The role of management Information systems in enhancing Interoperability in E-governance

A case of Galaxy backbone.
Abstract

Informatics is a deep area of science with having information system as well as technology, and in recent times, Information technology organizations cannot exist without a functioning information system. It facilitates and promote the information flow within an organization, at all levels, particularly it allows set of data to reach the right persons, in the right format, and at the right time, generating a positive and beneficial contribution to the organization. The world has become a global village where every nation including Nigeria is striving to attain a high level of electronic governance to bring about inclusiveness, effectiveness, integration, and accountability. Which is why this thesis aims to examine the role of management information systems in enhancing interoperability between e-governance systems in Nigeria.

Interpretive qualitative research was carried out to examine the practices and performance of management information systems in Galaxy backbone in Nigeria to examine how it can be better enhanced interoperability within the organization. Data was gathered through semi-structured interviews and Focus group discussions and was analysed thematically to generate four themes. The findings were discussed in relation to the research questions and previous literature and were discussed with the use of Resource-based theory.

The result of the findings reveals that management information system important to enhance interoperability in the organization and it will go a long way bring about an integrative nature of information flow within the organization, it will change the physical and manual way processes to accommodate internal networks and departmental integrated systems. For a functional management information system, resources like Information communication technology infrastructure, skills, human resources must be available for effective interoperability. this shows that, management information systems will enhance interoperability between government systems and initiatives to make the government more open to citizen participation and involvement and be a tool for better governance. Management information systems will allow governments, through their departments and ministries, to easily generate, analyse, share, disseminate and manipulate information.

Key words

Information Systems, Management Information systems, Information communication Technology, Resources, Interoperability, Qualitative research, Resource-based Theory.
Acknowledgments

I would like to thank myself for putting the work to see this thesis is completed, I would like to thank my parents (Mr. & Mrs. Fashina) for sponsoring my education and always praying for me, it’s all love from you guys, and I am grateful.

I would like to thank my Twin sister (Omotola) for your love and daily encouragements, I was always exhausted, but your strength and kind words got me to this point, thank you so much. I would like to thank my brothers Timilehin and Sunmisola for always checking in on me.

I would like to thank my supervisor Imad Bani Hani for his guidance, feedback, and support throughout this thesis. You were very patient with me and helpful, I do not take for granted, Thank you. Many thanks the participants, for taking out time to answer my questions, without you guys this study would have been impossible. Thank you all!
# Table of contents

1 **Introduction.**  
1.1 *Background, Research Problem and Research Setting* 1  
1.2 *Purpose statement and Research questions* 3  
1.3 *Previous studies* 3  
1.4 *Topic Justification* 4  
1.5 *Scope and Limitation* 4  
1.6 *Thesis organization* 5  

2 **Literature Review**  
2.1 *Search Strategy* 7  
2.2 *Management Information Systems* 8  
2.3 *E-governance* 10  
2.4 *Management Information systems in E-governance* 11  
2.5 *Interoperability* 12  
2.6 *Interoperability Challenges* 14  
2.7 *The Resource-based Theory* 15  
2.8 *Theoretical Framework* 17  

3 **Methodology** 18  
3.1 *Philosophical paradigm* 18  
3.2 *Methodological Approach* 19  
3.3 *Data collection Methods* 19  
3.3.1 *Participants* 20  
3.3.2 *Interviews* 20  
3.3.3 *Focus Group* 21  
3.4 *Method of data Analysis* 21  
3.4.1 *Thematic Analysis* 22  
3.5 *Reliability and Validity* 23  
3.6 *Ethical Consideration* 23  

4 **Empirical Finding** 25  
4.1 *Overview of the empirical findings* 25  
4.2 *Theme 1 Obstinate attitude of staff and workers when it comes to change.* 25  
4.3 *Theme 2 Unavailability of Resources* 26  
4.4 *Theme 3 Bureaucratic bottlenecks at Interdepartmental level* 26  
4.5 *Theme 4 Information sharing, communication, and integration* 27  
4.6 *Summary of Findings* 27  

5 **Discussion** 29  
5.1 *The research questions* 29  
5.2 *Research findings based on the theoretical framework* 30  

6 **Conclusion** 34  
6.1 *Conclusion* 34
6.2 Research contribution 35
  6.2.1 Theoretical contribution 35
  6.2.2 Practical contribution 35
  6.3 Future research 35

7 Reference List 36

8 Appendices 40
List of figures
Figure 1 Six phases of thematic analysis...........................................22

List of tables
Table 1 Interview sessions with participants.................................20
Table 2 answer to the first research question...............................29
Table 3 answer to the second research question............................30
Table 4 Interview Guide...............................................................41
Table 5 Informed consent form for Interview and focus group.........42
1 Introduction.

This chapter presents the introduction to the master’s thesis research. Firstly, it presents the background of the research, the research problem, and the research setting. Secondly, it presents the purpose and the aim of the research along with the research questions. Thirdly, previous, and related studies are discussed to provide a base for justifying the research topic. Finally, the scope and limitations of the research are discussed, then the chapter is concluded by demonstrating the structure of the master’s thesis.

1.1 Background, Research Problem and Research Setting

Informatics is a deep area of science with having information system as well as technology, and in recent times, Information technology organizations cannot exist without a functioning information system. According to Amey, Jessup-Anger and Jessup-Anger, (2008) Information systems studies the representation, processing, and communication of information in natural and artificial systems. Considering technological artefacts, people and organizations all process information, information systems have computational, cognitive, and social aspects. This master thesis points towards e-governance as it is immensely entwined within the area of informatics. E-governance is seen as a two-way communication process that involves the use of information and communication technology to deliver government services and ensuring these government services are available to the citizens. The application of e-governance has become an important system in enhancing citizen’s participation, monitoring, and evaluating government projects, ensuring government accountability and transparency as well as transferring information from one sector to another (Adah and Abasilim, 2015).

Most of the developing countries are faced with issues when introducing e-governance into their system and sometimes it fails. According to Heeks (2003) implementations of e-government in developing countries fail or are abandoned because they do not fulfil or execute the goals they are deployed for. As we know Nigeria is a developing country and is striving to attain a high level of electronic governance where it is moving away from constitutional devolution, disconnected and single-purpose organisations to a more unified approach of public service delivery. This is an ideal move towards the perception of a connected, networked, citizen entered government. However, this has been very difficult to achieve because government initiatives are not interoperable. For systems to be interoperable they need to interact with one another and exchange data according to a specific prescribed method to achieve predictable results. Why this research looks to examine how Management information systems can bring about an incorporated public delivery approach.

The use of Management information systems which is a subset of Information system make use of Information communication Technology for
gathering and communicating information an organisation uses for operation (Laudon and Laudon, 2017). It is an information communication technology aimed at enhancing communication needed to aid managerial functions and connecting an organization with its external environment (Olalekan, 2014). This definition lays a strong foundation for reviewing management information systems which involve enhancing communication and connecting organizations with their external environment. Management information systems can also be described as a communication link that ensures that the roles and functions of management and managers are possible (Laudon and Laudon, 2017).

Apart from interaction and communication enhancement benefits, other definitions of Management Information Systems capture the role of data and information for the smooth performance of business and social activities. In line with this view, (King and Rodriguez, 1978, p. 46) defined management information systems as a “technological based system which transforms data into relevant information essential to providing the support necessary for making right decisions” which helps in bringing technological development that makes good governance possible by improving sectors like public administration, education, health, agriculture, and environment (Mohammed, et al., 2017).

Since governments systems are moving away from structural devolution, disaggregation, and single-purpose organizations to more integrated approach of public service delivery this means the systems must be interoperable. Therefore, it is safe to conclude that management information systems are a technology aimed towards building interactions by enhancing interoperability between the government and its respective initiatives. Since management information systems will play a significant role in the interoperability of e-governance systems, one must investigate practices in place with respect to management information systems in an organization in Nigeria to gain contextual knowledge of this multifaceted phenomenon.

The research setting is that of an information technology organization called Galaxy backbone, this organization is the leading enabler of e-governance in Nigeria and Africa responsible for providing network services to government initiatives, they provide IT and shared services to the government administration of Nigeria and is instrumental in driving the nation's Information Communication Technology (ICT) procedure and IT infrastructure to attain the 2020 eGovernment targets by the Nigerian government. Galaxy backbone is currently working on creating an enabling IT environment for Government Digital Transformation (GDT) in Nigeria, and an interoperability framework is one of the critical steps taken by Galaxy backbone to achieve the Government Digital Transformation. This organization works closely with other government organizations in Nigeria and has a management information system implemented for their activities.
This requires explorations as to how different departments of the organization interact and interoperate with each other and what challenges they face management information system in place.

