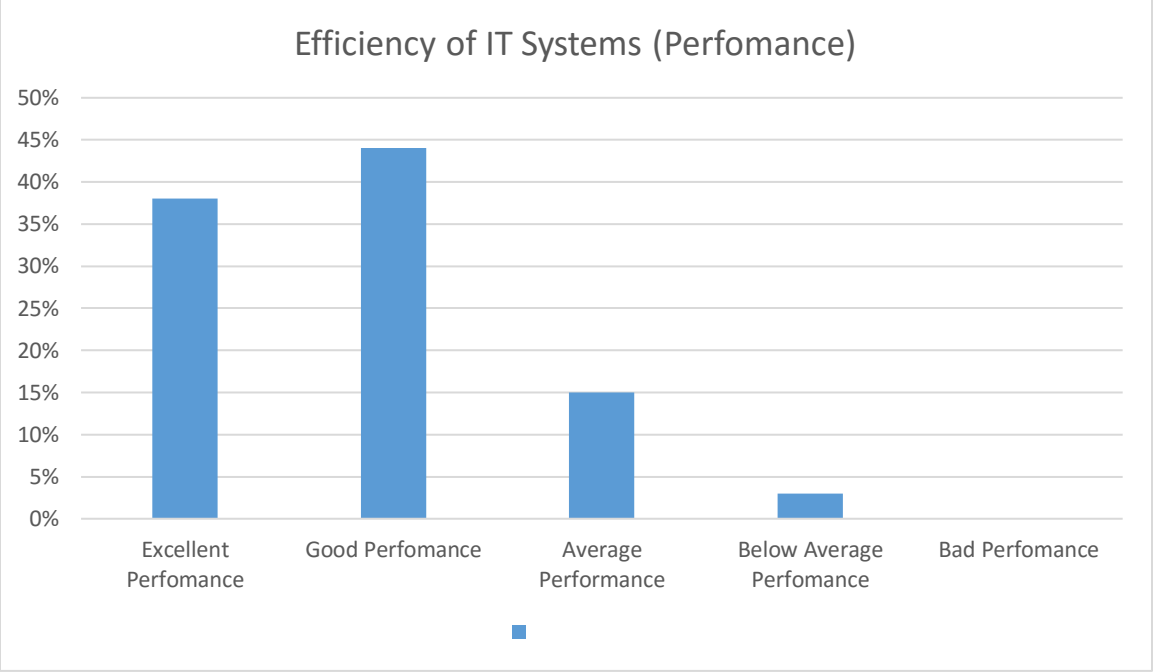

Figure 10: Efficiency of IT Systems

Figure 10 above shows that 38% of the respondents thought the performance of the IT systems was excellent and a binger number of respondents which is 44% said it was good, 15% noted that it was average and 3% noted that it was below average. However, no one noted of the bad performance.

4.5 BARRIERS TO PRACTICAL USE OF IT SYSTEMS

4.5.1. Challenges faced when using IT Systems

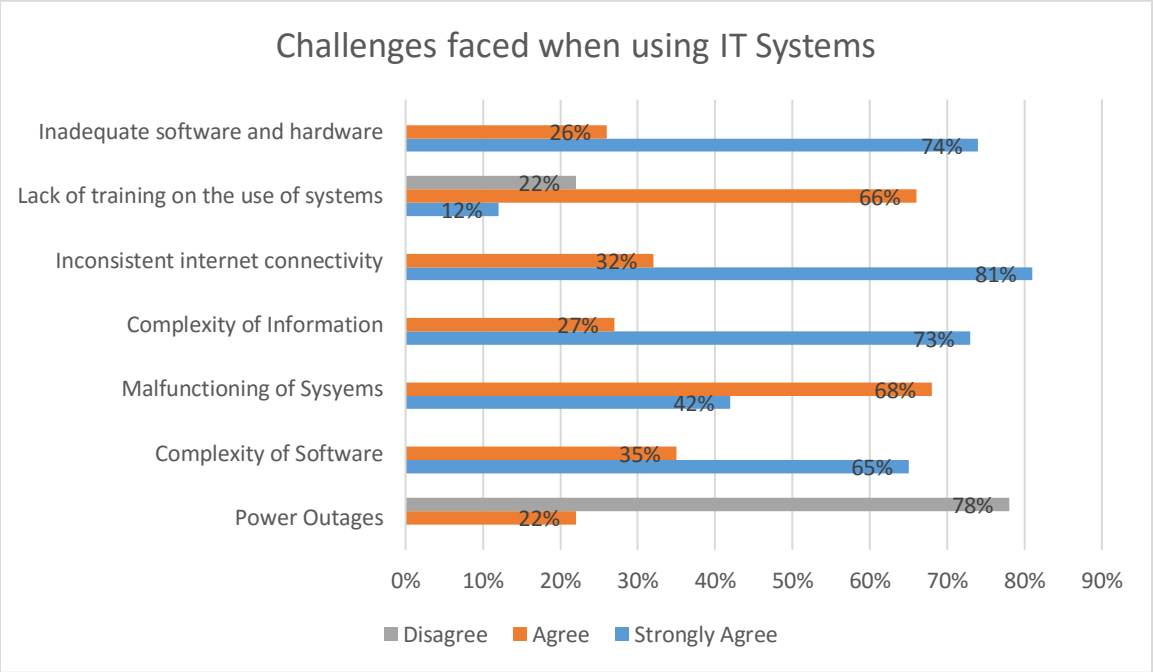

Figure 11: Challenges faced when using IT Systems

Figure 11 above reveals that majority (78%) of the respondents disagreed with power outages as a challenge faced when using IT systems and the remaining (22%) agreed. Another challenge faced was complexity of software in which the majority (65%) strongly agreed and 35% agreed. With regards to malfunctioning of systems 42% strongly agreed and 68% agreed, another challenge which is complexity of information 73% strongly agreed and 27% agreed. Inconsistent internet connectivity as a challenge faced when using IT systems, the majority 81% strongly agreed and 19% agreed. In terms of lack of training on the use of systems 12% strongly agreed, 66% agreed and 22% disagreed. The other challenge was on the inadequacy of software and hardware as 74% strongly agreed and 26% agreed.