1.2 Purpose statement and Research questions
The purpose of this thesis is to investigate the role of management information system in enhancing interoperability in e-governance systems. This is done by investigating the management information systems in Galaxy backbone in Nigeria. In order to accomplish the purpose of this thesis, the following research questions were formulated.

- What are the challenges of interoperability in e-governance systems?
- How can management information systems enhance interoperability?

1.3 Previous studies
Boluwaji and Opeyemi (2020) studied the effect of management information systems on the performance of business organisations in Nigeria. A quantitative approach was used to evaluate the performance of management information systems in business organisations over the past few years. Boluwaji and Opeyemi (2020)’s study unveils the factors militating against the development of management information systems in Nigeria. Results of the study reveal that poor financing, poor technological infrastructure, and tools, unfavourable government policies, lack of innovation. These factors reduce the ability of the organisation to compete in the global market through the development of a resilient management information system (Boluwaji and Opeyemi, 2020). In a similar study by Jones and Arnett (1993) on the current practices of management information systems it was discovered that management information system is critical for decision making and information sharing. The poor management information system was identified because of a lack of good technological infrastructures and tools for storing and retrieving data which consequently hinders the organisation from taking short- and long-term decisions.

Similarly, Ramesh, Vivekavardhan and Bharathi (2015) examined the challenges of successful e-governance interoperability implementation in Nigeria. The first major barrier identified is strong opposition from the bureaucratic quarters of the policy. Ramesh, Vivekavardhan and Bharathi (2015) explained this by noting that members of the over-bloated public service may perceive the e-governance policy as an attempt by the government to reduce human power jobs. Other challenges include lack of integrated policies and programs, lack collaborative and collective responses to social problems, not promoting shared infrastructure and applications, not leveraging on comparative advantages of various agencies and maximising value from investments in e-governement, also lack technical skills in human resources to manage the ICT infrastructures and tools, high costs of procuring ICT.
infrastructures and tools, and training of staff. Ramesh, Vivekavardhan and Bharathi (2015) further noted that another major challenge is the lack of adequate power supply in the country since ICT infrastructures require a regular power supply. The use of generators however is not always effective to adequately power ICT facilities. Other studies such as stress the barriers hindering the implementation of e-governance in Nigeria. According to the study, the hurdles to implementing e-governance and interoperability between the systems in Nigeria are the same of other developing countries. Adisa et al. (2017) identify barriers such as poor telecommunications and internet facilities. Citing Fatile (2012) and Ajibade et al. (2017) further stated that the technological frameworks for adopting e-governance in Nigeria are sub-standard. Other major challenges include poor ICT facilities, digital divide, poor power supply, and low technical skills. Furthermore, there are very limited similar studies on how management information systems can enhance interoperability.

1.4 Topic Justification

This master thesis topic is rooted in the Informatics research field. The previous research studies shows that more research is needed to explore the use of management information systems in enhancing interoperability amongst e-governance initiatives. Furthermore, the present knowledge needs to be investigated to understand how this works in real organization settings.

This master thesis contributes practically to information system development in organizations, to envision measures for interoperability. Most times, when it comes to interoperability, there is much focus on the technical aspect with few considerations on the Human factors that identify and agree on seamless required processes for seamless exchange of data through technical infrastructures. The result of this thesis will bring about how technical and human aspects of systems can work together to achieve seamless delivery of governance services to the public.

Furthermore, Nigeria is a developing country who is still faced with several challenges concerning the use of e-governance with interoperability as one of its challenges, which is why this thesis aims to understand the current practices, processes, and technology involvement in the system and what needs to be done to achieve seamless interoperability.

1.5 Scope and Limitation

This thesis aims to investigate the role management information systems will play in enhancing interoperability between e-governance systems and initiatives. To limiting the scope of this thesis, management information systems is the accumulation of various technologies, processes, and human power, applied to perform business tasks at departmental levels of an organisation (Mekonnen, 2017). it helps to build interactions between the
government and its respective stakeholders. Interoperability is a complex characteristics of information systems with several different perspectives due to human factor involvement with information communication technology such as communication, data sharing, interaction, and coordination (Vasavi S., 2011). In this master thesis, interoperability will be investigated through human processes with Information communication technology, other perspectives will not be considered.

Furthermore, the thesis will be carried out with departmental heads and staff of Galaxy backbone in Nigeria. It aims to investigate the current management information systems implemented in the organization and current practices with respect to interoperability in the organization. There are always substantial differences and peculiarities between theses government organizations, owing to unique histories, cultures and norms that make them. Therefore, results from the investigation cannot be generalized or made about other similar organizations.

1.6 Thesis organization
This thesis is organized into Six (6) chapters. This includes introduction, literature review, methodology, findings, discussion, and conclusion.

Chapter 1 includes the introduction to the master’s thesis research. Firstly, the background, research problem, and the research setting are outlined. Secondly, the purpose and the aim of the research along with the research questions were stated. Thirdly, previous studies related to the research topic is discussed providing a basis for justification of the research topic. Finally, the scope and limitations of the research is discussed.

Chapter 2 presents a review of the literature that develops the theoretical basis of the research. Firstly, it presents the search strategy for finding related literature and Articles. Further, it reviews the principal ideas that derived from the literature review which forms the theoretical base for the master’s thesis such Management information systems, Interoperability, and the Resource base Theory. The chapter concludes with the presentation of the theoretical framework that is applied to analyse and discuss the research findings in later chapters.

Chapter 3 presents the methodology employed to carry out the thesis, it describes the philosophical worldview chosen, secondly, the methodological approach is discussed. Thirdly, the methods of data collection and method of data analysis is discussed. Finally, the reliability, validity and ethical considerations of the research is presented.

Chapter 4 presents an outline of the empirical findings gotten from the data gathered. It discusses the themes derived from the thematic data analysis. Each theme is then backed up evidence gotten from the findings. Finally, the chapter ends with the summary of the findings.
Chapter 5 presents the discussion of the main findings gotten from the data analysis, these findings are in relation to the research questions and the theoretical framework discussed in chapter 1 and 2.

Chapter 6 concludes the thesis, it discusses the focus and processes of the research, it then discusses the challenges encountered during the research. Finally, suggestions for future research are presented.
2 Literature Review

This chapter presents a review of the literature that develops the theoretical basis for the thesis. Firstly, it presents the search strategy for related literatures and papers. Secondly, it discusses the main ideas that is derived from the literature review which forms the theoretical basis for the master’s thesis such as E-governance, Management information systems, Interoperability, and the Resource base Theory. It concludes by presenting the theoretical framework that is used to analyse and discuss the research findings.

2.1 Search Strategy

To begin my research a detailed review of existing literatures was carried out within my Topic of interest. This helps to form the basis of my research, to see what has been done and how I can contribute to knowledge. In the first stage, the university library was used through One search where most databases are available, for related papers and literatures. In the second stage, articles from ACM, Springer Link, Scopus, IEEE Xplore, Google Scholar and JSTOR were searched according to the inclusion standard. In the identification step, the search was carried out in the 6 databases: ACM, Springer Link, Scopus, IEEE Xplore, Google Scholar and JSTOR using the online library account of Linnaeus University while sticking to the inclusion standard and collected 50 papers. The inclusion standard are articles that focus on main ideas of the master’s thesis and the keywords used to search are


“Management info*” AND (“E-governance” OR “Developing Countries” OR “Nigeria”)

“E-governance” AND (“Interoperability” OR “Africa”)

“E-government” AND “MIS” (OR “Developing Countries” OR “Nigeria”)

Resource base theory.

Literatures and papers were selected from the top eight ranked IS journals (the baskets of eight): MIS Quarterly, Information Systems Research, Journal of Management Information Systems, Journal of the Association for Information systems, Information Systems Journal, European Journal of Information Systems, Journal of Information Technology and Journal of Strategic Information Systems. From these, papers and literatures that were published within the year 2011-2021 with those written in English were considered. After the identification stage, 50 literatures were chosen to be screened further. At the screening stage, the title of the papers was checked respectively, and 11 papers were removed. At the end of the screening step, 39 papers were chosen for eligibility stage. In the eligibility stage, 17 articles were removed after
reading their abstracts and evaluating whether abstract matches with the inclusion standard. At the end of the eligibility, I was left with 22 articles.

2.2 Management Information Systems

A management information system is a technology developed to ease and automate the process of decision making which in the past was more traditional, and ruled by a rule of thumb, intuition, and personal experience medium (Laudon and Laudon, 2017). This approach was un-facilitated and un-suited for fast-growing and expanding organizations. To improve responsiveness and Fastrack the process of decision making, a scientific system was necessary to gather, store and retrieve information at the appropriate time. This led to the development of management information systems (Laudon and Laudon, 2017). Achieving corporate goals is dependent on information systems quality and management. Specific corporate goals such as improving market position, building new products, or introducing new services, improving productivity, among others cannot be achieved without optimal information systems (Laudon and Laudon, 2017). Therefore, it can be stated that management information systems are a must-have for devising and implementing corporate strategies.

A simple way to explain the role of Management Information Systems in business is to compare it to the heart. Therefore, we can think of the role of Management Information Systems in business as the role of the heart in the body. In the body, the heart pump and supply pure blood to all part of the body including the brain. Not only this, but the heart also regulates and controls the incoming impure blood. Also, the heart works faster and supplies blood when needed. The bottom line is the heart ensures blood is supplied to the human body in the normal course and crisis. Just like the heart works, Management Information Systems plays the same role. It ensures that the right data from different sources are collected, processed, and sent to the appropriate destinations for devising corporate strategies. Considering this, Laudon and Laudon(2017) dissected corporate strategies into six categories namely, operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage and survival.

According to (Sipior, 2017) a management information system is based on information technology and functions primarily to transform raw data from external and internal sources into information which is also used to formulate reports which help different departments of an organization to make better and more informed decisions. In a nutshell, Management information systems collect data from external and internal sources, processes this information to facilitate fast decision-making in business. Put differently, management information systems are a database that holds organization information in a manner that makes it easier to produce reports that facilitate fast decision
making. The three words are key in understanding the fulcrum: Management, Information, and System (Sipior, 2017; Siering and Janze, 2019). On this note, Management is the aspect that involves human power who acts primarily as the decision-makers. On the other hand, information is primarily driven through technology, while the system deals with a set of principles or techniques to which something is done.

Some definitions of Management Information Systems are given below:

Management information system is an information communication technology aimed at enhancing communication needed to aid managerial functions and connecting an organization with its external environment (Olalekan, 2014). Management information systems can also be described as a communication link that ensures that the roles and functions of management and managers are possible. Management Information System is “an integrated technology to collect, process, classify, store and distribute information. Management Information System contains information about crucial people, systems and environment within and around the organization” (Sipior, 2017). Siering and Janze (2019) defined Management Information System as a “computer-based and manual system which transforms data into relevant information essential to providing the support necessary for making right decisions” Management Information System is a site where “the planning and integration of systems are carried out for the collection of relevant information, transforming it into the right data that can be supplied to executives at different levels which aids at providing the right information at the right time to interested personnel of the information” (Siering and Janze, 2019).

The following key points can be derived from the definitions cited above:

1. Management Information System helps achieve in making an efficient and illuminating managerial decision. i.e., facts-based decisions.
2. Management Information System gives feedback on the performance of the organization
3. The information is based on a system approach.
4. Management Information System enables easy, secure, and quick sharing of data within the organization.
5. Balancing Conflicting data requirements using Management Information System because the same data can be accessed in more than one location even remotely from outside the organization parameters.
6. Management information systems help decision-makers to process large voluminous data in a short period: Failure to make a rational decision costs the company. For managers to process this voluminous
data and make decisions Management Information System is important in achieving that.

7. Management Information Systems allows a business to compete globally and make a global decision by proving quality information from raw data derived from various sources.

In a world where things are changing rapidly, humans need to harness the available resources. In this age where technology is cardinal, we need to harness this and use it in making a fast rational decision. Management Information System proffers this opportunity through a database that holds organization information in a manner that makes it easier to produce reports that facilitate fast decision making. Management Information System enables the business to stay prepared, forecast these changes, and capitalize on the opportunities as and when they arise.

2.3 E-governance

The world has become a global village where every country around the world is striving to govern its citizens and attain a high level of electronic governance using information and communication technology (Adah, 2015). Bannister and Connolly (2012) state that the past two decades have seen the emergence of a widespread practice of placing the letter 'e' in front of words such as government, democracy, commerce, business, politics, warfare, and so on. An important question someone would ask when prefixing any field with 'e'- is the importance of Information Communication Technology (ICT) to the field.

E-governance deals with the use of information and communication technology by the various government agencies to enhance accountability, create awareness, and ensure transparency in the management of government businesses (Otinche Sunday, 2013). A similar view is given by Adah (2015) who defines e-governance as a two-way communication process that deals with the use of information and communication technology to deliver government services and ensuring the availability of such services to citizens. Therefore “the governing of a state/country by employing ICT in economic, political, administrative, and social management of public service in an effective manner through the engagement of citizens in public policy” is known as e-governance (Oyeleye, 2014; Adisa et al., 2017). Also, Alonso (2014) strikes a different perspective by defining e-governance as a transition from the traditional system of doing government businesses that are mostly linear and top-bottom approach to the use of information communication technology which allows the public access information at their convenience. This indicates that e-governance is a system built to involve and connect citizens and other stakeholders in public service by maximizing the use of ICT technologies.
2.4 Management Information systems in E-governance

Information is considered without any doubt a main and foundational factor in managerial decision-making in e-governance, due to current governance challenges in this century (Robbins, 2004). To provide such information, computers are used, and management information systems have become much more functional (Sirus and Majid, 2017). The role of management information systems on e-governance is demonstrated through “the exploitation of management information and communications technology to measure and improve and develop the various administrative processes within the organization” (Constantinides and Barrett, 2015)

The benefit that comes with replacing manual systems with computerized alternatives has caused this shift to e-governance, primarily as a way of improving service delivery (Constantinides and Barrett, 2015). Management information system is used at various levels by top-management, middle and even by the operational staff as a support for decision making towards achieving strategic aims and objectives (Héroux and Fortin, 2014). The management information system helps in bringing technological development that makes good governance possible by improving sectors like public administration, education, health, agriculture, and the environment (Héroux and Fortin, 2014). Management information system gives room for collecting and storing data that can be retrieved and used for decision making whenever the need arise (Héroux and Fortin, 2014).

Among the roles of management information system are to provide cheaper and more effective management and processing of information, opportunities to work in partnership with the private sector in modernizing governmental processes, transparency, particularly about the procurement of government services, and opportunities to combine traditional and modern methods of accountability (Onuigbo and Eme, 2015). The main role of management information systems is to make the government more open to citizen participation and involvement, and be a tool for better governance (Anastasiadou, Santos and Montargil, 2021). Management information systems allow governments, through their departments and ministries, to easily generate, analyse, share, disseminate and manipulate information (Masuku, et. al., 2017). Several technologies are used to serve the needs and ideas of e-governance, such as specific public sector portals and platforms, web services that serve the requirements for both government and citizens, websites, and the use of social networks that increase the participation of the citizens and helps the government to act fairer for the public good (Anastasiadou, Santos and Montargil, 2021). One of the main advantages of using management information systems is to support the democratic decision-making processes is that information systems help in civic engagement and allows citizens to become more involved (Anastasiadou, Santos and Montargil, 2021). The management information system improves the
participation of citizens when interacting with the government. It empowers individuals and groups of people by giving them better access to the information that allows them to have an impact on public policies (Anastasiadou, Santos and Montargil, 2021).

By using management information systems citizens can participate in an easier and efficient way in the decision-making process and the public discussion forums improve the collaboration with local citizens to help government focus on solving local issues (Anastasiadou, Santos and Montargil, 2021). The low cost of internet access and the easy and fast exchange of information on it makes the internet very important in the democratic process (Anastasiadou, Santos and Montargil, 2021). There are four components of management information system which plays important roles in promoting good governance, these components are review, control, approval, allocation. The review and control represent the accountability aspect of e-governance, while the approval and allocation represent the integrity aspect (Anastasiadou, Santos and Montargil, 2021). Government can use the platform of management information system in e-governance to know the level of project execution and implementation; also, citizens can use this medium to view existing and ongoing projects in respect of their constituencies (Mohammed, et. al., 2017).

Management information system helps in assigning resources to approved projects, assign monitoring and execution teams, and project allocations can be done according to the demand of citizens (Mohammed, et. al., 2017). There is some opposition from scholars about the use of management information systems in society, with the most important issue being the security of the information that has a major concern. Sometimes the entire society depends on this security of vulnerable information systems that require strict controls and maintenance (Anastasiadou, Santos and Montargil, 2021). There are several types of threats, such as human error, computer crime, and abuse, system failure, and disasters… for example, how safe is an e-voting system against cyber-attacks and hacking (Anastasiadou, Santos and Montargil, 2021).