4.5.2. Solutions to enhance barriers/challenges faced when using IT systems on freight transport clearing

The study sought to find out recommendations or any suggestions on how the barriers faced when using IT systems on clearing freight transport at the border be enhanced. This was an open ended question and many suggestions were brought forward by the respondents which include continuously training of staff on the use of IT systems put in place, increase stuff working at the border especially customs officers and increase of hardware especially scanners, desktops and printers. Other responses were that border authorities should adopt new technology and solutions as they emerge not use outdated software especially that ZIMRA uses an advanced software of ASYCUDA World Plus and ZRA id still using an older version, ASYCUDA World as this brings inefficiencies. Other respondents recommended on use of strong internet service providers and also regular maintenance of these systems especially scanners, databases and desk tops and also need for back up plans or alternative options when the systems fail. Some respondents noted that there is need for the border to have more self-service enabled systems which will automate all critical processes of freight clearing so as to achieve efficiency.

4.6 SUMMARY

This chapter has offered the research findings of the study. These findings have been presented in conformity to the themes that emerged in line with the specific objectives of the study.

CHAPTER 5

DISCUSSION OF RESEARCH FINDINGS

5.1 OVERVIEW

This chapter presents an in depth discussion of the research findings based on the data collected, analysed and interpreted in line with the objectives of the study which were: to determine the information technology systems used on freight transport clearing at Chirundu One Stop Border Post, assess the effects of information technology systems on border management of freight transport at Chirundu One Stop Border Post and identify barriers to practical use of information technology systems at Chirundu One Stop Border Post with regards to freight transport clearing in real time. It is in relation to both literature review and the findings of the study presents in the tables and figures from the previous chapter.

5.2 TYPES OF IT SYSTEMS USED ON BORDER MANAGEMENT FOR FREIGHT TRANSPORT CLEARING

The first research question focused on the types of IT systems that are used at Chirundu One Border Post for freight transport clearing. This question's quest was to get more knowledge on the IT systems used for freight transport clearing by various border agents and departments in their day to day duties. The research findings indicated that the types of IT systems used where broadly categorized into three broad components which work hand in hand which are hardware, software and internet.

With regards to hardware, the findings from all respondents (100%) indicated that various types of the IT systems are used for freight transport clearing which include laptops, desktops, printers, databases, video surveillance, scanners and scans. Moreover, the researcher also observed these IT systems which were used by various agents at the border during data collection. Another important type of IT systems used for freight transport clearing is internet in which all the

respondents (100%) were in agreement on the use of Internet with regards to freight transport clearing. This is because Internet is of much paramount importance in linking software and hardware so as to speed up the freight clearing process and procedures. Moreover, the researcher through observation during data collection at the border noticed satellites, base stations, modems and routers which connect the internet to the hardware. The final component of the IT systems used at the border indicated was software which varies among various agents at the border which include customs software, immigration software, border management software, vehicle management software among others. With regards to software; the main customs software which was highlighted by respondents was Automated System for Customs Data (ASYCUDA) which is used for electronic declaration and customs clearance system in which all respondents (100%) agreed to the use of the system. Immigration software is also used which include Migration Information and Data Analysis (MIDAS) and Personal Identification Secure Comparison and Evaluation System (PISCES) as noted by the key informants during data collection. Border Management Systems in terms of vehicle software for clearing include automatic radiation systems, automatic vehicle/container recognition system, vehicle smart card, electronic seal and vehicle tracking system, computerized system for transit control among others and all respondents (100%) agreed on those systems which play a pivotal role in freight clearing. However, all respondents (100%) disagreed on the use of electronic queue management. This is because clearance is done at a first come first serve basis.

The findings of the study are in agreement with the study done by Doyle (2017) in which he noted that various types of IT tools are used in border management especially on freight transport and these include computers, scanners, printers and cameras. Moreover, this information is in agreement which the study done by (Chong, 2018) in his findings , he noted that there are various

IT systems used on border management especially for freight transport and these include automated system for vehicle weight and dimension control, automatic vehicle/container recognition systems, video surveillance systems, automatic radiation systems, automatic health check equipment, vehicle smart card, automated passport control system, scanners, electronic seal and vehicle tracking systems, automatic detection and laboratory test equipment, electronic declaration and customs clearance system, computerized systems for transit control, electronic queue management system. Thus, these findings are also in line with findings of this study.

ASYCUDA was the most reported customs software in terms of freight transport clearing. This is in line with the findings of Dongo (2017) in his research in which he noted that the ASYCUDA system was developed by the United Nations Conference on Trade and Development (UNCTAD) and is commonly used in many African countries. Database software was also noted by the respondents as various border agents have their respective databases and database software. Thus, both ZIMRA and ZRA use Oracle Database Software which is linked to their respective national headquarters. In terms of vehicle management software, Real Time Monitoring Systems. Chong, (2018) in his findings noted that Real Time Monitoring Systems are also known as Cargo Control Systems and they are used in various borders by customs for freight transport clearing. This software work hand in hand with electronic cargo tracking system which tracks freight on real time basis. Thus, in a study done by Karibu (2016), in his findings he noted that electronic cargo tracking system uses Radio Frequency Identification (RFID) and Global Positioning System (GPS) to track the movement of vehicles and cargo across nations and is commonly used at borders for freight transport clearing.

Internet is the catalyst which speeds up freight transport clearing as it links hardware and software. Thus the findings of this research indicate that all respondents (100%) agree that internet is a

crucial type of IT system used at Chirundu One Stop Border Post. In an article by TRALAC (2021), on information systems on border management, internet was revealed as the most important type of IT system which speeds ups various border processes including freight transport clearance. Thus, at Chirundu One Stop Border Post there is high usage of internet from various internet service providers which include Telone, NetOne, Zamtel, Airtel and Starlink as revealed by the respondents in the study.

Moreover, the study revealed that there are various uses of IT systems at the border which were categorized in five themes which are administration, control, safety, vehicle management and clearance. In administration, IT systems are used for communication, planning, information storage and sharing. This was reiterated by World Customs Organisation (2020) that in a border set up IT systems are used for various purposes and it is the duty of a country's revenue authority to ensure that its departments, travelers, vehicles and other agencies records are well kept and easily accessible. As the clearance processes and procedures are many, IT systems play a role especially on freight transport clearance through vehicle management that is vehicle and load tracking, vehicle load and weight dimension control and all respondents (100%), from the study agreed on these uses not excluding immigration/passport control. However, all respondents disagreed on the queue management system as they noted that clearance is done on a first come first serve basis. Thus, this have led to various ques at Chirundu Border Post as the drivers of the trucks will park in waiting bays and truck stops while waiting for the whole clearance process. This was observed by the researcher during data collection as ques were seen all over on either side of the border. The findings are in agreement with the study by Ngarachu, et al (2019) which reiterated that Chirundu One Stop Border Post is one of the busiest borders in Southern Africa

especially on freight transport as ques are seen on any given day on either sides, Zimbabwe or Zambia.

5.3 EFFECTS OF IT SYSTEMS ON FREIGHT TRANSPORT CLEARING

The second objective of this study was to assess the effects and efficiency of information technology systems on border management of freight transport clearing at Chirundu One Stop Border Post. In order to realize this objective, the research question which was posed and was answered was the extent to which IT systems play a role in freight transport clearing.

In thematic analysis of this study, the effects of using IT systems were hinged on three categories which are efficiency, effectiveness and security. The findings show that the respondents are in agreement with the effects of using IT systems at the border though they have variations as others strongly agree and others just agreed. The effects included improved security, trade facilitation, efficiency in administration, efficiency on revenue collection, linkages with other stakeholder, effectiveness on vehicle and goods clearance and reduction on waiting times. All respondents agreed and no one disagreed on the effects as they gave advantages to all stakeholders which include haulage truck drivers, clearing agents, banks, customs and immigration officers among others. Various researches by scholars also noted that there are positive effects on the use of IT systems on border management. Doyle (2017) noted that positive effects can be seen on efficient collection of revenue and clearance, improved security and facilitation of trade. Saina (2013) also observed that information technology has positive effects especially on border security and improved performance. Nalishuwa (2020) in the findings of her study noted that adoption of information and technology systems on border management plays a role in improving performance, increased productivity and immediate dissemination of information. IT has played a role in border management on freight transport in terms of time management, improved

information and administrative services especially on the effectiveness of customs clearance processes by customs (Chong, 2018). Thus, these findings are in line with the effects revealed by this study.

However, a variation was found on the reduction of waiting time for haulage trucks to be cleared as 42% strongly greed and 58% agreed on this effect. It led the researcher to focus on time and performance as measures of the efficiency of the IT systems at the border. Thus, maximum and minimum time for freight clearing was measured meaning freight transport clearing in real time is a challenge at the border post. With regards to the minimum time for clearing freight transport, the findings show that the majority of the respondents 72% noted that the minimum time for clearing freight ranges from 0-4 hours, 18% noted that the minimum time ranges form 4-8hours, 5% noted that it ranges from 8-12 hours, 3% noted that it ranges from 12-16 hours, 1% noted it ranges from 16-20hours, another 1% noted that it ranges from 20-24hours and none above 24 hours. Thus, it shows that the minimum time take for clearing freight ranges between 0-24 hours. With regards to maximum time taken for clearing freight transport, the findings show that the majority of the respondents 42% noted that the maximum time for clearing freight ranges from 36-48 hours, 30% noted that the maximum time ranges form 48-72hours, 18% noted that it ranges above 72 hours and 10% noted that it ranges from 24-36 hours. Thus, it shows that the maximum time taken for clearing freight takes days and even weeks. These findings are in line with the findings from various scholars because there are various procedures which are done at the border for freight transport which include scanning and weighing and clearing of consignments as noted by Doyle (2017). Nalishuwa (2020) from her study findings noted that waiting time has been reduced and trucks could do online pre-clearance. TRALAC (2017) noted that the information systems used at Chirundu One Stop Border Post have reduced the time and number of procedures for passenger

and commercial clearance, as before use of IT systems, which would take up to 20days for cargo trucks to be cleared but now it is only a matter of hours. However, Doyle (2017) argue by stating that a little improvement has been done on waiting periods as waiting time of freight transport exceeds 24 hours and pre-clearance is only done through a clearing agent. He argued this by noting that the effectiveness of IT is not being utilized as it is affecting freight transport which in the end distorts the whole supply chain.

Another measurement on the effects of IT systems on the border was the use of performance as an indicator of overall efficiency of these systems. In the findings of this study in Figure 10, it shows that 38% of the respondents thought the performance of the IT systems was excellent and a bigger number of respondents, 44% noted that it was good, 15% noted that it was average and 3% noted that it was below average. However, no one noted of the bad performance. From these findings it shows that the performance of the IT systems at Chirundu One Stop Border Post is not at par top notch as challenges are faced which will be discussed more in the next heading. In a study by TRALAC, (2019) its findings on the overall performance of IT systems was just above average as it noted that IT systems such as internet, scanners and desktops has led to inefficiencies in freight clearing thus leading to poor performance of these systems as they are inadequate and malfunctioning. Thus, the overall findings of this study reveal that there is efficiency with regards to the performance of the IT systems used at Chirundu One Stop Border.

5.4 BARRIERS TO PRACTICAL USE OF IT SYSTEMS ON FREIGHT TRANSPORT CLEARING AND SOLUTIONS TO ENHANCE THESE BARRIERS

The third objective of this study was to identify barriers to practical use of information technology systems at Chirundu One Stop Border Post with regards to freight transport clearing in real time and how can they be enhanced. To address this objective, the research question sought to find the challenges that are faced by freight transport on border clearing with regards to IT and how it can

be enhanced. Thus, from the findings of this study the challenges were categorised into six groups which are complexity, inadequacy, malfunctioning, power, internet and users of the IT systems. Doyle (2017) listed barriers in the findings of his study as human resources, type of systems, lack of systems and lack of supporting infrastructure.

The findings of this study noted that there was complexity of software and information in which from Figure 11 complexity of software as a challenge faced, majority (65%) strongly agreed and 35% agreed. Moreover, on complexity of information 73% strongly agreed and 27% agreed. This is relation to the findings of TRALAC (2017) that other systems are complex and their complexity affects the border procedures. Ndonga (2020) noted that the complexity of software affects freight transport as border agencies interact and interchange data relying on the IT systems such as ASYCUDA World. Moreover, from the findings of this study, the ASYCUDA World system at Chirundu One Stop Border Post is not linked between Zambia and Zimbabwe and this poses a challenge in the processing especially of transit goods. The lack of connectivity of ASYCUDA World for both countries has prevented the designated 'fast track' lane to be fully functional as observed by the researcher during data collection. Thus, with this barrier it can be noted that it is the main reason why freight transport clearing in real time is a challenge as the use of single window entry is ineffective at Chirundu One Stop Border Post.