2.5 Interoperability

Several definitions have been ascribed to interoperability. According to (Kolsoom Abbasi Shahkooh, Masoumeh Sadeghi and Nasrin Dastranj Mamaghani, 2011) Interoperability is the ability of two or more systems to exchange information and use this exchanged information effectively. Also, (an Staden and Mbale (2012) defined interoperability as the ability of two or more systems to interact with one another and exchange data according to a specifically prescribed method to achieve predictable results. Chander and Williams (2012) believe that interoperability is an important issue in e-governance because the relevant stakeholders cannot successfully interact and
exchange meaningful information without interoperability. Kirilova (2015) also defined interoperability as “the ability of different systems from various stakeholders of e-governance to work together, by communicating, interpreting and exchanging the information in a meaningful way”. Apart from connecting different stakeholders, interoperability as also been identified as a necessary element to enable seamless services of e-governance to stakeholders by facilitating information sharing, system integration, and cross-boundary collaboration (Ipinge and Nengomasha, 2018). Ipinge and Nengomasha (2018) also stated that e-governance interoperability is the foundation to the success of connected government objectives: efficient and effective government, collaborative, and government seamless delivery of public services to citizens. These definitions point out the fact that e-governance interoperability is a means and not an end (Pardo, Nam and Burke, 2011); (Ipinge and Nengomasha, 2018), the important goal in e-governance initiative is to provide services to various stakeholders (citizens, business), and to improve government administrations (Ipinge and Nengomasha, 2018).

According to Williams (2012), interoperability cannot be achieved without a solid framework. Going forward, Williams (2012) stated that an interoperability framework for e-governance involves a common structure that comprises a set of standards and guidelines; the structure can be used by public agencies to specify the preferred way that all stakeholders interact with each other to share the information. Therefore, the adoption of interoperability frameworks in the public domain provides various benefits to the government, as technical requirements are specified regarding the technical specifications that governmental agencies agreed upon collectively. Williams (2012). Sulehat and Taib (2016) also pointed out that an interoperability framework involves two components namely, barriers hindering the implementation of government Management Information Systems and success factors. The barriers hindering e-governance Management Information Systems as identified by Sulehat and Taib (2016) include poor ICT infrastructure, poor management support, lack of technical skills, security concerns, data and information integration issues, and business processes. On the other hand, Sulehat and Taib (2016) discuss critical success factors for implementing Management Information System e-governance which include collaboration between government bodies. Sulehat and Taib (2016) also noted that collaboration between the government bodies can be ensured by having common e-governance interoperability goals and objectives, the commitment of government bodies, and having a customer-driven focus.

Finally, Sulehat and Taib (2016) noted that the benefits and advantages of the model include effectiveness, efficiency, and transparency through a strong commitment from the administration and management as well as cost reduction and returns on investment through “private-public partnership (PPP) for improving responsiveness, reducing duplication, and reducing costs”
Successful implementation of an interoperability framework would require making available best practice guidance, toolkits, schema development guidelines, and centrally agreed data schemas (Abraham, 2005). According to Das (2012) interoperability aims to achieve three goals in any system: meaning exchange, process management, and data exchange as explained below:

Data Exchange: Interoperability enables basic data exchange, for example, emails, phone connections, document exchanges to web form (web pages), and data exchange between two or more computer systems where there is a mutual agreement on the size and type of data to be exchanged, the data exchanged can go back and forth, participants in the data exchange don’t need to have any knowledge of the data exchanged between them (Das, 2012); (Ipinge and Nengomasha, 2018).

Meaning Exchange: Interoperability enables the exchange of meaning, all the participants taking part in communication are assigned with the same meaning of the information being exchanged between them. The meaning exchanged is difficult as there is no guarantee that all communicating participants will interpret the meaning of the data in the same manner (Das, 2012); (Ipinge and Nengomasha, 2018).

Process Agreement: The final or third goal of interoperability is the agreement on how to respond or act on the information exchanged. Process agreements concentrate on action taken by participants in communication, once information that is exchanged took place, all the participants in the communication must agree in advance concerning what to do with the received data in exchange (Das, 2012); (Ipinge and Nengomasha, 2018).

There are three strands to e-governance interoperability from a European Interoperability Framework (EIF) perspective: semantic interoperability, technological interoperability, and organizational interoperability (Misuraca, Alfano and Viscusi, 2011); (Ipinge and Nengomasha, 2018). To reach the 'transformation' stage, interoperability must be achieved at both the technical and semantic level (Ipinge and Nengomasha, 2018).

2.6 Interoperability Challenges

Irimia (2011) noted that there are significant challenges to affect truly usable service delivery, caused by lack of literacy, limited resources, and lack of knowledge on how to deliver services in culturally and socially appropriate ways. Similarly, Pardo, Nam, and Burke (2011) also remarked that there are barriers for institutions to achieve the required interoperability effectively, and barriers range from political issues, financial issues, organizational issues, and technical issues. (Gottschalk and Saether, 2008) also indicated that some other constraints can influence the adoption of interoperability, aspects can be
classified as Collaborative, cost, technological, performance, constitutional, legal, managerial, and informational.

A more specific and detailed list of barriers to interoperability was given by (Gottschalk and Saether, 2008). The key challenges identified by (Gottschalk and Saether, 2008) included: Redefining rules and procedures, Information transparency, Legal issues, Infrastructure, Skill, and awareness, Access to the right information Interdepartmental collaboration and Tendency to resist the change in work culture (Gottschalk and Saether, 2008).

There are three aspects of interoperability that need to be taken into consideration: semantic interoperability, organizational interoperability, and technical interoperability (Ipinge and Nengomasha, 2018). Concerning organizational interoperability, Williams, (2012) noted that the interoperability of e-governance systems involves much more than technical specifications of data formats and protocols, but also includes a different organizational entity, developed using different process models, and maybe positioned in different cultures. Ensuring interoperability in such a scenario, need to consider organizational issues (Williams, 2012). Also, organizational interoperability is concerned with organizational processes and cooperation of agencies (Gottschalk and Saether, 2008).

Regarding semantic interoperability, Gottschalk and Saether, (2008) remarked that semantic interoperability is an enterprise capability derived from the application of special technologies that infer, relate, interpret, and classify the implicit meanings of digital content, which in turn drive business process, enterprise knowledge, business rules, and software application interoperability. Semantic interoperability includes specific issues such as different ways of representations, context-based reasoning, inconsistency in data, etc. On the other hand, challenges in achieving technical interoperability cover the technical issues of computer systems. It includes also issues on platforms and frameworks (Gottschalk and Saether, 2008).

The challenges in achieving technical interoperability include non-availability of ICT infrastructure, the interoperability among legacy systems with disparate technology, unavailability of adequate resources, facilities, and autonomy to monitor the compliance with IFEG from the stage of Request for Proposal (RFP).

2.7 The Resource-based Theory

The resource-based theory is used as the theory in this master thesis. Resource-based theory has emerged as one of the most propitious theoretical frameworks in the field of management for analysing the resources and sustainability of competitive advantage (Barney, Ketchen and Wright, 2011). This theory equalizes those organizational resources are susceptible when it is valuable, rare, literal, and cannot be substituted (Barney, 1991). Resources
are assets of available components of production owned or controlled by an organization (Amit & Schoemaker, 1993). Capabilities, as opposed to resources, refer to an organization’s ability to utilize resources using organizational processes (Amit & Schoemaker, 1993). Capabilities can be seen as the capacity of a team of resources to carry out some task or activity (Barney, 1991), which are often produced in functional and sub functional areas by connecting physical, human, and technological resources (Amit & Schoemaker, 1993). From a resource-based perspective, management information systems as resources that are incomparable and valuable can be produce returns. Technology assets such as networks and databases are not likely to produce returns, since they could be easily obtained (Barney, 1991). However, merging hardware and software assets to bring about a flexible and sophisticated IT infrastructure that will be matchless, because creating such an infrastructure requires carefully involving technology components to fit an organization needs and priorities (Amit & Schoemaker, 1993). In addition to a sophisticated IT infrastructure, skilled human resources, relationships between the IS department and user departments, and IS managerial knowledge are valuable resources that are used to produce returns (Barney, 1991).

Similar research shows that focus on functional capabilities of the IS department as a source is of competitive advantage (Fenny & Willocks, 1996). Fenny & Willocks (1996), identified nine critical IS capabilities which are leadership, business systems thinking, relationship building, architecture planning, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development and used anecdotal evidence to argue that these capabilities have a direct impact on organization performance. (Fenny & Willocks, 1996).

Another perspective envisions resource complements supported on how resources are coursed and used. It is not the appearance of resources or capabilities that gives rise in complementarities. But how organizations have choices on how resource are deployed. for example, DeLone & McLean, (1992), argued that Information communication technology can be used to provide renewable competitive advantage when it is used to influence constructive changes between organizations, such as the level of standing integration and modification. Also, Barney (1991) reflects this perspective of resource complementarities, the main argument of this paper is that mutual connection between IS advantages and initiatives, and organisation practices are very important.

The resource-based theory assumes that no single organization can produce all the required resources necessary for its activities and operations. Therefore, it must collaborate with other principal actors and organizations in its environment. (Eze, Adelekan and Nwaba, 2019) also pointed out that limiting resources to organizational level will give a restraining picture
because information systems cut across organizational boundaries. Thus, it is “more sensitive towards being exposed to the dynamism of discontinuous and cataclysmic environmental changes” (Eze, Adelekan and Nwaba, 2019). For this reason, an organization should be capable of satisfying respective stakeholders such as employees, clients, and shareholders.

In this view, this master thesis intends to understand the importance of management information systems as a critical resource for enhancing interoperability amongst e-governance initiatives. Therefore, this thesis finds the resource-based theory as an appropriate lens to view, understand the findings of this thesis. The resource-based theory is used in my thesis to understand how resource should be managed using a collaborative effort with other principal actors such as citizens, businesses, other government bodies, and employees.

2.8 Theoretical Framework
The literature review, which comprises of the main ideas of the research, which includes management information systems, information technology and E-governance with focus on Interoperability, along with literature related to organization resource management and practices of information systems departments. All these formed theoretical foundation for my master’s thesis research. The review of literatures and papers along with Resource-based Theory formed the theoretical framework of the master’s thesis, which was used to reference and come up with questions for the interviews, and to discuss the research findings after data analysis.
3 Methodology

This chapter establishes the methodology planned to be used in carrying out the research. Firstly, it addresses the philosophical paradigm in use. Secondly, it addresses methodological approach presented. Thirdly, it presents the methods of data collection and method of data analysis. Finally, the chapter concludes with the reliability and validity of the research and ethical considerations.

3.1 Philosophical paradigm

Every research carried out is based on some essential premises on why the research logical and which research methods are suitable for the research. The three dominant philosophical paradigms in IS research are positivist, interpretive and critical paradigm (Myers & Avison, 2002).

Positivism research assumes the traditional form of research, that is void of human interactions and actions, it holds value for quantitative research (Creswell & Creswell, 2018). It involves trying to test a theory to gain understanding by predicting a phenomenon. Most research from a positivist point of view is focused on hypothesis testing, generalising the results of a phenomenon from a sample to a wider audience or quantifiable measures of variables. (Creswell & Creswell, 2018).

Interpretivism is seen as an approach to qualitative research, humans try to understand the world which they live in there by developing subjective meanings from their experiences towards objects and things (Creswell & Creswell, 2018). An interpretive researcher tries to derive meanings the phenomena through the meanings that people assign to them.

Critical research conforms with history and political constitution of humans, (Creswell & Creswell, 2018). This comes to play when the ability of people to act deliberately on changing the social and economic situations by finding justice impeded by social, cultural, and political power. (Myers & Avison, 2002).

In this master thesis, the interpretive philosophical paradigm is employed. The interpretative paradigm is strongly entrenched in the field of information systems (Myers & Avison, 2002). It states that reality is born out of human representation and influence on a phenomenon. Therefore, it is impossible to understand the phenomenon with the absent of human representation. Therefore, the intent of the interpretive paradigm in this research is to understand the phenomena in its reality from the reach participants point of view (Myers & Avison, 2002). Since this thesis aims to understand the how management information systems can enhance interoperability between e-government initiatives. Therefore, this paradigm is most suitable for this thesis.
3.2 Methodological Approach

Methodology refers to justifying the approaches used in research while method implies the approaches employed to carry out research. This study infers from this correlative relationship that exists between a methodology and a method. There are three types of research approach which are qualitative approach quantitative approach and Mixed method approach (Creswell & Creswell, 2018).

Qualitative approach is used when studying a social context or phenomena, its method of data collection consists of interviews, field work, observation, experiences, and reactions from participants. Quantitative approach is used when studying or investigating a natural phenomenon. Its method of data collection is through survey, statistics, and other numerical methods. Finally, mixed method approach is the combination of qualitative and qualitative approach. It is used when the research wants to get a deep comprehension of a phenomena.

According to Creswell & Creswell (2018), “the process of qualitative research involves developing questions and processes, collecting data in the participants’ natural setting, analysing the collected data inductively from data to themes and finally, making meanings from the themes. In carrying out qualitative research, grounded theory, ethnography, narrative research, and case studies are the usual strategies used (Creswell & Creswell, 2018). And interviews, observation, etc. are used for data gathering.

Qualitative research approach aims to investigate and understand the perspective of people attach to a human or social construct. Qualitative approach is associated with interpretivism paradigm while quantitative approach is associated with positivism paradigm (Creswell & Creswell, 2018). The qualitative approach will be employed in this master thesis because it enables me to gain an accurate account of participants in their natural setting.

To construct a justification for qualitative research study, a choice of strategy needs to be employed. As the intention is to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context, a case study is therefore considered most appropriate (Myers & Avison, 2002). Since I aim to explore and understand the management information systems implemented and practices in Galaxy backbone.

3.3 Data collection Methods

The method for collecting data is strongly dependent on the chosen philosophical paradigm, research approach, and followed methodology. Which is why the data method is related to the qualitative approach which is also related to the Interpretative paradigm. The data collection method chosen for this thesis is interviews and Focus groups
3.3.1 Participants
The research participants include managers and employees of Galaxy Back Bone in Nigeria. These research participants were chosen because they have good working experience to gain prolific data. This organization was chosen because the organization is the leading enabler of e-governance in Nigeria, and it provides IT and shared services to the government administration of Nigeria. Therefore, seven participants who fulfilled these benchmarks were selected to participate in the interviews and Focus group.

3.3.2 Interviews
Interviews are one of the famous method of data collection (Yin, 2009). Interviews are of different types (Yin, 2009), structured interviews comprise of only strictly preformulated questions which requires an accurate outlining in advance. It is used by administering the same set of questions. It is a quantitative method of observation; its downside is that it does stimulate creativity owing to the rigid laid down questions. On the other hand, is the other method interview which is the unstructured. It contains few general questions and themes, and participants are allowed to speak freely. This helps the researcher to gather new and unexpected ideas from the participants. The downside of this method is that it becomes clumsy, and it is difficult to manage interview sessions. The semi-structured interview offers the advantages of structured and unstructured interviews, this why it is chosen for this study.

When coordinating an interview, it is important for the researcher to create an environment where the interviewee feels relax and safe (Yin, 2009). Also, keeping to time is very important to gain prolific data from the participant. (Yin, 2009).

The following table 1 shows how the interviews was conducted with the research participants.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Department</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>Operation</td>
<td>45 Mins</td>
</tr>
<tr>
<td>Participant 2</td>
<td>IT</td>
<td>47 mins</td>
</tr>
<tr>
<td>Participant 3</td>
<td>Human Resource</td>
<td>48 mins</td>
</tr>
<tr>
<td>Participant 4</td>
<td>Finance Head</td>
<td>45 mins</td>
</tr>
<tr>
<td>Participant 5</td>
<td>Marketing&amp;communication</td>
<td>47 mins</td>
</tr>
<tr>
<td>Participant 6</td>
<td>IT</td>
<td>48 mins</td>
</tr>
<tr>
<td>Participant 7</td>
<td>Sales</td>
<td>40 mins</td>
</tr>
</tbody>
</table>

Due to the difference in location and as I am in Sweden and the research setting is based in Nigeria and the covid-19 pandemic situation, the Interviews were conducted digitally through platforms like Skype and Zoom at times
convenient for the participants. An invitation with a consent email was sent to the participants, the consent email contained all necessary information about the research as well as the potential outcome of the research. After consent was obtained, another email was sent to properly arrange the time and base for the interview on the convenience of the research participants.

A semi structure interview guide was used during the interview. It consists of two (2) general questions and ten (10) open-ended questions, open ended questions were applied because it allows for original thoughts to be added by the participant by allowing the participants to provide more detailed answers without restrictions. The interviews were conducted in English because the official language in Nigeria is English language. The interviews were recorded with the permission of the participant. This important because it helps the research document the discussion (Yin, 2009).

3.3.3 Focus Group

Another form of interview is the focus group discussion which is conducted in a group of people (Myers, 2009). It’s a group comprises of five (5) to eight (8) participants. It involves the use of unstructured and generally open-ended questions that are few to stimulate discussions between participants (Creswell & Creswell, 2018). The interviewer usually takes up the role as moderators to trigger a discussion between participants and keep them engaged and channel the interview on the right path related to the subject and questions. While focus groups can offshoot in vehement interaction, various perspectives and rich views and understandings between the participants, they are time-consuming and expensive to carry out (Myers, 2009).