Inadequate software and hardware is another challenge faced and from the findings of this study 74% strongly agreed and 26% agreed. Thus lack of some IT systems can also be a barrier to freight transport clearing. This is because some systems are expensive hence border agencies will use alternatives which are in most cases tedious and slow for example manual inspection of goods. Doyle (2017) noted that scanning equipment is very expensive and this had led to lack of scanners on various borders in Africa. Ndonga (2020), also raised the same issue explaining that at Chirundu

One Sop Border Post, scanners are a cause of concern as ZIMRA has two scanners which are used for both freight and passenger transport. This was also observed by the researcher during data collection. Moreover, in the study done by National Travel Release Study Working Group in 2020, its findings revealed that, at the Zambian side of Chirundu One Stop Border Post other clearing agents share hardware especially desktops, laptops and servers; thus affecting freight transport clearing in real time. Saina (2013) in the findings of her study noted that border police at Isebania and Busia Border in Kenya did not have IT systems and everything was processed manually. This is also a challenge at Chirundu OSBP as it was observed by the researcher that drivers and clearing agents had various clearance papers which need to be issued manually to customs and health departments. Thus, form these findings one can safely note that inadequacy of IT systems is a barrier to efficiency of freight clearing as it is time consuming and costly.

In the findings of this study, malfunctioning of IT systems was another challenge faced which affects real time clearing of freight transport as 42% strongly agreed and 68% agreed. Respondents noted that the malfunctioning is also due to complexity of data, power outages, out datedness and non-maintenance of the IT systems. Ndonga (2020) noted that IT systems at the Chirundu One Stop Border Post can sometimes be a problem as customs officers always say 'the system is down'. This will surely affect freight transport as malfunctioning of the systems will increase waiting times, ques and unnecessary costs. That is why Doyle (2017) noted that in developing countries there is use of outdated technological systems as compared to developed countries. This is a barrier to practical use of IT because outdated systems pose challenges and at the end affects freight transport by increasing waiting times and costs. Thus, from this one can safely note that malfunctioning systems are a barrier to efficiency and they will surely affect freight transport

which must be inspected and in the end there will be physical inspections which are time consuming.

Power was noted as a barrier faced when using IT systems. This is because all these IT systems rely on power which is electricity. Thus, from the findings of this study a variation was noted whereby the majority 78% of the respondents disagreed with power outages as a challenge faced when using IT systems and the remaining 22% agreed. Many respondents noted that electricity challenges are now history as there is no longer load shedding from Zambia Electricity Supply Company (ZESCO) and Zimbabwe Electricity Supply (ZESA) and also both ZIMRA and ZRA have back up plans of mega generators which are automatically connected in any case of power outages. This was also observed by the researcher as she noticed the mega generators at the back of customs offices. However, power challenges are experienced especially by some clearing agents which do not have backing power systems and this and it will affect the whole customs clearance process thus increasing waiting time and long ques, (National Time Release Study Working Group (2020).

Inconsistent internet connectivity is another a challenge faced when using IT systems, the majority 81% strongly agreed and 19% agreed. Many respondents noted that internet connectivity was a challenge at the border because without internet many procedures will not take place. Ndonga (2020) in his findings noted that at Chirundu One Stop Border Post there is poor and inconsistent internet connectivity and frequent power which will lead to manual documentation and inspection. Many respondents noted that internet is the backbone of many IT systems used at the border and for the clearance to be done in real time there must be available internet connectivity. The researcher observed the inconsistency of internet connectivity as various border agencies and departments use several internet service providers which include Airtel, Zamtel, MTN, Econet,

Telone, NetOne and Starlink only to mention a few. Thus, due to these services providers the speed of transmission varies as some are slow and some are fast. Hence, it affects the freight transport clearing as various agencies use different internet service providers.

Users of the IT systems were also regarded as a barrier to practical use of IT systems. The findings of this study revealed that lack of training of staff on the use of the systems was a challenge and 12% strongly agreed, 66% agreed and 22% disagreed. This is because the IT systems cannot operate on their own but rather people play a role in the use of the IT systems. The International Trade Centre (INTRACEN), (2018), in their surveys and pilot studies' findings noted that, the extensive transactions required on BMIS demand technical and operational capabilities in the form of human resources and skills to manage the system. Thus, human resource is a barrier to practical use of IT systems in most cases there are resistant to change and incompetent to use the systems. Muqayi and Manyeruke (2015) conquered by noting that challenges experienced at Chirundu One Stop Border Post were resulting from poorly trained stuff especially Zambia Revenue Authority. Thus, lack of trainings play a role as a barrier to practical use of IT systems because the systems do not operate on their own they need people to input data for the transactions to be processed and these inputs can be prone to human errors. Ndonga (2020) also noted that clearing and forwarding agents lack international experience and do not take responsibility if there are errors on documents and step out if cargo is lost or damaged. Doyle (2017) put across such sentiments and noted that errors usually occur when border agencies are changing shifts and this will disrupt the whole process. However, the findings of this study noted that some respondents disagreed noting that the users of the IT systems are highly computer literate and do periodic trainings on the use of new IT systems. This also can be extracted form Table 6 in which clearing agents and customs officers are highly computer literate as their levels of computer literacy are advanced and proficient. Other

respondents noted that in some instances it is the character and attitudes of other agencies who work slowly thus affecting the whole clearing process.

However, the study did not end on the challenges faced when using IT systems at the border but rather also asked respondents on solutions to enhance these challenges. As an open ended question, many responses as solutions were centered on political will, use of user friendly software and hardware, use of other power systems, training the users of IT systems and use of efficient internet service providers. Political will was much emphasized by respondents as a solution to challenges faced on the use of IT Systems at Chirundu OBSP because as a juxtaposed one stop border Zimbabwe and Zambia with the help of other international bodies such as SADC and Africa Union must consider linking up their ASYCUDA software so that freight transport clearing in real time will be 100% efficient. This was also reiterated by other respondents that ZIMRA uses an advanced software of ASYCUDA World Plus and ZRA is still using an older version, ASYCUDA World as this brings inefficiencies, hence they must use the same software such as MIDAS which is used by immigration agents across the globe.

Other respondents suggested that there must be continuously training of staff on the use of IT systems put in place and also increase staff working at the border especially customs officers. This was observed by the researcher of this study as there are few border agencies working at the customs department as compared to the trucks which pass the border either Northbound or Southbound. Some respondents also suggested that the customs officers must be motivated in terms of salary increments so that they work effectively and efficiently. Some of the findings were that there must be an increase in the number of IT systems such as printers, desktops, scans and scanners and regular maintenance of these systems. From the findings, respondents recommended on use of strong internet service providers. This is because internet connectivity plays an important

role in freight transport clearing, hence border agencies should use high competitive service providers. Many respondents noted that use of Airtel and NetOne has brought so many challenges to other border agencies as their network connectivity is poor and inconsistent as compared to other service providers such as TelOne, Zamtel and Econet. Some respondents noted that there is need for the border to have more self-service enabled systems which will automate all critical processes of freight clearing so as to achieve efficiency. Lastly the findings of this study noted that all agencies at the Chirundu OSBP should invest solar energy as Chirundu is situated in a dry region which is always hot. Thus, many respondents suggested solar as the best sustainable energy unlike mega generators which use much fuel. Hence, many suggestions as solutions were found in this study which are in line with various research findings of other scholars. These solutions, if implemented will go a long way to increase the efficiency of IT systems on border management of freight transport clearance in real time.