A focus group discussion was conducted with 5 participants digitally via zoom and it lasted for an hour. The focus group discussion was recorded and documented.

3.4 Method of data Analysis

Interviews and Focus group discussions were conducted with seven participants from Galaxy backbone in Nigeria. The interviews lasted between 40-50 minutes while the focus group discussion lasted for an hour. The data collected from the interviews and focus group discussion were transcribed. Thematic analysis was used to analyse the data to generate codes and Themes. According to Braun &Clarke (2006), thematic analysis will be used to examine the patterns of meanings or themes in the research. It involves six phase which are:
Figure 1: Six phases of a thematic analysis (Braun & Clarke, 2006)

3.4.1 Thematic Analysis
Thematic analysis is a systematic approach used in identifying meaning patterns across the data sets. It is an iterative process for generating codes and themes from a qualitative data. codes are features of data that are most relevant to the research questions. theme “captures something important about the data concerning the research question and represents some level of patterned response or meaning within the data”. Thematic analysis is a very compliant data analysis method which gives the research insights on the data gathered from the participants point of view (Clarke and Braun, 2017).

The first phase is to familiarise yourself with the data, this phase involves studying the datasets through listening to the recorded interviews repeatedly to get immersed in the data, transcribing the recorded data, reading, re-reading the data, and understanding the initial ideas (Clarke and Braun, 2017). The data collected during the interview were recorded through the digital platform used and transcribed with the www.otter.ai tool. To carry out the above processes, I went over the transcriptions severally while listening to the audio files to check for mistakes in the transcription. This allowed me to familiarize myself with the transcription and embed myself in the whole process.

The second phase is to Generating initial codes this phase deals with generating codes define (Clarke and Braun, 2017). codes are features of data that are most relevant to the research questions. Here, codes were generated by going over the transcription severally and using delvetool.com to generate relevant codes.
The third phase involves searching for themes at this stage codes of similar features were patterned together to form themes. Here, I mapped familiar codes together to form a theme.

The fourth phase is reviewing the themes. Here, the themes were reviewed to check for duplicate themes and to check for labels for each theme.

The fifth phase involves determining the authenticity of the themes, defining, and naming of the themes, while the sixth phase involves a complete research report is generated based on the analysis of the themes identified, tested, and defined. Here, there was an iterative process between the themes generated and the literature review done in chapter 2 of the research.

3.5 Reliability and Validity

According to Creswell & Creswell, (2018, p. 319) “qualitative validity means that the researcher checks for the accuracy of the findings by employing certain procedures”. To ensure that data collected and interpreted are valid the following steps were carried out. First, Data collection was carried out through semi-structured face-to-face interviews, data collected from the participants who have several years of experience in the field of study. Transcription was carried out in an iterative manner to make sure no mistakes were made in during transcription, continuous communication with my thesis supervisor is taken. These steps assisted with providing vital information, supervision of the Study. According to Creswell & Creswell, (2018, p. 319), qualitative reliability ensures “that the researcher’s approach is consistent across different researchers and different projects”.

To ensure high reliability of this thesis, every procedure was documented, to get reliable data, only experienced, reliable, and knowledgeable participants were chosen. Also, since the main aim is to get the opinions and experiences of the participants, the interviews were carried out in a manner and setting where participants felt comfortable to air their opinions (Creswell & Creswell, 2018).

3.6 Ethical Consideration

Most research are based on the data gotten from participants. According to Creswell & Creswell, (2018), it is the duty of the researcher to protect its participants and make them feel safe. During this thesis, the interviews were carried out in a way that was beneficial to the participants. Convenient date, time and place of the interview were chosen by the participants. Also a safe and friendly environment was chosen in order for the participants to feel relax and share their opinion and experience freely.

Also privacy was taken into consideration, the research participants were immune from any form of harm and the privacy of the participants was preserved, Personal information about the participants were withheld and kept
anonymous. The participants in this research will be government officials while interviews will be conducted via skype after consent has been sought and approved. In a bid to protect the privacy of the participants, a new account will be created on skype. This research chooses to skype and zoom due to its cost effective medium to reach a reasonable portion of people. It was noted by (Hanna, Womack and Hanna, 2012), that the use of Skype and Zoom as a research instrument has the benefit of ensuring visual experience and face to face interaction between the interviewer and the participants while also ensuring adequate flexibility and privacy at the same time.

There was voluntary participation of all the participants and the participants reserve the right to withdraw from the study at any stage they wish to. Proportionately, all the participants were fully aware of the necessary information, and implications of participating in the research. The interview and Focus Group discussion were also free of offensive and provocative language which can repel the participants. Finally, all participants were treated with respect not minding, gender, age, or profession.
4 Empirical Finding

This chapter introduces an overview of the empirical findings and then discusses the themes that emerged from the thematic data analysis. Subsequently, each theme is presented together with the evidence that supports those findings. Finally, the chapter ends with a summary of the findings.

4.1 Overview of the empirical findings

This master’s thesis research focuses on perspective staff and worker at Galaxy backbone working with management information systems with respect to interoperability during their work process. The data was analysed using thematic analysis and Five (4) themes were generated.

Theme 1 Obstinate attitude of staff and workers when it comes to change.

Theme 2 Unavailability of resources, illiteracy, and Unwillingness.

Theme 3 Bureaucratic bottlenecks at interdepartmental level.

Theme 4 Information sharing and interoperability.

4.2 Theme 1 Obstinate attitude of staff and workers when it comes to change.

Participant 2 mentioned for communication and information sharing at all to be established the attitude to work must change. The participant stated this by saying “that most staff are lazy and do not even want to understand how these systems works. They find it complicated and repelling, participant went further to still complain about the attitude of the staff, they do not check their emails, this makes communication, decision making and delegation very difficult”.

Participant 1 also noted that it is difficult for staff to adjust to change, because visiting offices for processes seemed to be easier for people who are used to physical interactions, most of the are still used to the old way of carrying out their activities. That is, they are still known to be working with many papers, carrying of files from one desk to the other or from one office to the other.

Participant 4 pointed out that the sluggishness to change as at when due is one of the challenges the inadequate knowledge management can cause in ways of enabling practices and experience used across departments. Going further, the participant also noted that in the technology world, there is always constant change daily many people are creating new updates everyday but, in a state, where there is lack of enough knowledge to know when to upgrade, change and update the infrastructures in use will not enable the practice and experience of technology to go round leaving some people obsolete. on a similar note, participant 5 “it is not fair funding sensitizations and awareness when people are unwilling to learn, this is very discouraging and frustrating”.

Thus, this causes resistance to change in delivering services is what has culminated to the poor rating of the implementation of e-governance in the
public service. Some of the reasons for this, is that most of the public servants are not computer literate, not qualified, have little or no training in the installation, maintenance, designing and implementation of ICT infrastructure.

4.3 Theme 2 Unavailability of Resources
On the note of Unavailability of resources, Participant 1 said “most staff and works lack sufficient skills and resources to drive these government initiatives, because lack of financial capital (that might have been mismanage by those in upper seats) which is expected to be invested or use to educate the staff”. Participant 2 mentioned “the challenges of little to no power supply in the country. Adequate power supply is needed to carry out every necessary operation related to e-governance, without this nothing can be done even if there is the availability of enough skilful staffs. This participant added that inability to maintain substitution for the power supply is another issue. Generator is a second option used to bring about power to operate and get things done. This too bring about some challenges as the maintenance is a big deal and lot of work, there is not enough provision for skill personal to operate, maintenance, service and repair this alternative as well” participant 4 mentioned that “demographic differences in terms of income and education have caused a great deal of digital divide in the organization. The participant described as quality information and knowledge is not evenly distributed as a required resource among the staff which sad”. Participant 5 said that the problem with the available human resources is not lack of skills as some of the participants had claimed. “On the contrary, the participant stated employers place too much emphasis on years of experiences of applicants while neglecting proper screening of correct and adequate skills among the applicants. The participant believes this might tend to lead to employing staffs who are outdated and does not know the current and updated wares to use in executing task”. This shows that unavailability of technical and human resources poses as challenges of effective interoperability.

4.4 Theme 3 Bureaucratic bottlenecks at Interdepartmental level
Participant 2 complained of the issue where people work inside departments, units, government, government bodies don’t even relate together. The participant mentioned “that there is lack in skill and experience among the staff, most staff do not check emails or know how to use tools for collaboration” which makes it difficult to work with each other because all the departments work in silos, so it is difficult to communicate with one another” Participant 3 “mentioned that some staff prefer to carry out activities manually and find it difficult accepting technology which makes communication collaboration and information sharing very difficult”. Participant 7 complained about the same issue, the participant said “the staff prefer to carry out operations manually which leads to lose of time and decline in productivity. The participants complained about corruption, the participants talked about the government employing people who are not qualified but know
people in high places. This becomes a liability instead of gathering assets which lead funding a sensitization program that they will not attend. The participant further explained that a lot goes into planning with little or no results when it comes to implementing”. This shows that’s Implementation of ICT infrastructure will go a long way to way to improve e-governance interoperability, also getting skilled and experienced people to manage these government initiatives will aid interoperability. Lastly acceptance of these initiatives by the public will go a long to how people respond to these initiatives.

4.5 Theme 4 Information sharing, communication, and integration
The participants demonstrated that information sharing, communication and integration will be an important feature of their organization enhanced by management information systems. Participant 1 “said management information systems will make it easier and more efficient to work and deliver more qualitative results. Instead of departments having to work in silos, everything will be available for everyone. The will system provides the infrastructure needed to make our processes easier to oversee and follow up, both on departmental and organization level”. Participant 2 said “absolutely I think workload will improve if a functioning management information system is implemented”.

Participant 4 said “I think management information system creates a good condition for interoperability as information sharing and feedback is made easier. It will make our way of working is better because of the system since every staff of the organization is involved, no matter where they are in or out the organization, to make decisions and the communicate to each departmental head, which means the conditions for reaching each employee increases a lot” Participant 6 said “if we have a functional system in place, communication and information sharing will be easier, I do not have to leave the comfort of my office if I want to assign a task or reach a particular staff” Participant 7 said “a functional management information system will make it much easier and faster complete reports, make budgets, do analyses bugs and issues on time, it will save time there by making work process fast, accurate and efficient”. It shows the impact a functional management information system will have on the organization with regards to information sharing and interoperability. It been beneficial in saving time, reducing the workload and communication between departments

4.6 Summary of Findings
From the analysis four themes were generated along with facts to support these themes. Theme 1 described the Obstinate attitude of staff and workers when it comes to change. Firstly, the staff and workers of Galaxy backbone shows how important work process is and how the attitude of staff and workers impedes
that. Secondly, lack of skills and information communication technology stands a major problem. Finally, it discusses how these attitudes to change stands as road to successfully interoperability.

Theme two presents how unavailability of resources, illiteracy, and Unwillingness impede system interoperability. Firstly, it discusses how unavailability of human resources, Information communication technology infrastructure, and skills pose as challenge for effective interoperability. Secondly, it discusses illiteracy and how and have baked staff pose as a challenge too. Finally, it discusses the challenge of unwillingness of the staff to pursue new ways to effectively carry out their activities.

Theme three presents the bureaucratic bottlenecks at inter departmental level. Firstly, it discusses the issue where people work inside departments, units, government, government bodies don't even relate together. Secondly, it discusses lack in skill and experience among the staff, most staff do not check emails or know how to use tools for collaboration which makes departments work in silos and does not support interoperability.

Theme four presents how information sharing, and interoperability can be achieved. Firstly, the benefits of management information systems on information sharing and departmental integration possible. Also, it discusses how a functional management information system will foster organizational interoperability. The research findings will be discussed in the next chapter on the basis theoretical framework.
5 Discussion

This chapter discusses the finding from the data analysis in relation to the theoretical framework. Firstly, it presents the findings in relation to the research questions then backed up with the theoretical framework.

5.1 The research questions

This section presents the answers to the research questions, the first research question “What are the challenges of interoperability in e-governance systems?”.

Table 2 answer to the first research question

<table>
<thead>
<tr>
<th>First Research question</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the challenges of interoperability in e-governance systems?</td>
<td>Theme 1 Obstinate attitude of staff and workers when it comes to change.</td>
</tr>
<tr>
<td></td>
<td>Theme 2 Unavailability of resources</td>
</tr>
<tr>
<td></td>
<td>Theme 3 Bureaucratic bottlenecks at Interdepartmental level</td>
</tr>
</tbody>
</table>

In answering the first research question, the findings show there are several challenges mitigating against interoperability, the participants believe that unavailability of resources, attitude to work and other factors pose as a roadblock.

The first theme presents how staff at Galaxy backbone perceive their attitude to work and change within the organization. Most staff are lazy and do not even want to understand how these systems works so they for a resistance to these systems. They prefer the manual way of carrying out their activities which impedes communication and forces depart to function in silos which poses as challenge to effective interoperability.

The second theme, Unavailability of resources, from this theme, it answers the research question because lack of skills, technical resources and information communication infrastructures all pose as challenges of interoperability. the staff believe that if the organisation is lacking in these, there is no way interoperability can take place. Which is supported by Das (2012) who noted that there are significant challenges to affect truly usable service delivery, caused by lack of literacy, limited resources, and lack of knowledge on how to deliver services in culturally and socially appropriate ways.

The third theme presents the bureaucratic bottlenecks at interdepartmental level. Here it is evident that the department in the organisation finds it difficult to interoperate and integrate because majorly
because of the attitude of the staff, some finding it difficult to use digital artefacts which makes it very difficult to communicate, collaborate and cooperate. This makes each department to function as silo departments instead of being integrated and function as a whole organization.

In summary, the staff at Galaxy backbone perceive the lack of information technology infrastructure, human resources, and skills are the major challenges of interoperability. Which is supported by (Das 2012) who noted that there are significant challenges to affect truly usable service delivery, caused by lack of literacy, limited resources, and lack of knowledge on how to deliver services in culturally and socially appropriate ways.

The second research question How can management information systems enhance interoperability? which is answered in the table below

<table>
<thead>
<tr>
<th>Research question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can management information systems enhance interoperability?</td>
<td>Theme 4 Information sharing, communication, and integration.</td>
</tr>
</tbody>
</table>

To answering the second research question, it is evident that information communication technology is a critical resource for effective interoperability. the staff at Galaxy backbone believe that an implemented a of a functional management information systems will be about seamless information sharing, communication, and integration amongst the departments in the organization to making decisions for easy flow of work process. This is seen in one of the literatures reviewed who discussed management information system based on information technology and functions that primarily transform raw data from external and internal sources into information which is also used to formulate reports which help different departments of an organization to make better and more informed decisions (Laudon and Laudon, 2017).

5.2 Research findings based on the theoretical framework

In this section, the researched findings are discussed based on the theoretical framework discussed in the literature review chapter. The responses of the staff and managers at the Galaxy backbone organization was based on their work processes, experiences and use of technology. As we can see from their responses, they find it difficult to carry out their daily activities effectively due to the challenges and unsatisfactory state of the management information system which has impeded effective interoperability amongst the departments in the organization. However, if a functional management information system is in place with sufficient resources, staff and managers at Galaxy backbone will be able to carry out their activities diligently and seamlessly which in turn will foster effective interoperability.
Management information system is an information communication technology aimed at enhancing communication needed to aid managerial functions and connecting an organization with its external environment (Olalekan, 2014). According to findings, characteristics such as information sharing, communication, data exchange, feedback, work process tracking and decision making all support interoperability amongst the departments. Management information system will change the silo configuration of the departments to adjust local networks and departmental integrated systems. It will also validate methods to provide management at all levels and in all functions with appropriate information from all relevant sources to bring about timely and effective decisions for planning, directing, evaluating, and controlling the activities for which they are responsible. management information systems as resources that are incomparable and valuable can be produce returns and this can only be possible when human resources, skilled workers and technological resources are sufficient.

In terms of human resources, from findings, the major challenge with staff as discussed by the research participants is lack of sufficient knowledge and skill. Previous research from (Adah and Abasilim, 2015) shows that the staff perceive the use of computers and information communication technology artefacts as very complex and build a resistance towards it. Which has resulted to a manual way of carrying out their activities,

In terms of skilled workers, most staff lack sufficient skills to handle infrastructures, and from findings it is evident their attitude to work is poor and do not want to understand better ways and ideas to handle their activities. From the literature review such as (Adah and Abasilim, 2015) found out that most Nigerians perceive the use of computers and internet as very complex and strive to avoid them.

In terms of technological resources, here we consider Information communication infrastructures. From findings, it is evident that the organization does not poses sufficient information communication infrastructures which is very important requirement for management information systems. According to (Adah and Abasilim, 2015), ICT requirements for management information systems and e-governance cannot be met without adequate infrastructure. This will bring about an integrative nature of information flow within the organization, it will change the physical and manual way processes to accommodate internal networks and departmental integrated systems. This will allow staff to able to work from any station without having to be physically present which will enable them to make timely and effective decisions to plan, direct, evaluate, and control activities they are assigned to. This will be about integration and interoperability among the departments of the organization.
In relation E-governance systems, management information systems will enhance interoperability between government systems and initiatives to make the government more open to citizen participation and involvement and be a tool for better governance. Management information systems allow governments, through their departments and ministries, to easily generate, analyse, share, disseminate and manipulate information (Anastasiadou, Santos and Montargil, 2021). Furthermore, enhancing communication among employees of government initiatives, exchange of information and materials, Reduction of manual way of carrying out activities, and support for organizations strategic goals and decision making will be benefits of management information systems. Information communication technology will bring about public access information at their convenience. This will enhance an integrated e-governance system that will connect citizens and other stakeholders in public service. Furthermore, information communication technology is used to serve the needs and ideas of e-governance. Technologies such as specific public sector portals and platforms, web services that serve the requirements for both government and citizens, websites, and the use of social networks that increase the participation of the citizens (Anastasiadou, Santos and Montargil, 2021). From findings it is seen information communication technology will go a long way for effective management information systems practices. To make the best use of these technologies, experienced and skilful staffs are required.

The resource-based theory is emerged as one of the most propitious theoretical frameworks in the field of management for analysing the resources and sustainability of competitive advantage (Barney, Ketchen and Wright, 2011). This theory equalizes those organizational resources are susceptible when it is valuable, rare, literal, and cannot be substituted (Barney, 1991). It sees resources as assets of available components of production owned and controlled by an organization (Amit & Schoemaker, 1993). From finding it is evident that resources have a relevant part to play from a resource-based perspective. From a resource-based perspective, management information systems are seen as resources that are incomparable and valuable that will enhance interoperability. Technology assets such as networks and databases are not likely to produce returns, since they could be easily obtained (Barney, 1991). However, merging hardware and software assets to bring about a flexible and sophisticated IT infrastructure that will be matchless, because creating such an infrastructure requires carefully involving technology components to fit an organization needs and priorities (Amit & Schoemaker, 1993). In addition to a sophisticated IT infrastructure, skilled human resources, relationships between the IS department and user departments, and IS managerial knowledge are valuable resources that are used to produce returns (Barney, 1991). The findings presented in theme 4 shows that management information system is important to enhance interoperability in the organization and it will go a long way bring about an integrative nature of information flow.
within the organization, it will change the physical and manual way processes to accommodate internal networks and departmental integrated systems. From theme 2 it is evident that resources like human resources, Information communication technology are important requirement for a functional management information system that will enable effective decisions to plan, direct, evaluate, and control activities. This confirms that management information systems have an important role to play in enhancing interoperability in e-governance systems.
6 Conclusion

This chapter introduce the conclusion to the thesis. Firstly, it discusses the aim of the thesis, the process of the thesis and how it addresses the research problem. Secondly, it discusses challenges faced during the thesis followed by the contributions to research. Finally, the chapter concludes by presenting suggestions for future research.

6.1 Conclusion

The aim of this master thesis is to examine the role of management information systems in enhancing interoperability in e-governance systems. This thesis was based on a case study of Galaxy Backbone Nigeria. Galaxy backbone is an information technology firm responsible for providing network services, IT, and shared services to the government administration of Nigeria. To support the thesis’s aim, an interpretive qualitative research study was conducted. The empirical data was collected through semi-structured interviews and Focus group discussions from seven (7) staff at Galaxy backbone in Nigeria to answer the research questions:

- What are the challenges of interoperability in e-governance systems?
- How can management information systems enhance interoperability?

The data gathered was analysed thematically and four (4) themes were generated. The findings were discussed with the support of the theoretical framework which is the foundation of the research. Which included concept of management information technology, Interoperability, and the Resource-based theory which provide the background information of the thesis.

From findings it reveals that management information system important to enhance interoperability in the organization and it will go a long way bring about an integrative nature of information flow within the organization, it will change the physical and manual way processes to accommodate internal networks and departmental integrated systems. For a functional management information system, resources like Information communication technology infrastructure, skills, human resources must be available for effective interoperability. this shows that, management information systems will enhance interoperability between government systems and initiatives to make the government more open to citizen participation and involvement and be a tool for better governance. Management information systems will allow governments, through their departments and ministries, to easily generate, analyse, share, disseminate and manipulate information. Furthermore, enhancing communication among employees of government initiatives, exchange of information and materials, reduction of manual way of carrying out activities, and support for organizations strategic goals and decision making will be benefits of management information systems. Information communication technology
will bring about public access information at their convenience. This will enhance an integrated e-governance system that will connect citizens and other stakeholders in public service. Furthermore, information communication technology is used to serve the needs and ideas of e-governance. Technologies such as specific public sector portals and platforms, web services that serve the requirements for both government and citizens, websites, and the use of social networks that increase the participation of the citizens.

6.2 Research contribution

6.2.1 Theoretical contribution

This thesis contributes to the existing body knowledge in the informatics field about how management information systems can enhance interoperability. The contribution was descriptive and prescriptive. Descriptive because I described the current practices and state of management information systems in Galaxy backbone and challenges of interoperability, and it is prescriptive because I prescribed what needs to be put in consideration for effective interoperability. The existing theory of resource-based theory was used as a lens to analyse what was ascertained in the empirical findings. The discussion was finally presented from the perspective of the staff of the case study.

6.2.2 Practical contribution

This thesis contributed practically by emphasising the importance of Information communication technology to management information system. That will enable an integrated e-governance system that will connect citizens and other stakeholders in public service.

6.3 Future research

Interoperability was examined from the perspective of management information system where, information communication technology, human resources and processes were considered, it will be interesting and insightful if other aspects of interoperability are investigated. Also, this research was based on a single case of a government organisation, therefore future research can be done on other organisations to gain more insights for a generalized knowledge to other developing countries like Nigeria.

Finally, from reviewing literature I came to understand most researchers make use of quantitative approach which in my opinion doesn’t allow for deep investigations therefore, future researchers should consider using a qualitative approach for findings because it really helps the researcher gain deep insights on the research.
7 Reference List


8 Appendices

Appendix A

Table 4: Interview and Focus group Guide
Interview questions

**General Questions**
1. How long have you been working in Galaxy Back Bone?
2. Can you describe your job role in Galaxy Backbone?

**Questions on the role of MIS on e-governance interoperability in Nigeria**
1. Can you tell me about your experience working with e-governance initiatives and why e-governance interoperability is important?
2. What do you think are the central issues, challenges, and questions with e-governance interoperability?
3. How will you characterize the overall attitude of your organization to change? How often does your organization implement new systems and change old ones?
4. How is the quality, participation, and commitment of the employees?
5. Is there knowledge management scheme in place that enable practices and experience to be used across e-governance initiatives?
6. What practices are in place to ensure proper planning processes, scope, and other activities?
7. How is the relationship between your IT department and the IT service providers?
8. Is there reliable ICT infrastructure with network connectivity that ensures e-governance interoperability?
9. Do you think IT service provider have sufficient skills and experience to execute e-governance initiatives?
10. Do you think financial allocation towards IT services provision is adequate?

Appendix B

Table 5: Informed Consent Form for interview and Focus Group Discussions
Informed Consent Form for interview and Focus Group Discussions


Date of interview: 2021

Confidentiality and anonymity: The participants in this study will be anonymous and the personal information of the respondents will not be revealed at any point. The interviews will be audio recorded and will only be accessible by the researcher. All collected data will be assured to be confidential and be only used within the frame of this study purpose. The researcher will transcribe the recorded interview verbatim. A copy of the transcribed interviews will be sent to the participants to confirm their statements. After the completion of the study, all materials about the interview will be deleted. There might be scientific publications based on the result of this study.

Participation in interviews and Focus group discussion is completely voluntary. Participants have the right to refuse participating without any explanation. During the interviews and Focus group discussion, if any participants is uncomfortable with answering any questions, it is within their rights to skip answering those questions with no explanation. Respondents may stop interviews and focus group discussion at any point, and the information collected during the interview and focus group will be hence deleted without questioning.

Research purpose & Procedures: The focus of this study is to examine the role of Management Information Systems in Enhancing E-Governance Interoperability in Nigeria. The interviews and focus group discussion will be performed online due to current circumstances with covid19, booked and confirmed by email. The interview will take about 30-45minutes, and the focus group will last for about an hour. The interview and focus group discussion will be recorded as it is part of the data collection process, and it will be used to describe the empirical findings in the study.

The collected answers during the interview will be used solely for the purpose of this study. Your answers and personal experiences will help me further understand the role of management information systems in e-Governance interoperability and I aim to use this information to suggest workable solutions towards effective of e-Governance Interoperability in Nigeria.
Further questions about the research: If there are any other questions you want to ask me or answers to before or after the interview, please send me an email or give me call.

Contact information to the researcher. Signature: Name: Omotayo Taiwo Fashina Email: of222dh@student.lnu.se