5.5 SUMMARY

This chapter discussed the findings of the study and linked their connection to assessing the efficiency of IT systems on border management of freight transport clearing in real time at Chirundu One Stop Border Post. The chapter also established that the objectives and research questions of the study were addressed.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 OVERVIEW

This chapter presents the conclusions and recommendations which were made based on the research findings and discussions of the study. The conclusions were presented in line with the research objectives which were to: determine the information technology systems used on freight transport clearing at Chirundu One Stop Border Post, assess the effects of information technology systems on border management of freight transport at Chirundu One Stop Border Post and identify barriers to practical use of information technology systems at Chirundu One Stop Border Post with regards to freight transport clearing in real time.

6.2 CONCLUSIONS

The purpose of this study was to assess the efficiency of IT systems used in the management of Chirundu One Stop Border Post on the clearing of freight transport. The principle behind was to know the IT systems used at the border and how there are used by ZRA, ZIMRA and clearing agents and their effectiveness and efficiency on freight transport clearing. From the findings which were in line with research objectives a number of conclusions were made.

6.2.1

The first objective of the study was to determine the information technology systems used on freight transport clearing and the findings indicated that the ICT systems were categorically in components which are hardware, software and internet connectivity. Thus, these were further broken down into systems/tools such as laptops, desktops, scanners, video surveillances, information systems such as real time tracking systems, ASYCUDA

World, immigration software (MIDAS) and internet. Agents at the border post such as customs department, immigration, health department, banks, clearing agents use these systems to clear freight in real time. Moreover, these IT systems are used for various purposes in clearing freight transport which include health control, safety measures, declaration and clearance of goods, immigration/passport control, information storage and record keeping, information sharing among stakeholders, vehicle and load tracking and vehicle, load weight and dimension control.

6.2.2

The second objective was focused on assessing the effects and efficiency of information technology systems on border management of freight transport clearing at Chirundu One Stop Border Post, it was found that IT systems have positive effects which include efficiency in administration and revenue collection, improved security, facilitation of trade, improved security, linkages of border agents and other stakeholders, reduced waiting times and effectiveness of vehicle and goods clearances. Moreover, in terms of efficiency of the IT systems performance and clearance time were used as measures of the efficiency. Performance of the IT systems were above average and the minimum time taken to clear freight transport was in a range of 0-4 hours while the maximum time was above 72hours. Thus, this meant that the efficiency of real time clearing has remained a cause of concern, though waiting times have reduced as compared to findings of other studies done at Chirundu OSBP.

6.2.3

The last objective focused on identifying barriers to practical use of IT systems at Chirundu One Stop Border Post with regards to freight transport clearing in real time and how they can be enhanced. It was found that various challenges are faced by haulage drivers, clearing agents and customs officers. These challenges included complexity of software, inadequate software and hardware, lack of training of stuff, malfunctioning of systems, complexity of information, power outages and inconsistent internet connectivity. Thus, solutions to enhance barriers faced when using IT systems, it was found out that there was need of continuous training of border agents on the use of IT systems, increase stuff working at the border especially customs and immigration officers, increase hardware especially scanners ,desktops and printers, use of up to date software, maintenance of the IT systems, use of strong internet service providers and use of self-service IT systems which will play a role in real time clearing of freight transport.

6.3 RECOMMENDATIONS

The use of IT systems at border posts on freight clearing is very important for everyone which include service providers such as customs and immigration departments, clearing and forwarding agents and beneficiaries of these systems which are haulage truck drivers and their respective companies so as to carry out their day to day duties smoothly. In this regard and based on findings of the study and discussions thereof, the following recommendations were made:

(i) Border agents such as customs officers, immigrations officers and clearing agents should increase their knowledge of ICT so that they can fully utilize it when executing their duties.

(ii) Customs departments should be proactive when it comes to the maintenance and upgrading of the available IT systems.

(iii) Customs departments should consider investing in other sources of electricity such as solar power as a way of enhancing the use of IT systems at the border in cases of power outages.

(iv) Border agents should also use efficient network providers and to have back up plans of service providers.

(v) Customs departments through their respective ministries and governments should initiate projects of linking up software with other countries for the smooth flow of information especially at One Stop Border Posts.

6.4 SUGGESTIONS FOR FUTURE RESEARCH

With regards to the major findings of this study, a proposal for future research of other one stop border posts in Africa must be taken into consideration. There is need to replicate this study using various border posts so as to assess the efficiency of IT systems on freight transport clearing in real time.

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APPENDICES

APPENDIX I: BUDGET

ITEM	DESCRIPTION	COST (ZMK)
Airtime	Phone calls and Internet	500
Stationery	Books, Pens, Envelopes, etc.	100
	Printing and Photocopying	2 000
	Recorder for Interviews	2 000
Travelling	From Mwinilunga to Chirundu	1 000
	Chirundu to Mwinilunga	1 000
Accommodation	In Chirundu	3 000
Personal	Food and Miscellaneous	2 000
	TOTAL	**11 600**

APPENDIX II: GANT CHART

	April 2023	**May 2023**	**June 2023**	**July 2023**	**August 2023**	**September 2023**	**October 2023**	**November 2023**
Preparation of research proposal								
Presentation of Research proposal								
Working on Corrections and Submission to Ethics Committee								
Data Collection								
Data Analysis								
Report Writing								
Submission of Dissertation								

APPENDIX III: MAP OF STUDY AREA

APPENDIX IV: KEY INFORMANT INTERVIEW GUIDE FOR HEAD OF CUSTOMS (ZIMRA AND ZRA)
UNIVERSITY OF ZAMBIA IN COLLABORATION WITH ZIMBABWE OPEN UNIVERSITY

Research Topic: An assessment of the efficiency of Information Technology systems on border management of freight transport clearing in real time. A case of Chirundu One Stop Border Post, Chirundu, Zambia-Zimbabwe.

Interview Date…… **Interview Duration**…….

Venue of Interview……

Opening Remarks

In the opening remarks, the interviewer will;

-Thank the participate for accepting to be interviewed and seek consent to record the interview.

-Introduces herself and stating the purpose of the interview.

Beginning of The Interview

PART 1: INTRODUCTION

1.Kindly tell me about yourself and what you do, for the sake of anonymity do not mention your name.

PART 2: TYPES OF IT SYSTEMS USED AT THE CHIRUNDU OSBP

2.Which IT systems do you use for freight transport clearing at Chirundu one stop border post?
3.Of the IT systems that you mentioned, what are their purposes?

PART 3: USE OF IT SYSTEMS ON BORDER MANAGEMENT OF FREIGHT TRANSPORT

4.How does the use of IT systems play a role in border management of freight transport clearing?
5.What are the effects of using IT systems on border management of freight transport clearing?

PART 4: BARRIERS TO PRACTICAL USE OF IT SYSTEMS AT CHIRUNDU OSBP

6.What challenges are you facing when using IT systems when clearing freight transport?
7. Is there anything that you can do or that you have done differently in your quest to eliminate the barriers faced when using IT systems in the management of the border especially on clearing of freight transport?
8. How can the application of IT systems on border management be enhanced especially on clearing of freight transport at Chirundu One Stop-Border post?
9.Are they any issues, comments and suggestions you may wish to raise so that they can be captured in this research study?

THANK YOU.

APPENDIX V: QUESTIONNAIRE FOR CUSTOMS OFFICERS

UNIVERSITY OF ZAMBIA IN COLLABORATION WITH ZIMBABWE OPEN UNIVERSITY

Research Topic: An assessment of the efficiency of Information Technology systems on border management of freight transport clearing in real time. A case of Chirundu One Stop-Border Post, Chirundu, Zambia-Zimbabwe.

Dear Participant

My name is Angela Elsie Makoni and I am a postgraduate student at the University of Zambia (UNZA) pursuing a Master of Business Administration. I am conducting a research on information technology systems on border management at Chirundu One Stop Border Post. You are kindly requested to provide responses to the questions in this questionnaire truthfully and honestly. You should be rest assured that the information that you will provide will be treated with confidentiality and will only be used for academic purposes. Please do not write your name on the questionnaire.

Date……..

Questionnaire Number……...

PART 1: DEMOGRAPHIC INFORMATION

(Provide the answers by placing a tick in a box which is applicable to you)

1.What is your age group?

AGE GROUP	i. 20 -30 years	☐	ii. 31-40years	☐
	iii. 41-50 years	☐	iv. Above 50 years	☐

2.Kindly state your gender

GENDER	i. Female	☐	ii. Male	☐

3.What is your highest level of education?

EDUCATION QUALIFICATION				
	i. Certificate	☐	ii. Diploma	☐
	iii. Degree	☐	iv. Masters	☐

4.How long have you served in your current position?

YEARS IN CURRENT POSITION				
	i.0-5 years	☐	ii.6-10years	☐
	ii.11-15 years	☐	iv. Above 15 years	☐

5. Are you computer literate? (If yes, what is your level of qualification)

COMPUTER LITERACY

i. Basic ☐ ii. Immediate ☐

ii. Advanced ☐ iv. Proficient ☐

PART 2: TYPES OF IT SYSTEMS. (Tick in the appropriate box where applicable)

6. Which Information Technology systems are used at Chirundu One Stop Border Post especially on freight transport and how much do you agree with their application when performing your duties as a customs officer?

	TYPES OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Laptops		
2.	Desktops		
3.	Printers		
4.	Databases		
5.	Software		
6.	Internet		
7.	Video Surveillances		
8.	Automatic Radiation Systems		
9.	Scanners		
10.	Automatic Vehicle/Container recognition System		
11.	Automatic health Check Equipment		
12.	Vehicle Smart Card		
13.	Electronic Seal and Vehicle Tracking System		
14.	Electronic Declaration and Customs Clearance System		
15.	Computerised System for transit control		
16.	Electronic Queue Management System		

PART 3: USES OF IT SYSTEMS ON BORDER MANAGEMENT OF FREIGHT TRANSPORT.

7.How much do you agree as a customs officer on the use of IT systems in areas listed below on border management of freight transport?

	USES OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Passport Control		
2.	Communication and Planning		
3.	Information Sharing (With other stakeholders)		
4.	Information storage-record keeping		
5.	Vehicle and load Tracking		
6.	Vehicle and load weight and dimension control		
7.	Health control		
8.	Declaration and clearance of goods		
9.	Queue Management		
10.	Safety Measures		

8.How much do you agree as a customs officer on the effects of using of IT systems on border management of freight transport at Chirundu One Stop Border Post?

	EFFECTS OF IT SYSTEMS	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
1.	Efficiency on administration			
2.	Efficiency on revenue collection			
3.	Improved Security			
4.	Facilitation of Trade			
5.	Linkages with other stakeholders			
6.	Effectiveness of vehicle and goods clearance			
7.	Reduced waiting time for haulage trucks			

9. What is the minimum time you have cleared freight transport?

i.0-4 hours ☐ ii.5-8 hours ☐
iii.9-12 hours ☐ iv. 13-16 hours ☐
v.17-20 hours ☐ vi.20-24 hours ☐

10. What is the maximum/longest time you have cleared freight transport?

i.24-36 hours ☐ ii.36-48hours ☐
iii.48-60 hours ☐ iv. 60-72 hours ☐
v. Above 72hours hours ☐

11. How would you rate the efficiency of the IT Systems on Chirundu One Stop Border Post in terms of performance on border management of freight clearing?

i. Excellent ☐ ii. Good ☐
iii. Average ☐ iv. Below Average ☐
v. Bad ☐

PART 4. BARRIERS TO PRACTICAL USE OF IT SYSTEMS AT CHIRUNDU ONE STOP BORDER POST

12.How much do you agree as a customs officer on the barriers you face when using IT systems on border management of freight transport at Chirundu One Stop Border Post?

	BARRIERS FACED WHEN USING IT SYSTEMS	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
1.	Complexity of Software			
2.	Inadequate software and hardware			
3.	Lack of training on use of systems			
4.	Malfunctioning of systems			
5.	Complexity of information			
6.	Power Outages			
7.	Inconsistent internet connectivity			

13.How can the barriers faced on using of IT systems on border management be enhanced especially on freight transport at Chirundu One Stop-Border?

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Thank You.

APPENDIX VI: QUESTIONNAIRE FOR CLEARING AND FORWARDING AGENTS UNIVERSITY OF ZAMBIA IN COLLABORATION WITH ZIMBABWE OPEN UNIVERSITY

Research Topic: An assessment of the efficiency of Information Technology systems on border management of freight transport clearing in real time. A case of Chirundu One Stop-Border Post, Chirundu, Zambia-Zimbabwe.

Dear Participant

My name is Angela Elsie Makoni and I am a postgraduate student at the University of Zambia (UNZA) pursuing a Master of Business Administration. I am conducting a research on information technology systems on border management at Chirundu One Stop Border Post. You are kindly requested to provide responses to the questions in this questionnaire truthfully and honestly. You should be rest assured that the information that you will provide will be treated with confidentiality and will only be used for academic purposes. Please do not write your name on the questionnaire.

Date…….

Questionnaire Number……

PART 1: DEMOGRAPHIC INFORMATION

(Provide the answers by placing a tick in a box which is applicable to you)

1.What is your age group?

AGE GROUP	i. 20 -30 years	☐	ii. 31-40years	☐
	iii. 41-50 years	☐	iv. Above 50 years	☐

2.Kindly state your gender.

GENDER	i. Female	☐	ii. Male	☐

3.What is your highest level of education?

EDUCATION QUALIFICATION

i. Certificate	☐	ii. Diploma	☐
iii. Degree	☐	iv. Masters	☐

4.How long have you served in your current position?

YEARS IN CURRENT POSITION

i.0-5 years	☐	ii.6-10years	☐
ii.11-15 years	☐	iv. Above 15 years	☐

5. Are you computer literate? (If yes, what is your level of qualification)

COMPUTER LITERACY

i. Basic ☐ ii. Immediate ☐

iii. Advanced ☐ iv. Proficient ☐

PART 2: TYPES OF IT SYSTEMS. (Tick in the appropriate box, where applicable)

6. Which Information Technology systems do you use which are linked with Customs Departments at Chirundu One Stop Border Post especially on freight transport and how much do you agree with their application when performing your duties as a clearing and forwarding agent?

	TYPES OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Laptops		
2.	Desktops		
3.	Printers		
4.	Databases		
5.	Software		
6.	Internet		
7.	Video Surveillances		
8.	Automatic Radiation Systems		
9.	Scanners		
10.	Automatic Vehicle/Container recognition System		
11.	Automatic health Check Equipment		
12.	Vehicle Smart Card		
13.	Electronic Seal and Vehicle Tracking System		
14.	Electronic Declaration and Customs Clearance System		
15.	Computerised System for transit control		
16.	Electronic Queue Management System		

PART 3: USE OF IT SYSTEMS ON FREIGHT TRANSPORT.

7.How much do you agree as a clearing and forwarding agent on the use of IT systems in areas listed below on freight transport?

	USES OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Passport Control		
2.	Communication and Planning		
3.	Information Sharing (With other stakeholders)		
4.	Information storage-record keeping		
5.	Vehicle and load Tracking		
6.	Vehicle and load weight and dimension control		
7.	Health control		
8.	Declaration and clearance of goods		
9.	Queue Management		
10.	Safety Measures		

8.How much do you agree as a clearing and forwarding agent on the effects of using of IT systems on freight transport at Chirundu One Stop Border Post?

	EFFECTS OF IT SYSTEMS	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
1.	Efficiency on administration			
2.	Efficiency on revenue collection			
3.	Improved Security			
4.	Facilitation of Trade			
5.	Linkages with other stakeholders			
6.	Effectiveness of vehicle and goods clearance			
7.	Reduced waiting time for haulage trucks			

9. What is the shortest time you have taken to clear a haulage truck at Chirundu One Stop Border Post?

i. 0-4 hours ☐ ii. 5-8 hours ☐

iii. 9-12 hours ☐ iv. 13-16 hours ☐

v. 17-20 hours ☐ vi. 21-24 hours ☐

vii. Above 24 hours ☐

10. What is the longest time you have taken to clear a haulage truck at Chirundu One Stop Border Post?

i. 24-36 hours ☐ ii. 36-48 hours ☐

iii. 48-60 hours ☐ iv. 60-72hours ☐

v. Above 72 hours ☐

11. How would you rate the efficiency of the IT Systems on Chirundu One Stop Border Post in terms of performance on border management of freight clearing?

i. Excellent ☐ ii. Good ☐

iii. Average ☐ iv. Below Average ☐

v. Bad ☐

PART 4. BARRIERS TO PRACTICAL USE OF IT SYSTEMS AT CHIRUNDU ONE STOP BORDER POST

12.How much do you agree as a clearing and forwarding agent on the barriers you face when using IT systems on freight transport at Chirundu One Stop Border Post?

	BARRIERS FACED WHEN USING IT SYSTEMS	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
1.	Complexity of Software			
2.	Inadequate software and hardware			
3.	Lack of training on use of systems			
4.	Malfunctioning of systems			
5.	Complexity of information			
6.	Power Outages			
7.	Inconsistent internet connectivity			

13.How can the barriers faced on using IT systems be enhanced especially on freight transport at Chirundu One Stop Border Post?

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Thank You.

APPENDIX VII: QUESTIONNAIRE FOR HAULAGE TRUCK DRIVERS UNIVERSITY OF ZAMBIA IN COLLABORATION WITH ZIMBABWE OPEN UNIVERSITY

Research Topic: An assessment of the efficiency of Information Technology systems on border management of freight transport clearing in real time. A case of Chirundu One Stop-Border Post, Chirundu, Zambia-Zimbabwe.

Dear Participant

My name is Angela Elsie Makoni and I am a postgraduate student at the University of Zambia (UNZA) pursuing a Master of Business Administration. I am conducting a research on information technology systems on border management at Chirundu One Stop Border Post. You are kindly requested to provide responses to the questions in this questionnaire truthfully and honestly. You should be rest assured that the information that you will provide will be treated with confidentiality and will only be used for academic purposes. Please do not write your name on the questionnaire.

Date……

Questionnaire Number…….

PART 1: DEMOGRAPHIC INFORMATION

(Provide the answers by placing a tick in a box which is applicable to you)

1.What is your age group?

AGE GROUP	i. 20 -30 years	☐	ii. 31-40years	☐
	iii. 41-50 years	☐	iv. Above 50 years	☐

2.Kindly state your gender.

GENDER	i. Female	☐	ii. Male	☐

3.What is your highest level of education?

EDUCATION QUALIFICATION				
	i. Diploma	☐	ii. Degree	☐
	iii. Masters	☐	iv. Doctorate	☐

4.How long have you served in your current position?

YEARS IN CURRENT POSITION				
	i.0-5 years	☐	ii.6-10years	☐
	ii.11-15 years	☐	iv. Above 15 years	☐

5. Are you computer literate? (If yes, what is your level of qualification)

COMPUTER LITERACY

i. Basic ☐ ii. Immediate ☐

iii. Advanced ☐ iv. Proficient ☐

PART 2: TYPES OF IT SYSTEMS. (Tick in the appropriate box, where applicable)

6. Which Information Technology systems are used by the Customs Departments and Clearing agents at Chirundu One Stop Border Post for freight transport and how much do you agree with their application on your truck and goods?

	TYPES OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Laptops		
2.	Desktops		
3.	Printers		
4.	Databases		
5.	Software		
6.	Internet		
7.	Video Surveillances		
8.	Automatic Radiation Systems		
9.	Scanners		
10.	Automatic Vehicle/Container recognition System		
11.	Automatic health Check Equipment		
12.	Vehicle Smart Card		
13.	Electronic Seal and Vehicle Tracking System		
14.	Electronic Declaration and Customs Clearance System		
15.	Computerised System for transit control		
16.	Electronic Queue Management System		

PART 3: USE OF IT SYSTEMS ON FREIGHT TRANSPORT.

7.How much do you agree as a haulage truck driver on the use of IT systems in areas listed below on freight transport?

	USES OF IT SYSTEMS	**DISAGREE**	**AGREE STRONGLY AGREE**
1.	Passport Control		
2.	Communication and Planning		
3.	Information Sharing (With other stakeholders)		
4.	Information storage-record keeping		
5.	Vehicle and load Tracking		
6.	Vehicle and load weight and dimension control		
7.	Health control		
8.	Declaration and clearance of goods		
9.	Queue Management		
10.	Safety Measures		

8.How much do you agree as a haulage truck driver on the effects of using of IT systems on freight transport at Chirundu One Stop Border Post?

	EFFECTS OF IT SYSTEMS	**DISAGREE**	**AGREE**
1.	Efficiency on administration		
2.	Efficiency on revenue collection		
3.	Improved Security		
4.	Facilitation of Trade		
5.	Linkages with other stakeholders		
6.	Effectiveness of vehicle and goods clearance		
7.	Reduced waiting time for haulage trucks		

9. What is the shortest time you have taken to clear a haulage truck at Chirundu One Stop Border Post?

i. 0-4 hours ☐ ii. 5-8 hours ☐

iii. 9-12 hours ☐ iv. 13-16 hours ☐

v. 17-20 hours ☐ vi. 21-24 hours ☐

vii. Above 24 hours ☐

10. What is the longest time you have taken to clear a haulage truck at Chirundu One Stop Border Post?

i. 24-36 hours ☐ ii. 36-48 hours ☐

iii. 48-60 hours ☐ iv. 60-72hours ☐

v. Above 72 hours ☐

11. How would you rate the efficiency of the IT Systems on Chirundu One Stop Border Post in terms of performance on border management of freight clearing?

i. Excellent ☐ ii. Good ☐

iii. Average ☐ iv. Below Average ☐

v. Bad ☐

PART 4. BARRIERS TO PRACTICAL USE OF IT SYSTEMS AT CHIRUNDU ONE STOP BORDER POST

12.How much do you agree as a haulage truck driver on the barriers you face when using IT systems on freight transport at Chirundu One Stop Border Post?

	BARRIERS FACED WHEN USING IT SYSTEMS	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
1.	Complexity of Software			
2.	Inadequate software and hardware			
3.	Lack of training on use of systems			
4.	Malfunctioning of systems			
5.	Complexity of information			
6.	Power Outages			
7.	Inconsistent internet connectivity			

13.How can the barriers faced on using IT systems be enhanced especially on freight transport at Chirundu One Stop-Border Post?

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Thank You.

APPENDIX VIII: ETHICAL CLEARANCE APPROVAL LETTER

THE UNIVERSITY OF ZAMBIA
DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Great East Road Campus | P.O. Box 32379 | Lusaka10101 | Tel: +260-211-290 258/291 777 **Fax**: (+260)-211-290 258/253 952 | E-**mail**: director.drgs@unza.zm | Website: www.unza.zm

APPROVAL OF STUDY

IORG No. 0005376
HSSREC IRB No. 00006464
REF NO. HSSREC-2023-SEPT-007

26th September, 2023,

Ms. Angela Elsie Makoni
The University of Zambia,
P.O. Box 32379
LUSAKA

Dear, Ms Makoni

RE: ‘‘AN ASSESSMENT OF THE EFFICIENCY OF INFORMATION TECHNOLOGY SYSTEMS ON BORDER MANAGEMENT OF FREIGHT TRANSPORT CLEARING IN REAL TIME. A CASE OF CHIRUNDU ONE STOP BORDER POST, CHIRUNDU, ZAMBIA-ZIMBABWE”

Reference is made to your submission of the protocol captioned above.

The HSSREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

REVIEW TYPE	ORDINARY REVIEW	APPROVAL NO. HSSREC - 2023- SEPT- 007
Approval and Expiry Date	Approval Date: 26th September, 2023	Expiry Date: 27th September, 2024
Protocol Version and Date	Version - Nil.	27th September, 2024
Information Sheet, Consent Forms and Dates	English.	To be provided
Consent form ID and Date	Version - Nil	To be provided
Recruitment Materials	Nil	Nil
Other Study Documents	-Questionnaire -Interview Guide	
Number of Participants Approved for Study		

CONDITIONS OF APPROVAL

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.

- All unanticipated or Serious Adverse Events (SAEs) must be reported to HSSREC within 5 days.

- All protocol modifications must be approved by HSSREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.

- All protocol deviations must be reported to HSSREC within 5 working days.

- All recruitment materials must be approved by HSSREC prior to being used.

- Principal investigators are responsible for initiating Continuing Review proceedings. HSSREC will only approve a study for a period of 12 months.

- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to HSSREC.

- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by HSSREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will be labelled “late submissions” and will incur a penalty fee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.

- Every 6 (six) months a progress report form supplied by The University of Zambia Humanities and Social Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.

- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO), both HSSREC and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.

- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.

- Filing a closing report (rather than just letting your approval lapse) is important as it assists HSSREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.

- A reprint of this letter shall be done at a fee.

- All protocol modifications must be approved by HSSREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except were noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by HSSREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of HSSREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,

Dr. J.I. Ziwa

DR. J. I. Ziwa

CHAIRPERSON

THE UNIVERSITY OF ZAMBIA HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE - IRB

CC: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies