INFORMATION MANAGEMENT CAPABILITY AND OPERATIONAL EXCELLENCE OF SELECTED INSTITUTIONS OF HIGHER EDUCATION IN SOUTH AFRICA

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Declaration

I, **Maphangwa Mboniseni Rejoyce**, student number **9805404** declare that this thesis for PHD in the Faculty of Management, Commerce and Law submitted to the Department of Business Management at the University of Venda with a topic ***"Information management capability and operational excellence of the selected higher education institutions in South Africa"*** has not previously been submitted for a degree at this or any other institution, and that is my own work in design and execution, and that all reference material contained therein has been duly acknowledged.

Maphangwa MR  Date: 27 May 2022

(Student)

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Dedication

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Abstract

The advancement of the industrial revolution has had an impact on the way things are done globally. For instance, the unfolding of the Fourth Industrial Revolution (4IR) within the current society has resulted in urgent or rapid demands for more effective information management. Both private and public sectors were impacted by the advancement in technology. It is pertinent to note that the need for enhancing information management efforts is particularly urgent for public sector institutions that continue to struggle with operational deficiencies. This is owing to these institutions being still anchored on old bureaucratic models of management. It is within this context that this study focused on assessing information management capability and operational excellence of selected higher education institutions in South Africa from the resource-based view perspective. Concepts that measure the value of managing information and how it influences the operational excellence in higher education institutions were developed. This research was grounded on the Resource Based View. This theory provided the guidance towards comprehensively assessing the nature of relationship between operational excellence and the management of information capability. Adequate insights towards understanding the influence of information management capability and the extent to which it influences operational excellence were analyzed. Information technological capabilities, processes and systems used for managing information capability, benefits and challenges were also explored. The researcher used both primary and secondary data to depict how information capability management contributes to operational excellence of selected higher education institutions. Secondary data assisted the researcher to make primary data more specific and assisted in identifying the gaps, deficiencies and additional aspects required for the success of the study. This study was conducted within the qualitative dictates. The data was collected from 60 heads of departments and academics from four higher education institutions. The participants were selected purposively. The collected data was analyzed through thematic framework analysis using ATLAS.

The study found that information management capability can be perceived as availability or access, data integrity, mechanism to identify the business needs and directions to follow, ensuring hardware and software reliability and user-friendly mechanisms adopted to ensure that hardware and software are meeting current business needs and directions. The findings showed that information management capability is critical towards enhancing operational excellence in higher education institutions. The study concludes that information management capability and operational excellence are being realized in institutions of higher learning though there are accompanying challenges. The study recommends that for higher education institutions, the recommendation is that they should ensure that digital information

management capabilities are enhanced through the adoption of advanced digital technologies which will ultimately push the boundaries of education and enhance information management capabilities and ultimately operational excellence. Several theoretical and practical recommendations were provided.

Keywords: Capability; Information; Management; Information management; Operational excellence

Abbreviation and acronyms

ATT	Attitudes Towards Technology
DIT	Digital Information Technology
DTS	Digital Information Strategies
ERP	Enterprise Resource Planning
IA	Information Accessing
ICT	Information and Communication Technology
ID	Information Distribution
IG	Information Gathering
IMC	Information Management Capability
IS	Information System
KM	Knowledge Management
LSS	Lean Six Sigma
OPEX	Operational Excellence
RBV	Resource Based View
TA	Thematic Analysis
TAM	Technology Acceptance Model
VRIO	Valuable, Rarity, Inimitable and Organisation

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Chapter 1
Introduction

1.1 Background of the study

Research in management of information systems is rapidly expanding due to institutional demands and the need to be in a competitive position. Nathan *et al.* (2022) alluded that all species on earth use their senses to collect information about the environment. The information collected is processed and stored before it can be translated into actions which have positive or negative impact (Nathan *et al.*, 2022). Due to changing information needs, information needs to be managed (Prajogo *et al.,* 2018). The management of information is done through IT and information systems which offer organizations a fundamental decision enhancing environment that extends new opportunities, and therefore producing thriving and competitive institutions, adding institutional value and offering valuable products and services to customers or clients (Prajogo *et al.,* 2018; Aydiner *et al.,* 2019).

Higher education institutions (HEI) exist in a changing, unstable and unpredictable environment (Kovalenko *et al.,* 2021). Most of them operate in a relatively unchanging manner (Kovalenko *et al.,* 2021). Among the challenges faced by higher education institutions, there is an increasing pressure to fight for a place in the global higher education institutions market. Their future becomes a lot less certain due to increasing demand for information systems and the management of information (Martins *et al.,* 2019). Since 2019, the world has been hit with the COVID-19 pandemic which is still prevalent to date which has resulted in the shift from the traditional way of offering educational services or tutelages to modern and digitalized service offering efforts. For instance, as alluded by Adedoyin and Soykan (2020), this epidemic has rapidly caused the global suspension of various activities, including educational activities, resulting in massive university crisis reaction migration using online learning as the educational platform. Abad-Segura *et al.* (2020) concur with Adedoyin and Soykan (2020) proffering that digital transformations have been noticed within the educational institutions' context.

Abad-Segura *et al.* (2020) added that this transition has advocated the incorporation of sustainable management to be able to adapt to the current changes imposed by innovative technology and the COVID-19 pandemic. This implies that the COVID-19 pandemic has placed more pressure among higher education institutions to update and manage better their information systems in order to cope further with the crisis, while still requiring the institutions to offer quality services (Murphy, 2020; Adedoyin & Soykan, 2020; Abad-Segura *et al.*, 2020).

It is imperative to note that operational excellence has been pursued by institutions in a bid to ensure that quality services are attained. Aguilera and Ruíz (2019) are of the view that operational excellence is the dynamic capability to realize efficient and effective core processes in the value creation chain utilizing cultural, organizational and technological factors in an integrative way based on the respective strategy. Towards attaining their intended objectives and aligning with strategic intent of organizations, operational excellence has received higher focus and attention for organizations to remain competitive (Ruiz, 2019). For instance, some institutions of higher education have adopted e-learning efforts towards meeting with the enhanced demand of the higher learning education and broaden in access thereof (Kibuku, Ochieng & Wausi, 2020).

It is integral to note that despite the benefits associated with the realization of operational excellence in higher education institutions, this concept has associated challenges (Kibuku *et al.,* 2020). For instance, in the adoption and implementation of e-learning, the challenges include lack of and/or inadequate information communications technology (ICT) infrastructure (Ndungu, Lewis & Mothobi, 2019), lack of ICT and pedagogical skills (Kibuku *et al.,* 2020) and financial constraints and sustainability issues (Toquero, 2020). This thesis is found on the belief that information management capability has the ability to influence operational excellence in any institution. While information systems may have impacted various functional areas of an institution, information management capability is regarded as a powerful tool that gives an institution an excellent operation through the reduction of overall costs, and improving the systems user satisfaction

(Al Shobaki *et al.,* 2018; Toquero, 2020). Aydiner et al., (2019) attest that many institutions maintain a variety of their databases and information systems in complex infrastructures which do not meet the requirements of their activities, processes and other related functions. Adding to that, Kasemsap (2018) attests that every institution seeks to find ways of controlling both structured and unstructured information in a way that will enable it to perform its activities in a better way and to maintain excellence. This challenge is seen in a technological perspective in institution such as businesses (Aydiner et al., 2019). The study therefore, provide a comprehensive overview of the assessment of information management capability and operational excellence of selected higher education institutions in South Africa.

The contemporary world regards information as a valuable institutional resource which contributes to the success of operational excellence if well managed (Lowry, Dinev & Wilson, 2017; Aydiner et al., 2019). Its management becomes critical for operational excellence. This is regarded as competency-based management of information. For this reason, information systems are used in building information capability.

With the growth of an institution, an increase in the quality and quantity of information requires such an institution to adapt its ways to the new processes, procedures and information systems (Aydiner *et al.,* 2019). Creating and maintaining efficient information capability assists in managing career planning, supporting the staff and embracing institution's focus as well as its operational objectives and processes which directly benefits an institution (Aydiner et al., 2016; Stewart & Brown, 2019).

The role and influence of information management must be relative to the environment within which an institution operates (Toquero, 2020). Understanding this will pinpoint information capability and operational excellence in selected higher education institutions in South Africa. It is within this background that this study focused on assessing the influence of information management capability on operational excellence in the selected higher education institutions in South Africa.

1.2 Context of the study

The study was conducted in selected higher education institutions in South Africa. Higher Education Act no. 101 of 1997 defines higher education institutions as the level of education that is provided by higher education institutions, vocational higher education institutions, institutes of technology, community colleges, liberal arts colleges and other collegiate level institutions such as trade schools, career colleges, and vocational schools that award academic degrees, diploma or professional certifications.

They enhance the capacity of societies to live together in an interdependent world and whose future is the patrimony of a global society (Ehlers, 2020). This is an optional final stage of formal training that occurs after the completion of secondary education. South Africa is composed of nine provinces, namely, the Eastern Cape, the Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, the Northern Cape, North West and the Western Cape.

The rationale of choosing the selected higher education institutions in South Africa is that South Africa has many institutions that provide higher education on a part-time, distance or full-time basis which are established, merged or deemed to be public university in South African context. While many studies focus on the changes brought through information technology, digital technologies and information systems, the study focuses on the information management capability and operational excellence as key factors to today's higher education institutions.

Below is a map of South Africa which consists of nine provinces within which higher institutions were selected for the study as represented in Figure 1.1.

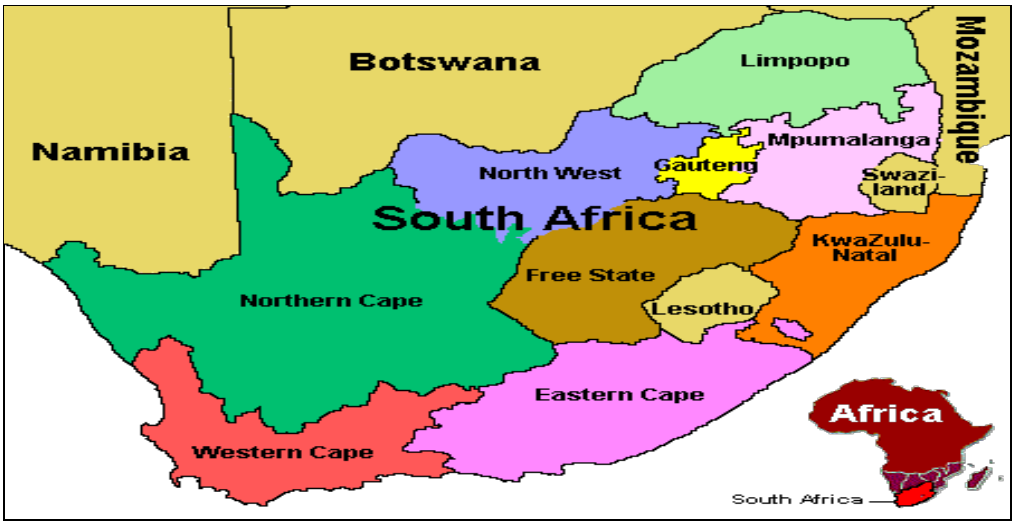

Figure 1.1: SA provinces Map

Source: South Africa Maps – Perry-Castaneda Library Maps Collection (1995); Aarts, Greijn, Mohamedbhai, & Jowi, (2020)

The World University Rankings are the sole provider of global reading tables that judge research-intensive in universities across their fundamental missions, namely: research, teaching, international outlook and knowledge transfer (Fokazi, 2021). In alignment with 2022 Times Higher Education World University Rankings, the University of Cape Town was classified as the top leading African university followed by Stellenbosch University and Wits University, which were both in score ranging from 251 to 300 (Fokazi, 2021). Majority of the South African universities do not fall within the top 300 category which also shows the lack of competitiveness in terms of research outputs, teaching and knowledge transfer (Fokazi, 2021).

It is imperative to note that Covid-19 advanced the online learning agenda, making the use of learning platforms more strategic, with students no longer in classrooms. Most of the universities in South Africa were traditional learning centric with few adopting the online learning efforts. COVID-19 has brought out a clearer picture of the unpreparedness of the higher education institutions in South Africa pertaining digitalization of educational efforts.

There is need for universities to upgrade their information systems towards information management capability (Papachashvili, 2021). For instance, universities may employ file sharing, video, and other technologies to supplement classroom-based teaching while also putting learning in the hands of students through technology-enabled learning (Papachashvili, 2021). Garcia-Penalvo (2021) is of the view that employers' value critical thinking, the capacity to examine data, and the ability to be self-directed. Hence, self-paced learning, along with the capacity to deliver personalized information to learners, can aid in the development and improvement of these abilities (Garcia-Penalvo, 2021). Mhlanga and Moloi (2020) are of the view that the epidemic did not only cause a widespread human distress, but also provided a chance to evaluate the failures and achievements of deployed technologies, gauge these technologies and costs associated with them as well as to increase access in the context of higher learning institutions (Mhlanga & Moloi, 2020).

1.3 Problem Statement

Institutions spend large amounts of money acquiring IT-related products for managing information with a view that such investments will benefit them (Aydiner et al., 2019; Chani, 2019). This has been attested by Balzer (2020) who puts emphasis on the need for information capability and the use of its efficient management as an important success factor that enables an institution to improve its results and serves as a source of an institution's competitive advantage. Miandar, Galeazzo and Furlan (2020) assert that big data, robotics, artificial intelligence, laser cutting and the Internet of Things are examples of emerging technologies that may assist institutions to produce knowledge and enhance overall performance and excellence. Kettinger, Ryoo and Marchand (2021) and Obitade (2021) are also of the view that information capability management is one of the imperative drivers of the performance of businesses. It is imperative for data sources to be reliable and credible. discrepancies arise in the influence of information management and uncertainty (Aydiner et al., 2019). In the era of the fourth industrial revolution 4.0 (IR 4.0), sustainability is seen as a serious challenge of contemporary institutions. Access to information as a component of information management affects sustainability (Imran, Salisu, Aslam, Iqbal & Hameed, 2019).

The challenges and benefits of managing change in institutions information management remained largely invalidated and the opportunities for enhancing the benefits and reducing challenges remained relatively unexplored (El Alfy, Gómez & Dani, 2019). This study will contribute empirical evidence on information management capability and operational excellence in selected institutions of higher education in South Africa. A model that will assist the study to assess the management of information capability as an influence on operational excellence of institutions is desired. The extent to which information management capability influences operational excellence in an institution must be known. The Information Management Capability (IMC) construct gathers skills and capacities available for managing information through its data life cycle in an institution will therefore be proposed. The value of information gathered will allow the researcher to assess IMC and operational excellence of an institution directly.

The question that is asked is, “How does IMC influence operational excellence in selected higher education institutions in South Africa?” The study intends to come up with the model that will assist the study in determining how IMC enables operational excellence in a HEI regardless of other challenges that exist. The authentication of the IMC value and the first-hand testing of the study research questions were done using data gathered from the selected higher education institutions.

1.4 Aim of the Study

The aim of the study was to assess the influence of information management capability on operational excellence in the selected higher education institutions in South Africa. The study developed a conceptual framework guided by the resource-based view in order to interrogate information management capability and operational excellence within higher education institutions landscape. The resource-based view (RBV) approach is an efficiency-based explanation of performance differences which regards information as a resource. The RBV sees resources as critical in helping institutions to achieve institutional performance and thus, operational excellence. An institution’s IMC influences the operational excellence environment and resources (Mikalef, Krogstie, Pappas, & Pavlou,

2020). The IMC changes provides the premise for the generation of new information which ultimately creates new learning opportunities (Mikalef *et al.,* 2020).

This results in the creation and development of new required resources (Mikalef *et al.,* 2020)). From the Resource Based View perspective, the researcher therefore, views operational excellence as an ongoing process. It is imperative to note that the information cycle is a source of improvement and competitive advantage for an institution and for the sake of simplicity, this theoretical framework was first developed focusing on the issues of operational excellence and IMC in selected higher education institutions in South Africa (Matjila, 2021). Leih and Teece (2016); Aydiner et al., (2019) define institutional resources as capabilities, organizational processes, assets, knowledge, firm attributes, information, etc. A thorough analysis of information as a resource from the RBV assisted the study of IMC and operational excellence in higher education institutions.

1.1 Summary

This chapter presented a discussion of the context in which the research study was conducted. Orientation on the background of the study and problem statement were provided. The research questions, objectives and research methodology were outlined. The study concepts and terminology were defined in the context of the study. The chapter concluded with a brief overview of each of the seven chapters of the thesis. The next chapter discusses the conceptual and theoretical framework informing the research study.

1.2 Objectives of the Study

The following research objectives were pursued to realize the above-mentioned aim:

i. To determine the relationship between IMC and operational excellence of the selected higher education institutions in SA
ii. To establish the extent to which IMC affects the information systems as well as the user satisfaction of the selected higher education institutions in SA
iii. To develop a model that best suits higher education institutions in South Africa in achieving operational excellence through IMC.

1.3 Research Questions

The following research questions were used to achieve the objectives stated above:

i. How does information management capability of the selected higher education institutions in South Africa link to their operational excellence?
ii. To what extent does information management capability contribute to effective utilization of information systems to achieve excellence in the selected higher education institutions in South Africa?
iii. What model can best suit the selected higher education institutions in South Africa in achieving operational excellence?

1.4 Justification of the Study

Obitade (2021) is of the view that information management capability has the capacity to offer data and information to information users at the appropriate and relevant levels with universal access, as well as the flexibility to modify these levels in response to market requirements and directions. The definition gives evidence that information management is complex and seems challenging due to so many tasks, questions, critical connections, information sources, and processes involved. Many systems and stakeholders use their own systems to capture, store and share important data (Nisar, Prabhakar & Strakova, 2019; Prajogo et al., 2018). Disconnects between the front and back of office organization usually takes place. A large volume of information and data, big data, small data, fast

data, ever more unstructured data keeps growing at an astonishing pace on daily basis (Nisar, Prabhakar & Strakova, 2019).

The value of information management for institutions has been recognized as a necessity in organizations even though it is difficult to prove it because information is an intangible resource. Any institution's information technology resource infrastructure must benefit that institution (Aydiner et al., 2019). In addition to this, Prajogo et al. (2018) attest that information management systems are empirical in day-to-day operation of institutions because the systems work with people, institutions, technology and relationships among people and institutions. Lack of consensus remains among scholars and practitioners concerning the successful and experiential information exchange processes (Suryawan, 2017; Stone, Aravopoulou, Evans, AlDhaen, & Parnell, 2019).

The application of information technology in support of IMC which covers the leverage technologies for facilitating both internal and external communications, the adoption of technologies for data management and market research purposes, and the employment of technologies in determining individuals who have the potential to deliver the highest value to an institution remains a challenge (Abdullah & Pan, Pan, Song, Ai & Ming, 2019). It is therefore, important for an institution to study IT assets that can analyse its complementary and integration with other institutions to create Information System that will give it operational excellence.

The study focused on information management capability as a resource and how policies, procedures and Information systems from the first point of information cycle become a source of operational excellence for an institution (Aydiner et al., 2019). Information cycle describes how information is produced as input, distributed and changes over time. It also includes identification of needs, accessing, gathering, categorizing information, processing, coding and storing, identification of, validating information and, distribution and deletion thereof (Khabi, Nor & Bahrami, 2011; Aydiner et al., 2019). For operational excellence, an institution's information capability must be in line with its objectives. This implies that successful alignment is a two-way relationship, that is; a give and take between IMC and operational excellence. Establishing a relationship between information

management capability and institutions' operational excellence in selected higher education institutions in South Africa is of greater importance.

The functions of Information systems were examined because they guide information throughout its life cycle. It also became imperative to determine how IMC generates an institutional value which directly affects performance. This is a strategic capability, especially in information-intensive institutions such as higher education institutions. The study adds to the literature review of higher education institutions in South Africa and will assist other researchers with IMC and operational excellence information that could be useful in future.

1.5 Delimitations of the Study

Hoftsee (2011) defines delimitation as what the researcher will cover in the research study. This comprises of population of the study, study variables, statistical analysis and the research focus**.** This includes excluding resources, limiting the number of results and only using specific research plan of action to gather data to reach specific research objectives. Delimitation helps readers to understand what the research or study is all about.

- The scope of the study was restricted to the selected higher education institutions from nine provinces in South Africa.
- Only information from the selected higher education institutions in South Africa was used for the research study.
- Interviews were not restricted to specific questions.
- The survey was limited to academic heads of department, ICT lecturers, students, student assistants, information management officials such as IT technicians, It specialists, Project managers, MIS administrators and HR departmental head as well as other relevant information users of the selected higher education institutions in South Africa.

1.6 Operational Definitions

Operational concepts cover the definitions of terms and concepts that are used in the study. The operational concepts used in the study are defined as follows:

Information: Information is a summary of data stimuli that has a meaning to its receiver in a particular context. Information can be used for knowledge, for understanding or for doing something (Brockbank, Ulrich, Kryscynski & Ulrich, 2018). According to Kamau, Senaji, Eng and Nkozioki (2019), information begins and ends in the knowledge or found in the minds of people that are regarded as input for making decisions or solving problems. This can be acquired through investigation or study and contributes to an understanding or decrease in uncertainty.

Capability: Capability refers to a set of key detailed underlying skills, behaviours, attributes, knowledge, abilities that are required for successful performance in an institution (Teece, 2018). Tseng and Lee (2014) define capability as the ability to execute and integrate resources to attain institutional goals, as well as outcomes acquired from the accumulation of long-term interaction among various resources.

According to Aydiner et al. (2019), capabilities favourably influence the human resources, financial, customer, and institutional effectiveness measures of an institution's performance.

Information capability: Information capability is defined as an organized collection of process, people, technology and other resources which assist in realizing information ability in order to satisfy the need for known configurations of data used and produced, usable and producible data as well as the management of information capabilities of an institution in order to achieve the goals of serving an institution's mission and sustainability of the institution's system (Teece, 2018; Zulkepli, Hasnan & Mohtar, 2019).

This focuses on the value of information and the principles and practices that guarantee security, effective and efficient system in an institution that exploits information to provide benefit in an institution (Brockbank, Ulrich, Kryscynski & Ulrich, 2018).

Information capability is interdependent on and interconnected with an institution's capability, IT capability, system offering as well as service offering (Forbes & Brockman, 2019).

Information system: Prajogo et al. (2018) define information system as what emerges from the usage derived from IT delivery system by users whose strengths are that they not machines but human beings. These encompass software, database, hardware, network and people. According to Issa, Isaias and Kommers (2013), information system entails a software that helps an institution to analyse data that helps to solve its problems.

Information management: Information management entails the collection, storage, archiving, dissemination and destruction of information. It is closely related to data systems, technology and other information processes (Aydiner et al., 2019; Issa, Isaias & Kommers, 2013).

According to Prajogo et al. (2016), a variety of stakeholders including those who ensure accessibility, those who assure quality, those who ensure safekeeping, archiving and/or disposal and those who need it for making decision are included in information management.

Generic concepts of management such as planning, organizing, controlling, assessment and reporting of information activities are included as important aspects needed to meet the needs of an institution (Kasemsap, 2018).

Information management system: This refers to various technologies used by an institution including the required personnel to manage it (Martins, Branco, Goncalves, Au-Young, Oliveira & Cruz-Jesus, 2019). It is a general term for software designed to facilitate the storage, organization and retrieval of information. Some common systems include process control system, human resource management systems, inventory control systems, office automation systems, accounting and finance systems and management reporting systems (Dumka & Sah, 2019).

Information management capability: Aydiner et al. (2019) define information management capability as the ability to provide information and data to users with the

pertinent levels of reliability, confidentiality, connectivity, security, accuracy, timeliness, and access and the ability to adjust these in response to changing needs and directions of an institution. Information management capability plays a major role in developing other institutional capabilities necessary for customer management, performance management and process management. In addition, Aydiner et al. (2019) and Kasemsap (2018) identified information management capability (IMC) as the set of valuable institutional IT-based technological resources, and the institution's potential in deploying these resources in managerial, organizational and human capabilities in a general coordinated way, in order to perform an institution's activities or tasks, and to manage information effectively.

Operational excellence: Operational excellence refers to a philosophy of the workplace wherein aspects such as teamwork, leadership and problem-solving result in ongoing improvement in an institution (Isaar & Navon, 2016). Operational excellence in higher education system includes the administrative and academic process efficiency in such a way that transparency, efficiency and operational practices are achieved. Operational efficiency results in the investment in capital, growth, funding, efficient processes and systems and new innovative practices (Garba, Mohammed & Arba, 2019).

1.7 Structure of the thesis

The research study is divided into the following seven chapters:

Chapter 1: Introduction and Background of the study

This chapter presents the introduction; problem statement, aim of the study, objectives of the study, research questions, justification of the study, delimitations of the study, definitions of operational concepts as well as the structure of thesis.

Chapter 2: Literature review

The chapter gives a detailed analysis of information management capability and operational excellence in higher education institutions in South Africa, benefits and challenges of IMC and the influence of IMC on operational excellence.

Chapter 3: Theoretical and Conceptual Framework

This chapter provides the theoretical framework and conceptual framework of information management capability and operational excellence. A general overview of the link of information management capability and operational excellence of higher education institutions in the South African context is also illustrated as a way of contextualising the two important aspects of the study.

Chapter 4: Research D Methodology

This chapter provides details regarding the methods used in investigating information management capability and operational excellence in the selected higher education institutions in South Africa. The following areas were covered in this chapter: research paradigms, population of the study, study area, data collection, data analysis and ethical considerations.

Chapter 5: Data Presentation, Analysis and Interpretation

The chapter presented data relating to information management capability and operational excellence gathered from the selected higher education institutions from all nine provinces of the Republic of South Africa. The provinces are: the Eastern Cape, the Free State, Gauteng, Mpumalanga, KwaZulu-Natal, Limpopo, the Northern Cape, North West and the Western Cape.

Chapter 6: Discussion of results

This chapter focuses on providing a discussion of the results that emanated from the analysis of data with the past scholastic views that are related to the subject matter, Information Management Capability and Operational Excellence.This chapter focuses on the study findings and assessment of information management capability and operational excellence of the selected Higher education institutions in South Africa.

Chapter 7: Conclusions and Recommendations

This chapter presented the research findings together with the conclusion and recommendations with reference to the research problems of information management capability and operational excellence study. The chapter also outlines the proposed model of operational excellence for higher education institutions in South Africa. Reasons for the decisions, including suggestions for future research study are also incorporated in this chapter.

Chapter 2
Literature review

2.1 Introduction

To furnish a platform for the discussion of Information Management Capability (IMC) and Operational Excellence (OPEX), this chapter focuses on the definitions and key themes surrounding the two concepts. These aspects are highlighted before an examination of the degree of IMC influence on OPEX, and primarily for the purpose of the research study, the benefits and challenges in implementing IMC. The literature review chapter also focuses on the processes involved in IMC and OPEX.

This chapter primarily, but not exclusively, seeks to inform the following research objectives:

- To determine the link between Information Management Capability and Operational Excellence
- To determine the degree to which Information Management Capability is improved by Digital Transformation strategies
- To develop a framework of Operational Excellence for higher education institutions in South Africa.

2.2 Digital information management capability

This section of the literature review puts IMC in perspective by discussing key definitions of the concept (2.2.1), followed by the processes of IMC (2.2.2) and digital transformation as part of IMC (2.2.3).

2.2.1 Understanding the concept of IMC

The concept of IMC consists of three abilities which include (1) the provision of data and information to end users with the desired levels of accuracy, timeliness, security, reliability, and confidentiality; (2) the provision of connectivity and universal access at sufficient scale and scope; and (3) the adaptation of the infrastructure to the emerging direction and needs of the market (Macada, Brinkhues & Freitas Junior, 2020).

IMC is linked to the three other institutional capabilities, that is; customer management, performance management and process management. For one to understand the holistic impression of Information Management Capability, it is prudent to define “Information management (IM)” before defining IMC.

2.2.2 Defining Information Management

Information management (IM) have to do with a cycle of organizational activity: the collection of information from one or more sources, the custodianship and the distribution of that information to those who need it, and its ultimate disposition through archiving or deletion (Brinkhues, Macada & Casalinho, 2015). This cycle of information management institutions requires a variety of stakeholders, including those who are responsible for assuring its quality, accessibility and utility of acquired information; those who are responsible for storing it safely and disposal; and those who need it for decision making. Information management embraces all the generic management concepts such as planning, organising, structuring, processing, controlling, evaluation and reporting information activities needed to meet the needs of those with institutional roles or functions that largely depend on information.

These generic concepts of information management allow the information to be presented to the correct audience or the group of people. Information gains more value after being used by individuals (Pickard & Roedler, 2020). Information management is closely associated to, and overlaps with, technology, processes, the management of data, systems, and where the availability of information is critical to institutional success – strategy. This broad view of the realm of information management differs with the earlier and established, more customary view, that the life cycle of information management is an operational matter that requires specific plan of action or procedures, standards that deal with information as a product or a service and organisational capabilities (Haase, 2019). Information management therefore, covers a cycle of institutional activity involving the collection or acquisition of information from one or more sources, its custodianship and the distribution of that information to users, and its ultimate disposition through deletion or archiving where necessary.

From these definitions, the cycle of information organization involves different stakeholders including those responsible for processing, quality assurers, those who ensure accessibility and value of acquired information; those who are responsible for its safe keeping and disposal; and those who need it for making decision. Information stakeholders might have the rights to change, distribute, originate or delete information according to the institutional information management policies. Fig 2.1 below illustrates the information management cycle.

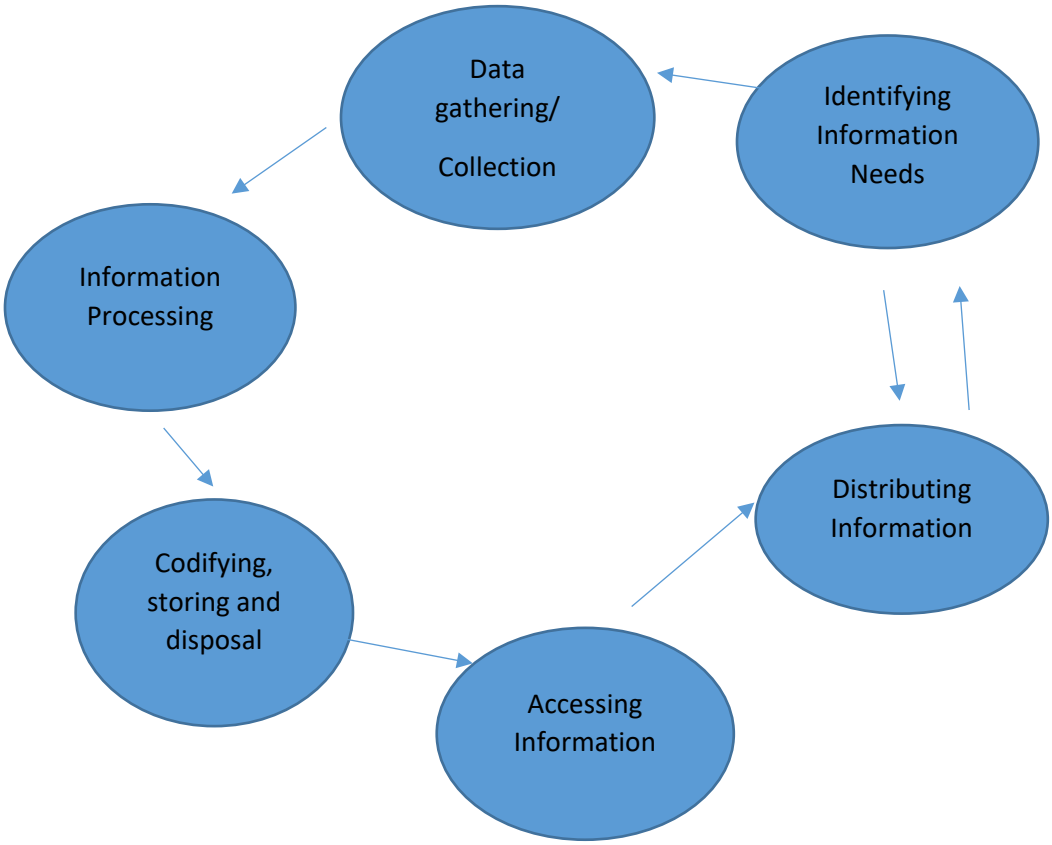

Figure 2.1: Information management cycle

Source: Adapted from Merchand, Kettinger and Rollins (2000)

Information management is has to do with, and overlaps with, the management of data, technology, processes, systems, and – where information availability is critical to organisational success – strategy (Haase, 2019)

Previous researchers proved that Information Management Capability (IMC) is an important resource for organisations to obtain value in a changing competitive business

environment. New digital technologies on the other hand, have imposed some strategic challenges on organizations. Brinkues, Macada and Freitas Junior (2020) define IMC as a set of abilities that links people, infrastructure, architecture, access, and distributes information to make institutional changes in response to the imposition of possible changes in the external and internal institutional environment. The definition identified the following five dimensions that make up IMC: people, infrastructure, distribution, access, and information architecture. Institutions develop IMC at a higher level for decision support, business intelligence, executive support and information processing (Seres, Pavlicevic & Freitas Junior, 2019).

The dimensions of information management are defined by building on the functions in which information management is divided (Alberto, Peris-Ortiz, 2014). These functions are data gathering, coding and storing, information processing, information accessing, needs identification and distribution. Alberto, Peris-Ortiz (2014) explained the dimensions of information management as follows:

2.2.2.1 Data gathering (DG)

The information that managers need to take decisions on comes from both within and outside the institution. The information provided in both cases is essential, but institutions are limited in terms of external records. Institutions with greater sophistication in information management usually integrate all data generated in the firm's functional areas. The need to use a common database for the whole firm has led to the spread of enterprise resource planning (ERP) systems. The implementation of ERP systems often requires business reengineering and deeply affects many business activities which means that the organisation must have the necessary culture to accept change. In addition, to achieve the objectives of these reengineering processes, the firm requires certain IT capabilities, without which the firm cannot successfully complete these transformations. Conducting surveys forms the basis of understanding institutional needs (Fachamps & Woodruff (2017).

2.2.2.2 *Coding and storing information*

Once institutions have acquired and processed information, they must code it and store it for subsequent use as and when necessary. Codifying information assists in finding information easily when required for use. This process limits and affects the subsequent access to information. Codifying, depositing and recovering information are therefore, interrelated functions. Higher education institutions are typically thought of as places where information and data disseminate from. They collect and store datasets regarding academic departments, class enrolment levels, student demographics, academic performance, meal plans, housing status and other important information. They deploy business intelligence tools to help in managing all these variables and making the best use of available resources. (Chakraborty et al., 2019).

2.2.2.3 *Information Processing (IP)*

After initially gathering or acquiring information, institutions must treat the information in such a way that it is reliable, adapt it to the specific institutional context and improve its interpretation, integrating disparate pieces of information and condensing it if necessary. In addition, initial data gathering often gathers or collects simple data that require processing to convert them into meaningful information and ensuring their quality. Matching information-processing capacity with institutional needs is necessary to achieve high-quality service and/or product output. The processing of information is performed by categorising, contextualising, calculating, condensing and correcting the data. The staff and administrators are able to convert all their raw data into visually intuitive dashboards by leveraging business intelligence tools. This can enable institutions to assess and monitor student performance and determine the effectiveness of institutional educational processes (Chakraborty et al., 2019).

2.2.2.4 *Accessing information (AI)*

Although institutions possess precise information or data for effective decision making, the acquisition and use of information can be hindered by various factors. Accessing information has two approaches, that is; one relating to organisational design and the other to technology.

The technological component refers to the capability to rapidly access information regardless of the geographical barriers to any information available to the institution provided the information user is authorised. Individual preferences and skills to obtain and process information can therefore, restrict or limit the use of the most competent and advanced sources despite the organisational design and institution's technology. Training and motivation therefore, play important roles in accessing information.

Blackboard and Google Classroom allow lecturers and professors in higher education institutions to distribute or share notes and other multimedia resources related to their courses with students. Lecturers are now able to deliver course content through various digital platforms. They use videoconferencing software, other online educational platforms and social media to teach their courses. These online educational platforms allow students to submit their assignments and lecturers to monitor the progress of the students. Videoconferencing tools such as Zoom, Google Meet, and Microsoft Teams are helping in discussion sessions. Such digital tools typically support chat box and slideshows. Some higher education institutions disseminate course materials through their database or websites (Chakraborty et al., 2019).

Additionally, lecturers are taking help of virtual laboratories for teaching and learning science courses with Virtual laboratories that allow students to conduct experiments related to their courses online (Vasiliadou, 2020). These tools are used for data visualization and simulation. Lecturers can post open-ended questions in the chat box and request students' responses. Students are also able to share their ideas on solving a problem, particularly in courses related to circuit designing and computer programming (Chakraborty et al., 2019). "My access" student portal enables students of higher education institutions to carry out academic activities and to access important information. Learning Analytics (LA) dashboards have become prevalent in higher education institutions. They aggregate performance indicators about student and demographics to assist academic advising (Hilliger, DeLaet, Henriquez et al., 2020; Chakraborty et al., 2019).

2.2.2.5 Identifying information needs (ID)

Identifying information needs is linked to institutional routines and culture. In traditional institutions with employee hierarchies, the institutional or organisational chart becomes a good reference to learn each employee's information needs. Contradictorily, in knowledge-intensive institutions, where employees are usually involved in complex processes and/or where knowledge of information is outside their normal remit, if no behavioural patterns have been established to identify information needs and instil a culture of sharing, then much of the institutions' accumulated information will be lost and make employees work poor. Surveys, feedback and requisitions from individual department helps higher education institutions to identify business needs (Fatchamps & Woodruff, 2017; May, Atkinson & Ferrer, 2017).

2.2.2.6 Distributing information

The distribution of information to those who need it is an important dimension which cannot be ignored in information management. Distribution of information also relates to the identification of information needs. The identification of information needs determines which data must be acquired, where such information is needed for distribution and thereby, closing the loop in the information life cycle. Institutions can easily distribute collected information using technology, but to be effective, distribution needs must be centred on human and cultural aspects.

The culture of sharing information must be created so that relevant information may flow timeously not only to those who directly need it, but also to other members in the institution. Information requires subjectivity in many situations. Social interpretation and value are therefore, determined by the institutional culture and employees' collective perceptions. The European Medicines Agency 2019-2021 strategy showed that information management enables an institution to maintain and improve operational excellence. Websites upload, emails, my access, dashboard, Moodle, telephones, etc., are used to distribute information internally and externally (Peneva, 2016; Chakraborty et al., 2019; Topa & Kayda, 2019).

To ensure sustainability of information services provided by the institution and its operations, they dedicate their resources to upgrading technology to meet the required technical and information security standards, improve internal communication and collaboration and reconfigure existing business applications and services. The institution's strategic choices include business capabilities, information and technology, people and culture and ecosystem (Foerster, Schmid & Vissichio, 2018).

2.2.3 Data information integrity

Data integrity entails the process of ensuring data accuracy, consistency and maintaining data throughout its life cycle (Liu and Chen, 2017). Roger (2013) added that the content and the hosting of information systems must be reliable and trusted. Data integrity can be maintained by continuously validating and updating the completeness of data throughout the IT infrastructure data bases such as SIS, LMS, and portals and exploring the latest offerings that are intended to ensure data integrity and enabling academic institutions to make informed decisions through big data. Higher education institutions are reliant on information for operations, reporting and providing solutions for decision making. There should be a trusted relationship between the institution, academics and students for the success of higher education institutions. Trusted users must be identified and transmission lines across department must be secured. Without trustworthy information, higher education institutions cannot function properly (Liu & Chen, 2017).

2.2.3.1 Data Policy (Code of ethics)

It should be noted right from the beginning that data security data and data integrity are not the similar and that everyone in an institution must adhere to the established policy for data security. While the Protection of Personal Information Act (POPI) [59] and the set standards and guidelines of the higher education institutions guide institutions on how information is generated, used, transmitted, kept, retrieved, managed and preserved, there is a need for proper implementation of a data integrity policy. The best way to communicate data integrity practices in an institution is to develop a data integrity policy that everybody should follow.

A proper written data integrity policy should be implemented for both the computer-based and paper-based systems that clearly define what constitutes atomic data, source data, metadata and a complete data set. It should define how one has to handle the information, as well as how the process of validation happens. Data governance framework that contains policies and regulations, data ecosystems, data strategy and leadership and invested data technologies can mitigate risks to society and government from poor data quality, data obsolescence, data falsification and security intimidations (Shedaneh et al., 2016). Passwords and username encryption provide a maximum level of security and maintaining data integrity and confidentiality because only the relevant user will access data (Khan & Ablbattah, 2017).

2.2.3.2 Environment

It should be noted that *data integrity* refers to completeness, the accuracy, and reliability of data throughout its lifecycle. Error checking and validation will always ensure data integrity. Institutional culture has the capacity to increase the likelihood of unintentional or intentional errors in data integrity. To reduce this potential of data errors, institutions should strive for an open-minded culture in which managers and subordinates maintain data integrity (Shedaneh et al., 2016). Restrictions on the number of individuals who can access and disseminate data is an effective control measure that ensures integrity of data in institutions (Harley & Cooper, 2021).

2.2.4 Information technology and business capability

Business capability refers to what an institution needs to enable it to execute its business strategy. A higher education institution requires capabilities such as processes, people, and technology gathered for a particular purpose or objective. It also includes the number of capabilities such as research and development, stakeholders' engagement, information management, etc. (Cao, Duan & Cadden, 2019).

Information technology on the other hand concerns building communications networks for an institution, creating and administering databases, safeguarding data and information, helping staff members troubleshoot problems with their computers or mobile

devices, and/or doing a wide range of other work to ensure the effectiveness, efficiency and security of the institution information (Kasemsap, 2018). According to Kasemsap (2018), information and technology enable an institution to:

- delivering external commitments such as implementing new legislative requirements that affect the institution,
- maintaining operational stability to continue to deliver on existing commitments such as upgrading and maintaining technology underpinning current processes, and
- building the institutional capability as a way of investing in technology that intensifies an institution's ability to deliver on its commitment and thereby, the capabilities of the digital network.

2.2.4.1 People and culture

This section covers all changes in business capabilities including information and technology landscape which may have an impact on people and culture. Managers and staff members need to critically examine the institution's current ways of working in order to identify and align themselves across the business areas, seeking out simplification of processes and embracing the concept of the institution-wide ways of working.

Senior management and staff members need to embrace the institutional culture and opportunities that may arise for improved decision making presented by data analysis. The introduction of improved collaboration enables effective feedback and openness which in turn leads to innovation and better decision making. Becoming an increasingly data-driven institution requires different types of skills for new technology adoption which benefits the institution through the reduction of administrative and repetitive tasks such as rekeying (Cao, Duan & Cadden, 2019).

The introduction of information-sharing and increased dissemination of data and documentation further requires tightening the institution's information management procedures, policies and governance to ensure that permissions-based access by the institution's staff members and non-staff members is workable against the institution's applications and systems. Technology competencies are key to the institution and in most

cases, require acquiring new competencies amongst staff members and training (Kasemsap, 2018).

2.2.4.2 Ecosystem

Ecosystem strategy requires the institution to change its approaches to network and external stakeholders, including suppliers through procurement processes. Changes required usually require strengthening the use of existing Telematics governance process, improved strategic planning with the network, continuous monitoring, and leveraging the network more to identify business trends such as the use of artificial intelligence and robotics (Liao & Liu, 2020).

2.2.4.3 Suppliers

When engaging with suppliers of information and technology services, the institution continues to transist from a strategy of contracting consultants on a “time and means” basis to a strategy of sourcing more institutional services via outcome-based contracts (Kasemsap, 2018).

2.2.5 Information Technology (IT) principles

The IT principles are informed institution’s strategic choices for information and technology and guide its decision making and governance to ensure that the IT strategy remains on track. Various authors identified diverse principles. Amongst others, Jemes (2019) suggests the following principles:

- Standard solution principle: Deliver services that meet minimum requirements – then improve them. Through incremental alterations, the institution, will continuously provide improvements to solutions.
- Self-service principle: Eliminate routine engineering tasks with inherent properties of the infrastructure, automation that allows customers to execute well-defined tasks
- Flexible work-hours principle: Embrace flexible working hours if sufficient staff is maintained.

- Transparency principle: Promote partner and customer trust by sharing details about service issues and implementation mistakes and following through with continuous improvement changes.
- Knowledge sharing principle: Promote personal and institutional growth by fostering a culture of sharing. Sharing knowledge encourages efficiency and minimizes duplication of effort.
- Service Relevance principle: The institution should keep services relevant by routinely improving customer experience, efficiency and stability.
- Common cause principle: Expand the scope of an initiative when launching a major change.
- Shifting from specific solutions to shared information services: As solutions are delivered, the institution will continue to establish a set of sustainable services and shift to funding continuous improvements.
- Collaborate for the maintenance and delivery of services: Interactive service-centered approach aims at establishing a common shared centralized technology infrastructure where elements are maintained and delivered by the institution and its agencies.
- Keep customers' close principle: Staying closely with customers regardless of the institutional hierarchy provides opportunities to build trust, diffuse grievances and maintain a common understanding of priorities and issues.
- To procure institutional services at the highest level of outcome by default that is relevant: Since IT services benefit the largest number of users with diverse needs, the institution keep customization to a minimum to allow leveraging cloud and ready-made solutions that require little adaptation to increasing certainty of delivery and reducing maintenance efforts.
- Maximizing the intellectual capital of the institution in support of fundamental regulatory scientific activities: The institution should deliver services that allow the collection of information and made actionable in institutional processes.

2.2.6 Digital transformation as part of IMC

Digital transformation is currently a top priority for many institutions operating in different areas of business, with permanent velocity being the primary characteristic of the change

process. All business sectors, whether a primary, secondary or tertiary, are not immune to the process of digital transformation. In most instances, digitalization causes them to change significantly, or even cease to exist entirely (Seres, Pavlicevic & Tumbas, 2018).

Higher education institutions are amongst the sectors influenced by digitalization and faced with different challenges because of rapid and diverse changes in the business environment.

Different authors have defined digital transformation in different ways. The ambiguity of views led to queries into academic and professional literature using keywords “digital transformation”, resulting in thousands of papers exploring the concept of digital transformation from different perspectives. “The most common perspectives include: an institution/organization, an individual, a network, an industry or an entire ecosystem society or economy as well as the digital era”

According to Seres, Pavlicevic and Tumbas (2018), most researchers agree that digital transformation of business comprises the following six dimensions or transformation blocks:

- Established and accepted institutional digital strategy and the approach to application of innovation.
- Substantially adaptable collaborative processes and organized agile promptly in modern institutional models.
- A complete automation of business processes.
- A detailed research and analysis of customers’ decision making.
- Institutional information technology supporting all institutional business processes.
- A relevant and usable data and use of data analytics for making decision in accordance with the institution’s goals and strategy.

Numerous authors agree that digital transformation is, before all, institutional changes, realized by means of digital technologies and institutional models which aim at improving the institution’s operational performance. Categories of organizational business transformations encompass the business models, people/staff, business processes,

organizational structure, technologies utilized for gathering and managing information, range of products and/or services, and models of engaging with clients, customers and suppliers.

Digital transformation of higher education institutions is a process of their technological and institutional changes, primarily caused by the development of their digital technologies. Some authors highlight the fact that true digital transformation of institutions can be achieved only if the significance of their digital culture is comprehended and accepted by all units and adopted as part of their institutional culture.

However, most authors commonly view digital transformation as one of the complex business transformation models enabled by digital technologies. Digital transformation ascertains the possibilities for successful digital innovation and strategic role of novel digital technologies in the digital era. Through the process of digital transformation, institutions converge multiple new digital technologies with the intent to achieve superior performance and sustained continuous improvement. In this way, they transform different dimensions of business such as customer experience and operations, the business model, and simultaneously impacting on people and networks.

The main aim of the digital transformation process in higher education institutions is to redefine educational services and redevelop the institutions' operational processes. According to Sandkuhl and Lehmann (2017), there are three possible approaches to accomplish this goal, namely;

- Service-first transformation, focusing on changing and redefining services before making key improvements and changes to operations (activities within processes).
- Operation-first transformation which aims at identifying new and amending activities and operations, as well as presenting digital processes as the basis for redefining institution of higher learning services.
- Service-operation combination which involves the integrated transformation through systematic interrelation of the first two approaches.

2.2.7 Challenges of Digital Information Management Capability implementation

In dynamic technological world, it can sometimes seem that institutions are trying to hit a moving target by fixating on the next evolution in technology rather than focusing on the goals of the institution and stakeholder values. Digital transformation may be understood as driven by key drivers such as technological, social and political processes. These form a loop in which social processes influence technological and political processes, which in turn influence the meaning of a technology as well as the needs and usage patterns among end-users.

Digital transformation and the development of technologies are moving targets, and institutions are facing technological implementation dilemma: the impact of a technology or digital service is difficult to predict until such technology or digital service is extensively developed and implemented in its intended context. The dilemma can be addressed by focusing on the needs and goals of the institutions and end-users instead of, on the continuing evolution of technology. Furthermore, if a technology or digital service is identified as adding value to the receivers and/or staff, then the institution needs to respond and accommodate the changing practices and technological changes (Frennert, (2019). The following challenges digital information management implementation in institutions:

2.2.7.1 Lack of standardisation practices for change

Lack of standardisation practices for change affects both seizing and reconfiguring capabilities. The process development work is still considered as trial and error due to its dependence on tacit knowledge and lack of factual information. Most institutions struggle with the implementation of new processes because of their unstructured way of working. There is a tendency to reinvent the wheel for almost every new implementation due to poor communication about the changes, lack of standardized handover documents and lack of proper time for training. Although the processes are updated with respective documents, the majority of people still work in different ways as compared to the latest

best practice caused by lack of detailed training plans that cover all concerned stakeholders (Li, Zhou & Cheng, 2019).

2.2.7.2 Competence and culture gaps

Competence and culture gaps in institutions affect sensing, seizing and reconfiguring capabilities of process innovation negatively. There is a lack of clear technical understanding between process engineers and IT in most institutions. The IT people struggle to understand the daily demands and production situations from institution processes while process engineers struggle to understand constraints and technology opportunities. Incremental improvements in systems or operations require a lot of changes from both people and institutional perspectives. This is caused by the lack of skills and competence related to data handling and understanding important data needs as well as ad-hoc follow-up on solutions (Li, Zhou & Cheng, 2019).

2.2.7.3 Ad-hoc problem solving

Ad-hoc problem solving is the key challenge that mainly affects the sensing capabilities. Institutions spend less time understanding process-related problems before starting to solve them. This approach has long-term implications that prolong the implementation phase (Li, Zhou & Cheng, 2019).

2.2.7.4 Infrastructure

Infrastructure is a key element for proper implementation of digital information capability. Lack of infrastructure affects the efforts of employees negatively towards attaining institutional goals (Savic, Lazarevic, Kukic et al., 2019).

2.2.7.5 Poor data strategy and readiness

Poor data strategies have a significant effect on sensing capabilities. An institution can acquire a lot of data in different systems, such as furnaces and detailed reports. This may mean that the system has not been effectively used for many years, and the data are often handled manually. In addition, the different architecture of systems at different sites makes data handling more difficult. An institution gathering information from operations

measurements and maintenance systems but covering only a small part of the institution may hinder information management capability. It is important to know that the major source of information is humans, with their tacit knowledge experiences. However, if an institution is missing a lot of interesting opportunities from a information perspective given the lack of ways to use data among the people involved and awareness of potential possibilities and (Li, Zhou &Cheng, 2019), implementation cannot be a success.

2.3 Operational excellence

2.3.1 Operational excellence background

To provide a platform for the discussion of operational excellence, this section focuses on the definitions and key themes around operational excellence, limitations, enablers, key component, the methods of Lean and Sigma and principles surrounding the concept of operational excellence.

Operational Excellence is essential for the growth of institutions and industries of all sizes due to its characteristics of searching quality as well as efficiency and effectiveness of institutions (Aguela & Ruiz, 2019). Although the concept of Operational Excellence is quite complex, based on the theories of Lean and Six sigma, it has a lot to offer to institutions in the ways of management, control and increasing the overall value of the institution.

Operational Excellence in its nature aims at maintaining and keeping continuous improvements. It thus has a way to see the positive changes in institutional performance, empowering the employees and maintaining customer satisfaction, as well as eliminating wastes and/or reducing costs and risks, while completing deadlines and deliveries on time (Aguela & Ruiz, 2019; Marvin, 2019; Mauzi & Tasmin, 2017).

The old version of Operational Excellence known as the “Centers of Excellence”, was to be adapted everywhere. It’s focus was on having leaders from each department, manufacturing, selling department, construction, etc.; top talents so to say, to be the one with all the knowledge of the methods of Lean and Six Sigma. This was regarded as the way to succeed. But when the institutions left Centre of Excellence team alone, it started

to turn bad. “Running on autopilot, each day became a repetition without a clear vision on what to strive for” (Rivo, 2018). And when the results were measured, it became clear that they had failed to produce. In the end, even with the best leaders, it was a never going to succeed, without constant improvement in mind.

The problem was that the culture and mindset of Operational Excellence hadn’t been adopted by the entire organization, as they were trying it out as a gesture for change. Failure to know the true meaning of Operational Excellence simply means not knowing what and how to sustain the institution in the long run, and this has always been a recipe for institutions to fail.

This section of the study focuses on understanding Operational Excellence, and principles that underlie continuous improvement and the variables of operational excellence being operationalized by flexibility, speed, cost, quality, social and environmental factors (Fork-Yew & Ahmad, 2014). Moreover, enablers such as managing people, structure, technology, leadership, strategy culture, and employees’ commitment to change are key variables that affect Operational Excellence of an institution. Information Management Capability therefore, becomes a stimulus of Operational Excellence which cannot be ignored.

2.3.2 Dimensions of Operational Excellence

Operational efficiency can be explored in three dimensions, that is; operational, professional, and support services; in strategic governance and in academic matters (Curaj, Deca & Pricopie, 2018).

2.3.2.1 Professional, operational and support services

Operational efficiency in a professional, operational and support services is driven by the need to optimise the use of resources and streamline business processes. It combines a wide range of activities or performance measues to ensure the efficient implementation of day-to-day institutional operations, including space facility management, procurement, finances, human resource management and student support services. Operational efficiency measures can give benefit to internal institutional reorganisation or institutions

sharing resources, and thereby optimising their operations'' (Curaj, Deca & Pricopie, 2018).

2.3.2.2 Academic matters

In academic matters, operational efficiency relates to efficiency in research as well as in teaching and learning. It covers processes associated with the institution of teaching and research. The optimisation of the academic offer, the use of ICT for teaching and learning, digital learning and research profiling, can be cited as examples among others. The question of operational excellence in academic matters arises on all institutional levels, including faculty and departmental levels. This also concerns the individuals involved in teaching activities and in research. Institutional measures in this area can therefore, include the definitions of class sizes, teaching load, and research output requirements.

2.3.2.3 Strategic governance

Operational excellence in strategic governance in a higher education institution is associated with a broad range of activities that relate to the articulation of efficiency in the context of the value creation model to underpin institutional development and performance management; accountability and stewardship for the capital of the institutional (finance, human intellect, natural, reputational, relationship, etc.); development of institutional "operational excellence culture" based on leadership and staff engagement, effective internal communication, investment in skills, technology and capacity-building; stakeholder perception of value and integrated reporting, engagement of governing bodies, etc. (for example, through value for money reports).

Most activities in this area have a long-term nature based on a strategic, sustainable and coherent-approach to value for money, efficiency and effectiveness which supports the institution-wide development. Operational excellence occurs when every employee in an institution can perceive the flow of value to the customer and fix that flow before it breaks down (Ozumba, 2010). Operational excellence (OE) in an institution predominantly deals with continuous improvement, the efficiency, effectiveness, and optimization of

production processes. In comparison, operations excellence (OE) enlarges the perspective to see operations as setting lever by providing enablers for achieving goal as a central role for continuous operational and long-term success of an institution.

Operational excellence involves the development of enablers that help to generate competitive benefits in a dynamic environment based on the available resources of an organization or adaptability. The composition and expansion of enablers becomes the basis for continuous improvement, the optimization of business processes and change. Operational excellence therefore, refers to the dynamic capability to realize the effectiveness and efficiency of core processes in the value creation chain utilizing cultural and technological institutional factors based on the respective strategy in an integrative way.

Miller (2014) defines operational excellence as a tour, and not just a set of goals, but striving for the future vision. Choosing the correct tools and methods that are custom made to fit an institution´s vision is the foundation of operational excellence. The theory of operational excellence uses Lean as a mind-set to improve the flow of information, eliminate all waste and using Six Sigma to remove variation in the processes and standards in production to maintain batch-to-batch quality. However, an institution that undermine the benefits of employee interaction and ignore their suggestions, gives itself a way of reaching operational excellence failure.

Operational excellence's focus is on continuous improvement that uses the aspects of Lean and Six Sigma to adapt to the changes of the institution to maintain the vision that everyone has in mind in order to achieve the institution's vision and future goals. To achieve this, there must be focused people around the institution.

Operational excellence is therefore, an element of organisational leadership that stresses the application systems, tools and a variety of principles towards the sustainable improvement of key performance metrics. According to Ahmad and Beharin (2013), the assessment of operational excellence is the process of assessing an institution against a model for continuous improvement that highlight what has been achieved and what

needs to continually improve. It is therefore, an outstanding practice in managing the institution and achieving performance results.

2.3.3 Enablers of Operational excellence

2.3.3.1 Process

In the case of process, excellence is most likely found near the centre of the scale between autonomy and alignment. It should be noted that there is no perfect end state. Process excellence requires an ever ending and continual sensitive adjustment between autonomy and alignment (Zeitoun, 2019). The best way to achieve scale in excellence is to balance the need for strategic alignment across all processes, with the need for local autonomy and the ability to make adjustments in order to address current demands and needs of the market.

Charkraborty, Sharma and Vaidya (2020) consider the process as enabling structure. “Information Technology (IT) infrastructure is integral to operational excellence approaches towards sustainable institutional supply chains” (Charkraborty, Sharma & Vaidya, 2020). Enabling infrastructure relates to technology, processes and people practises in an institution. This provides the basis for operational excellence as it enables high levels of productivity. The behavioural issues at the institutonal level require urgent and immediate attention to strengthen the IT infrastructure (Charkraborty, Sharma & Vaidya, 2020).

2.3.3.2 Culture

The institutional culture shapes the choice of processes that enable both operational and strategic alignment yet leave an open window for different organizational units to put a more personal stamp on their work. This blend creates operational excellence stickiness.

Finding the correct balance point for some of the institution’s key units is vital to demonstrate early adopters’ successes. At this point, change becomes transmissible: measurement happens when it becomes attractive for all other units to follow suit. (Ahmad & Baharin, 2013; Charkraborty, Sharma & Vaidya, 2020).

2.3.3.3 People

People enabler represents a balance between the present and the future. The scale goes from traditional to non-traditional abilities. At one end of the scale, the traditional is seen as the healthy mix of leadership and strategic competencies – still challenging enough to deliver thoroughly. The non-traditional end represents the competencies that are required for excellence in a world defined by digital technology. Challenging as it may be, finding the right and correct mix of people competencies is vital for institutions seeking to excel operationally while also becoming more and more innovative.

The secret recipe for making people work will be a level of collaboration across institutional boundaries that have not yet been witnessed (Charkraborty, Sharma & Vaidya, 2020). According to Issar and Navon (2016), human resource is a key asset in an institution on the basis that skills and abilities contribute to operational excellence. “For operational excellence to take place, every member of the operations team should always know the institutional actual production pace versus its goal. Production pace should reflect out the operations reports and dashboards. To prevent supply stoppage, the production line constraint needs, by design, to have some over production capacity. Once the production line stops, a task force needs to be urgently activated. The safe inventory will serve to ensure the continuous supply while solving production stops (Issar & Navon, 2016).

2.3.3.4 Technology

Despite the importance of digital technology in institutions, the reaction to revolution is quite uneven and is often difficult to sense. As with process, it is important for all layers of the institution to sense and respond quickly to changing needs. Change leaders need insight to establish where to hit the balance in terms of technology.

In practice, delivering operational excellence on the people scale in an institution requires people to work on new implementation approaches that are comprehensively designed around clients or customers (Charkraborty, Sharma & Vaidya, 2020). Operational excellence takes place at a point where the institution reaches the height of efficiency by

doing things better, faster and cheaper. The institution processes become efficient, boosting productivity with improved quality and meet up with the clients (Fork-Yew & Ahmad, 2014). Operational excellence from the angle of waste elimination (lean), requires continuous improvement and flexibility.

2.3.3.5 Governance

The classical view of governance in institutions is one of the most steering function that can be fulfilled by dedicated committees. For excellence to be achieved, there should be a shift towards a much more fluid viewpoint that is more benefits-focused and supports timely and fast decision-making by executive teams. The governance enabler measures spans from delivering to steering. Leaders have to see the institution holistically and carefully weigh its readiness and appetite for the redesigned approach.

Another critical dimension to the governance enabler requires the executive leadership to create a greater transparency in the meetings, designing reflection sessions, revisiting the values and also changing the executive role from one of steering, to one of redirecting experimenting. Bringing operational excellence enablers together creates a multiplier for measuring operational excellence.

Successful information technology (IT) governance is vital for institutions to achieve their goals and objectives. According to Muazu and Nashehu (2021), governance of institutional activities grounded on effective established structures and processes for accountability and decision-making regulations have significant positive effects on the operational excellence. Governing regulations for control of activities and operations are recommended.

2.3.3.6 Knowledge

Knowledge management is a crucial factor that can improve operational excellence. Knowledge is created by the interaction between explicit knowledge and tacit knowledge. This is a fluid mixture of values and contextual information and framed experiences which provides a framework for incorporating new experiences and assessing information.

Knowledge management essentially comprises of processes and tools that can capture and transmit data.

The institution's culture is a critical factor in building and reinforcing knowledge creation and knowledge management as it impacts in the way members learn, acquire, and share knowledge. Tools and processes are used to apply and share knowledge between individuals internally and externally. Successful knowledge management requires more than innovation and new technologies. It requires the understanding and the aspects of the integration between humans and institutional culture. Knowledge becomes evident by competences of employees (Carvalo et al., 2017). "The level of service quality is dependent on staff performance through service ability. This simply means the required skills, knowledge and concepts which are required for line staff members to offer excellent service continuously (Shedaheh, Al-Zu'bi, Abdallah et al., 2016).

Communication management as part of knowledge management can be considered a good knowledge sharing method among employees. Good information sharing practices, understanding technology and adequate use of past experiences and lessons learned result in continuous improvement and operational excellence (Carvalo et al., 2017).

2.3.4 Lean and Six Sigma as operational excellence tools

Lean thinking in an institution helps it to re-attain the value lost in waste and can revive an institution. The institution that correctly implements lean culture, lean concept, tools, and lean planning reaps the benefits of guaranteed success. Six Sigma is about process-control to remove variation and to standardize existing processes. It optimizes each work method and uses measurements to ensure the quality of the production. The purpose of Six Sigma is to make the work-environment a defect-free area and a problem-solver (Roger & Antony, 2019, Yew, Hee, Fei & Long, 2019). The mindset of enablers is represented in Figure 2.2 below:

Training (Empowerment)	People (Leadership)

Communication (Technology)	Customer collaboration (Teamwork)
Governance (Executive teams	Culture

Figure 2.2: Lean Pillars

Lean concept has to do with the elimination of the eight non-value-added wastes to improve the working conditions in an institution. Sticking to lean concept can help the institution to multiply the overall flow, speed of production and add value to the processes. The eight Lean concept non-value-added wastes are as follows:

- Defects leading to repairs or re-work
- Over production which creates inventories that take up space and capital
- Incorrect processing/over processing
- Over production
- Underproduction
- Unnecessary movement of employees (Motion)
- Delay time (waiting for the next value-added process to start)
- Movement of work products (Transportation)

Lean has a variety of tools to choose from. Institutions use some of the most popular tools as TPN, Jidoka, 5Ss, Andon, Continuous flow, Value Stream mapping, Kaizen, Kaiban, JIT, PDCA, Poks-Yoke, Muda, etc. Lean Planning involves aligning the lean tools and combining them with Kaizen Event. These are useful for convincing institutions to Sigma of the value of methodology (goals of the institution).

2.3.5 Kaizen event

Below follows Kaizen Event as represented in Figure 2.3

Kaizen Event/tools

Gather owners, operators and managers of the process in one place

Mapping the existing process

Improving the existing process

Soliciting buy-in from all parties that relates to the process

Figure 2.3: Kaizen Event

According to Kaizen Event, Operational Excellence can be achieved through the application of tools and methods to change the way in which an institution is managed and what are managed within the institution. This involves many institutional influencers such as culture, discipline, policies, and procedure. It goes further to the way in which an institution deals with people and resources not just relevant with cost reduction and quality improvement (Ahmad & Baharin, 2013).

2.3.5.1 The objectives of operational excellence

Kaizen is Japanese and the word Kaizen stands for "Continuous Improvement". It refers to activities that aim at the implementation of positive and ongoing changes at the institution. It is a strategy that involves all workers from every institutional level to work willingly and together being proactive with the motive of achieving regular and incremental improvements to the manufacturing process of an institution (Ozumba, 2018).

(a) Effective service delivery

Operational excellence is the processes of optimizing post-sales services where the service operation involves synchronizing various processes involved in service delivery. It goes further to handling the institution's costs and risks associated with its service portfolios, beyond just operational effectiveness but also for achieving the institution's outstanding performance (Muazu & Tasmin, 2017).

(b) Customer satisfaction

The emphasis of operational excellence in the tertiary sector is customer satisfaction and delivery of service in time (Muazu & Tasmin, 2017**).** Institutions world-wide are facing competitions, comprehensive changes in technology, regulatory requirements and demographic changes, and customers' demands. Having that in mind, effective strategies are needed to be able to continuously create superior value to customers through operational excellence. The aim is to meet and exceed a variety of stakeholders' expectations of whom customers are the most prominent to an institution (Tornjanski, Marikonvic & Jancio, 2017).

(c) Effective task execution

Operational excellence is the dynamic capability that helps to realize effective and efficient key processes in the value creation chain through technological, cultural and organizational factors in an integrated way and based on the respective strategy. It encompasses quality, efficiency, and effectiveness, but above all, there is a very strong focus on the institutional culture.

Employees could detect problems and solve them analytically timeously. The core processes in the value chain are utilised in an integrative way based on the institution respective strategy and involve the organizational culture of the company (Aguilera & Ruiz, 2019).

(d) Effective service delivery

Operational excellence reaches the height of operational efficiency by doing things faster, better and cheaper. Operational excellence is the unification of the institution's entire operations such as manufacturing, procurement and after-sales service as an end-to-end system [35]. It has been the purpose of operational excellence to increase the production efficiency, improve the quality of service and meet up with the institution's market demands.

Operational excellence takes place at a point where the institution reaches the height of operational efficiency by doing things faster, better and cheaper. The institution processes become efficient, boosting productivity with improved quality and meet up with the clients. (Fork-Yew & Ahmad, 2014). Operational excellence from the angle of waste elimination (lean) requires continuous improvement and flexibility.

(e) Governance

Successful information technology (IT) governance is vital for an institution to achieve its goals and objectives. According to Muazu and Nashehu (2021), governance of institutional activities grounded on effective established structures and processes for accountability and decision-making regulations have significant positive effects on the operational excellence. Governing regulations for control of activities and operations are recommended.

2.3.6 The components of Operational Excellence

The next step to adapt OPEX is to align the four components of it to fit with the direction that the institution is headed at. The components are the following:

- Attracting and Maintaining Top Talents
- Innovation and Collaboration
- Aligning Strategies and Tactics
- Acquiring and keeping customers

Having a strong team of committed leadership aligned with the vision of an institution, adapting to new tools and strategies to achieve institutional goals and milestones, and attaining customers that the institution want enable operational excellence either in developing and innovating new products or services. By knowing where the institution is heading, one can optimize the speed of development and maximize the profits.

This mind-set helps the institution to set path and adapt with time. This enables the institution to know when to speed up or to slow down, and when to acquire new markets or grow with the customers. Operational excellence can only take place if everyone and

every field in the institution strives for excellence and goes with the flow of change as it arises. Continuous improvement is therefore, a key for success in any institution.

2.3.7 The five keys elements/Performance indicators of Operational Excellence

Even if the institution has adopted the OPEX culture and has made effort to learn its mind-set and methodologies, there is still more to do to sustain OPEX. Without having all key elements in place, the implementation of OPEX can never be complete. This includes speed, effective communication, applied wisdom, leadership and performance (Aguilera & Ruiz, 2019; Marvin, 2019).

2.3.7.1 Speed

The institution needs to find the optimized production speed and know when to slow down for the best performance.

2.3.7.2 Effective Communication

Goals must be communicated with everyone, the employees, customers and business partners, contractors and other stakeholders to gain trust and mutual understanding on where the institution is heading and things that are still to be done.

2.3.7.3 Applied Wisdom

Applied wisdom covers internal learning and sharing of knowledge across the entire institution. This helps all parties involved to see the institution in the bigger picture.

2.3.7.4 Leadership

The institution must identify key leaders and develop them in line with the objectives of the institution. Finding hidden talents in the workforce and knowing the type of skills required is essential for the success of the institution.

2.3.7.5 Performance

A good institution's strategy leads to good performance. A strategy that does not go towards the vision is worth less.

According to Marvin (2019), performance can be boiled down to seven areas that organizations must excel at:

- **Strategy** – leadership creates vision and values and refine it into strategic focus and direction
- **Metrics** – balanced scorecards cascaded down through the organization
- **Culture** – staff understand the strategy and accountable for the results
- **Processes** – integrated business process architecture (BPM)
- **Methodology** – applying discipline and rigor to continuous improvement through Lean Six Sigma (LSS)
- **Project Management** – applying discipline and rigor to projects (PMBOK)
- **Tools** – solution delivery (processes, products, and services), problem solving and continuous process improvement

It is also essential to understand that these areas are all interconnected. For an organization to claim it operates in the Operational Excellence space, it must excel at all seven of these areas.

2.3.8 Principles of operational excellence

According to Lean Six Sigma, the following principles are essential for operational excellence:

2.3.8.1 Leading with humility

Leading with humility requires "letting go of the past, and what you thought was the "right way" in the past. Managers must learn to accept that there is a need for improvement and lead with humility. Seeking feedback, listening to others' opinions and accepting

suggestions will makes employees feeling empowered and encouraged to work towards the goal of an institution.

2.3.8.2 Respecting every individual

Each person working in the institution has worth and potential to deserve to be respected. This includes customers, employees, suppliers, partners, and the whole community of the institution at large. This makes them feel empowered and motivated to think about positive ideas for the improvement of the institution and to achieve operational excellence.

2.3.8.3 Embracing scientific thinking

The 4th Industrial Revolution Embracing scientific thinking requires every institution to embrace scientific thinking. “In science, scientists believe in rigorously testing, observing, analyzing and experimenting new ideas and methods to find out the best idea”. The leadership must continuously explore new ideas and encourage employees to do the same without the fear of facing failure. An institution can never grow until it determines what works and what does not work (Aguilera & Ruiz, 2019; Marvin, 2019).

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2.3.8.4 Seeking perfection

Institutions must continually seek for perfection. Many people do not like the principle of seeking perfection as they believe in the belief that perfection is unattainable. Striving to achieve excellence helps to create a different perception in the institution. This helps all stakeholders to have different attitudes to deal with challenges and problems that they face on daily basis. It is important to confront a challenge with a positive attitude rather than providing quick fix short term solutions. A simplified work approach should be embraced and long-term solutions should be highly considered without compromising the quality of the work (Aguilera & Ruiz, 2019; Marvin, 2019).

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2.3.8.5 Assuring Quality at the source

“Best quality can only be achieved by achieving the best quality of each process of the production. Each part of the production process must be performed rightly” (Marvin, 2019). This can be attainable provided the work area is designed in such a way that each problem becomes visible immediately in the work area. Whenever a problem arises, all the work should be stopped immediately for everyone to focus on solving the problem before moving ahead.

2.3.8.6 Focusing on the process

It is believed that human nature blames others whenever a problem arises. It should be noted that it becomes impossible for an employee to consistently produce good quality work when there is a fault in the process, no matter how smart the employee can be. It is advisable for an institution to look at the processes before pointing the finger at employees. Adopting this attitude can help an institution to make changes where necessary.

2.3.8.7 Create a Blueprint to Guide What You Build/The IT Architecture

The institution must define and maintain its IT architecture with guidance and application selection and deployment, data definitions and usage and approved digital technologies. The application of IT and data architectures must be mapped to the institutional process model and driven by the strategic plan. This eliminates the rapid increase and duplication of technologies and tools (Marvin, 2019).

2.3.8.8 Thinking systematically

The institution needs to understand the relationship between the processes to make the right decisions. This is a crucial matter because an institution is formed of several small processes that are interconnected with one another to achieve its objectives. Barriers that prevent creative thinking or the movement of ideas, information, or material in the institution must therefore, be removed.

2.3.8.9 Understanding the customers, business alignment, strategic planning, and IT governance

An institution needs to learn about the needs and expectations of its clients/customers. Customers define the value of something by conveying what they want as compared to the price that they are ready to pay for it. An institution can achieve long-term success if it delivers what its customers want consistently and efficiently.

It is therefore, essential for institutions to continuously work to learn about the needs and expectations of customers and to keep modifying and enhancing its processes to meet the expectations of its customers. A strong senior business executive commitment and support for the adoption of the Operational Excellence model for managing IT services is essential.

Strategic planning process and ongoing verification and adjustment through department and corporate governance boards help the institution do things right and to accomplish the business alignment. Establishing an effective strategic planning process, engaging both the business and IT leadership team assist in defining the broad principles and strategies of an institution for establishing periodically update of portfolio of projects.

Setting up governance processes helps guide the development of plans and programs, approval of projects, funding, and steward results. Governance boards should consist of senior business and IT executives who are committed to standardization, consolidation, and best practices as a foundation strategy of an institution. The IT budget and billing processes must be consolidated and centralized. Corporate policies and guidelines governing the development and use of IT services must also be developed and communicated to all stakeholders.

2.3.8.10 Flow and pull value

The main objective of every institution is maximum benefit to its customers. The organization should create and maintain the continuous flow of goods/services in response to the demand. This reduces waste production. It therefore becomes important

to continuously evaluate the demand of customers and produce right quantity to meet the demand.

2.3.8.11 Create constancy of purpose

Employees need to know the institutional goals and mission statements. They need to be reminded continuously of customers' needs, organizational goals, the progress that the institution is making, and efforts required to achieve goals. This will enable them to align their personal goals and actions with the goals of the institution.

2.3.9 Other principles that underlie continuous improvement

2.3.9.1 Commitment

Parast and Safari (2022) acknowledged the importance of HR as an intellectual asset within the industrial firms. They stressed that operational excellence is a result of surpassing an outstanding achievement that can be gained by using of HR strategies and practices as a tool in situations where the employees are committed. HRM practices cannot be efficient without eliciting specific employee attitudes like institutional commitment. This means that operational excellence is found in institutions where all employees, across managerial levels, have a strong commitment and sense of ownership and see connection to the goals of the institution (Bernardo *et al.,* 2022). Top management commitment provides the basis for knowledge sharing for continuous improvement and enhanced operational excellence (Carvalo *et al.,* 2017).

2.3.9.2 Hard work

Institutions must seek continuous improvement in the objects that define their areas of operation to remain competitive in the business environment (Benitez *et al.,* 2022). This requires managers to strive to achieve world-class performance level by integrating their institutions' people, processes and tools (Bernardo *et al.,* 2022). Maintaining a high level of integration between the institution's strategy, action programs, practice, and performance lead to continuous improvement (Parast & Safari, 2022). Studies have found leadership as the largest single factor responsible for the success of operational

excellence and leaders are accountable not only for achieving results, but for achieving results effectively and efficiently" (Benitez *et al.,* 2022).

2.3.9.3 Leadership

Leadership can be defined as the social influence whereby one person seeks the voluntary participation of their subordinates to reach institutional goals in various situations (Bernardo *et al.,* 2022). Benitez *et al.* (2022) acknowledges leadership as the largest single factor responsible for the success of operational excellence in the service industry.

Due to rapid technological change in the services delivery systems which put additional responsibility on this sector's leaders to draw a clear vision in order to respond to those changes while considering customers' demographic and life style variations, managers will focus on a short view using their authority or power (Bernardo *et al.,* 2022). Leaders must have the ability to develop vision, plans and strategies through motivation, stimulation and encouragement.

2.3.9.4 Human Resource Management (HRM) practices

HRM is an important source of competitive advantage and operational excellence. Good HRM practices have a positive impact on many areas such as organizational performance, service quality and operational excellence (Parast & Safari, 2022). Key HRM practices such as recruiting, selecting, training and development, performance appraisal, and employee compensation should not be ignored.

2.3.9.5 Operations Strategy

Service strategy is about ensuring that institutions are in a position to handle risks associated with Service Portfolios and costs and are setup not just for operational effectiveness, but also for distinctive performance. Decisions made by any institution with respect to service strategy have extensive consequences including those with delayed effective service strategy is the implicit factor of operational excellence. Customer service delivery system includes technology, physical facilities, the role of people, equipment and

the process by which a service is created and delivered. Excellent customer service delivery provides the customer with the right value and has a positive impact on the institution's operation profit and operational excellence (Benitez *et al.,* 2022).

2.3.9.6 Involvement culture

Culture is the invisible bond which ties community members together. When it comes to improvements, firms should transform to a cultural settings where every single person is involved (Bernardo *et al.,* 2022).

2.3.9.7 Involvement of culture

Culture is regarded as the invisible bond which ties community members together. When it comes to continuous improvements, institutions should transform to a cultural setting where every single person is involved (Benitez *et al.,* 2022).

2.3.9.8 Honesty

Honesty goes hand in hand with integrity, thus being honest and having integrity enable institutions to build better internal relationship. Operational excellence is built on knowing what the right is and being willing to always to do the right thing. This requires honesty and integrity. This leads to accurate planning, reduction of waste, harmonizing activities and driving productivity up (Shehadeh et al., 2016).

2.3.9.9 Integrity

Integrity entails being honest and having strong moral principles that provide an institution with bases of operational excellence. It is regarded as one of the most fundamental traits of professionalism which promote a successful work environment and continuous improvement in the institution. There cannot be reliability, confidence and trust if there is no integrity, and therefore, an institution is doomed if employees lack integrity (Shehadeh et al., 2016).

2.3.9.10 Cooperation

Performance improvement is sustained by cooperation as operational discipline that strives for consistency in daily work practices by all employees in an institution (Yeo, 2019). Operational excellence requires culture that permeates everything that people do, rather than as an isolated initiative or event, that is; cooperation (Marvin, 2019). “Operational excellence frees up employees, so they have more bandwidth to focus on activities that drive value - which ultimately drives customer satisfaction” (Yeo, 2019). Pursuing operational excellence requires adopting a mindset of teamwork, problem solving, and top-line growth while allowing employees to create more value for customers (Yeo, 2019; Marvin, 2019).

2.4 Achieving institutional operational excellence

Achieving operational excellence requires administrative services to be committed to identifying, analyzing and improving existing institutional processes in order to create greater efficiency and cost saving that leads to high level of services in an institution.

The RVB considers an institution’s possession of a sustainable performance as operational excellence where an institution results in extra ordinary income such as an institution’s growth and capital profitability (Bernardo *et al.,* 2022). Operational excellence in an institution refers to the efficient and effective management of resources, physical assets, finances and information (Bandara, Abbott, Mathiesen, Meyers & Nagra, 2018).

The resources are optimally aligned with financial sustainability which can be achieved through generating sufficient funds to cover operating costs and to support investments in both staff and students, estates, IT infrastructure and other facilities (Liao, Fu & Liy, 2020; Zulkepli, Hasnan & Mohtar, 2019). This can be achieved by capitalizing investments in information systems and tools.

2.4.1 Measuring operational excellence

According to Bandara, Abbott, Mathiesen, Meyers and Nagra (2018), operational excellence can be measured through external benchmarks, leading internal indicators, and goals to measure against. This requires the consideration of the following:

- The gap to address perfect performance
- Operational improvement initiatives that an institution is undertaking
- Operational maturity profile of an institution or best standard practices for the industry in which an institution operates.

2.4.2 IMC linkage with operational excellence

According to Aydiner et al. (2019), for IMC to be an originator of institutional operational excellence, it must have a positive effect on the system as well as the user satisfaction. In response to this, an institution's capability in managing information will be regarded as a strength if it gives operational excellence (Liao *et al.,* 2020). From the RVB, the IMC addresses operational excellence of an institution in certain aspects. Some institutions achieve operational excellence with their IT efforts whereas others continue to struggle regardless of being in the same line of business activity (Aydiner *et al.,* 2019). New technologies and processes should have a direct influence on productivity.

Bag *et al.* (2020) alluded that an institution can fail to succeed due to lack of attention given to the integration of capabilities and resources. Bag *et al.* (2020) added that the improvement in efficiency can be achieved from the coordinated deployment of activities in an institution, from the correct decisions enabled by IMC, and also from investments in technological assets that are applied to individual tasks. Al-Dalaien *et al.* (2020) argued that information management capability plays an important role in developing other firm capabilities for customer management, process management, and performance management. Al-Dalaien *et al.* (2020) added that these capabilities favorably influence customer, financial, human resources, and organizational effectiveness measures of firm performance which provides the premise for operational excellence.

Furthermore, Sokiyna and Aqel (2020) postulated that the ability to provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, and confidentiality. Sokiyna and Aqel (2020) added that information management capability provides the premise for the ability to provide universal connectivity and access with adequate reach and range. Luz *et al.* (2021) is of the view information management capability provide the premise for the ability to tailor the infrastructure to emerging business needs and directions. Luz *et al.* (2021) added that information management capability ambidexterity is a nascent concept providing a philosophy and framework for organizations to radically innovate their business processes, while maintaining their capabilities in process efficiency and operational excellence.

2.4.3 IMC as an institutional performance factor

The IMC becomes an institutional factor if the investment in IT generally reduces costs and increases the quality of products and productivity without price decisions necessarily affected (Luz *et al.*, 2021). Most institutions confirm the recognition IMC in achieving operational excellence even though there is still confusion around measuring its success (Liao *et al.,* 2020).

2.5 The necessity of information management capability

From a technological evolution perspective, a need for use of electronics and information technology (IT) to support automation and management capabilities in an institution will continually be desired (Liao, Deschamps, Loures & Ramos, 2017). The long-term operational excellence can be achieved through the articulation of resources in order to create capabilities which will lead to efficiency. Information systems become a core system for operations and services. The systems are always on the list of various projects throughout either planning, implementing other new systems and/or upgrading the existing systems. The management of information is crucial in every institution. Most institutions are now moving into the global information age. For this reason, institutions are required to be increasingly information driven. Many information-based institutions fail due lack of adequate information, poor management of information policies or failure to

establish significant management initiatives that can help them to succeed. According to Aydiner et al. (2019), information management capability influences other capabilities in an institution for customer management, process management and performance management.

2.6 Systems for managing information in higher education institutions

Many institutions use information technology systems to perform various tasks. This includes basic processing transactions, communicating with customers, data management, executive support as well as workgroup support. Aydiner et al. (2019) and Issa, Isaias and Kommers (2018) identified the following information systems:

- Executive support systems (ESS),
- Management information systems (MIS),
- Decision Support system (DSS),
- Knowledge management systems (KMS),
- Transaction processing systems (TPS), and
- Office automation systems.

Information systems also include other data warehouses, expert systems, search engines, enterprise resource planning, enterprise systems, global information system, as well as geographic information system. The new digital technologies enable institutions to develop other institutional capabilities through IMC as an influence on the strategic differentiation, hence operational performance. Centobelli, Cerchione and Esposito (2019) developed a 5 level Pyramid Model of Information system types as shown in Figure 2.4 below.

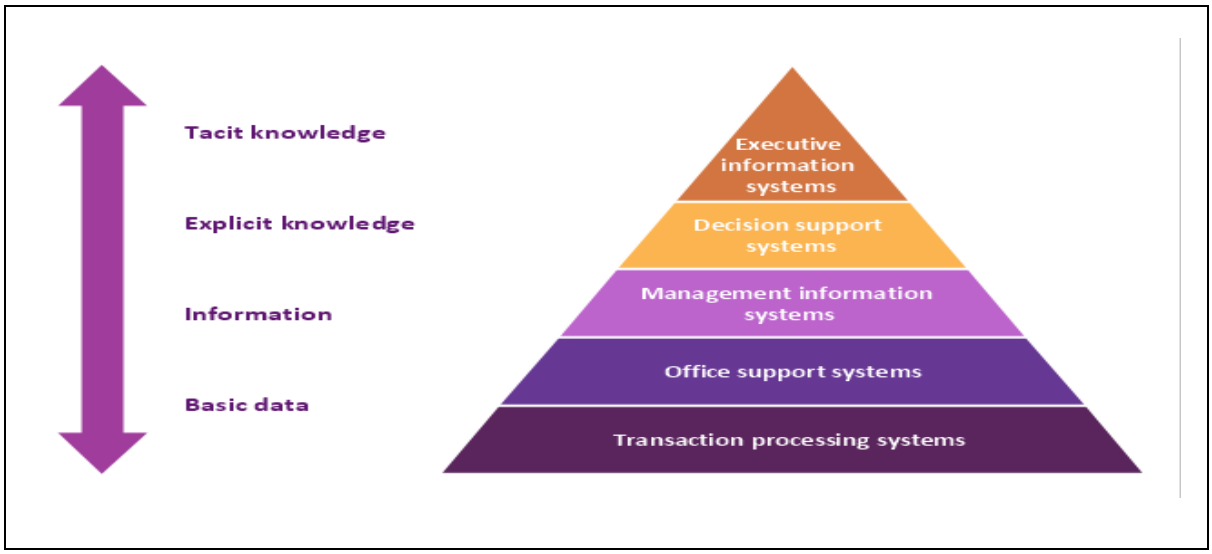

Figure 2.4: Information systems types
Source: (Centobelli, Cerchione & Espisito, 2019)

Figure 2.4 shows a five-level pyramid model of different types of Information Systems levels in an institution based on the different requirements of information processing. The first level indicates a transaction processing system used to process basic institutional data mostly done by workers. Information technology workers use the IS components to create information systems that watch over the management of data, risks, and safety measures in an institution. These actions are known as information technology services. The second level in the diagram indicates office support systems for processing information in offices by middle managers.

The third level represents management information systems to process information by managers. The fourth level indicates the institution's decision support systems for processing explicit knowledge by senior managers. The last fifth level indicates executive information systems for processing tacit knowledge by the executives of an institution. An IS technology which is computer based is used to carry out some or all the planned tasks of an institution. According to Aydiner et al. (2019), IS systems provide support to the functions of an institution such as accounting, marketing, finance, human resource management, customer service, operations and other functions depending on the type and nature of an institution. Aydiner et al. (2019) concur with Popovic' et al. (2018) on the fact that the basic components of computer-based information system encompass

hardware, software, database and network which make up the information technology platform as follows:

- The hardware for accepting and processing data and information.
- Software which entails programs that allow the hardware for data processing.
- Databases for the gathering of associated files or tables which contains related data.
- Networks for connecting system that allows diverse computers to distribute resources.
- Procedures with command for combining networks, databases as well as hardware and software for processing information and producing a preferred output.

2.6.1 Management of information using IT

An appropriate management of information uses information technology (IT) for ensuring automatic management of information processes (Garba, Mohammed & Abba, 2019; Weldon, 2019). It requires an institution to ensure that the right information is obtained at the right time by the right people. Information management includes a cycle of institutional activities, that is, collecting, making analysis, categorizing, contextualizing, and archiving as well as deleting information where necessary.

Tools and policies that allow data to move from one stage to the other during data lifecycle are used to determine how information management capability influences firm performance (Aydiner et al., 2019)). They argued that there are two philosophies of information management, that is: control centric applicable to sensitive data such as health records and financial services. However, this is not always possible to “lock down” everything due to increasing amount of new data. For this reason, most institutions use this philosophy to their most often shared data assets and most important data assets such as reference and master data.

The second philosophy entails the exposure of greater data freedom in the hands of their partners, business analysts and customers in hopes of unleashing digital transformation. They all have valid reasons. For this reason, it is important to manage information in any institution (Garba, Mohammed & Abba, 2019). Components of information management encompass people, policies and processes, technology as well as data and information.

There are, however, principles that must be followed for proper management of information. Proper information management practices entail:

- The interpretation of data in IT infrastructure
- Understanding information in information systems
- Taking effective decisions

2.7 Challenges in managing information

Although the management of information benefits an institution, several challenges have been observed. This includes collecting information and making it available for use when needed. This requires an institution to work as a team for efficiency (Aydiner et al., 2019; Garba, Mohammed & Abba, 2019).

2.7.1 Collection of information

There are various ways of collecting information in professional services industry. This may include existing data sources, observations and audits as well as issuing questionnaires/surveys to be completed by the relevant party or group of people targeted and conducting interviews about the work. Most institutions find it difficult to obtain the correct and relevant information in most institutions. It is not possible to share information without it (Dimitros, 2018, Aydiner et al., 2019).

2.7.2 Information availability

The unavailability of information makes it difficult for institutions to operate smoothly. A huge amount of money is needed for information databases to be successful. Most people find it difficult to obtain the right information at the right time (Dimitros, 2018; Garba, Mohammed & Abba, 2019).

2.7.3 Ensuring the usage of information

Most leaders use data analytics before making decisions (Martins, Branco, Goncalves, Au-Young, Oliveira & Cruz-Jesus, 2019). Accessing and putting information to use is a challenge to many institutions. Information management requires teamwork. Information

sharing technique must be accessible and easy to use. Having applications which usually do not do what is required can be a challenge in an institution. Institutions without IT specialists will find it difficult to use information to support the applications that their clients use (Martins, Branco et al., 2019). For example, a cloud technology provider having a difficulty in finding a professional for supporting applications used by clients.

The same applies to an institution with a cloud technology but lacks the MIS specialist with the ability to use it as a way of ensuring that the desired objectives of an institutions are achieved. The lack of MIS specialist will be a challenge to that institution. Responding to the challenge brings another challenge of bringing employees on board as a way of training them to adjust with what they do (Martins et al., 2019).

2.8 Benefits of Information Management capability

The management of information can be regarded as proper if managers and other information users have access to information and where it helps an institution in managing its challenges (Martins *et al.,* 2019). The information management system in such an institution creates the required information, process and disseminate information necessary for operational excellence. Garba, Mohammed and Abba (2019) state that information management can only be good if it uses IT for information management automation.

Additionally, Martins *et al.* (2019) attest that the benefits derived from the application of IT include a guarantee that required information will be available to managers and other users timeously and accurately, reduction in the number of personnel due to automation, improvement of economies of scale, reduction in the overall cost for service deliveries and academic activities and collaboration that enable employees to work easily in teams through sharing information across functional departments. This results in motivation of MIS deployment, reporting and analyses benefits and planning benefits.

2.8.1 Motivation for management of information system deployment

Managing an institution can be unimaginable without a software support represented by information systems (Martins *et al.*, 2019). The information systems that most institutions

acquire can be in the form of human resources management system, accounting system, or it can cover some other areas. Some institutions decide to buy some more complex system solutions that are capable of providing information support of everyday operations in all key areas. A high-quality MIS can provide the institution a comprehensible, reducing exhausting routine work and unblocking staff capacities for creative, faster planning, structured information and capability of variant planning and modeling impacts of various institutional situations.

2.8.2 Reporting and analyses benefits

Properly designed MIS can be the right solution for analysis and reporting in an institution. Reporting is regarded as a system of interinstitutional statements and reports, utilized not only for evaluating and controlling results achieved previously (Garba et al., 2019). Statements and reports from suitable MIS can also be used for decisions about the measurements for improvement of the institution's performance in the future (Garba, Mohammed & Abba, 2019). The availability of data through the correct MIS can provide correct and reliable information virtually immediately, without any delays and without risk of mistakes made by manual processing of large amounts of data.

2.8.3 Planning benefits

Modern MIS offer various tools for efficient planning and support. This is a fundamental activity in majority of institutions. According to the classical concept, plans can be long-term (strategic plans), mid-term (tactical plans) and short-term (operative plans). Most institutions have annual plans (Martins *et al.*, 2019). Many institutions then see their annual plans as documents that are created mainly because they have to be made.

Quality management information system can assist in providing a substantial simplification of the planning process, speeding up the planning and providing tools for creating variants, updating forecasting or prognoses based on an institution's statistic method. Researchers world-wide confirm that information is valuable in every institution. The management of information entails the combination of an institution and processes as well as technology. Institutions use computers for transforming, storing, and retrieving

information as well as implementing decision-based programmes on information feedback obtained in the form of analytical report (Aydiner et al., 2019). This requires the information management systems and other tools that provide institutional information, the benefits and challenges of information management. The main aim of the chapter is to prove the influence of IMC on operational excellence of a university.

2.9 Effect of digital transformation strategies on information management capability (IMC)

Anim-Yeboah *et al.* (2020) elucidated that digital transformation is characterized by changes and transformation which are driven and built on a foundation of technologies. Anim-Yeboah *et al.* (2020) added that within an enterprise, digital transformation is defined as an organizational shift to big data, analytics, cloud, mobile and social media platforms. Sharing the same sentiments with Anim-Yeboah *et al.* (2020), Li *et al.* (2021) postulated that the current business environment is witnessing a radical altering of the business landscape fueled by the emergence of digital innovations and opportunities leading to the increased adoption of various opportunities such as analytics, big data, cloud, social media and mobile platforms in a bid to build competitive digital business strategies hence enhancing information capability. Benitez *et al*. (2022) indicated that information management capability is more than just an ability that a firm possesses, but rather a complex package of information technology-related resources, skills and knowledge that enable firms to coordinate activities and other resources to produce desired results. Benitez *et al*. (2022) added that institutions with the ability to plan and integrate their information management resources are more positioned to capture information about customers, share knowledge and improve business processes.

2.10 Identification of research gap

It is pertinent to note that the discourse pertaining information management capability and operational excellence dictates from the past scholars' perspective has been provided. However, despite the contributions of these scholars, the benefits and challenges of managing change in business information management remained largely invalidated and the opportunities for enhancing the benefits and reducing challenges remained relatively

unexplored (El Alfy *et al.,* 2019). This study will contribute empirical evidence on information management capability and operational excellence in selected institutions of higher education in South Africa. A model that will assist the study to assess the management of information capability as an influence on operational excellence of institutions is desired. Additionally, the extent to which information management capability influences operational excellence within the institutions of higher learning context still need to be explored as there is still paucity within that discourse. A construct of information Management Capability (IMC) which gathers capacities and skills available for the management of information through its life cycle in an institution will therefore be proposed. Hence this study provides the premise researcher to assess IMC and operational excellence of an institution directly.

2.11 Summary

Given the pervasiveness and criticality of IT services in institutions today, it can be concluded that a high performing IT function is an absolute pre-requisite if the institution as a whole is to achieve operational excellence. Excellence in IT management begins with the notion that IMC influences operational excellence as the guiding principle and driving force for the IT function design, the operating culture and the management and decision-making processes from which the institution enjoys continuous improvement and an enduring competitive advantage from superior performance in areas such as effective change management, lower costs, a great deal for the reliable operations, customer robust and flawless execution. In conclusion, this study results from the application of IMC are focused on institutional sustainable performance and thus, operational excellence. Research methodology in the next chapter will provide an empirical testing of the questions in the study using data from departmental heads or managers in selected higher education institutions. Results from the research questions will be analysed before conclusions, limitation and suggested future line of study can be presented

Chapter 3

Theoretical and conceptual framework of the study

3.1 Introduction

For any research study, it is prudent to base the study on existing theories and models. This chapter therefore, provides the theories and concepts related to the study. This includes an in-depth understanding of theories and models primarily from information management capability which entail the Digital transformation strategies (DTS), Information management cycle which includes Information Gathering (IG), Information Processing (IP), Information Access (IA), Needs identification and Distribution (ID) and Operational Excellence. Research in information management and systems has rapidly developed during its relatively brief existence. This covers Information Technology (IT) and Information Systems (IS). IT offers institutions a fundamental decision intensifying environment that hold forth new opportunities, therefore giving rise thriving, competitive institutions, adding institutional value and offering valuable services and products to customers. Research within the IT domain has produced several new theories, some of which have been used to aid explaining and predicting end-user use of technologies. To obtain a foundation of the study, we provided a comprehensive overview of the prime theories related to IMC and their theoretical fundamentals review.

3.2 Theories related to IMC

This section provides a discourse of the theories that are related to information management capability. The theories that will be discoursed are the Resource Based view, Knowledge Management theory and Technology Management model.

3.2.1 The Resource Based View theory

The Resource Based View theoretical model has inspired recent research in the management of information systems (Devece, Palacios & Martinez-Simmaro, 2016). The theory highlights the importance of capabilities and resources, particularly those that are intangible in nature, in competitiveness, business strategy and success (Greve, 2021).

The essential determinant of economic rents and long-term competitive advantage and improvement is the ability to protect, accumulate and continually develop resources and capabilities that are rare, valuable, inimitable, distinctive and which have imperfect mobility (Greve, 2021). Capabilities refers to the skills that an institution possesses in deploying its resources, in a generally coordinated way, using institutional processes to achieve a desired set goal (Mong, Mohamed, Misnan & Palis, 2021).

It is pertinent to note that operational excellence is achieved by articulating resources in order to create institutional capabilities integrated within the institution (Saeed, Tasmin, Mahmood & Hafeez, 2021). The use of IT implementing revolutionary IS and the integration of IS into institutional activities supporting an institution's strategy requires the combination of capabilities and resources (Drnevich & Croson, 2013). The Resource Based View (RBV) gives new prospects for examining the problem of information management paradox.

The major advantage to be derived by applying the concept of IMC is that it permits some of the underlying hurdles in previous literature to be resolved. It explains the importance of capabilities, especially those that are intangible in competitiveness, success and in business strategy. The ability to develop, accumulate, and protect valuable and scarce resources gives a long-term competitive advantage to an institution and therefore, operational excellence. It should be noted that the first aim of this study is to develop a construct that enables us to analyse how information management capability of the selected higher education institutions in South Africa links to their operational excellence. This will assist in identifying skills and capabilities available to the institution for managing information effectively through its life cycle in an institution.

Brockbank, Ulrich, Kryscynski and Ulrich (2018) define capabilities as a combination of skills possessed by an institution in the deployment of its activities, in a coordinated way using the available resources in order to attain the desired objective. For the institution to excel, competitors must find it difficult to imitate the skills possessed for an institution to maintain a sustainable competitive advantage when articulating the available resources, hence operational excellence.

Since the resource-based view assert that an institution possesses resources, a subset of which enables competence, and a further subset that leads to superior long-term performance, it is discernible that the effects of an institution-specific resources on performance are considerably high. Empirical studies of institutions or firms' performance using the RBV for instance (Campbell & Park, 2017; Gupta, Kumar, Singh, Foropon & Chandra, 2018; Shibin, Dubey, Gunasekaran, Hazen, Roubaud, Gupta & Foropon, 2020) have found differences between institutions in the same industry within the narrower confines of groups within institutions. Although one of the major challenges that RBV theorists have encountered was to define the meaning of a resource. Many researchers and practitioners have interest in the RBV and have used a variety of different terminology to talk about institutional resources including competencies (Popli, Ladkani & Gaur, 2017).

The theory argues that the benefit can be sustained over longer periods. The empirical studies have strongly supported and uphold the resource-based view (Campbell & Park, 2017; Campbell *et al.,* 2018; Shibin *et al.,* 2020). The evaluation of information systems' effectiveness has been a primary concern of both academics and practitioners (Hasan, Maarop, Samy, Mohammad, Azmi, Hassan & Ghaffar, 2018). The RVB is one of the theoretical models which inspire recent research in information management systems (Barney, 2001; Aydiner et al., 2019; Steininger, Mikalef, Pateli, de Guinea & Ortiz-De, 2021; Pereira & Bamel, 2021; Beamish & Chakravarty, 2021). The model understands an institution as a set of assets which are productive and whose value for the growth of an institution lies in the services produced and/ or in the way they are produced.

The core assumption of the RBV understands an institution as a set of high-yielding assets, whose value for the institution's growth does not lie in the assets themselves, but rather in the services they produce, or in the way they are used. For instance, considering IT from the RBV, these technologies do not meet the criteria for operational excellence. IT can rather be integrated alongside other intangible assets to create unique capabilities that might represent a source of operational excellence (Hasan et al., 2018). Furthermore, the RBV give highlights on the significance of resources and capabilities for institutional competitiveness and success.

Capabilities entails skills possessed by an institution in deploying its resources in a coordinated way, using its processes in order to achieve its objectives (Padadopulous, 2016). The use of information technology (IT), implementing information systems (IS) and therefore, the integration of IS into an institution's activities as a way of supporting the firms' strategy requires the combination of capabilities and resources. An institution IT resource infrastructure such as software, hardware, networks, and databases. The approach to study IT assets, analyzing their integrating and complementarity with other institutional assets as a way of creating IS helps an institution's operational excellence.

The operational excellence derives from IT and IS emanates from the way they are used and from services accompanying them and not from tangible assets. This approach also focuses on information management and how IS combination, policies from the information cycle and procedures are viewed as a competitive advantage in an institution.

Another objective is the influence of information management on operational excellence. Any attempt to establish relationship between IT or IS and operational excellence is mediated by higher-order capabilities that relate to information management. Such capabilities do not depend on the benefits and costs of investment relative to ad hoc problem solving. Information is regarded as a higher-order capability for use and exploitation of the institutional value of an institution's IS. This helps to build technologies for managing information (Dimitrios, 2018).

RBV scholars such Dubey, Gunasekaran, Childe, Blome and Papadopoulos (2019) argue that that an institution can perform well and succeed on condition that it can transform the available resources into sustainable competitive advantage. They both agree that an institution will have operational excellence provided its various resources such as tangible (physical) and intangible resources (human) as well as organizational resources are valuable, imperfectly imitable and non-substitutable. The researcher adopts the view of Sun, Li, Yue and Kong, Y (2017) which defines capabilities as tangible, intangible, information based organizational process and intermediate goods.

Aydiner et al. (2019), Munyanyi and Pooe (2019) added by describing tangible assets as physical things such as land, buildings, equipment, machinery and other capital as well

as intangible assets, as everything else that has no physical presence owned by the institution. This include trademarks, brand reputation, intellectual property as well as information which is key to the study. The RBV provides the empirical evidence on the importance of information management for institutions and focuses on information as a resource instead of IT (Mong *et al.,* 2021). This will also give direction to the influence of information management capability on excellence operations of higher education institutions (Mong *et al.,* 2021).

The use of both capabilities and resources can lead to operational excellence if well managed (Greve, 2021). The view of this RBV argues that organizations should look inside the institution to find the source that makes it to perform well and not the environment within which it operates (Shibin *et al.,* 2020). According to the RBV model and resources (tangible and intangible resources) play an important role in helping institutions to achieve higher institutional performance and thus operational excellence (Greve, 2021).

The RBV is based on the supposition that capabilities, skills and other resources that an institution has differ from one institution to the other and therefore, institutions can perform well by using their different bundles of resources at their disposal (Sun et al., 2017; Sarkar, 2012; Stone, 2017; Dubey et al., 2019). This stresses the importance of developing and enhancing those resources that are distinctive, in particular, an institution's distinctive capabilities based on institutional processes and routines which are socially complex. An explicit knowledge or 'knowing about' becomes visible through communication that can be readily transferred from one point to the other. The approach therefore, considers operational excellence as benefits derived from the continuous improvement in the application of IT and IS and continuous service improvement that accompany them.

Fig 3.1 below illustrates the RBV model adopted for the study by the researcher.

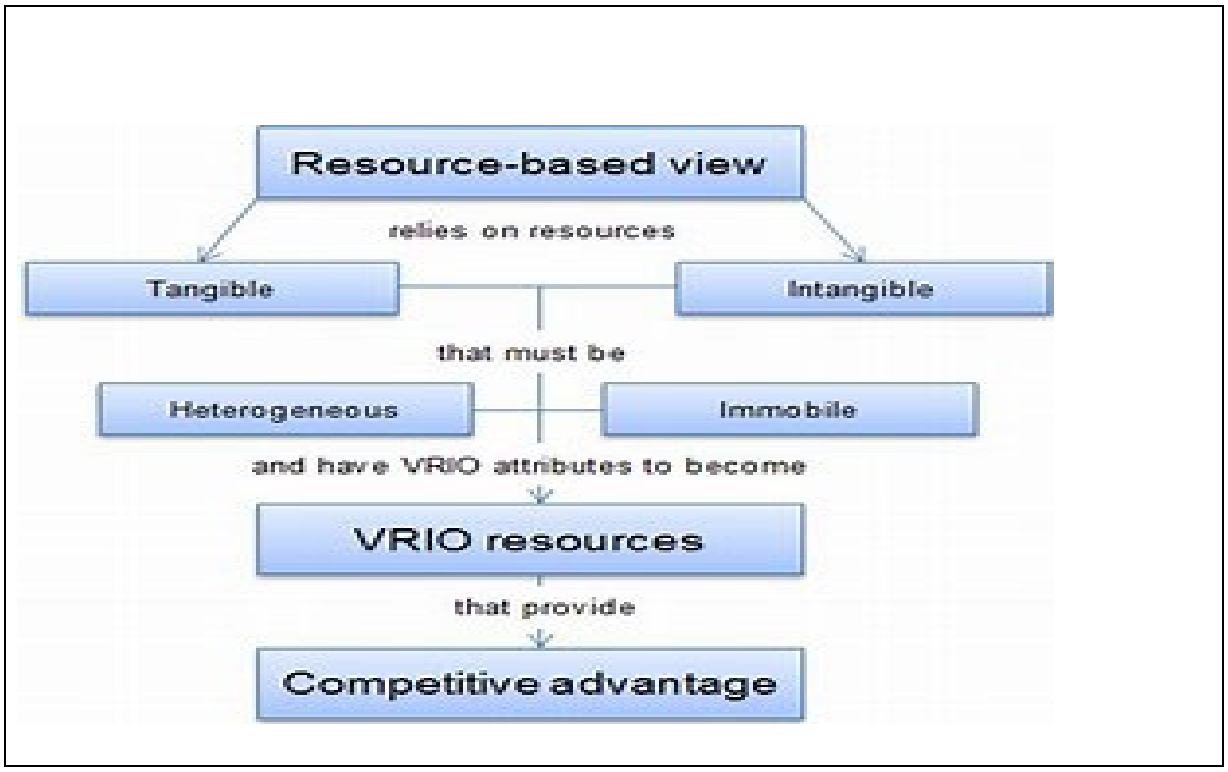

Figure 3.1: VRIO RBV
Source: (Barney, 2001)

The RBV above known as VRIO was developed by Jay B. Barney in 2001. The motive was to evaluate the resources of an institution on the level of the microenvironment that comprises human resources, financial resources, material and non-material resources such as knowledge of the industry, information about the market and more (Gawankar, Gunasekaran & Kamble, 2020). The researcher focuses on two aspects of VRIO, that is, VRIO Analysis and Analysis of the institution.

- Within the context of the VRIO Analysis, it is imperative to note that this acknowledges the basic questions that the resources and capabilities are valuable for the institution's growth and development (Indartono & Wibowo, 2017). Additionally, it firstly defines one of the two aspects, secondly; it can be considered as the strength of the institution and thirdly if it does not, it is regarded as the weakness of the institution that needs to be worked on thoroughly (Indartono & Wibowo, 2017).

However, depending on the standard of the situation and the industry domain, some of the capabilities and resources can be regarded as a weakness to one institution and strength to the other (Gawankar et al., 2020). In both cases, the outcome lies in the decrement in the costs, increase of the revenues or both the scenarios depending on the play of internal and external factors affecting the operations of the institution and the merit of the situation and (Sun et al., 2017). The available resources and capabilities of the firm should be able to sustain institutional excellence and should continue over a long period of time. If both the factors are not met, the firm fails to attain the objective of operational excellence (Sun et al., 2017; Gawankar et al.,2020).

- Another facet is the analysis of the institution. Within the context of the analysis of the institution there are many factors that include the compensation policies, management reporting structure, and the management control systems for the entire hierarchy of the firm (Gawankar *et al.,* 2020).
- The reporting structure of management comprises the aspects of the various reporting authorities and who reports to whom in the organization (Indartono & Wibowo, 2017). The control of management system comprises of the rules and regulations to make sure that the decisions taken by managers are well aligned with the institution's strategies (Hsu & Chen, 2019). It includes regular meetings, budgeting procedures and the other reporting activities that assist in keeping the management well informed about the day-to-day activities (Hsu & Chen, 2019).
- The informal activities cover the institution's innate culture and motivating employees to monitor each other to attain the institution's aims and objectives (Gawankar et al., 2020). The RBV theoretical framework will assist the researcher to determine how information management capability influences operational excellence as rational decisions are taken in the selected higher education institutions in South Africa.

3.2.2 Knowledge Management theory

Knowledge management has emerged as an important field for research and practice in information systems. This field is building on theoretical foundations from strategic management, information economics, institutional behaviour, institutional structure

quality management, artificial intelligence, and institutional performance measurement. These theories are being used as bases for new concepts that gives a rationale for managing knowledge, define the processes of managing knowledge, and enable the institution to evaluate the results of these processes (Baskerville & Dulipovic, 2018). Knowledge management refers to the deliberation and systematic coordination of an institution's technology, people, processes and structure to add up value through innovation and reuse (Mahdi, Nassar & Almsafir, 2019). This can be achieved through promoting knowledge sharing, the application and creation of knowledge through the best institutional practices, and feeding valuable lessons learned into corporate remembrance for fostering continuous institutional learning (Dayan, Heisig & Matos, 2017). Technology enables change in the way people do their work and consequently, the operating model of institutions needs to be re-examined and modified within the foreseeable future (Botha, 2020). Changes that result from the Fourth Industrial Revolution and its prominence on the digital productivity and technological innovation will make the way the institution works almost unrecognizable to today's institutional leaders. According to Bhalla, Dyrcks and Strack (2017), knowledge Management is known as an enabler and supporter of the following four areas, namely; customer expectations, product management, new forms of collaborative well known as innovation collaboration and organisational forms.

3.2.2.1 Customer expectations

Tahir, Arshad and Khan (2018) alluded that one of the important facets of knowledge management is that which is concerned about improving the experiences of the customers. Abubakar, Elrehail, Alatailat and Elçi (2019) alluded that knowledge management focuses on understanding the customers and establishing strategies or mechanisms to ensure that they are served in an excellent manner. Hence, customer expectations is grounded on the notion of how the customers are served (Tahir *et al.,* 2018).

3.2.2.2 Product enhancement

Another facet of knowledge management is concerned with product enhancement. Product enhancement entails modifications or improvements made to the products which

improve performance of such products (Ode & Ayavoo, 2020). This implies that product enhancement is grounded on digital capabilities, durable and resilient as well as predictive maintenance (Ode & Ayavoo, 2020).

3.2.2.3 Collaborative innovation (new forms of collaboration)

Collaborative innovation is described as actions that businesses utilize to increase their rates of innovation and problem solving by harnessing the various ideas and insights of workers, customers, and partners more effectively (Bhalla *et al.,* 2017). Collaborative innovation can take many forms that include brainstorming session and crowdsourcing towards attaining the desired results (Botha, 2020).

3.2.2.4 Organizational forms

At the organizational and institutional levels, a definition of organizational form is provided in terms of labour power, the object, means, and division of work, as well as labour control (Oliva & Kotabe, 2019). Following that, a number of typological methods are examined, with an emphasis on the identification of novel organizational forms (Abubakar et al., 2019). Organizational forms are grounded on new business models, different talent and skills (Abubakar et al., 2019).

Previous studies showed that numerous knowledge management strategies and initiatives have been implemented to focus on the processes of capturing, creating, organising and leveraging the knowledge and information of individuals whereas the technology dictates the way forward regarding how institutions manage the knowledge of people and the work processes performed in institutions (Bhalla et al., 2017; Abubakar et al., 2019; Oliva & Kotabe, 2019; Botha, 2020). Knowledge management therefore, remains pertinent in an era in which knowledge is an outcome of data captured in various systems that connect institutional technologies (Botha, 2020).

Amongst others, knowledge management will need to support institutions in the Fourth Industrial Revolution by sourcing the relevant data, ensuring that the available data is clean before it can be analysed; and ensuring that knowledge can be created from the connectedness of devices and that relevant devices are connected to the Internet of

Things. We are in the era of knowledge and reason of increased significance of knowledge lies in the fact that effective management of knowledge presents many positive outcomes to enhance efficiency. And we implement KM initiatives with the expectation that it will result in continuous improvement. KM is used for capturing, documenting, retrieving and reusing knowledge, as well as for the creation, transferring and exchanging of knowledge. There is no restriction as to where KM can be implemented. KM is growing becoming increasingly more important for institutions and individuals to understand the type of information that is essential, how to administer it and how it can be transformed into permanent knowledge (Tseng et al., 2012); KM plays a fundamental role in the success of an organization's activities and strategies (Castrogiovanni et al., 2016). Therefore, managing and using knowledge successfully is important for both individuals and institutions to take full advantage of the value of knowledge (Gao, Chai & Liu, 2017).

3.2.3 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the effective models that have been used tremendously in information management research (Opoku & Enu-Kwesi, 2020:35). The technology acceptance model refers to an information systems theory that models how technology users come to accept and use it. The actual system use is the end-point where people use the technology. Behavioural intention is a factor that leads people to use the technology. The Technology Acceptance Model (TAM) is regarded as a leading model that outlines the user's intentions to use technology often labelled as "behavioural intentions (BI)", by their attitudes toward technology (ATT), which are in turn predicted by their beliefs about technology. Technology Acceptance Model (TAM) describes the factors that determine the use and the intentions to use technology. These factors include the external, outcome variables and mediating some of which evolved as the TAM advanced further.

TAM is considered as one of the best-operationalized approach to describe and link the systems, people and other contextual factors with potential impact on the acceptance of information systems (Makuri & Mauti 2016). The core variables in the TAM comprise the perceived ease of use, perceived usefulness, the intentions to use technology and

attitudes toward technology. The perceived ease of using a technology describes the extent to which a person believes that the use of technology would be free of effort or ease its use. Similarly, the perceived usefulness of technology refers to the extent to which a person believes that using a technology would enhance his or her job performance (Sherer & Teo, 2019). The acceptance of digital technologies as fundamental elements in all sectors of the society and the economy in general (research, education, scholarship, business, and government) is important. The applications of technology enhance and promote education, as learning and knowledge practices have changed the nature and role of information management in institutions. (Makuri & Mauti 2016). TAM can be illustrated as follows:

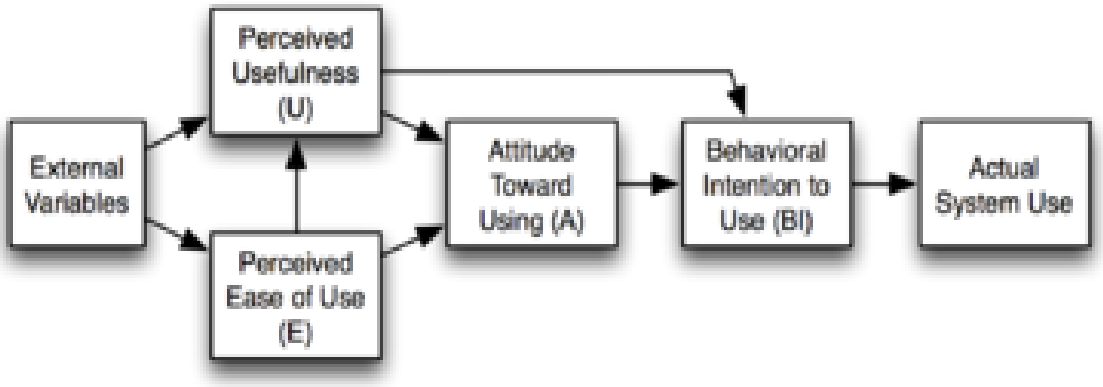

Figure 3.2: TAM Model
Source: Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." MIS Quarterly, 13(3), 319-340.

3.2.3.1 Justification for using the RBV to the context of the study

TAM is regarded as the right model for quantitative based information management research, and to a lesser extent qualitative information management research and desk studies (Opoku & Enu-Kwesi, 2020:35). On the other hand, many studies found that institutions put knowledge management initiatives with information and communication technologies (ICTs) being primary to many of these initiatives. However, the results show that levering knowledge through ICTs is often difficult to achieve because knowledge is human-centred (Walsham, 2002).

How institutions promote the sharing of knowledge becomes a major challenge because KM requires the evaluation the human, IT, and processes in the institution (Gao, Cahai & Liu, 2017). The study of the IMC and OPEX found that the Resource-Based View of the institution (RBV) is the underlying theory that provides the desired strategic viewpoint on the research (Opoku & Enu-Kwesi, 2020; Wu et al., 2021; Wong & Ngai, 2021). The literature on the resource-based view (RBV) of institutions defines resources as any institutional characteristics that can be a strength or weakness, particularly if the resources are valuable, rare, inimitable and non-substitutable as such resources can be the source of continuous improvement (Barney, 1991; Williams, 2014).

Generally, the resource-based view approach gives planners and managers of institutions with an logical means of assessing possible factors that can enable continuous improvement. It therefore, becomes imperative to understand that managers need to identify, classify, and understand resources that offer continuous improvement. For these reasons, institutions need to invest in information management capability. According to Arikan and Barney (2018), the resource-based logic influences the theoretical and empirical work in non-strategic management disciplines including marketing, management information systems, human resource management and operations research among others. The measurement of information systems effectiveness has been a central concern of both academics and practitioners (Hasan, Maarop, Samy, Mohammad, Azmi, Hassan & Ghaffar, 2018). Literature review showed that RVB is one of the theoretical models which inspires recent research in information management systems (Barney, 2001; Aydiner et al., (2019).

The model understands an institution as a set of assets which are productive and whose value for the growth of an institution lies in the services produced and/ or in the way they are produced. The core assumption of the RBV understands an institution as a set of productive assets, whose value for the institution's growth does not lie in the assets themselves, but rather in the services they produce, or in the way they are used. For instance, considering IT from the RBV, these technologies do not meet the criteria for operational excellence. IT can rather be integrated alongside other intangible assets in

order to create unique capabilities that might represent a source of operational excellence (Hasan et al., 2018).

Firstly, the RBV give highlights on the importance of resources and capabilities for an institutional competitiveness and success. Capabilities entails skills possessed by an institution in deploying its resources in a coordinated way, using its processes in order to achieve its objectives (Padadopulous, 2016). The use of information technology (IT), implementing information systems (IS) and therefore, the integration of IS into an institution's activities as a way of supporting the firm's strategy requires the combination of capabilities and resources of an institution's IT resource infrastructure such as software, hardware, networks and databases. The approach to study IT assets, analyzing their integrating and complementarity with other institutional assets as a way of creating IS helps an institution's operational excellence. The operational excellence derives from IT and IS emanates from the way they are used and from services accompanying them and not from tangible assets. This approach also focuses on information management and how IS combination, policies from the information cycle and procedures are viewed as a competitive advantage in an institution.

Another objective is the influence of information management on operational excellence. Any attempt to establish relationship between IT/IS and operational excellence is mediated by higher-order capabilities that relate to information management. Such capabilities do not depend on the benefits and costs of investment relative to ad hoc problem solving. Information is regarded as a higher-order capability for use and exploitation of the business value of an institution's IS. This helps to build technologies for managing information (Dimitrios, 2018).

RBV scholars such Dubey, Gunasekaran, Childe, Blome and Papadopoulos (2019) argue that an institution can perform well and succeed provided it can transform the available resources into sustainable competitive advantage. They both agree that an institution will have operational excellence provided its various resources such as tangible (physical) and intangible resources (human) as well as organizational resources are valuable, imperfectly imitable and non-substitutable.

The researcher adopts the view of Sun, Li, Yue and Kong, Y (2017) which defines capabilities as tangible, intangible, information based organizational process and intermediate goods. Aydiner et al. (2019), Munyanyi and Pooe, (2019) added by describing tangible assets as physical things such as land, buildings, machinery, equipment and capital and intangible assets as everything else that has no physical presence owned by the institution. This include trademarks, brand reputation, intellectual property as well as information which is key to the study.

The RBV provides the empirical evidence on the importance of information management for institutions and focuses on information as a resource instead of IT. This will also give direction to the influence of information management capability on excellence operations of universities. The use of both capabilities and resources can lead to operational excellence if well managed. The view of this RVB argues that organizations should look inside the company to find the source that makes an institution to perform well and not the environment within which it operates. According to the RBV model, resources, namely; tangible and intangible resources play a major role in helping companies to achieve higher organizational performance and thus operational excellence.

The RBV assumes that skills, capabilities and other resources that institutions have differ from one institution to another and therefore, institutions can perform well by using their different bundles of resources at their disposal (Sun et al., 2017; Sarkar, 2012; Stone, 2017; Dubey et al., 2019). This stresses the importance of developing and enhancing those resources that are distinctive, in particular, an institution's distinctive capabilities based on institutional processes and routines which are socially complex.

An explicit knowledge or 'knowing about' becomes visible through communication that can be readily transferred from one point to the other. The RBV approach therefore, considers operational excellence as continuous improvement derived from IT and IS that are used in an institution and from services that accompany them.

3.3 The conceptual model of the study

This section provides an exploration of the conceptual model of the study, thus a proposition towards the development of the conceptual model in the context of IMC and operational excellence in higher education institutions.

3.3.1 Conceptual development

This research investigates the institutions' capabilities and information management to understand how to apply information management capability in order to enhance and influence operational excellence. The operational excellence debate, in this new century, assumes a central role in the reflection on the dimensions of development and possible emerging managerial frameworks in search of world-class, sustainable institutions (Papadopoulos, Ali-Eldin, Årzén, Tordsson, and Elmroth, 2016). Consequently, a new development strategy in the form of information management capability has emerged. This new paradigm of management for operational excellence implies the need for profound changes in the collection of data and information, processing, distribution, and deletion or archiving.

Firstly, most researchers conducted reviews of the existing literature on information management capability to pinpoint the theoretical models used in other studies and the factors that were found to be strong indicators of information management capability and operational excellence. The wide variation of theoretical frameworks used in prior research has produced countless variables that seem to influence operational excellence through information management capability. The researcher used the variables of the Resource Based View model in order to successfully address the objectives formulated for this study.

The Resource Based view theory highlights the importance of resources and capabilities, particularly those that are intangible in nature, in competitiveness, business strategy and success. The essential determinant of economic rents and continuous improvement is the ability to accumulate, protect and continually develop resources and capabilities (Devece, Palacios & Martinez-Simmaro, 2016).

Rather than testing all the variables, with the aid of the RBV, the researcher adapted the approach used by Baumgartner and Steenkamp (1996), by integrating some other new variables into an already existing model. In order to implement this approach successfully, the researcher developed a list of the significant variables emerging from the literature review for higher education institutions which are now digital orientated to achieve operational excellence, digital information management capability, Customer Management and Process Management. For the sake of simplicity, a conceptual framework is developed focusing on the issues of IMC and operational excellence.

Fig 3.3 below illustrates a conceptual framework employed in this study.

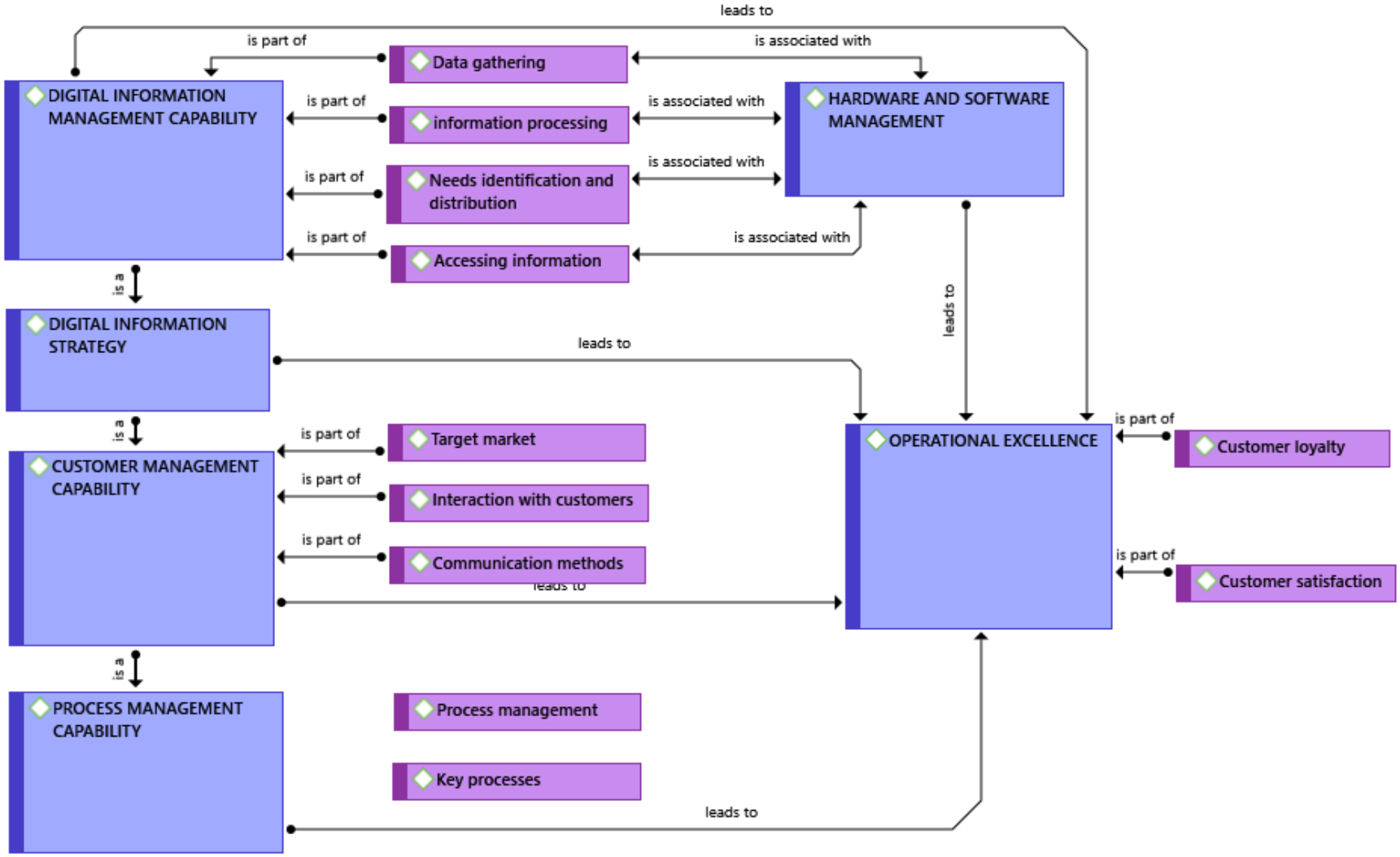

Figure 3.3: The proposed conceptual framework of the study

Source: Researcher's own construct

It is important to note that there is no definite theory that rules in information management since information systems are continually increasing (Aydiner et al., 2019). This has led to the review of many of institutional performance studies, with divergent conclusions linked to theoretical or methodological inadequacies applied. Investment in information technologies (IT) has been highly considered as economically relevant. The Resource Based View theory, Technology Acceptance Model and Knowledge Management play an important role in assisting institutions not only by creating, nurturing, and maintaining competitive advantage, but also in understanding the collective resources needed for excellence and competence in a globalized and highly competitive markets. “With the specialist knowledge workers at its fundamental to provide support for knowledge creation, sharing, and utilization, the RBV theory promises to guarantee a methodological step geared towards the achievement of competence and continuous improvement (Kodua, 2019).

The theories of TAM on the other hand, precisely target technology acceptance and most popularly underpin many IS studies that explain end-user adoption at organisational level (Venkatesh & Bala, 2008). Although the model has been used extensively in information management research, the model explains factors that influence the acceptance and use of technology and argues that technology usage is influenced by the users’ attitude which may also be influenced by perceived ease of use and perceived usefulness. This perceived ease of use and perceived usefulness are further influenced by other external factors (Opokwu & Kwesi, 2020). The extensive focus of TAM on technology neglects social and psychological parameters and restricts its explanatory and predictive utilities, and therefore demands its integration with other frameworks (Baridam et al., 2015).

Managing and using knowledge effectively becomes vital for both individuals and organizations to take full advantage of the value of knowledge (Gao, Chai & Liu, 2017). Knowledge Management theory primarily focuses on institutional structures and how an institution is designed culturally and hierarchically to manage knowledge and knowledge processes Fereirra et al. (2016).

The theory provides foundations for new concepts that provide a rationale for managing knowledge, defining the process of managing knowledge, and enabling institutions to evaluate the results of this process. The development in knowledge management encourages those factors that give way to superior performance: operational effectiveness organizational creativity, and quality institutional services and products (Baskerville & Dulipovic, 2006). Sustainable knowledge management (KM) is considered to assume an indisputable significant part in generating competence and continuous improvement (Hlatshwayo, 2019.) For operational excellence reasons, KM should be integrated with information and communication technologies (Gao, Chai & Liu, 2017).

However, the RBV as one of the theoretical models that stimulate recent research in the management of information system has been adopted by the researcher. This approach suggests new prospects for examining the problem of information management paradox. The major benefit to be gained by applying the concept of IMC is that it permits some of the underlying challenges outlined in previous literature to be solved. It explains the importance of capabilities, especially those that are intangible in competitiveness, success and in business strategy. The ability to develop, accumulate, and protect valuable and scarce resources gives a long-term competitive advantage to an institution and therefore, operational excellence. This will assist in identifying skills and capabilities available to the institution for managing information effectively through its life cycle. Brockbank, Ulrich, Kryscynski, and Ulrich (2018) define capabilities as a combination of skills possessed by an institution in the deployment of its activities, in a coordinated way by using the available resources in order to achieve the desired objectives, that is

- To determine the relationship between IMC and operational excellence
  Firstly, all the information management capability elements that contribute to operational excellence in higher education institutions will be identified
- To determine the extent to which digital transformation strategies influence IMC
  The researcher will construct IMC which gathers the co-specialized resources and capabilities available to higher education institutions for the effective management of information and operational excellence.

- To develop a model for operational excellence in higher education institutions in South Africa.

Consideration is given on the effects of IMC on achieving extra benefits of an institution and developing questions for contrast. Employing the RBV in this study therefore, provides the understating of information management capability which includes digital transformation, what operational excellence is, and how operational excellence is influenced by IMC. This will further help to develop a model of operational excellence for higher education institutions in South Africa.

3.4 Information management capability and operational excellence

To determine the relationship between IMC and operational excellence of the selected universities in SA, the two need to be outlined in detail. The focal point of IMC is on information, whereas information system refers to the process that helps arrange and study data. IMC depends on the institution's information policy and practices but can give a favourable idea of the business value and quality of the institution's information systems (Imran et al., 2019). The IMC determines and manages information as a valuable resource. It focuses on information where the system of information is defined as a system that helps in organising and analysing data (Aydiner et al., 2019). The IMC depends on the institution's information policies and practices. This gives a clear idea of an institution's value and the quality of an institution's IS, and it should be linked with the institution's routines that are necessary for the promotion and storing of information policy and the use of IS in an institution's strategic and operational excellence. Researchers such as Carter (2015) consider the following three types of information management practices:

- Information values and behaviours' which include information management aspects such as formality, control, integrity, transparency, pro-activeness in the use of information and information sharing,
- IT practices, and
- Information management practices including colleting, sensing, organising, processing, and maintaining information.

An operational excellence is a process that aims at building a sustainable improvement in an institution processes and activities through the operations management (Issar & Navon, 2016; Garba, Mohammed & Abba, 2019). Many information based institutions fail to transform due to poor management of information. Inappropriate Initiatives employed do not suit the culture of an institution. Information policies are treated as peripheral and not comprehensive. Aydiner et al. (2019) and Stone (2017) define IMC by its functions which guide the information throughout its lifecycle, that is; identification of needs, collecting, processing, coding and storing, validation and valuation of the available information, modification and updating information, as well as accessing and distribution procedures. It therefore, becomes important to understand IMC as a combination of different skills and routines that lead an institution and technological system that manages information.

The value of a resource managed by IMC as a source of operational excellence cannot be questionable. From the value chain point of view, information is a necessity at all hierarchical levels of an institution and it is always desired in coordinating functions. The advantage obtained from IMC depends on the isolation mechanisms like path dependence, development time and causal ambiguity which does not exist in IT. An institution gains operational excellence by managing information through practices of co-specialisation, complementarity, and idiosyncratic development with other information systems (complex technologies). Operational excellence in the selected higher education institutions helps reduce cost and enables an institution to stay in today's environment.

The IMC generates value to information intensive institutions by affecting its operation directly, becoming a capability strategically and serving as a source of operational excellence (Suryawan, 2017, Aydiner et al., 2019; Projogo et al., 2018). Every institution seeks to improve and maintain its efficiency. An operational excellence of an institution is evidenced by results caused by the consistency and reliability of the institution's strategies. Operation management systems, processes and behaviours of both the clients and personnel contribute to operation excellence.

Various efforts to transform institutions in information-based companies have failed to establish remarkable management initiatives due to poor management of information policies This occurs as a result of inappropriate initiatives for the general culture of an institution or company policies being treated as a peripheral matter (Aydiner et al., 2019). For an information-based institution, the IMC must be understood as a blend of different routines that lead to institutional and technological systems that manage information. Information is an important part of any business activity at any hierarchical level. From the viewpoint of the value chain, it also becomes present in the process of coordination between functions (Tseng, 2014; Sun; 2017; Prajogo et al., 2018; Lowry, Dinev & Willison, 2017).

The IMC therefore, generates an institution's value, directly influencing performance and can become a strategic capability acting as an inexhaustible source of operational excellence in those institutions where information is particularly important, as in the case of information-intensive companies.

It should be noted that operational excellence in higher education system entails efficiency in both the administrative and academic processes in such a way that transparency, efficiency and operational practices are achieved as desired. This operational excellence will result in growth in capital investment/ financial sustainability, growth in funding, efficient processes and systems/technology enabled environment and new innovative practices, cost reduction, investment in staff and estates, etc.

The operation management systems are the processes to be followed and how they should be controlled. Certain principles and tools for sustainable improvement of an institution are put in place. An institution can achieve operational excellence provided it continues the refining of processes for growth on a continuous basis. Operational excellence in information management occurs where the correct behaviour ensures that an institution's management system functions as desired and is able to control the processes as per set standards set by an institution, each member of an institution strives to improve both the value and delivery; and a culture that allows an institution to achieve long term sustainable growth is created (Aydiner et al., 2019; Sarka et al., 2019).

Processes take place where the work is done. The process capability outlines the targets which are set by the management. Fig 3.4 below illustrates the information management link to OPEX as suggested by the researcher.

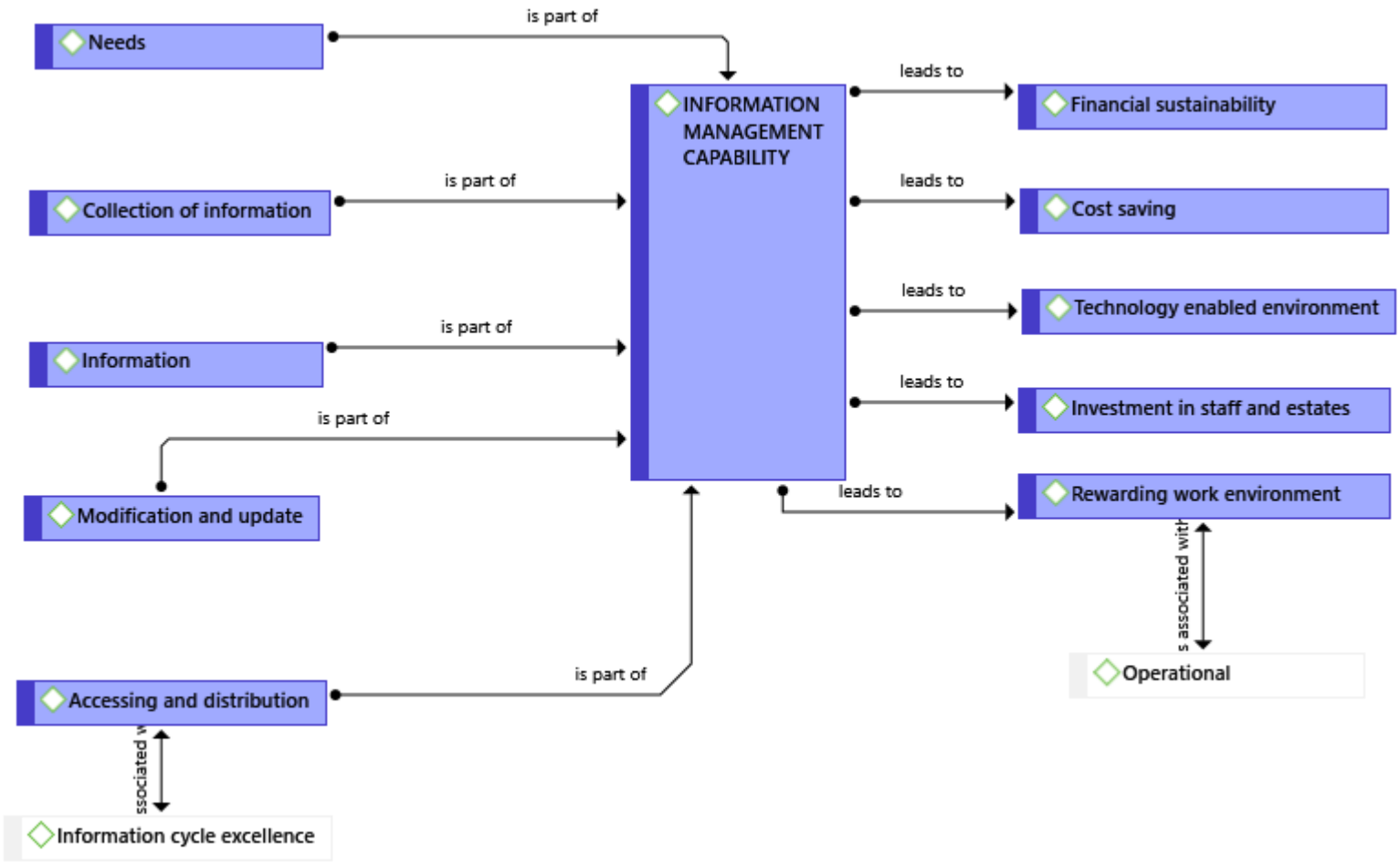

Figure 3.4: Information Management and OPEX
Source: Researcher's own construct

The management of information systems requires the involvement of technology adaption, information policies in relation to procedures and processes involved as well as the culture and idiosyncratic institution (Lowry, Dinev & Willison, 2017). Other institutions may find it difficult to adapt to an individual copy of technology or system due to various aspects that must be considered in the management of information. The path dependence of IMC and its idiosyncrasies create barriers that prevent imitation and the adoption of the best management of information practices developed by an institution.

The operational excellence in higher education framework and processes focus on elements that are necessary to establish and maintain excellence in the institution departments and/or programmes of the institution as a whole. Lowry, Dinev and Willison (2017) as well as Martins et al. (2019) give clarity of operational excellence in selected higher education based on the following core values:

- A clear sense of purpose or mission and a vision or future aspirations is understood and valued by all stakeholders.
- Effective governance processes and leadership mechanisms for feedback and review which exist at all levels of an institution,
- The institution has strategic plans, priorities, and goals for translating the purpose and aspirations into specific programs, services, and activities and that ensure the effectivity and efficiency of operations and resources,
- The institution has high-quality programs and services which are consistent with the established mission and aspirations, carefully designed, and regularly evaluated for continuous improvement.
- An institution which operates excellently has a mutually valued and strong relationships with constituencies, particularly groups and individuals who benefit directly from the programmes and services offered by the department or institution.
- The information about the expectations, needs, and experiences of key constituencies, gathered and used as inputs to programmes and service development, review, and provide day-to-day guidance for decision making and resource allocation for continuous improvement.

- The qualified and dedicated faculty and staff and a satisfying work environment, with a continuous review and improvement as priorities.
- An institution has a systematic review processes and the assessment of outcomes that determine the success of the institution, department, or programme if it fulfils its mission, aspirations, and goals.
- An institution with excellent operation documents, its current strengths and identified improvement priorities,
- Compares with peers and leaders in an institution to encourage innovation and improvement and provide a context for clarification of strengths and areas in need of improvement.

The institution operating excellently works in interaction with the components that constitute a system, that is, the essence of an academic student life, service, or administrative unit of an institution.

3.4.1 Operationalisation of the digital transformation and IMC in HEIs

This section provides the discussion of the digital transformation and information management capability dictates in higher education institutions.

3.4.1.1 Digital transformation

Digital transformation is, before all, organizational change realized by means of digital technologies and business models aimed at improving the organisation's operational performance (Mitroulis & Kitsios, 2019). Digital transformation in higher education institution aims at adopting new ways of working order to continue delivering user-focused services, audience needs and behaviour, and competition in the face of changing technology. This is characterised by digital (core) services, digitally skilled students and educators, and decisions that consider available digital evidence (Seres, Pavlicevic & Tumbas, 2018). Internal and external, conventional and unconventional/unstructured data should be used for discovering hidden patterns underlying performance in different areas, optimizing enrolment, tracking admissions, managing grants, enhancing academic, advising and other things. It should be noted that data itself is an asset while

the real challenge is turning that data into value for operational excellence (Seres, Pavlicevic & Tumbas, 2018).

The motive behind digital transformation process in higher education institutions is redeveloping higher institutions' operational processes and redefining educational services. Previous studies concluded that digital transformation is more than just technology, and has always had a powerful connection to the industry, and is currently re-experiencing huge changes as the industry 4.0 represents the coming fourth industrial revolution. Digital transformation strategy refers to a designed plan which is implemented to manage transformations caused by the integration of digital technologies in a sustainable way (Mitroulis & Kitsios, 2019). The focus is on the end-to-end digitization of all physical assets and integration into digital ecosystems with value chain partners. Digital transformation is essential for success of any institution and it is becoming a critical management issue. As with any IT-enabled change, it is not enough to bring the IT to the organization. Digital Transformation success depends on process and operations management changes. To accomplish such management, people must be trained in a change process that considers the unique challenges presented by IT. A digital revolution is positively developing the digital and standardized working. Some workplaces are being virtualized or remotely controllable. The digital era is not only driving innovation in the enterprise sector, but it is also influencing developments in the public sector. Governmental digitalization is one of the promising themes with more prospects of being developed in the future (Reis, Amorim, Melão & Matos, 2018).

Leading organizations significantly leverage the power of analytics due to widespread availability of data. Regardless of whether the issue relates to product development, asset utilization, customer, service delivery or other operational area, the analytics use data to discover hidden patterns underlying performance in specific areas affecting the most important decisions in their business. This also influences decisions that yield maximum favourable impact for the business (Seres, Pavlicevic & Tumbas, 2018).

Considering that digital technologies include changes related to end-users of the products/services as customers, it should be noted that digital transformation has an

impact on different perspectives and serves different goals (Mitroulis & Kitsios, 2019) and, an institution may therefore, highlight the transformation of services, products, processes, business models and the implementation of new technologies by fostering a digital transformation strategy.

As a result, digital transformation strategies will surpass the concepts of process automation or process optimization. According to Mitroulis and Kitsios (2019), an institution can guarantee the successful implementation of a digital transformation strategy and take advantage of its effects on the organisation by aligning the following four dimensions: i) structural changes of digital transformation (ii) the use of technologies in an institution, (iii) financial aspects of digital transformation and (iv)) changes in value creation.

Combining these successful digital transformation elements, that is; (i) digital strategy related to SMACIT inspired (social, mobile, analytics, cloud, and Internet of things), (ii) value proposition, (iii) an operational backbone that leads to operational excellence and iii) a digital services platform which enables rapid innovation and responsiveness to new market opportunities leads to continuous improvement (Sebastian et al., 2017; Mitroulis & Kitsios, 2019).

According to Seres, Pavlicevic and Tumbas (2018), digital transformation in higher education institutions comprises the following six dimensions/ transformation blocks:

- organized agile, promptly and substantially adaptable collaborative processes in modern business models
- Relevant and usable data and use of data analytics as a basis for decision making in line with the institutional goals and strategy
- Complete automation of institution processes
- Detailed analysis and research of customers' decision making
- Information technology supporting all institutional business processes; and
- Established and accepted institutional digital strategy and the approach to application of innovation.

Categories of institutional business transformations comprise business models, organizational structure, people/staff, business processes, range of products or services, technologies utilized for gathering and managing information, and models of engaging with customers and suppliers. Through the process of digital transformation, institutions converge multiple new digital technologies to achieve superior performance and sustained continuous improvement.

In this way, institutions transform different business dimensions, such as the customer experience, business model, and operations, and simultaneously impact on people and networks. This requires understanding of information management capability, and the management of hardware and software as part of IMC.

3.4.1.2 Information management capability in higher education institutions

Information management capability is the ability to: 1) provide data and information to users timeously, with the appropriate levels of accuracy, reliability, security, and confidentiality; 2) provide universal connectivity and access with adequate range and reach; and 3) tailor the infrastructure to emerging directions and business needs (Lee, 2012). IMC refers to the ability of the institution to understand and use the human, technological, and institutional resources needed to manage both internal and external information (Macada & Freitas Junior, 2015). Carmichael et al. (2011) define IMC as a set of abilities that links infrastructure, people, architecture, access, and distribution of information to make institutional changes in response to the imposition of possible alterations in external and the internal institutional environment.

3.4.1.3 The management of hardware and software as part of IMC

Managing hardware and software requires a server system. This is a centralized system which can respond to the requests of several clients at a time. Server hardware refers to a highly configured system or computer with a large amount of memory capacity and which can hold a large amount of data and works in high speed. Server as software handles the requests coming from clients on the network system. The system software helps to manage the network resources like memory unit, printer, projector etc. Institutions buy this type of system to reduce the cost of computer systems by utilizing the

same resources by all computers in network and provide security in the whole system of institution by centralized security. For managing this kind of glitches, institutions must have intuition to hire ICT expert at any time as per requirement (Joshi & Bhandari, 2016).

The influence of IMC on operational excellence is best explained through the Resource Based View.

The study identified the five dimensions that make up information management capability, that is; people, distribution, access, infrastructure, and information architecture. According to RBV, sustainable differentiation is possible when the development of capabilities and possession of resources create value. This also applies to institutions in the same industry which are heterogeneous in composition and in use of capabilities and resources. IMC influences institutional performance directly and indirectly (Macada & Freitas Junior, 2015). A distinction should be made between Information Communication Technologies (ICT) and ICT system. "Information Communication Technologies (ICT) is the combination of computer-based technologies such as computing devices and smartphones with communication technologies and the internet. This includes all the hardware, software, and systems essential to communicate electronically. An ICT system refers to the overall set-up, consisting of hardware, software, data and its users" (Foerster, Schmid & Vissichchio, 2018). Hardware and software constitute the computing system. According to a definition of the European Commission (EC, 2015), industry 4.0 consists of a number of new and innovative technologies (Lee, Bagheri, Kao, 2015):

- **Information and communication technology (ICT)** to digitize information and integrate systems at all stages of product creation and use (including logistics and supply), both inside companies and across company boundaries.
- **Cyber-physical systems** that use ICTs to monitor and control physical processes and systems. These may involve embedded sensors, intelligent robots that can configure themselves to suit the immediate product to be created, or additive manufacturing (3D printing) devices.

- **Network communications** including wireless and internet technologies that serve to link machines, work products, systems, and people, both within the manufacturing plant, and with suppliers and distributors.
- **Simulation**, modeling, and virtualization in the design of products and the establishment of manufacturing processes.
- **Big data analysis** and exploitation, either immediately on the factory floor, or through cloud computing.
- **Digital assistance systems for human workers**, including robots, augmented reality, and intelligent aid systems.

It should be noted that no institution can achieve information management capability without proper management of hardware and software (Mithas et al., 2011; Simon, 2017). The use of ICTs in higher education institutions is crucial not only as a learning tool, but also for proper administration (Joshi & Bhandari, 2016). The use of ICT in institutions helps speed up the integration of complex administrative functions, while ensuring a modern method of administration that gives faster administrative transactions. To obtain the advantage of ICT, higher education institutions need to adapt ICT-enabled education system. This requires hardware and software resources for enhancing the management of information. A sufficient budget to import ICT related resources such as computers, projectors, scanner, router, electrical power supply, software, storage memories, other input/ output devices and other necessities ensures the platform to exhibit information management capability. It becomes vital to keep all the ICT resources safe by ensuring a proper supply of electricity and the right mechanism to control the case of electrical surge, brownout, blackout, spike, etc. Enabling regulator or stabilizer and generator can control the above electrical anomalies. For the proper utilization of the ICT system, an institution's staff (teaching and non-teaching staff) should attain ICT-related trainings, seminars, conferences, workshops and symposiums. This helps the staff to obtain ICT related new information and skills. The evaluation of effective usage of ICT in institutions promotes efficiency and effectiveness in daily operations (Joshi & Bhandari, 2016). Managing ICT requires the involvement of the institution's key stakeholders such as

managers, ICT coordinators, staff representatives, etc. An institution should have a clear outline of the vision for ICT and its use to support the execution of their administrative and managerial tasks (Crown, 2014; Ahmed, 2015).

3.5 Maintenance, evaluation of hardware and software

3.5.1 Maintenance

Maintenance of hardware and software assets is part of a comprehensive IT management process that minimizes disruptions, provides asset stewardship, optimizes costs, and brings the best practice to the institutions (Kathiresan, 2021). Effective maintenance and support of assets and IT infrastructure provides longer life, higher employee productivity, and increased user satisfaction (Wu *et al.,* 2021).

Modern multi-gigabit computer networks are faced with enormous increase of network traffic and constant growth of number of users, servers, connections and demands for new applications, services, and protocols (Ippolito, Nikolakis, Cerquitelli *et al.,* 2021)". Networking devices remain the bottleneck for ICT in such networks (Wu *et al.,* 2021). The design of fast network processing hardware is needed for networking equipment to maintain an acceptable performance (Wu *et al.,* 2021)

3.5.2 Evaluation

A need for architectural enhancements and novel algorithms to efficiently implement the various network features therefore becomes crucial. Constant assessment of systems provides the basis for increased institutional efforts to remain relevant and competitive in the changes in the market (Efnusheva, 2019).

3.5.3 Hardware and software support

Hardware and software maintenance and support arrangements are required for all standard and non-standard desktops, servers, network infrastructure equipment, peripherals, and related software. This include applications and systems that are subject to their own proprietary maintenance and upgrade

policies. Service, maintenance and support must be properly staffed and managed through a ticket management system and help desk.

Hardware and software standards can be enforced through centralizing purchasing supplies, ensuring that tools are covered under appropriate warranty and maintenance support agreements, implementing configuration management and security policy consistently to minimize organizational risks, and configuring the equipment properly with appropriate security controls/software (Foerster, Schmid & Vissichchio, 2018).

3.6 Customer Management Capability

Customer Management Capability is the ability to determine the requirements, preferences and expectations of customers as significantly important in the contemporary business environment characterised by hyper-competition. Most research conducted in the Resource Based View field put emphasis on strategic resources. The model shows that only resources combining the four characteristics (Valuable, Rare, Inimitable and Non-substitutable) give competitive advantage to an institution (Barney, 1991). However, Barney (1991) underlines that not all resources have a direct impact on the construction of continuous improvement.

The misuse of common resources that do not directly give an institution competitive advantage could lead to a great strategic disadvantage. Resting on an approach based on the consideration of Marie (2017), the notion of value capture and creation becomes an issue in the resource-based-view. In this regard, customers (the demand side of a market) need to better understand the location of value in a firm's resource bundle. Concurring with Marie (2017), the study acknowledges the client as a key stakeholder in the determination and conduction of a firm's strategy for operational excellence. Customers are regarded as a resource in institutions because they actively participate in the value creation process of services. With digitisation, customers (clients) are more engaged and empowered in controlling and deciding their access to information and the knowledge share they produce.

This impact on information technology is particularly significant concerning the institution's reputation, which must consider the power of customers. The value perceived by customers and impact of meeting their needs must be known by managers in order to understand how institutions can improve their performances. The RBV helps the study to understand the origins of economic performance, especially in cases where customers are integrated in the institution's value creation process.

3.7 Process Management Capability

Process Management Capability is the ability to attain speed, flexibility, and cost economy through the design and management of three major types of institutional processes: 1) product design and delivery processes (including new product development and manufacturing); 2) non-service and non-product business growth processes (including supply chain management, supplier partnering innovation, research and development, acquisitions, outsourcing, mergers, global expansion, and project management; and 3) support of processes such as accounting, finance, human resources management and facilities management. In response to the growth of technology-based improvement solutions, the pace of change and needs for customers, the role of process management in digitalization initiatives and process, teams need to improve their relationship with IT (Gartner, 2019). "Process Management Capability is the science and practice of overseeing how work is performed to ensure consistent outcomes and take advantage of improvement opportunities"(Dumas et al., 2018).

It strives for efficient and effective execution and the continuous management of business processes, as well as for the development of organizations' Process Management capability (Harmon, 2018). Processes are sets of activities in which humans and technology co-create value (Dumas et al., 2018). Though most commonly split into the areas of core, support and management, processes can also be classified according to knowledge intensity, repetitiveness, interdependence, and variability (Kerpedzhiev, Koning, Roglinger & Rosemann. 2020).

To implement process orientation in institutions, successful process management requires capability areas related to the core elements of process management comprising

the Strategic Alignment, Methods, Information Technology (IT), People Governance, and Culture. Thereby, method- and IT-related capability areas are commonly structured according to the phases of the process management lifecycle; that is, process design, implementation, execution, monitoring, and improvement (Kerpedzhiev et al., 2020). Process management, technology and tools have always been entwined**.**

An institution's process management software helps an organization or individual departments reduce costs, limit errors, maintain compliance, maximize efficiency, and improve employee satisfaction by providing process definition, business process automation, form design, and self-service portal deployment and auditing for areas such as Information Technology, Human Resources, Finance and other types of services**.** Process management has a strong link to capability development which builds on the resource-based view of the institution. The reason is that capabilities and processes deal with the same phenomenon, the difference being that capabilities put more emphasis on "what", while processes focus more on "how". Process management comprises routine and skills required to implement incremental and radical process change as well as to execute business processes.

3.8 The role of technology in higher education institutions

Technology has a prominent role on information management capability. The adoption and integration of technology in various works of higher education institutions automatically saves money, time and labour for activities such as the conduct of examination, declaration and delivery of results. With the use of proper software, communicating with various stakeholders becomes safe and secure" (Shende & Reddy, 2020). According to Lee (2012), information management capability plays an important role in developing other institutional capabilities for performance management, customer management and process management.

These capabilities in turn favourably influence customer, financial, human resources, and organizational effectiveness measures of the institutional performance. Among key managerial implications, senior leaders must focus on creating necessary conditions for developing IT infrastructure and information management capability because they play a

foundational role in building other capabilities for sustainable improved performance. It should be noted that resources and capabilities of information systems interlink with their utilization, institutional performance and business value (Lee, 2012). Information management capabilities are therefore, positively influenced by institutional capabilities, while the capabilities of information systems are measured by the qualities they contribute to IMC.

Information management capability enables valuable institutional capabilities through the three important organizational capabilities, that is; performance, customer, and process management capabilities. These three organizational capabilities mediate the links between information management capability and several measures of institutional performance. Many institutions that highly depend on information systems address issues of reliability and sustainability. Institutional competence relies on the success of information systems; consequently, these systems help institutions generate more revenue.

Information systems' success cannot be achieved without adequate qualified resources. "Resource-based view is one of the fundamental theories to analyze the impact of information technology on business performance" (Barney, 1991; Lee.2012). The institution's competences/competitive advantages are determined by valuable resources that are unique with the following characteristics: (1) Valuable - the resource is used to conceive or implement strategies that improve effectiveness and efficiency;(2) Rare/scarce - the resource is not easy to acquire within a short period of time by competitors; (3) Imperfectly imitable - the resource is not easy to imitate or replicate owing to its uniqueness (4) Non-substitutable – cannot be replaced. However, either the supplier or the consumer, or both play a role in the value chain which is an ecosystem with competition.

3.9 Summary

This chapter explained the theories and concepts relevant to IMC and OPEX, reasons for their consideration, the disputed characteristics of the theories, their limitations and how they are relevant in this study. The RBV theoretical framework was intended to assist the

researcher to determine how information management capability influences operational excellence when rational decisions are taken in the selected higher education institutions in South Africa. The next chapter presents the research methodology used in this study.

Chapter 4
Research methodology

4.1 Introduction

The previous chapter provided a comprehensive background to information management capability and operational excellence. This chapter shifts its focus to the research design and methodology and/or techniques applied in the study. It is imperative to note that various authors have different preferences regarding research techniques and models.

This section was useful in establishing the structure of the research, that is; the research design, research paradigm, research methods, study area, population, sample size, data collection methods and data analysis, limitations as well as research ethics which the study adhered to identify problems that were to be investigated to reach the objectives set by the research study. A detailed description and clarification of the research approach method of collecting and analyzing data was outlined. Relevant techniques and models were chosen to accomplish the study objectives. Ethical consideration was also taken seriously.

4.2 Research approach

This study adopted the qualitative research approach. Qualitative research studies generally “dictate” the use of non-probability sampling because qualitative research is concerned with seeking information from a specific sub-group or groups in a population, with no concerns from sample representation. In support of this, Schindel et al. (2022) attest that qualitative studies generally draw upon a phenomenological approach to gather data in the form of in-depth semi-structured or unstructured interviews. In purposive sampling, sampling units are selected according to the purpose (Schindel et al., 2022). The technique provides biased estimate and is not statistically recognized.

4.2.1 Justification of qualitative research approach

Qualitative research involves the collection and analysis of non-numerical data such as text, video, or audio to understand concepts, experiences or opinions. It is helpful in

gathering in-depth insights into a research problem or generating new ideas for the study. The approach is commonly used in the humanities and social sciences in subjects such as education, health sciences, anthropology, sociology and history.

In addition, according to Ebrahimi (2022) a qualitative research design has a flexible structure as the design can be well constructed and reconstructed to a greater extent. This allows a thorough and appropriate analysis of an issue to be produced by utilising qualitative research methods, and therefore the participants are at liberty to determine what is consistent for them. Complex issues can therefore, be easily understood. De Jonckheere and Vaughn (2019) aver that qualitative research interviews are 'attempts to understand the world from the subjects' point of view, to unfold the meaning of peoples' experiences, to uncover their lived world prior to scientific explanations.

Rahman (2016) outlined the following benefits of qualitative research:

- Qualitative research approach produces a detailed description of participants' feelings, experiences, opinions, and interprets the meanings of their actions.
- Qualitative research approach holistically understands the human experience in specific settings.
- Qualitative research allows the researcher to discover the participants' inner experiences, perceptions and to figure out the meaning of such experiences.
- Qualitative research methods such as unstructured interviews, participant-observation, direct observations and focus groups are most commonly used for data collection. Data collected is detailed and subjective because the researcher interacts with the research participants directly during the process of collecting data.

The qualitative paradigm was primarily selected for the study, particularly due to its ability to provide in-depth, complex textual descriptions of experiences pertinent to the study objectives. The qualitative research has many advantages than quantitative research (Rahman, 2016).

The approach allows the researcher to find issues that are often missed such as complexities and subtitles which could not be possible in quantitative approach. The

literature review also revealed that most studies in Information Management Capability and Operational Excellence are highly qualitative, or at least have some qualitative components.

4.3 Overview of research paradigm

Creswell (2014) describes research paradigm as a model or pattern containing a set of legitimated assumptions and a design for data collection and interpretation, and a basic set of beliefs that guide action. He further identified paradigms that are worldviews which are generally philosophical oriented about the world and the nature of research that the researcher brings to study. Paradigms guide the research approach because they are born out of discipline orientations, student's mentors as well as researchers' past experiences. According to Creswell (2014), individuals do not stick to a single option but have latitude to choose methods, techniques and procedures for data collection. Meissner (2022) alluded that there are four categories of paradigms and these are positivism, realism, constructivism, and critical theory.

Positivism is a study method and approach based on the concept that truth and reality are free and independent of the observer and viewer (Rahi, 2017). Rahi (2017) further posited that positivists believe that the world is governed by constant, unchanging laws or rules of causation and events. On the other hand, positivism appears to be a poor or insufficient foundation for study and investigation in reaching nuanced or in-depth findings (Schneider, 2022). Schneider (2022) alluded that within the context of positivism, there are a variety of issues, for instance, induction, initiation, and universal application. Further criticisms and analyses focus on the epistemological issues that result from positivist ontology (Rahi, 2017).

Critical theory is another paradigm. As alluded by Blaikie and Priest (2017), researchers that study critical theory believe that social reality is historically and socially formed, and that it is generated and reproduced by people. It is imperative to note that the critical researcher's goal is to publicly criticize the status quo while focusing on society's problems and limits (Blaikie & Priest, 2017).

As a result, the critical theory paradigm invites evaluators to examine and assess the underlying cultural, political, social, and gender assumptions of the phenomena being studied (Rahi, 2017). The realist paradigm, which was employed in this study, supports the philosophical stance that reality exists independently of the researcher's mind: reality exists outside of the researcher's mind (Blaikie & Priest, 2017).

While abstract phenomena have their origins in, or are born of people's thoughts, they exist independently of any one individual - external reality is mainly autonomous, while being generated by humans. Realist scholars recognize the distinctions between the 'real world' and their interpretation of it, and attempt to create multiple perspectives of reality in terms of which views are relevant to a certain time and location (Meissner, 2022). In this study, the interpretivist paradigm was adopted.

	Constructivism	**Critical realism**	**Positivism**	**Pragmatism**
Epistemology	▪ Subjective meaning and social phenomena. ▪ Motivating actions	▪ Observable phenomena ▪ Explanation within context/s	▪ Only observable phenomena. ▪ Causal and law-like generalizations.	▪ Observable and subjective meanings ▪ Integrate different perspectives
Ontology	▪ Multiple ▪ May change ▪ Subjective ▪ Socially constructed	▪ Objective ▪ Independent of human thoughts and beliefs ▪ Interpreted through social conditioning.	▪ External ▪ Objective ▪ Independent of social actors	▪ Multiple ▪ External ▪ Objective ▪ Independent

Axiology	▪ Value bound ▪ Subjective	▪ Value laden ▪ Researcher biased (World views, cultural experiences and upbringing)	▪ Value free way ▪ Researcher independent ▪ Objective	▪ Objective and subjective point of view.
Method	▪ Qualitative	▪ Qualitative or quantitative	▪ Quantitative	▪ Quantitative and qualitative
Data collection techniques	▪ Small samples ▪ In-depth investigations ▪ Qualitative	▪ Qualitative or quantitative	▪ Highly structured ▪ Large samples ▪ Measurement	▪ Mixed or multiple designs

4.3.1 Justification of the Interpretivist Paradigm

The interpretivist paradigm was employed in this study because it recognizes that reality is made by the researcher and emphasises the presence of various worldviews that emerge from people's interactions, contact, and communication (Meissner, 2022). This means that in order to have a thorough understanding of information management capability and operational excellence at higher education institutions, it is necessary to connect, contact, and communicate with academics and heads of departments. This paradigm allowed the researcher to see the things through the lens of the participants' views and experiences.

Researchers that follow the constructivist school of thinking frequently discuss the processes of individual interaction, social interaction and engagement (Thomas *et al.,* 2014). They also concentrate on the unique circumstances in which individuals live and work to gain a better understanding of the participants' historical, cultural, and social backgrounds (Thomas *et al.,* 2014). The interpretivist paradigm was chosen for this study because it entails an awareness of diverse participant meanings and enables for the development of theories.

4.4 Research strategy

Research design refers to a set of methods and procedures used in collecting data as well as the analysis measures of the specified variables in the research problem. It entails types of inquiry within quantitative, qualitative and mixed methods approaches that provide specific direction for procedures in a research design. Creswell (2014) and Hofstee (2011) confirm this by indicating that the researcher has an option to choose the study design, and the general techniques to be employed in the study.

According to Hameed (2020), five common qualitative research designs are found, that is; Case study, Phenomenological study, Ethnography, Content analysis and Grounded theory study. Common qualitative research designs can be explained as follows:

4.4.1 Case study

Case study refers to an in-depth study of a programme or event, an individual or group for a particular period of time to explore the causes of underlying principles. A distinction is made between a single case study and a multiple case study. A single case study focuses on a single case whereas a multiple case study focuses on multiple cases to understand the similarities and differences in those cases. According to Guffstafsson (2017), multiple case study researches offers the following advantages:

- Evidence generated from a multiple case study is reliable and strong even though it may be time consuming and expensive.
- Multiple case study allows a wider discovery of the study questions.

4.4.1 Phenomenological study

Errasti-Ibarrondo, Jordan, Diez-Del-Corral and Arantzamendi (2018) postulated that phenomenology aids in comprehending the significance of people's lived experiences. Errasti-Ibarrondo *et al.* (2018) further alluded that a phenomenology research considers what individuals have experienced and focuses on how they felt about a phenomenon. Phenomenology is a qualitative research method that is well-suited to this investigation as it supplements qualitative approaches (Errasti-Ibarrondo *et al.,* 2018).

In addition, Thomas (2021) postulated that phenomenology believes the real meaning of things to be discovered via the individual's experience of them. Thomas (2021) added that phenomenology is a descriptive research approach that is inductive. Errasti-Ibarrondo *et al.* (2018) postulated that the goal of phenomenological inquiry is to define the structure or substance of lived experiences in the quest for meaning by identifying the essence of the phenomenon and accurately describing it through each day lived reality

4.4.2 Ethnography

The focus of Ethnography is on the entire group over a period such as a year or several months. Ethnographic research is a type of qualitative research in which scholars observe and/or engage with research participants in their natural surroundings (Pereira *et al.,* 2021). This means the ethnographic research design will provide the basis for understanding the views of the participants comprehensively (Pereira *et al.,* 2021) The ethnographic research design establishes a linkage with the qualitative research approach (Pereira *et al.,* 2021).

4.4.3 Content-analysis

Content analysis is a detailed systematic examination of contents of a body of material for identifying themes, bases, or patterns (Chen, Huang & Li, 2022). Content analysis is a qualitative analysis method that focuses on recorded human artefacts such as manuscripts, voice recordings and journals (Chen *et al.,* 2022). Content analysis investigates these written, spoken and visual artefacts without explicitly extracting data from participants and this is called unobtrusive research (Hart *et al.,* 2021). In other words,

with content analysis, the researcher does not necessarily need to interact with participants (although it can be possible if necessary); the researcher can simply analyse the data that they have already produced (Hart *et al.,* 2021). With this type of analysis can be possible for data such as text messages, books, videos and audio (Hart *et al.,* 2021).

4.4.4 Grounded theory.

Grounded theory is a research method concerned with the generation of theory which is grounded in data that has been systematically collected and analysed (Makri & Neely, 2021). Makri and Neely (2021) added that this approach is used to uncover such things as social relationships and behaviours of groups, known as social processes. The ultimate objective of grounded theory is to develop a theory about what the study focuses on (Makri & Neely, 2021). Charmaz and Thornberg (2021) are of the view that grounded theory is a research tool which enables the researcher to seek out and conceptualise the latent social patterns and structures of the subject area through the process of constant comparison. Charmaz and Thornberg (2021) further proffered that initially the researcher will use an inductive approach to generate substantive codes from the data, and subsequently the developing theory will suggest the next phase of data collection with more focused questions to ask.

From the above designs, the study found phenomenological study as the most relevant design. This was suitable because respondents (staff members and students) in higher education institutions were to provide qualitative information in terms of their perspectives, understanding and perceptions of the information management capability and operational excellence. The units of analysis were ICT students and lecturers, deans of students, Heads of Departments, Administrators, IT technicians, System support staff and administrators in selected institutions of higher education in South Africa. Data was collected using interview guide.

Qualitative research does not look to find a single ‘truth’ but rather multiple views of a context-specific reality (Creswell, 2014; Tracy, 2019). For the effectiveness of the research study, interviews were conducted to collect data using an interview guide. The

qualitative research interview sample is dependent on the saturation of data, that is; case where new themes or knowledge no longer emerge from the research interviews (Mihas, 2019). This philosophy opens the opportunity for flexibility and unstructured approach in data collection and seeks description, narration of feelings, experiences and individual perceptions.

A qualitative methodology was considered as the relevant and suitable method to be employed in this study because the development of concepts would reflect what goes beneath the surface, on an unseen, and where relationships or deeper social structures reside. The qualitative method can best be used to uncover trends in thought and opinions and dive deeper into the problem (Hennink, Hutter & Bailey, 2020). This also helped the researcher to access the thoughts and feelings of managers in the Information Management departments in five selected higher education institutions as participants. This also enabled the development of an understanding of the meaning that people ascribe to their views and experiences (Khoo-Lattimore, Mura & Yung, 2019). The qualitative method was therefore, suitable for building the theory of the influence of information management capability through grounded data. One of the key characteristics of qualitative research is that the data is gathered through interviews which are conducted using an interview guide. The primary and secondary data that gives clarity on IMC and operational excellence were gathered using the above paradigm. The data collected took form of qualitative interviews with open-ended questions that were conducted mainly to gather data that is non-numerical in nature.

4.5 Population

Population refers to a full group of potential participants to whom a researcher wants to generate the findings of the study and have the elements to meet the selection criteria to be studied. The researcher chooses a group to be studied, and from which a sample is taken for study (Hofstee, 2011). Any institution comprises a unit of analysis (Crossan & Apaydin, 2010). The researcher has targeted the selected higher education institutions in South Africa from the top ten rankings because ranking is done in terms of performance (Kwach, 2020). The researcher believes that performance goes hand in hand with IMC and operational excellence. It should be noted that the study considers information as a

strong source of institutional operational excellence and focuses on higher education institutions as information intensive institutions. The population of the study comprised Heads of Department (HOD) Administration, HODs Information, HODs in IT and Systems and System Support, HODs Human Resources, HODs Academic in Management Sciences, students, ICT Lecturers, Student Assistants/ Students in Learnership, Project Managers and System Administrators.

4.6 Sample size and sampling method

4.6.1 The study sample size

A sample can be defined as a finite part or subset of participants drawn from the target population (Mesa, 2016; Cash *et al.,* 2022). A sample is a subset of a population selected to participate in the study, it is a fraction of the whole, selected to participate in the research project (Cash *et al.,* 2022). There is no specific sample size for a qualitative study but it should be able to answer the research questions appropriately.

Sampling is also regarded as the act of selecting a suitable representative part of a population for the purpose of determining characteristics of the whole population. Creswell (2014) asserts that it is an act of taking a small group of people from a larger population to represent the entire study population. Five selected higher education institutions were used as population for the study because the approach places less emphasis on generalizations as it communicates the findings in a descriptive and narrative manner and seeks description and narration of experiences, feelings, and perceptions of individual participants. Higher education institutions' departmental heads were used as suitable candidates or respondents with the greatest knowledge on information management and the extent to which the institution manages information, the IS in place and changes associated with information.

According to Saunders (2019), the researcher should use the research questions and objectives to give direction for the determination of a suitable sampling method. It should be noted that an appropriate sample size for a qualitative study is most of the time, not defined, but it should answer the research questions. Data saturation determines the

number of the participants and occurs as the study progresses when new categories, themes or explanations no longer emerge from the empirical data which is being collected. After carefully looking at several sampling techniques, the researcher settled for purposive sampling technique for the qualitative research.

The researcher used the available, easily accessible and relevant sample who were willing to participate in the study among higher education institutions in South Africa. Patton (2002) asserts that purposive sampling involves deliberate selection of particular group of people. The researcher sought participants who are knowledgeable and have more information about the subject matter. Five specific institutions were deliberately and purposively chosen to ensure that the results are not institution specific. This helped to obtain equal representation from all levels of hierarchy in each selected institution of higher learning.

Table 4.1 below provides a summary of distribution of sample number in selected higher education institutions.

STAKEHOLDER (RESEARCH PARTICIPANTS)
1. Head of Department (HOD) Administration
2. HOD Information
3. HOD IT and Systems and System Support
4. HOD Human Resources
5. HOD Academic in Management Sciences
6. HOD/ Students
7. ICT Lecturers
8. Student Assistants/ Students in Learnership
9. Project Managers
10. System Administrators
11. Others
60 PARTICIPANTS IN 5 HIGHER EDUCATION INSTITUTIONS

Table 4.1: Distribution of sample

The motive behind using the above sampled group was that all the participants are beneficiaries of this study and could provide useful information to the study.

4.6.2 Sampling procedure

A combination of non-probability sampling methods was utilized by the researcher to generate the sample population. Qualitative research is more concerned with seeking information from specific sub-groups or groups in the population, and it generally dictates the use of non-probability sampling. The primary data collection focused on elite individuals, with regard to information management capability and operational excellence. This necessitated the gatherings of extensive and exhaustive data from purposively sampled population of elite informants in selected higher education institutions.

This included elites in information management, information communication technology, administrators, deans of schools, academics, system support staff, students and other people who use or need ICT to provide in-depth knowledge, without concerns for generalization and representativeness, and rich information that is central to the purpose of the study. Purposive sampling was used to choose the research participants for the study. Qualitative case studies typically work with small sample sizes of people (Vasileou, 2018). The study noted that there is variability in terms of the sample size that is adequate in a qualitative data.

Qualitative data requires a small sample size to support the depth of case-oriented analysis fundamental to the research study (Vasileiou, Barnett & Young, 2018). The minimum number of at least 12 is required to reach a data saturation in qualitative data (Cash *et al.,* 2022). Many qualitative research books recommend and suggest 5 to 50 participants interviews and/observations for grounded theory and ethnographic research (Vasileiou *et al.,* 2018). However, “most scholars argue that the concept of saturation is the most important factor to think about when mulling over sample size decisions in qualitative data” (Vasileiou *et al.,* 2018).

Qualitative sampling should also be large enough to obtain adequate data to sufficiently describe the phenomenon of interest and address the research questions. A sample size which is too small reduces the power of the study. Research results may therefore, be biased, variable and invalid (Vasileou *et al.,* 2018). Sim, Waterfield, Saunders and Kingstone (2018) posit that there is a need to ensure that sample size does not assume

a disproportionate prominence and overshadow other important elements within the process of qualitative data collection and analysis. Researchers are reminded that is not the number of cases that matters in research, but what researchers do with them that counts (Vasileou, 2018).

For this study, consideration was given to the relevancy of information that could be gathered instead of a number. The researcher knew that people selected as participants would give information that was required because they are involved in ICT in one way or another (problem solving, decision making, supporting the system, reporting, etc.). A heterogeneous or maximum variation in purposive sampling for the study reached its saturation at 60 after realizing that responses were repeating.

A heterogeneous sampling focuses on participants with diverse characteristics to ensure the presence of maximum variability within the primary data.

4.7 Data collection procedure

Data refers to information that the researcher collects for the study (Creswell, 2014). Relevant information is vital in the study and enables researchers to draw valid conclusions and reports. For this reason, the researcher used simple and easy to understand research instruments, that is; interview guides, to ensure that the data collected is accurate, relevant and correct. Semi-structured interviews were used to collect relevant information through interviews. Both primary and secondary data were used in the study.

It should be noted that qualitative methods focus on interpretations, case studies, observations and other communicative imagery, and not statistics. For the purposes of this study, literature review and empirical research were used for collecting data. The following methods were used:

4.7.1 Secondary data collection/Desk Research

Creswell (2014) defines secondary data as the information that has already been gathered and used by someone else. The information may come from books, journals or

reports and publications of other organizations or associations. It also includes previous research obtained from published information on the internet articles and Acts and/ or reports on IMC and Operational excellence in firms and higher education institutions. The researcher used books, journals, articles, and business reports that contain relevant information on IMC and operational excellence that were found to be useful for the study.

The researcher conducted desk research before collecting primary data. This was done to inform the research on existing approaches to information management capability and operational excellence. More importantly, the literature review in Chapter 3 assisted in the formulation of the interview schedule for collecting the primary data. Data relevant to the study was collected from published articles from Google, Elsevier, Web of Science, Springer and the Association of Information Systems (AIS).

A bulk of qualitative information on information management capability and operational excellence was provided by secondary data. The study literature review provided the theoretical concepts and models that informed the study (Chapter 2). This provided the premise to position the study within the body of knowledge and guide the development of the research instrument. The presentation of secondary data was grounded on the following research objectives:

- To determine how information management capability influences operational excellence
- To determine the degree to which information management capability is improved by digital transformation strategies
- Develop a framework of operational excellence for higher education institutions in South Africa.

4.7.2 Primary data

Mihas (2019) defines primary data as the data that is collected for the first time to address a specific challenge. Therefore, in this study, the researcher developed a semi-structured interview guide for use when conducting interviews. Interviews were administered to sixty participants from five selected higher education institutions in South Africa. Semi-structured interview guides were also used. The main objective of adopting interviews

when collecting data from the respondents was to understand the respondents' point of view rather than making conclusions based on assumptions. For this reason, the researcher compiled a set of predetermined questions on an interview schedule which was developed to guide the interview in such a way that the research participants' thoughts would be provoked.

Primary data served as the most critical aspect of the research process, as it yielded the empirical evidence of the study. A semi-structured interview approach to primary data collection required the researcher to collect data in a uniform manner, while allowing the room for probing by the researcher to be utilized. A semi-structured interview approach suited the purpose of the study because it accommodated the dynamic nature of information management capability and operational excellence, and the unforeseen data that was generated from the study participants.

Again, the semi-structured interview approach ensured consistency and objectivity on the researcher's part, while ensuring a certain desired level of standardization on the research process and subjectivity of the research participants. The semi-structured interview approach assisted in ensuring that the study is not sidetracked from its objectives and in limiting personal bias by the research participants, while allowing them to express themselves freely within the confines of the research study.

4.7.2.1 Primary data collection method

Face to face interviews and Micro-Soft Teams interviews were conducted for the collection of primary data. The interview guide was utilized as the primary data collection instrument for research study. The interview guide provided a more structured approach of collecting data and outlined the systematic data generation procedure to be followed. The use of prepared open-ended questions made the in-depth interviews possible, through probing participants and facilitating the use of own knowledge and imagination. The researcher maintained the focus of the study during the interview process.

The purpose of the interview guide was to ensure that each question was fixed and similar in wording and sequence for each interview. This enabled the interviewer to limit or probe

further the discussions to the specific question posed with the participants, while maintaining relevance and objectivity to the study. All face-to face responses were recorded with an audio device, while responses from Micro-Soft Teams interviews were recorded in a computer. Transcripts were compiled for data analysis purpose.

4.7.2.2 Primary data collection instrument

The study utilized the research interview guide (Annexure G) for the primary data collection. The interview guide offered a structured approach to the research study as outlined in the systematic procedure of generating data. The interview guide comprised five sections which are explained hereunder:

Section A: This section focused on the demographics of the participants. This included the education and training, age, gender, career and role on the development of information management capability.

Section B: This section focused on the conceptualization of operational excellence in higher education institutions focusing on exploring issues such as the perception of operational excellence, its enablers and principles underlying continuous improvement.

Section C: This section focused on conceptualizing the information management capability in higher education institutions. This included aspects such as mechanisms to ensure data availability.

Section D: This section focused on the exploration of customer management capability in higher education institutions, and this included customer determination and interaction dictates.

Section E: This section was grounded on the process management capability dictates. This focused on the exploration of the management of key processes in higher education institutions.

(a) Development of the research interview guide

According to De Jonckheere and Vaughn (2019), semi-structured interviews include:

- a short list of 'guiding' questions that are supplemented by follow-up and probing questions that are dependent on the interviewee's responses,
- questions that are open ended, clear, neutral and avoid leading language,
- questions in familiar language which is free from jargon,
- interviews questions that start with easy, context-setting questions before moving to more difficult or in-depth questions

With the above guiding principles in mind, the researcher followed the following eight steps in developing an interview guide:

Step 1: General research area
Step 2: Promoter and researcher debriefing
Step 3: Identifying key areas
Step 4: Drafting/formulating research questions
Step 5: Review and revisions of research questions
Step 6: Finalizing interview questions
Step 7: Identifying topics
Step 8: Developing the research interview guide

The interview topics were identified and categorized into information management capability and operational excellence. These two general topics made up the theme areas under which data analysis was conducted. Questions under each thematic area were reviewed based on the preliminary review of the research objectives. The research promoters had an opportunity to review the questions and gave comments for improvement before the interview guide were submitted to the study department, and faculty higher degrees' committee as part of the proposal approval process. The proposal approval process resulted to the continuous improvement and refinement of the interview guide.

4.7.2.3 The interview process

The interview process should be scheduled at a convenient time and location for the interviewee (De Jonckheere & Vaughn, 2019). A conversational interview technique was

used to collect the research data. A conversational interview technique requires two individuals to chat about a given topic at a specific point in time. A conversational interview technique is intended to assure that participants understand the questions as intended. The interviewer may say what is needed so that respondents can correctly interpret the question (Conrad & Schober, 2016). An interview guide comprising structured and unstructured open-ended questions assisted the researcher to gain perspective on the study and to identify and generate ideas for improvement on the study to fit in the technological demands of higher education institutions in South Africa. Probing and follow-up questions assisted the researcher to understand the social reality, experiences and perceptions of participants on the topic that generated comprehensive information from the respondents.

To ensure that the interviews became a success, the researcher provided the interviewee with a purpose of the study, an overview of the agenda, and the fact that the process of interviews included audio recording, and taking notes within a span of approximately 30 to fifty minutes.

4.8 Data analysis

Data analysis entails the process of consolidating, interpreting and giving meaning out of the data collected. Data can only be meaningful provided it is analysed (Maxwell, 2016). The process of analysing data was complex since it involved inductive and deductive reasoning, the description and interpretation as well as moving back and forth between concrete bits of data and abstract concepts.

In this process, the researcher systematically searched and arranged field notes, interview transcripts and other materials accumulated to increase understanding. Data analysis can be defined as the process used by researchers for the reduction of data to make meaning out of it, interpreting it, deriving insights and/or making a story out of it. The process of analysing data helps to reduce a large chunk of data into smaller fragments which makes sense (Maxwell, 2016; Mihas, 2019).

4.8.1 Data analysis approach

The researcher adopted thematic or narrative methods in analyzing the qualitative data. When making analysis, the researcher made use of the transcription of data, identifying thematic or categorizing data, coding, mapping and interpretations using themes. In this way, reasonable results were found. The analysis of qualitative research data in the study enables the researcher to use various methods which are based on organizing data, coding, sorting and interpretations that generate interpreting data. This made data analysis clear and easy to understand. It also assisted the researcher to uncover complex phenomena hidden in data.

4.8.2 Data Analysis Procedure

An Atlas-ti system was used for thematic analysis which was used for the study advantage in breaking down interviews into clear sections which made the analysis process easier, thus, making the most out of the data collected. To analyse the collected qualitative data, the researcher opted for a Thematic Analysis (TA). Thematic analysis can be described as a process of identifying patterns or themes within qualitative data (Daly & Reed, 2022).

Thematic analysis process is not tied to an epistemological or theoretical perspective (Martinez- Garcia *et al.,* 2019). Due to large volume of data (large data sets), the researcher followed the thematic framework analysis using the Atlas-ti software. “Atlas-ti is a computer programme for the analysis of qualitative data that allows the import and encoding of textual data and the category that designates broadly semiotic elements (Martinez- Garcia *et al.,* 2019).

According to Daly and Reed (2022), there are six steps to follow when doing thematic analysis, that is; becoming familiar with data, generating initial codes, searching of themes, reviewing of themes, defining themes and writing up, which were followed in this study.

Step 1: Becoming familiar with data - It is important for the researcher to read, re-read the transcripts and to be familiar with the entire data collected (Daly & Reed, 2022). Collected data were transcribed from an audio-recorder. This helped the

researcher to be familiar with the transcripts through listening to the audio and making notes.

Step 2: Generating initial codes - Generating initial codes entails organising data in a systematic and meaningful way (Daly & Reed, 2022). The researcher worked through each transcript, coding every segment of text that seemed to be relevant to or specifically address specific research questions.

Step 3: Searching of themes - “A theme is a pattern that captures something significant or interesting about the data and/or research question” (Daly & Reed, 2022). The interviews conducted in the study were coded and analysed using meaning condensation. Data gathered was summarized and key themes emerged in relation to research objectives. As key themes were identified and presented accordingly, important narratives were presented in their original form to avoid losing their original meanings.

Step 4: Review of themes - Codes and/or themes were reviewed and some portions of the interviews were allocated themes that are already identified. New codes were generated as new things emerged. In certain instances, existing codes were modified.

Step 5: Defining themes - Themes defined were linked back to the study research questions and integrated into a non-redundant and coherent structure. Steps 4 and 5 took place concurrently

Step 6: Writing up - The researcher wrote the study report by imposing meaning on the analysis done based on the perspectives from pre-existing literature.

Below follows Table 4.2 which shows the study questions and analysis techniques.

Sub-Questions	Data analysis technique
Sub-Question 1: **How does information management capability of the selected higher education institutions in South Africa link to their operational excellence?**	Thematic Analysis

Sub-Question 2: **To what extent does information management capability contribute to effective utilization of information systems to achieve excellence in the selected higher education institutions in South Africa?**	Thematic Analysis
Sub-Question 3: **What model can best suit the selected higher education institutions in South Africa in achieving operational excellence?**	Thematic Analysis

Table 4.2: Questions and analysis techniques

4.9 Study Variables

The study variables are presented in Table 4.3 below:

Variable	Source
Operational excellence	Literature review
Digital Information	Literature review
Management Capability	Literature review
Customer management capability	Literature review
Process management capability	Literature review
Gender	Interview guide
Position and department	Interview guide
Education and training	Interview guide
Age and experience	Interview guide

Table 4.3: Study variables

4.10 Ethical Considerations

Ethical consideration is regarded as a process associated with morality that deals with both matters of right and wrong and conforming to the given standards of conduct (Babbie & Mouton, 2006). It entails the responsibilities of the researchers towards the participants in the research, beneficiaries and sponsors of the research study. Examples of ethical considerations are consent from research participants, deception and mental and physical stress as well as confidentiality (Creswell, 2014). The researcher strictly adhered to all ethics when collecting and analysing data. Participants' confidentiality were not violated. Consideration was given to voluntary participation, anonymity, confidentiality and avoidance of harm. A protocol for interviewers conducting interviews which served as a guide and for use by the project members was developed and administered as planned to protect the research participants.

The study was conducted within the framework of ethics. This included informed consent and confidentiality considerations. Formal requests for permission to conduct research interviews were sent to the heads of departments in selected higher education institutions prior to actual interviews (See Annexures C, D, E and F).

This was considered before and during field work (interviews). Objectives of the research and the role of respondents were outlined before the interviews. Confidentiality was achieved by maintaining privacy of research respondents such that their names and identities were not disclosed in this research study.

4.10.1 Avoidance of harm

According to Babbie (2007), the study should never cause any physical or mental harm to the research participants. In addition to this, Babbie asserts that everything people do in life can possibly harm others and for this reason, researchers should weigh the risks against the importance and possible benefits of their research projects. Causing harm to others can be done by revealing information that would embarrass or endanger the participant's 'home life, jobs and friendship'.

The researcher ensured that sensitive information was analysed in a way that did not cause harm to anyone. Participants were treated with the respect and dignity they deserved. No participants such as ICT clients showed dissatisfaction and disengaged from the study during interviews. Those who might have thought that they could be biased or express exaggerated opinions regarding information management capability and operational excellence were not interviewed.

Confidentiality of the interview sessions was emphasized and research participants were assured of the study intentions at a start of the interview session in a less interrogative, participative and collaborative manner. This was done to avoid research participants, especially staff members, from feeling uncomfortable as the interviews were involving personnel to whom they report and such, they would not like to be victimized or lose their jobs.

4.10.2 Permission to conduct the study

The researcher requested permission to conduct the study from the selected higher education institutions in South Africa. Evidence in the form of ethical form was presented when requesting for permission to conduct the study and before the researcher could engage participants in interview. All the Annexures have been attached to the research document.

4.10.3 Informed consent and voluntary participation

Voluntary participation requires participants not to be pushed or forced to participate in the study. They have the right to know what they are being researched for and to be informed about the nature and the type of the research (Babbie and Mouton, 2006). Even though participants were informed that information that was provided would be confidential, it could not be fair to withhold information regarding the objective of the study even though maximum participation and feedback was desired.

An informed consent form was provided even though the researcher knew that it could jeopardise full participation. The researcher ensured that all participants participated in the study voluntary and indicated to them that they could withdraw from the study at any time without prejudice should there be anything that might cause them discomfort during the study. The participants were freely engaged to give their views and opinions as part of contribution to the study.

The full participation of the identified participants could not be completely guaranteed, despite advising and assuring them about the confidentiality of information they provided. The researcher did not withhold information regarding the objectives of the study to avoid posing ethical problems, regardless of the aim to ensure maximum participation and feedback. The latter was a perspective and a subjective issue.

4.10.4 Right to privacy

The study did not disclose the selected names of institutions and names of the research participants who might have compromised information which could influence any future

engagement and decisions of the information management capability and operational excellence in higher education institutions. The results of the study are documented in such a way that all institutions and participants to the study are protected.

4.10.5 Professional code of conduct/anonymity and confidentiality

Creswell (2014) defines privacy as keeping to oneself that which is normally not intended for others to observe, hear or analyse. Confidentiality in research is a serious matter and cannot be taken lightly by the researcher. The researcher ensured that data collected from respondents is strictly confidential. The researcher made sure that no one outside the research accesses data without permission to do so. The principle of confidentiality was strictly adhered to. Information gathered was handled with care and not accessed by wrong people. The names and contacts of participants were deleted immediately after use or at the completion of the study by the researcher. Participant names did not appear in any page of the study document. Code of ethics of the selected higher education institutions were adhered to. Due consideration was given to the legal and confidentiality implications while seeking innovative engagement with the identified research participants. This was done to improve information management capability and operational excellence in higher education institutions in South Africa.

4.11 Budgetary constraints

The study did not receive any external funding. The researcher opted to use unpaid volunteers as research participants for qualitative data due to budgetary constraints. One research assistant who assisted with data collection was paid from the researcher's own pocket.

4.12 Summary

This chapter presented a comparison between quantitative and qualitative research. Motivations for selecting the qualitative research as the most suitable research and the technique used to interrogate the data were given. The empirical data gathered from organizational and operational factors were found to have contributed to the study. The research methodology validates the IMC measure and empirical testing of the questions

in the study using data from ICT sections, IT support service staff, students, departmental heads, administrative staff and other relevant people in selected higher education institutions in SA. The next chapter will focus on the actual outcomes of the study and demonstrate how the research objectives were achieved. Results from the research questions will be analysed before conclusions, limitations and suggested future line of study can be presented.

Chapter 5
Data analysis and interpretation of the results

5.1 Introduction

This chapter provides the results and data interpretation thereof. The significant results that were established from the analysis of data based on the data that was collected are presented in this chapter. The analysis of data was conducted using thematic framework analysis utilizing ATLAS. ti. The collected data was imported to ATLAS. ti, coded and categorised into themes which were organised according to the objectives of the study and the major research questions. The data on the phenomenon being studied were solicited from the participants through the interview guide which was developed from the major research questions.

5.2 Demographic profiles

The demographic profiles of the respondents are provided in Table 5.1 below.

Respondent	Age (Years)	Gender	Position	Education	Years in organization	Role
1.	23	Female	IT Technician	Bsc Computer Science	2	Systems support
2.	23	Male	Information systems Technician	Bsc Computer Science	1	Systems support
3.	28	Male	Website Assistance Officer	Bsc Computer Science	5	Website development and maintenance
4.	21	Female	Student Assistance	Bcom IT	2	Systems maintenance
5.	27	Male	IT Technician	Bcom Hons IT	2	Systems configurations
6.	25	Female	IT Technician	Bcom IT	2	Lecturer
7.	26	Male	IT Technician	Bcom IT	3	Systems support
8.	25	Male	Lecturer	Bsc Hons Computer Science	1 year 3 months	Systems support
9.	44	Female	IT Technician	National Diploma in IT	5	Systems support
10.	23	Female	IT Technician	Bcom IT	2	Systems support
11.	24	Male	IT Technician	Bcom IT	2	Systems support
12.	22	Male	Student Assistant	Bcom IT	1	Systems support
13.	24	Male	IT Technician	Bcom IT	8 months	Systems support
14.	31	Male	Audio Visual Technician	BA Media Studies	3	Blended Learning support
15.	37	Male	Lecturer	Bsc Hons Computer Science	3	Lecturing
16.	26	Male	Lecturer	Bsc Hons Computer Science	2	Lecturing
17.	25	Female	IT Trainee Technician	Bcom IT	1	Systems support
18.	49	Female	Secretary	Bcom Business Adminstration	12	Administration
19.	24	Male	IT Technician	Bcom IT	2	Systems support
20.	26	Female	IT Technician	Bcom IT	3	Systems support
21.	23	Female	IT Technician	Bcom IT	2	Systems support
22.	25	Male	IT Technician	Bcom IT	2	Systems support
23.	24	Female	IT Technician	Bcom IT	3	Systems support
24.	26	Male	Lecturer	Bsc Hons Computer Science	2	Lecturing
25.	36	Female	IT Technician	Bcom Hons IT	4	Systems Configuration
26.	23	Female	IT Technician	Bsc Computer Science	8 months	Systems support
27.	26	Male	IT Technician	BSCCOM	2	Systems support
28.	29	Male	IT Technician	Bcom IT	3	Systems support
29.	26	Male	IT Technician	Bcom IT	3	Systems support
30.	24	Female	IT Technician	Bcom IT	2 years 6 months	Systems support
31.	24	Male	IT Technician	Bcom IT	2	Systems support
32.	25	Male	IT Technician	Bcom IT	2	Systems support
33.	32	Male	Lecturer	Masters in IT	2	Systems support
34.	24	Male	IT Technician	Bcom IT	4	Systems support
35.	23	Male	IT Technician	Bcom IT	1	Systems support

36.	30	Male	IT Specialist	Bsc Masters Computer Science	6	Supervising Technicians
37.	36	Male	Lecturer	Masters in IT	8	Lecturing
38.	27	Male	Lecturer	Bcom IT	8	Lecturing
39.	26	Female	IT Technician	Bcom IT	3	Systems support
40.	43	Male	Lecturer	Bsc Masters Computer Science	12	Lecturing
41.	56	Male	Lecturer	PhD in Computer Sciences	10	Lecturing
42.	28	Female	IT Technician	Bcom IT	5	Systems support
43.	54	Male	Project Manager	Masters in Project Management	8	Systems support
44.	30	Male	Lecturer	Bcom Hons IT	5	Lecturing
45.	44	Female	Lecturer	Masters in BIS	8	Lecturing
46.	51	Female	IT Technician	National Diploma in IT	12	Systems support
47.	48	Female	IT Technician	National Diploma in IT	10	Systems support
48.	32	Male	IT Technician	Bcom Hons IT	6	Systems support
49.	26	Male	IT Intern	Bcom IT	1 year 2 months	Systems support
50.	48	Female	IT Technician	National Diploma in IT	18	Systems support
51.	39	Male	Lecturer	Masters in IT	4	
52.	46	Female	Lecturer	Bsc Hons Computer Science	12	
53.	49	Male	MIS Manager	Bsc Hons Computer Science	10	Systems administration
54.	42	Male	Systems Administrator	Bsc Hons Computer Science	10	Systems management
55.	21	Female	Student Assistant	Bcom IT	3	Systems support
56.	19	Male	Student Assistant	National Diploma in IT	2	Systems support
57.	21	Female	Student Assistant	Grade 12	3	Systems support
58.	28	Female	Student Assistant	Bcom Administration	1	Systems support
59.	26	Female	Student Assistant	Bcom Administration	1	Systems support
60.	25	Female	Student Assistant	Bcom Administration	1	Systems support

Table 5.1: Demographic profiles

5.3 Presentation of findings

The results of this study are presented according to the research objectives that framed the study. The results are presented as follows:

5.3.1 Operational excellence

Operational excellence, perceptions, enablers and principles underlying continuous improvement were investigated and the themes that emanated from the data analysis are explored in the next sections.

5.3.1.1 Operational excellence perceptions

In a pursuit to have a comprehensive understanding of operational excellence of Higher Education Institutions in South Africa, the researcher focused on understanding how operational excellence is viewed or perceived or conceptualized in Higher Education Institutions. The following are the subthemes that emerged under this main theme; objectives achievement, effective task execution, effective service delivery, customer satisfaction, effective strategy implementation, synergy of units, governance and awareness of a bigger picture. These sub-themes are discussed below.

(a) Objectives achievement

The results showed that objectives achievement is one of the manners in which operational excellence is perceived or conceptualized by the respondents. The respondents proffered that operational excellence is when the organization has realized its set objectives or established targets. This implies that operational excellence is perceived as when all the departments within the higher learning institution would have realised their set goals in an effective manner. This entails that operational excellence is perceived to be an outcome of objectives realization in Higher Education Institutions. This was evidenced by the expressions of Respondents 2, 3, 5, 6, 13, 16, 28, 30, 32 and 33 as indicated in the following quotations.

Ref		Discursive analysis
R2	We view operational excellence as when we have achieved what our department has set or what our superiors have set for us.	Objectives achievement
R3	Operational excellence is conceptualized as the attainment of the intended goals and alignment with the strategic plan of the institution.	Objectives achievement
R5	Operational excellence is when an institution has realized the goals that we have set or the targets in the expected way.	Objectives achievement
R6	Operational excellence is achieved when the outcome and the productivity increase or meet the standards that is required by the institution.	Objectives achievement
R13	I think it is when all departments are addressing their mandates; why they are established in the right way.	Objectives achievement
R16	I think operational excellence is when our sole mandate is achieved which is graduation of students.	Objectives achievement
R28	Whenever all the desired outcomes of the institution or department are obtained that is excellency in operations.	Objectives achievement

R30	When the organisation has made of its staff and students happy and all the plans are followed and goals achieved.	Objectives achievement
R32	Operational excellence is viewed as an important issue as we strive towards seeing our university being rated in the top 10.	Objectives achievement
R33	As an academic institution, the operation excellence is major priority. The aim is to ensure that goals are attained.	Objectives achievement

It is also imperative to note that based on the above evidence, the respondents also posited that operational excellence is when plans are followed and goals achieved. The respondents also submitted that operational excellence is also perceived when the university is within the top ten ratings.

This indicates that within the higher learning institutions, operational excellence is perceived as the effective achievement of the set institutional objectives in various faculties or departments.

(b) Effective task execution

Effective task execution was also noted to be another facet through which operational excellence is perceived or conceptualized in the Higher Education Institutions. This was evidenced by the sentiments of Respondents 11, 13, 14, 21, 22, 25 and 27 as indicated in the following excerpts.

Ref		Discursive analysis
R11	Operational excellence in my perception relates to effective and efficient way of performing our tasks in the institution.	Effective task execution
R13	I think it is when all departments are addressing their mandates; why they are established in the right way.	Effective task execution
R14	I believe people have got support from our line managers so our operations are doing very well.	Effective task execution
R21	Operational excellence is perceived as when both the student, staff and institutional needs are solved and addressed effectively.	Effective task execution
R22	When I am being able to fix all the problems that people are facing regarding the network that is an excellence for me.	Effective task execution
R25	In my organisation, it is viewed as making the best efforts to meet the expectations of our customers.	Effective task execution
R27	Operational excellence is viewed as an important issue because we value excellency as an organisation.	Effective task execution

The respondents in this study elucidated that operational excellence relates to effective and efficient way of performing tasks in the institution implying that all departments will be addressing their mandates, thus purpose of the establishment in a proper manner.

This means that operational excellence is grounded on the notion of effective task execution that the execution of tasks in the right, thus in line with the established set standards. Additionally, it also relates to the execution of tasks in a manner that resources are optimally utilized. This implies that effective task execution is another premise through which operational excellence is conceptualized within Higher Education Institutions.

(c) Effective service delivery

The results of this study revealed that effective service forms part of the operational excellence conceptualization in higher learning institutions. The respondents proffered that operational excellence is when the services provided to the students or staff is the best available or possible manner. The results also revealed that operational excellence is perceived as when student, staff and institutional needs are solved and addressed effectively. This implies that operational excellence is denoted as when the institutions handle or fulfil their duties effectively towards meeting the needs and the expectation of the customers. It is pertinent to note that indeed, this study has revealed that effective service delivery is one of the pillars through which operational excellence can be perceived or conceptualized. This was evidenced by the views of Respondents 4, 6, 20, 21, 22, 25, 26 and 32 as indicated in the following extracts.

Ref		Discursive analysis
R4	Operational excellence is perceived by attending to staff and student issues in the most efficient and effective manner.	Effective service delivery
R6	Operational excellence is achieved when the outcome and the productivity increase or meet the standards that is required by the institution.	Effective service delivery

R20	Operational excellence is when the service to be provided to our customers, that is students, is provided in the best possible way.	Effective service delivery
R21	Operational excellence is perceived as when both the student, staff and institutional needs are solved and addressed effectively.	Effective service delivery
R22	When I am able to fix all the problems that people are facing regarding the network that is an excellence for me.	Effective service delivery
R25	In my organisation, it is viewed as making the best efforts to meet the expectations of our customers.	Effective service delivery
R26	When the organisation has made of its staff and students happy and all the plans are followed and goals achieved.	Effective service delivery
R32	Operational excellence is viewed as an important issue as we strive towards seeing our university being rated in the top 10.	Effective service delivery

It should be also noted that based on the expressions of the respondents, operational excellence is perceived as when the institutions make the best efforts to meet the expectations of their customers. This entails being able to address all the needs and expectations of the customers or the problems that they are facing, for instance, connectivity problems or other digital related challenges in an effective manner. Hence, operational excellence is perceived as effective service delivery.

(d) Customer satisfaction

Customer satisfaction is another way in which operational excellence is perceived among the Higher Education Institutions. This is evidenced by the sentiments that were aired by Respondents 7, 9, 18, 25 and 26.

Ref		Discursive analysis
R7	Myself I view it as when the people that we are attending to are happy and we have met the maintenance and support goals.	Customer satisfaction
R9	We operate as a smart campus and on our department we make sure that we give student and staff the good services.	Customer satisfaction
R18	It is highly viewed as one need to perform their duties very well to satisfy customer needs.	Customer satisfaction
R25	In my organisation, it is viewed as making the best efforts to meet the expectations of our customers.	Customer satisfaction
R26	When the organisation has made of its staff and students happy and all the plans are followed and goals achieved.	Customer satisfaction

The respondents postulated that customer satisfaction as the basis for establishing operational excellence is attained when the people or the customers that are being given the service or attended to are happy and the maintenance and support goals are attained. The respondents also submitted that operational excellence is noted when the organization makes its best efforts towards meeting the expectations of the customers.

This implies that customer satisfaction is another premise for the conceptualization of operational excellence within Higher Education Institutions.

(e) Effective strategy implementation

Effective strategy implementation is imperative as it results in the institutions attaining their intended results or goals. In this study the results showed that effective strategy implementation is another basis through which operational excellence is conceptualized among the Higher Education Institutions. This is evidenced by the expressions of Respondents 1 and 13 in the following extracts.

Ref		Discursive analysis
R1	We view operational excellence as making sure that our setup and maintenance is implemented in such a way that we have no complaint from staff or students after our work is done.	Effective strategy implementation
R13	I think it is when all departments are addressing their mandates; why they are established in the right way.	Effective strategy implementation

The respondents in this study extended that operational excellence is ensuring that the digitization setup and maintenance is implemented in such a way that there will be no complaints from the customers, thus, the staff and the students. It is pertinent to note that there is a reciprocity between effective strategy implementation and the ultimate attainment of the intended objectives or set standards. This implies that effective strategy implementation provides the premise through which operational excellence can be perceived or measured. This means that effective strategy implementation is one of the indicators of operational excellence in the Higher Education Institutions.

(f) Synergy of units

Operational excellence has also been conceptualized as the synergy between units or departments. This was evidenced by the expression of Respondent 30 as indicated in the following quotation:

Ref		Discursive analysis
R30	Remember students are the custodians or the most important clientele that we have, so operational excellence in my view will be the synergy between units to support the students because without the students there are no operations if I have to put it that way. Well operational excellence from me it will be the synergy between what know couple of units that contributes in partaking the whole information because remember you have an ETP system, you have a business intelligence tool so the ERP system is the system for transactions and this is where all the transactions are happening. But now business intelligence you through that ETL process, (Extraction Transfer Load) so you enrich the data or the information. So at the lower level that's the capture level, that's where people are capturing the information, this other use like student administration they will accept students in admin, they process other assignments and course or modules and whatever.	Synergy of units

Based on the above evidence, the respondents in this study submitted that operational excellence is when there is synergy between diverse units that contribute in partaking the

whole information. This implies that the synergy between the Extraction Transfer Protocol system, the Extraction Transfer Load and the Electronic Resource Planning system is critical in ensuring operational excellence. This means the synergy between all departments thus, from student administration staff/departments, academic staff/departments and the Information Technology departments provides the premise for ensuring that operational excellence is attained. Thus, operational excellence is perceived as synergy of all units.

(g) Governance

Governance has also been established as another indicator of operational excellence, thus the premise through which operational excellence is conceptualized. This was based on the views of Respondent 30 indicated in the following excerpt.

Ref		Discursive analysis
R30	Then lastly it will be the governance of all these elements that I have spoken about. So, in that sense when you have governance, risk management, the infrastructure you know, the technology which is the enabler and then obviously the strategy that drives all these things at a holistic point of view. At higher level, we talk about the governance then for me that will be the operational excellence. So, from that synergy of all those elements, that is excellence for me.	Governance

Based on the above evidence, it is imperative to note that the results of this study have shown that operational excellence is also contextualized in the context of governance. The respondent alluded that operational excellence is realized by the governance of the Extraction Transfer Protocol system, the Extraction Transfer Load and the Electronic Resource Planning system. This implies that the governance of the afore-mentioned

elements provides the premise for operational excellence, hence governance is another indicator of operational excellence.

(h) Awareness of bigger picture

Awareness of the bigger picture was noted as another indicator of operational excellence. The respondents in this study postulated that when everyone in the institution is aware of their contribution to the bigger picture, thus the strategic intent of the organization, it is operational excellence. This means that in the transformation of data or the digital transformation, all the stakeholders within the institution will be aware of the strategic intent and contribute meaningfully towards aligning with that intent. This implies that when everyone is aware of the bigger picture, there is an enhanced sense of direction and esprit de corps which ultimately results in all individuals contributing effectively towards the success of the institution or towards attaining its goals.

Awareness of the bigger picture also provides the premise for individuals' understanding of what is expected of them and ensures that they contribute meaningfully towards the attainment of operational excellence. This is evidenced by the sentiments of Respondent 30 as indicated in the following extract.

Ref		Discursive analysis
R30	So, operational excellence means that everybody is aware of their contribution to the bigger picture. The bigger picture is when you see everything that has been done in terms of transforming the data from the fundamental basis as raw as possible up until you see it at the level of reporting, so when you say Univen graduate rate is 28 percent or 22 per cent; well that's the figure that you just see but where it comes from everybody has a role to play. So,	Awareness of bigger picture

they will capture, whatever and other people will say look but this student is not a first entering student, this student come from a certain school and then IT will enable the environment for this other custodians to be able to perform their meter centrics to confer.

A summary of the operational excellency perceptions is presented in Figure 5.1 below.

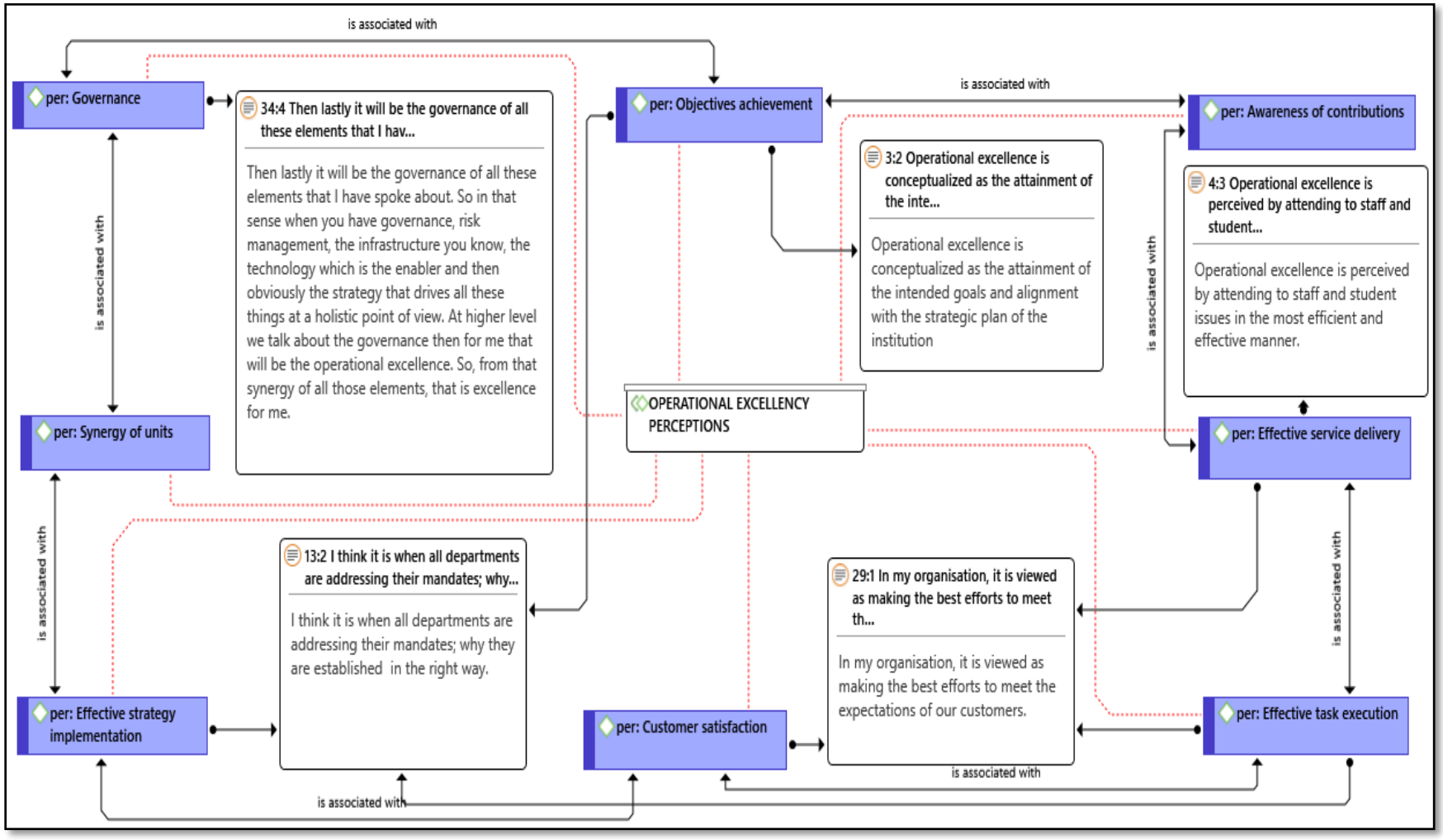

Figure 5.1: Operational excellence perceptions network
Source: Operational excellence perceptions using ATLAS ti.

5.3.1.2 Operational excellence enablers

The enablers of operational excellence were also investigated; thus, the respondents were asked questions pertaining to their views regarding the enablers of operational excellence. The sub-themes that emerged from the analysis of data that will be discussed in this section are: enabling infrastructure, human resources, information technology infrastructure and knowledge.

(a) Enabling infrastructure

The results showed that one of the enablers of operational excellence within the Higher Education Institutions is an enabling infrastructure. This was evidenced by the sentiments shared by Respondents 3, 11, 18, 21 and 24 as indicated in the following extracts:

Ref		Discursive analysis
R3	An enabling infrastructure is a critical enabler as to ensure that the website withstand the traffic volumes, the right infrastructure must be available.	Enabling infrastructure
R11	Commitment and appropriate infrastructure because commitment and availability of infrastructure are fundamental issues of excellence.	Enabling infrastructure
R18	ITS integrator, my access, library menu. To access budget and to apply or cancel a leave and to check the availability of books.	Enabling infrastructure
R21	Up to date equipment because you cannot provide excellent service using outdated equipment.	Enabling infrastructure

R24	Resources both capital resources such as computers and various equipment and software and human resources.	Enabling infrastructure

Based on the above evidence, it is pertinent to note that the respondents in this study submitted that an enabling infrastructure is a critical enabler to ensure that the digital efforts, for instance the website, withstand the traffic volumes, therefore, the right infrastructure ought to be present. The respondents further posited that the availability of infrastructure is a fundamental issue of operational excellence. This means that an enabling infrastructure entails the availability of the relevant and proper infrastructure to ensure that the digital efforts of the institutions are attained and to ensure that operational excellence is attained. The respondents also submitted that the enabling infrastructure includes the availability of capital resources such as computers and various equipment. Hence, an enabling infrastructure is one of the enablers of operational excellence in higher education institutions.

(b) Human resources

Human resources are the personnel of a business or organization that regarded as a significant asset in terms of skills and abilities. This is also true within the higher education institutions as it has been established that human resources are enablers of operational excellence. This is based on the views shared by Respondents 5, 24, 25 and 28 as indicated in the following extracts:

Ref		Discursive analysis
R5	Human resources because we can talk of technology but without the people to push that agenda excellency cannot be realized.	Human resources
R24	Resources both capital resources such as computers and various equipment and software and human resources.	Human resources
R25	Availability of resources or on time availability of the resources that we need to provide the service.	Human resources
R28	People because to achieve this operational excellence, people are important.	Human resources

In this study the respondents proffered that human resources or people are important in the attainment of operational excellence in higher learning institutions. The respondents also posited that the availability of technology without the people to push the institutional agenda, cannot be realize operational excellence.

This means that people are at the center of the operations of any organization as they are the drivers of all the key activities and oversee the day to day running of the organization, thus people plan, organize, lead, direct and control the operations of organizations towards attaining the intended objectives. This means that people are a critical resource to the operations of organizations/institutions, hence human resources are an enabler to operational excellence.

(c) Information technology infrastructure

Information technology infrastructure was also established to be another enabler that contributes towards the realization of operational excellence in higher education

institutions. This is evidenced by the sentiments shared by Respondents 2, 3, 9, 13, 18, 20, 21 and 27 as indicated in the following excerpts:

Ref		Discursive analysis
R2	IT infrastructure because so far, Univen ensures that we have the latest technology which helps us achieve excellence.	Information technology infrastructure
R3	Enabling infrastructure is a critical enabler as to ensure that the website withstand the traffic volumes, the right infrastructure must be available.	Information technology infrastructure
R9	In ICT, we have the best devices to work with because we are the heart of the university.	Information technology infrastructure
R13	Availability of network for easier communication and the availability of the people to address any problems that exist.	Information technology infrastructure
R18	ITS integrator, my access, library menu. To access budget and to apply or cancel a leave and to check the availability of books.	Information technology infrastructure
R20	Its technology because as we are in the world that is constantly revolving, technology is now a need in every operational effort.	Information technology infrastructure
R21	Up to date equipment because you can provide excellent service using outdated equipment.	Information technology infrastructure

R27	Equipment availability such as latest projectors that are user friendly.	Information technology infrastructure

Based on the expressions of the respondents above, it is important to note that information technology infrastructure is a pivotal enabler, for instance, in the case of websites, the availability of the information technology infrastructure provides the premise for withstanding the traffic volumes. In addition, information technology infrastructure provides the premise for enhanced operation or smooth operations as the availability of an enabling information technology infrastructure creates an environment for effective execution of tasks and ultimately excellence on the operations. Hence information technology infrastructure is an enabler of operational excellence.

(d) Knowledge

The study found that knowledge is another enabler of operational excellence in higher education institutions. The respondents alluded that knowledge is imperative in operational excellence as there will be no success if knowledge is absent. This implies that having comprehensive knowledge regarding an area of operation provides the premise for effective task execution. This means that acts, information, and skills acquired through experience or education or the theoretical or practical understanding of a subject is imperative in the operations of higher learning institutions as it results in excellence. This implies that knowledge is an imperative enabler of operational excellence. This was based on the views aired by Respondents 8 and 16 as indicated in the following extracts:

Ref		Discursive analysis
R8	You cannot succeed without knowing. I need to know in order to perform well.	Human resources

R16 Hard work and comprehensive knowledge because without hard work we can't meet the needs of the students.

A summary of the operational excellence enablers is presented in Figure 5.2 below.

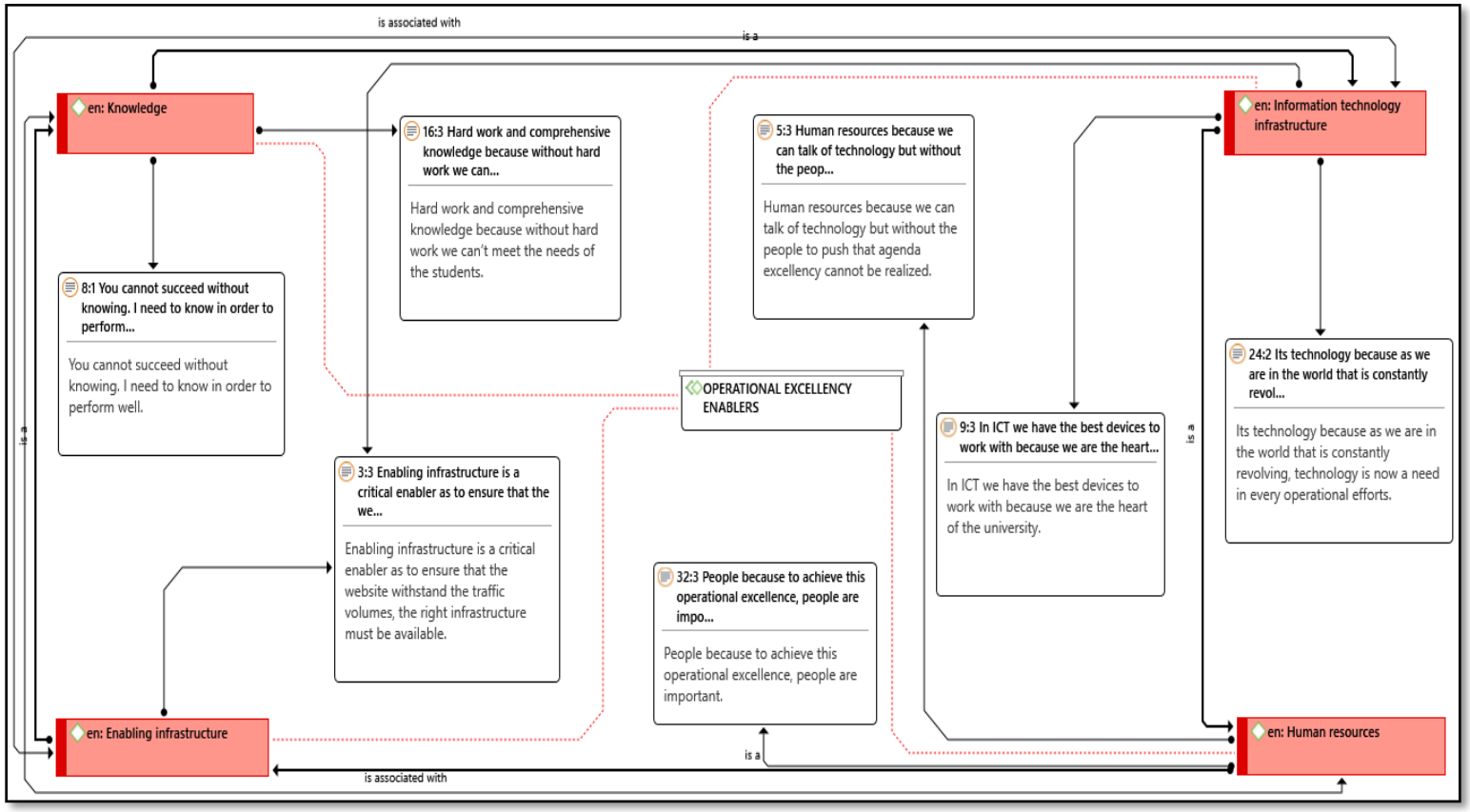

Figure 5.2: Operational excellence enablers network
Source: Operational excellence enablers using ATLAS ti.

5.3.1.3 Principles underlying continuous improvement

The principles that underlie continuous improvement were also established from the analysis of data and these are: commitment, hard work, honesty, integrity and cooperation.

(a) Commitment

Commitment was indicated to be one of the principles that underlie continuous improvement towards attaining operational excellence in higher education institutions. Commitment as a principle that underlies continuous improvement was established owing to the expressions submitted by Respondents 2, 5, 9, 11, 17, 22 and 29 as indicated in the following quotations:

Ref		Discursive analysis
R2	I value commitment and hard work. I believe that when one is committed and work hard towards achieving those targets, improvement is obvious.	Commitment
R5	The principles that guide my efforts are commitment and innovation because you just don't need to be committed but commitment should be realized by coming up with new ways of addressing problems.	Commitment
R9	I make sure that I work during the weekends in order to reach the goals that I need to achieve when helping students especially on the labs.	Commitment
R11	Hard work, honesty, commitment and integrity are the fundamental principles that guide my improvement efforts.	Commitment

R17	Hard work and commitment and readiness to work and learn.	Commitment
R22	To never give up until all the problems are being solved. I must find solutions on what I am supposed to do in order to have successful work.	Commitment
R29	Readiness and commitment because I am always ready to for any changes that occur.	Commitment

The respondents postulated that commitment supplemented by hard work is imperative towards enhancing continuous improvements efforts. The respondents further alluded that commitment supplemented by innovation results in enhanced continuous improvement efforts as commitment is realized by also coming up with new ways of addressing problems or doing things. In addition, the respondents also posited that commitment reinforced with integrity is the fundamental principle that guides improvement efforts. This implies that commitment is an integral principle that results in objectives being attained as it provides the premise for individuals finding new ways of executing their tasks. Commitment also entails that the personnel will be focused towards realizing the set targets, hence it provides the platform for continuous improvement of operational excellence in higher education institutions.

(b) Hard work

Hard work was found to be another principle that underlies continuous improvement. The respondents alluded that they believe that when one is committed and works hard towards achieving those targets, improvement is guaranteed. The respondents also postulated that they even go extra miles of working during weekends to ensure that the intended goals are attained and the expected standards met. This was evidenced by the sentiments shared by Respondents 2, 7, 9, 11, 16, 17 and 27 as indicated in the following excerpts:

Ref		Discursive analysis
R2	I value commitment and hard work. I believe that when one is committed and working hard towards achieving those targets, improvement is obvious.	Hard work
R7	Integrity, confidentiality, hard work and honesty are important principles that ensure that continuous improvement.	Hard work
R9	I make sure that I work during the weekends in order to reach the goals that I need to achieve when helping students especially on the labs.	Hard work
R11	Hard work, honesty, commitment and integrity are the fundamental principles that guide my improvement efforts.	Hard work
R16	Honesty and fairness are my main principles supplanted by hard work in everything that I do.	Hard work
R17	Hard work and commitment and readiness to work and learn.	Hard work
R27	Self-management, hard work and respect are the principles that guide me.	Hard work

In addition, based on the sentiments shared by the respondents, it can be noted that through constant, regular, or habitual engagement in earnest and energetic work, that is, being industrious and diligent in the execution of tasks, excellency will be the ultimate result. It can also be established that when the personnel's physical, mental or emotional

effort is high or there are high levels of focus and purpose, excellency will be realised. This means that one of the principles that contribute towards continuous improved efforts and ultimately operational excellency is hard work. It should also be noted that there is reciprocity between hard work and commitment as absence of commitment results in hard work being absent and vice versa. Hence, hard work is a critical principle that contributes towards continuous improvement and ultimately operational excellence.

(c) Honesty

Honesty is another principle that contributes towards continuous improvement efforts in higher education institutions. This implies that honesty has been noted to be a fundamental principle that guides continuous improvement towards attaining operational excellency. This is evidenced by the expressions of Respondents 1, 7, 11, 16, 21 and 25 as shown in the following excerpts:

Ref		Discursive analysis
R1	The principles that underlie continuous improvements are honesty, consistency and cooperation.	Honesty
R7	Integrity, confidentiality, hard work and honesty are important principles that ensure that continuous improvement.	Honesty
R9	I make sure that I work during the weekends in order to reach the goals that I need to achieve when helping students especially on the labs.	Honesty
R11	Hard work, honesty, commitment and integrity are the fundamental principles that guide my improvement efforts.	Honesty

R16	Honesty and fairness are my main principles supplanted by hard work in everything that I do.	Honesty
R21	Hard work and ethical behaviour as despite working hard an ethical behaviour is the heart of any form of excellency.	Honesty
R25	Honesty and dedication because that is what guides me.	Honesty

Honesty is an integral principle that provides the premise for morality in our day to day living. Honesty is also a fundamental principle even in the running or operation of institutions. This is so because it is a facet of moral character that connotes positive and virtuous attributes such as integrity, truthfulness, straightforwardness, including straightforwardness of conduct, along with the absence of lying, cheating and theft. Honesty also involves being trustworthy, loyal, fair and sincere.

This means that honesty embeds various principle such as integrity and truthfulness and implies that within the context of higher learning institutions, honesty is a cornerstone of their sustainability, hence it establishes the platform for continuous improvement. Honesty results with operational excellency being a reality as tasks will be executed with utmost truthfulness and integrity.

(d) Integrity

The results showed that integrity is another principle that underlie continuous improvement in Higher Education Institutions. The respondents in this study alluded that integrity is one of the principles that ensures continuous improvement in higher learning institutions. It is imperative to note that integrity is also closely linked with ethical behaviour as the respondents proffered that despite working hard, ethical behaviour is the heart of any form of excellence. This means that integrity is noted to be at the center of operational excellence. This indicates that integrity is a critical principle that provides the foundation for operational excellence in higher learning institutions. This is owing to

the notion that the quality of being honest and having strong moral principles contributes immensely to continuous improvements in higher learning institutions and ultimately in operational excellency. Integrity is a principle that underlies continuous improvements in institution of higher learning as indicated in the views shared by Respondents 7, 11 and 21 in the following extracts:

Ref		Discursive analysis
R7	Integrity, confidentiality, hard work and honesty are important principles that ensure that continuous improvement.	Integrity
R11	Hard work, honesty, commitment and integrity are the fundamental principles that guide my improvement efforts.	Integrity
R21	Hard work and ethical behaviour as despite working hard an ethical behaviour is the heart of any form of excellency.	Integrity

(e) Cooperation

Cooperation is another principle that has been noted to be underlying continuous improvements efforts in Higher Education Institutions. This implies that cooperation is also integral towards the attainment of operational excellence in Higher Education Institutions. This is evidenced by the expressions of Respondents 1, 13 and 26 as indicated in the following excerpts:

Ref		Discursive analysis
R1	The principles that underlie continuous improvements are honesty, consistency and cooperation.	Cooperation
R13	Teamwork, I think. We work as a team and through team efforts, we will continuously improve.	Cooperation
R26	Teamwork and relentlessness because I do not stop until what is intended is achieved.	Cooperation

Based on the above expressions of the respondents, cooperation is the action or process of individuals or departments working together towards the same end or the common goal results with the continuous improvement efforts being possible. The respondents alluded that cooperation or team work is supplemented by relentlessness results with the attainment of the intended goals and improved efforts thereof. This indicates that when people work together to achieve results or when people help each other out towards achieving a common goal, improvements efforts can be realized and ultimately operational excellence. Hence, cooperation is one of the principles that underlie continuous improvement efforts and ultimately operational excellence.

A summary of the principles underlying continuous improvement is shown in Figure 5.3 below.

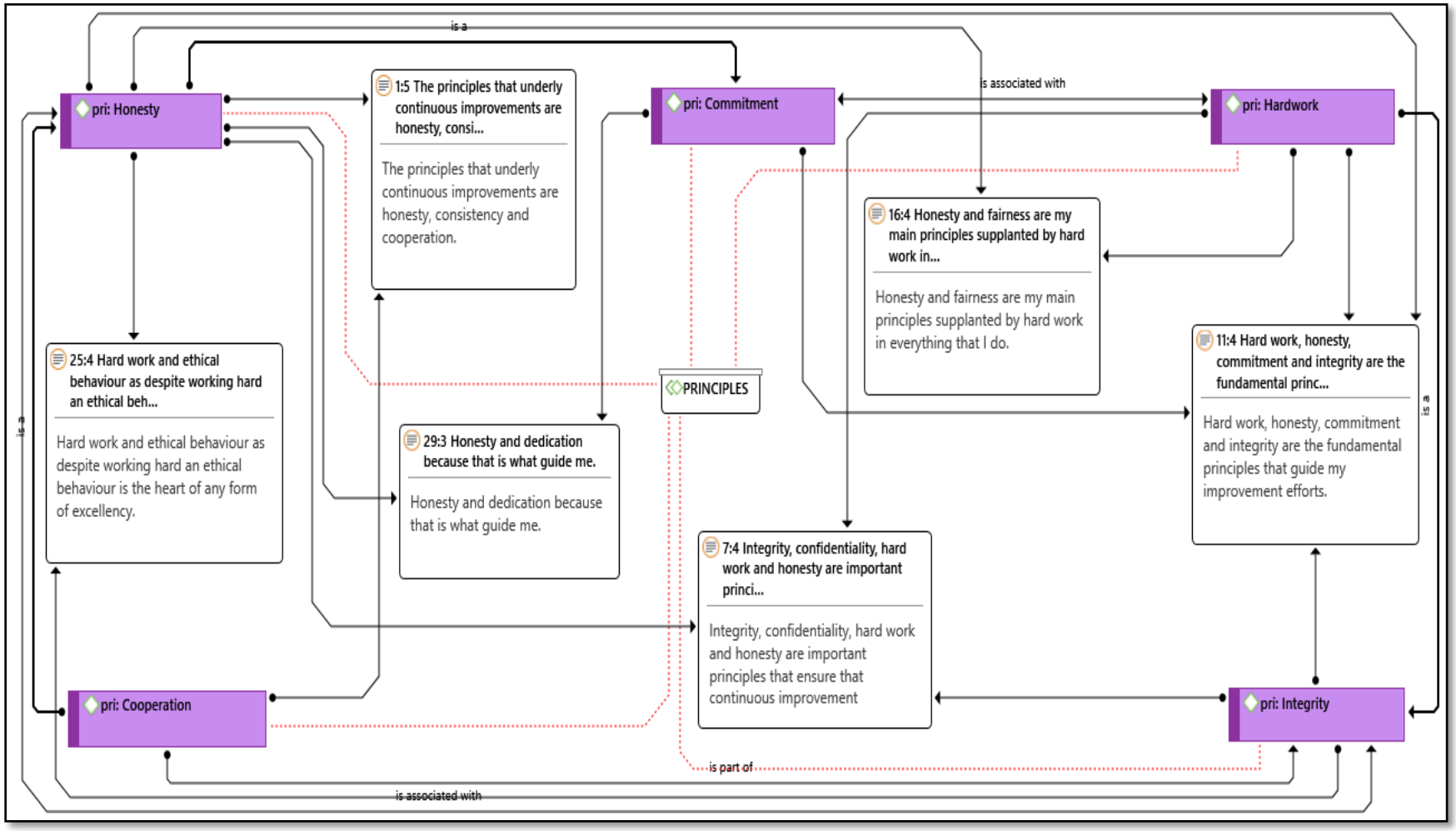

Figure 5.3: Principles underlying continuous improvement network
Source: Principles underlying continuous improvement using ATLAS ti.

5.3.2 Digital information management capability

The digital information management capability of the Higher Education Institutions was also investigated by the researcher. Various sub themes emanated from the data analysis pertaining to digital information capability of Higher Education Institutions and the discourse of these themes is propounded in the following sections.

5.3.2.1 Data and information availability/access

In this study the ways that are used to make the data and information available and how the suppliers/ partners and customers and employees access the data was investigated. The themes that emanated from the analysis of data are discussed in the section regarding data and information availability or access and these are emails, My Access, blackboard, dashboard, website uploads and help desk.

(a) Emails

Emails were noted to be one of the mechanisms that is used in the Higher Education Institutions towards ensuring that the required information is available or accessed by the supplier/partners and the customers and the employees. The respondents postulated that the information is disseminated through emails thus both students and staff emails. This entails that the use of emails towards the distribution or dissemination of important information that should be accessed by the students or staff or partners is the mechanism that is being used within the higher learning institution. thus contributing towards the digital information management capability within these institutions. This is evidenced by the sentiments shared by Respondents 11, 16, 20, 24, 26, 27 and 29 as shown in the following extracts:

Ref		Discursive analysis
R11	In ICT support we make sure that we disseminate the information through the website and student and staff emails.	Emails
R16	We use blackboard and emails and my access to ensure that the required data is accessed by students.	Emails
R20	Through my access and student emails and also dashboard so those are basically use towards accessing data.	Emails
R24	The data is made available through ITS emails and the website and that is also how the stakeholders access it.	Emails
R26	Through emails, ITS and also through the website.	Emails
R27	Through emails, my access but it depends also on who is requesting or whom the data is sent to.	Emails
R29	It is made accessible via emails and the website of the university.	Emails

(b) My Access

My Access is one of the dominating ITS integrator within the Higher Education Institutions in South Africa. This integrator is also being used to enhance the digital information management capability in Higher Education Institutions as it is being used towards ensuring that the diverse stakeholders, for instance the staff and students, have access

to information that is made available through such a mechanism. This is evidenced by the expressions of Respondents 5, 8, 14, 20 and 26 as shown in the following extracts:

Ref		Discursive analysis
R5	The required data is provided through my access, dashboard and the various interfaces we have as an institution.	My Access
R8	Through interfaces such as blackboard, my access, Moodle. There are different applications for different levels of data.	My Access
R14	Through my access.	My Access
R20	Through my access and student emails and also dashboard, so those are basically use towards accessing data.	My Access
R26	Through emails, my access but it depends also on who is requesting or whom the data is sent to.	My Access

The respondents in this study alluded that they basically use My Access towards making the information relating to the enrolment of the students and the modules linked to the academic staff available to these stakeholders. My Access is also used as the data and information accessing platform thus it is used to disseminate the data or information and ensuring that it is accessed through the same platform. Hence My Access is another mechanism being used in the Higher Education Institutions to ensure information availability and access.

(c) Blackboard

The results also showed that Blackboard is another mechanism or digital initiative that is being used in Higher Education Institutions to ensure that education information is made

available to the students by lecturers and to lectures by the IT department. This is evidenced by the expressions of Respondents 8 and 16 as indicated in the following extracts:

Ref		Discursive analysis
R8	Through interfaces such as blackboard, my access, Moodle. There are different applications for different levels of data.	Blackboard
R16	We use blackboard and emails and my access to ensure that the required data is accessed by students.	Blackboard

The respondents proffered that the required data is made available to students through Blackboard, and the same platform is also used for them to access it. Blackboard provides digital higher education learning solutions and ensures that these institutions are able to establish a platform to drive academic effectiveness, learner engagement and continuous improvement through education insights. This implies that Blackboard is one of the initiatives that is being used in Higher Education institutions towards enhancing the digital information management capability.

(d) Dashboard

Dashboard was established as another mechanism to be used in Higher Education Institutions towards ensuring the availability and access of information by both staff and students. This was evidenced by the expressions of Respondents 5 and 20 as indicated in the following excerpts:

Ref		Discursive analysis
R5	The required data is provided through my access, dashboard and the various interfaces we have as an institution.	Dashboard
R20	Through my access and student emails and also dashboard, so those are basically used towards accessing data.	Dashboard

Based on the expressions by the respondents, Dashboard was noted to be one of the interfaces that is being used to ensure that there is easier availability of data and information and access thereof.

Just like Blackboard, Dashboard provides digital higher education learning solution and ensures that these institutions are able to establish a platform to drive academic effectiveness, learner engagement and continuous improvement through education insights. This means that within the higher learning institutions, Dashboard is being used to ensure that information is made available easily and there is also easier access. This entails that Dashboard is another interface that is contributing towards enhancing the digital information management capability in Higher Education Institutions.

(e) Website uploads

A website is a a set of related web pages located under a single domain name that is typically produced by a single person or organization. The use of websites is another approach that is being used by the Higher Education Institutions to ensure the availability of information and its access thereof. Website uploads as an initiative contributing to digital information management capability in Higher Education Institutions is evidenced by the expressions shared by Respondents 3, 6, 7, 9, 11, 21, 25 and 29 as shown in the following quotations:

Ref		Discursive analysis
R3	The required information is available through the website thus we receive information from all departments and we ensure that it is uploaded and accessible to the relevant people.	Website uploads
R6	We always ensure that data and information is available by updating our websites with the latest information and suppliers and customers are contacted frequently.	Website uploads
R7	We provide the data and information through website or intranet. Website information can be publicly accessed but sensitive data is accessed through username and password.	Website uploads
R9	We make sure that on the website they get all information they need in time.	Website uploads
R11	In ICT support we make sure that we disseminate the information through the website and student and staff emails.	Website uploads
R21	What I do or what our department does is to ensure that relevant information uploaded at website and can be accessed by everyone.	Website uploads
R25	Through emails, ITS and also through the website.	Website uploads

R29	It is made accessible via emails and the website of the university.	Website uploads

With regards to website as a mechanism being used to manage data and information availability and access, the respondents in the sample of this study posited that the required information is made available through the website and that they receive information from all departments and ensure that it is uploaded and accessible to the relevant people. The respondents added that they always ensure that data and information is available by updating their websites with the latest information and suppliers and customers are contacted frequently. This means that the use of websites is another mechanism that is being used to ensure that data and information are made available through the website uploads and is made available through the website where all users have access to it. This means that websites are also contributing towards digital information management capability in Higher Education Institutions.

(f) Helpdesk

The help desk was also noted to be another platform through which information is made available and can be accessed by the staff and students. This is evidenced by the sentiments shared by Respondents 13, 22 and 23 as indicated in the following extracts:

Ref		Discursive analysis
R13	The required data is accessed through the help desk as I mostly find in IT support.	Helpdesk
R22	By being always there when the customers need our help, the customers may call me to fix their phones or network so we go to their office to get the job done.	Helpdesk

R23	By using the help desk as to log calls of nay staff or student who need help or any data.	Helpdesk

The respondents submitted that they use the help desk to log calls for the staff and students where they will be needing assistance that is information technology (IT) related and they may log their requests and get feedback or a response from the information technology department (IT). This implies that the Help desk is also being used as the platform where the required data and information can be accessed by various stakeholders. This implies that the Help desk is another mechanism being employed by the higher learning institutions towards enhancing the digital information management capability.

A summary of the mechanisms used to ensure data and information availability/access is shown in Figure 5.4 below.

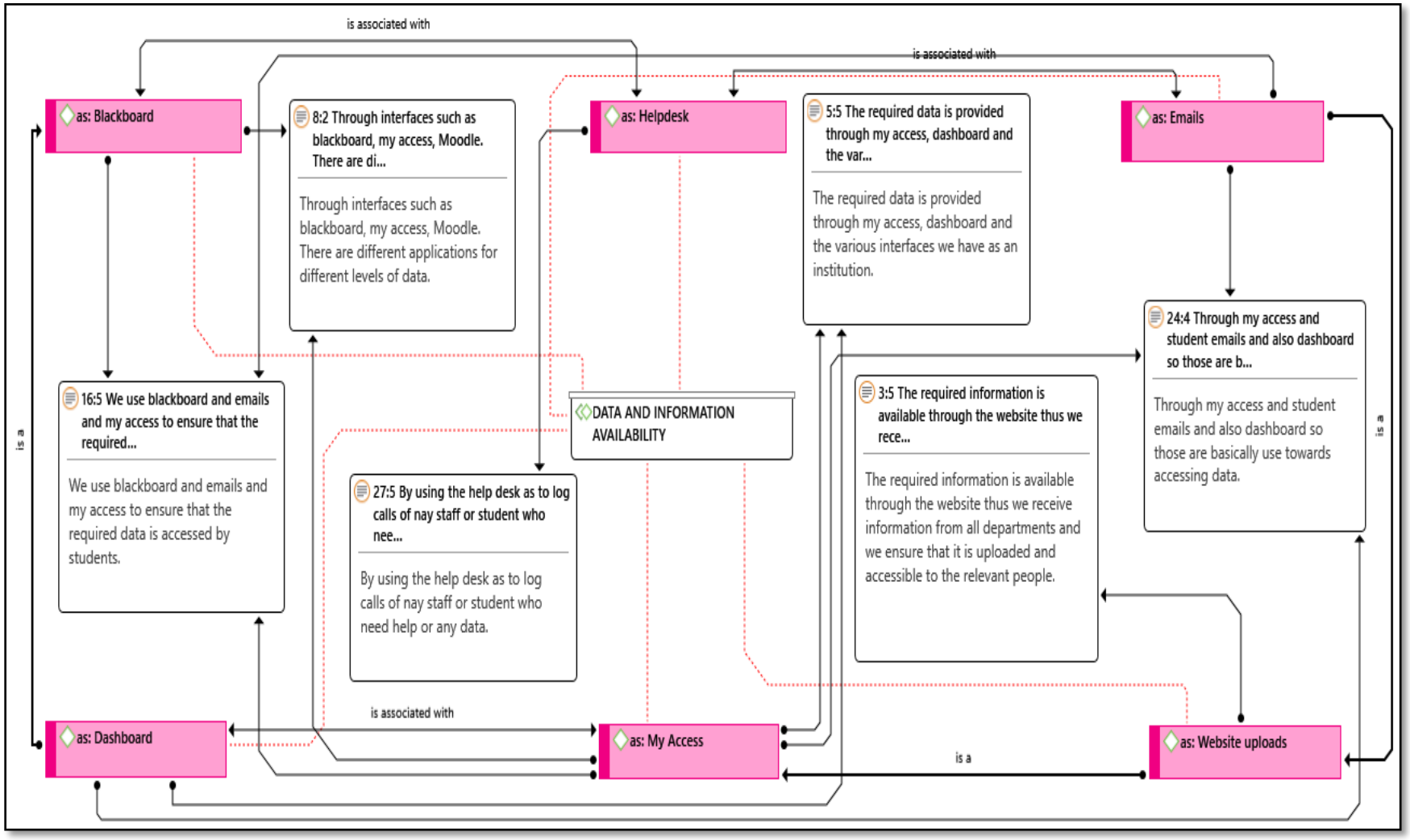

Figure 5.4: Data and information availability/access network
Source: Data and information availability/access using ATLAS ti.

5.3.2.2 Data and information integrity

In this study, the mechanisms being used by the institution of higher learning to ensure data and information integrity, reliability, accuracy, timeliness, security and confidentiality were also unraveled. The sub themes that emanated from the analysis of data are password and username encryption, limited data administrators, effective information distribution channels and code of ethics and these are discussed below.

(a) Password and username encryption

The results indicated that password and username encryption is one approach that is being adopted in the Higher Education Institutions towards ensuring data and information integrity, security and confidentiality. This was based on the expression of Respondents 5, 7, 8, 9, 14, 17, 21, 22, 24, 25, 26 and 28 as indicated in the following excerpts:

Ref		Discursive analysis
R5	Everyone has a username and password and there is no sharing of personal information of the users unless needed for institutional purposes and given to the superiors.	Password and username encryption
R7	Username and password are one way we ensure confidentiality and the policies available and an enabler towards ensuring confidentiality and integrity.	Password and username encryption
R8	Data can only be accessed by people who have user accounts, Student academic staff operational staff, have their own type of data they can access and at different levels depending on their position in the organisation.	Password and username encryption

R9	We make sure that each and everyone has their own username and password for security reasons and it changes for 8 weeks for security.	Password and username encryption
R14	By pushing students and staff not to share their secret pin.	Password and username encryption
R17	We always put software security in place to maintain the confidentiality and to maintain information integrity.	Password and username encryption
R21	Every staff and student or guest is provided with their own user name and password that is solely known to the user.	Password and username encryption
R22	For confidentiality, I always make sure that I memorize the password and the IP address by head and doing my thing in time so that I don't delay customers.	Password and username encryption
R24	Passwords or encryptions are the most crucial mechanism that we use to ensure that confidentiality and security is maintained.	Password and username encryption
R25	By history or system checks of every individual who logs in our system and ensuring that every individual have their own credentials.	Password and username encryption
R26	I make sure that my password is only known by me and I do not share it with anyone even my work colleagues.	Password and username encryption

R28	Providing everyone with password and usernames and providing awareness of the importance of not sharing passwords.	Password and username encryption

Based on the above evidence, the respondents extended that providing every end-user with unique username and password is aligning with the available policies and is an enabler towards ensuring confidentiality and integrity of data and information. The respondents added that passwords or encryptions is the most crucial mechanism that is being used to ensure that confidentiality and security is maintained. Towards ensuring security and confidentiality, the respondents also alluded that they ensure that each and everyone has their own username and password for security reasons and it changes within 8 weeks for security purposes.

It was also established towards ensuring the integrity, security and confidentiality of the data and information. The respondents also submitted that data can only be accessed by people who have user accounts and that students, academic staff and operational staff have their own type of data which they can access and at different levels depending on their positions in the organisation.

This entails that the use of username and password encryptions supplemented with established procedures of the distribution and access of information or data depending on the position level provides the premise for ensuring the integrity, confidentiality and security of the information and data. This implies that username and password encryptions are playing a crucial role within the digital information management capability.

(b) Limited data administrators

Limited data administrators were established to be another mechanism that is being used in the Higher Education Institutions to ensure that data and information integrity, confidentiality and security is upheld. This is based on the submissions of Respondents 1, 3, 11, 13, 24 and 27 as indicated in the following excerpts:

Ref		Discursive analysis	
R1	We check on each other's work and we make sure that everything is we share with our staff and students remain as something between us.	Limited administrators	data
R3	We have restriction in terms of who accesses the data and, in our department, its only me and the other two individuals. We ensure that the high level of reliability and integrity are enabled before information is published.	Limited administrators	data
R11	We have confidentiality policies and there is no-one who accesses data that they do not have clearance for.	Limited administrators	data
R13	By ensuring that data shared and the problems experienced by student and staff remain between the administrator, technician and the one being helped.	Limited administrators	data
R24	The information at my disposal is only known by me and the student and the head of the department and no one else.	Limited administrators	data
R27	We make sure that the dashboard is accessed only by the IT staff or the technicians only.	Limited administrators	data

To ensure data security, the respondents alluded that they have established restrictions in terms of who accesses the data in departments.

The respondents also indicated that they ensure that data shared and the problems experienced by student and staff remain between the administrator, technician and the

one being helped thus ensuring high levels of confidentiality. This also is supplemented by the respondent's assertions that integrity and reliability check of information are established before the information is published to anyone. This means that limited data administrators provides effective control measures to ensure that data and information integrity, confidentiality, security and reliability is ensured within the Higher Education Institutions.

(c) Effective information distribution channels

Effective information distribution channels were also established as another mechanism being used in the Higher Education Institutions to ensure that the data and information integrity, reliability, security, confidentiality and integrity are ensured. Effective information distribution channels such as a mechanism within digital information management capability in the Higher Education Institutions is evidenced by the sentiments shared by Respondents 3, 4, 16 and 20 as indicated in the following quotations:

Ref		Discursive analysis
R3	We have restriction in terms of who accesses the data and in our department, its only me and the other two individuals.	Effective information distribution channels
R4	By ensuring that information and data is only received by right stakeholders.	Effective information distribution channels
R16	I do not play a role much there but the only way is ensuring that the data is only accessed by the relevant student. There is no student who access each other's information such as marks.	Effective information distribution channels
R20	The information at my disposal is only known by me and the student and the head of the department and no one else.	Effective information distribution channels

The respondents alluded that there are restrictions pertaining who accesses the data in departments and its distribution thereof. The respondents further posited that the information at their disposal is known and is distributed among the relevant people who ought to access it. This implies that effectiveness of the distribution of the information and data within the Higher Education Institutions provides the platform for ensuring that data and information confidentiality, integrity and security is ensured and ultimately enhanced digital information management capability within these institutions.

(d) Code of ethics

Code of ethics was noted to be another mechanism being used in the Higher Education Institutions to ensure that information integrity, reliability, security and confidentiality is ensured. The respondents extended that all the issues are grounded on ethics and they ensure that everyone abides by the code of ethics towards ensuring that data and information integrity, reliability, accuracy and security are achieved. The respondents established that towards ensuring an environment where the integrity and reliability of data is ensured, they provide the premise where they enhance awareness and familiarly with the work ethics towards ensuring higher levels of professionalism. This ultimately ensures that data and information integrity, reliability, accuracy and security are attained. This is evidenced by the views shared by Respondents 2 and 6 as indicated in the following extracts:

Ref		Discursive analysis
R2	All the issues are grounded on ethics and we ensure that we abide by the code of ethics and obviously, data and information integrity, reliability, accuracy and security are achieved.	Code of ethics
R6	We ensure all of these by making sure that everyone is familiar with the work ethics and professionalism.	Code of ethics

Figure 5.5 provides a summary of the mechanisms used in Higher Education Institutions to ensure data and information integrity, reliability, security and confidentiality.

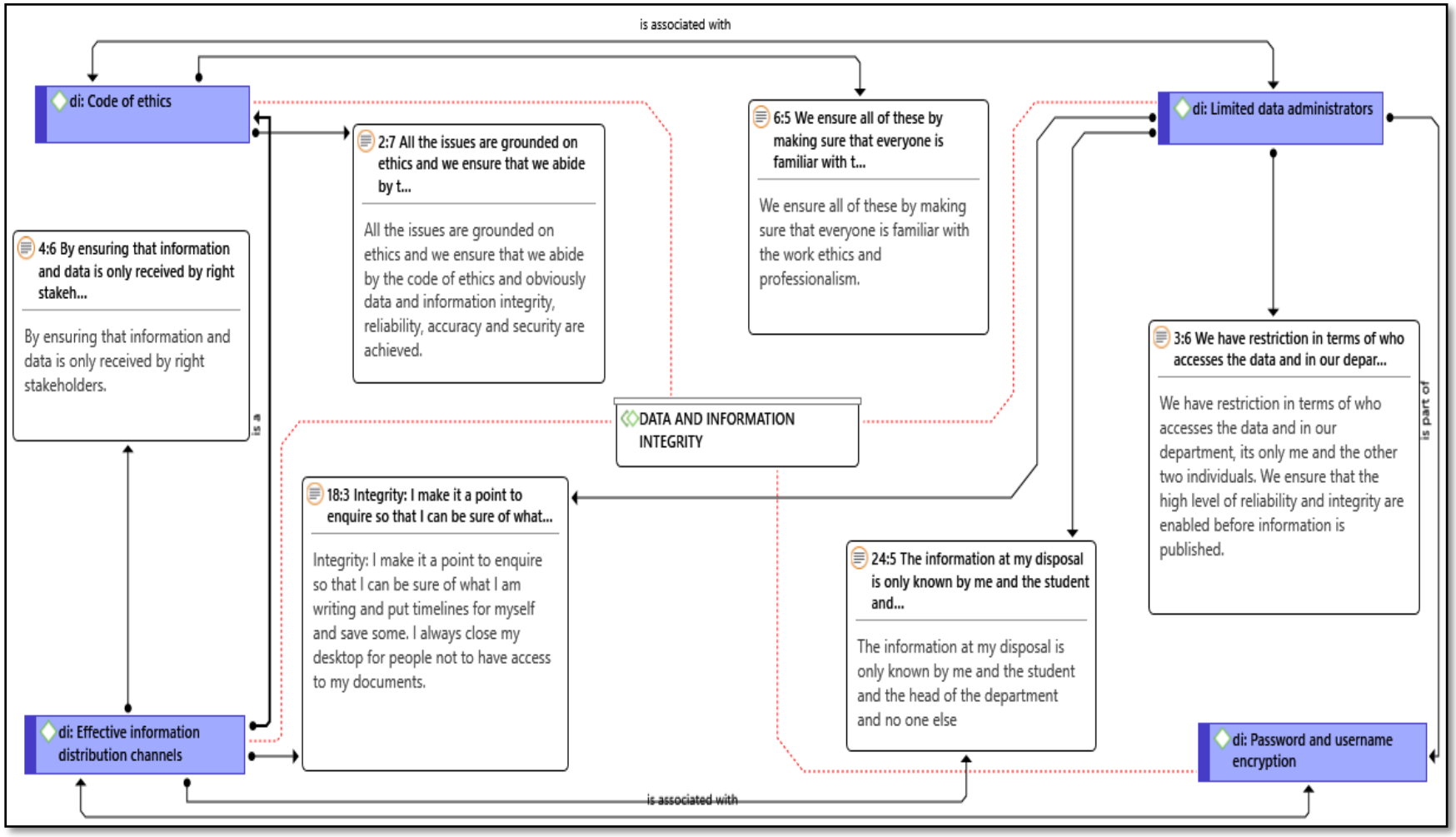

Figure 5.5: Data and information integrity network
Source: Data and information integrity using ATLAS ti

5.3.2.3 Mechanisms to identify business needs and directions to follow

The mechanisms that enable the Higher Education Institutions to identify the business needs and directions to follow were unraveled in this study. The sub themes that emanated from the analysis of data are surveys, help desks, feedback and requisitions and these are explored in this section.

(a) Surveys

The results indicated that survey is one of the current mechanism that is being used in the Higher Education Institutions to identify the business needs and directions to follow. The sentiments with regards to surveys were shared by Respondents 2, 3, 7, 17, 18, 21, 27, 28 and 29 as indicated in the following excerpts:

Ref		Discursive analysis
R2	We use help desks queries and surveys and they help us determine the needs based on the feedback we get.	Surveys
R3	We use surveys that we ask both staff and students to provide us with the meaningful feedback that we incorporate in our decision making.	Surveys
R7	Mainly we use surveys and feedback from the customers we are serving or assisting.	Surveys
R17	Survey and questionnaire, the department surveys ensure services for all hardware components.	Surveys

R18	Enquiring from customers and other stakeholders.	Surveys
R21	We conduct surveys and the suggestion boxes together with our query schedules helps in the determination of needs and the necessary directions.	Surveys
R27	Survey and requisitions are what determines the business needs.	Surveys
R28	We mostly use surveys among all our university staff and students.	Surveys
R29	Conducting research through our research and innovation department.	Surveys

Indeed, surveys were established to be one of the mechanisms being used to identify the business needs and directions to follow. The respondents in this study elucidated that the surveys help them to determine the needs based on the feedback they obtain from the respondents. The respondents added that they use surveys to provide a platform for soliciting information from both staff and students to provide them with the meaningful feedback that can be incorporated in decision making. This implies a survey as a research method used for collecting data from a predefined group of respondents to gain information and insights into various topics of interest which provides the premise for the institutions to obtain insights from diverse stakeholders and identify the needs of these stakeholders and ultimately make informed decisions on the business needs and directions to follow.

(b) Help desks

The respondents proffered that the help desks enable the Higher Education Institutions to identify the business needs and the directions to follow. With regards to help desks, Respondents 2, 5, 13, 18, 22, 23, and 24 indicated the following:

Ref		Discursive analysis
R2	We use help desks queries and surveys and they help us determine the needs based on the feedback we get.	Help desks
R5	In my opinion I can say it's the query dashboards and helpdesks where people send their problems for us as IT to address them.	Help desks
R13	The help desk is the one that enables us to identify business needs as calls are directed from there to us.	Help desks
R18	Enquiring from customers and other stakeholders.	Help desks
R22	Customers send emails to the helpdesk regarding what they need help with and to log on call or on the website.	Help desks
R23	Helpdesks, emails; If you have any problems related to IT, you can login to help desk using your email or user name and identify or request your issue.	Help desks

R24	I can say through the help desks, call logs and the survey we are able to gain great input concerning what our customers need.	Help desks

Considering the above evidence, it is important to note that help desks are being used as a mechanism towards the identification of the business needs of the Higher Education Institutions and the directions to follow thereof. The respondents alluded that the use of helpdesks queries enable them to determine the needs of the customers based on the problem that the customer would have logged on. The respondents further established that the help desks enable them to obtain comprehensive input pertaining to the business needs of customers as customers can log on their problems through calls or through the website interface and this provides the premise for also establishing the directions to follow.

(c) Feedback

The results in this study also revealed that feedback is another mechanism that is used in the identification of the business needs and directions to follow. The respondents submitted that feedback that they get from the people they are serving forms an integral part in determining their needs and satisfying customers and simply in solving their problems or addressing their needs. This implies that feedback that is obtained through surveys and the help desk forms an integral part in the identification of the business needs in the Higher Education Institutions which also provides the basis for the directions that ought to be followed. Hence feedback from the customers or the stakeholders being served provides the premise for the identification of the business needs and the directions to follow. This is evidenced by the sentiments shared by Respondents 1, 7, 24 and 25 as indicated in the following extracts:

Ref		Discursive analysis
R1	The current mechanisms are feedback from those we assist.	Feed back
R7	Mainly we use surveys and feedback from the customers we are serving or assisting.	Feed back
R24	I think the response or feedback that we get from the people we are serving forms an integral part of in satisfying customers and simply b solving their problems.	Feed back
R25	By the feedback we get from the people that we serve here.	Feed back

(d) Requisitions

With regards to the current mechanisms that enable Higher Education Institutions to identify the business needs and the directions to follow, the results indicated that requisitions are another mechanism that is being used. This is evidenced by the expressions of Respondents 16 and 27 as indicated in the following quotations:

Ref		Discursive analysis
R16	Through consultation with students and requisition through the head of department, the needs can be identified.	Requisitions
R27	Survey and requisitions are what determines the business needs.	Requisitions

Considering the above views of the respondents, it is imperative to note that requisition in procurement, refers to a request for goods or services made by an employee to the

person or department in an institution that is responsible for purchasing. These requisitions indicate what the employee requires from the organization and ultimately provides the premise through which the business needs can be established as these requisitions will be an indication of what is required by various departments across the institution and this enables sound decisions to be made regarding the directions that ought to be followed. Figure 5.6 provides a summary of the current mechanisms that enable Higher Education Institutions to identify business needs and directions to follow.

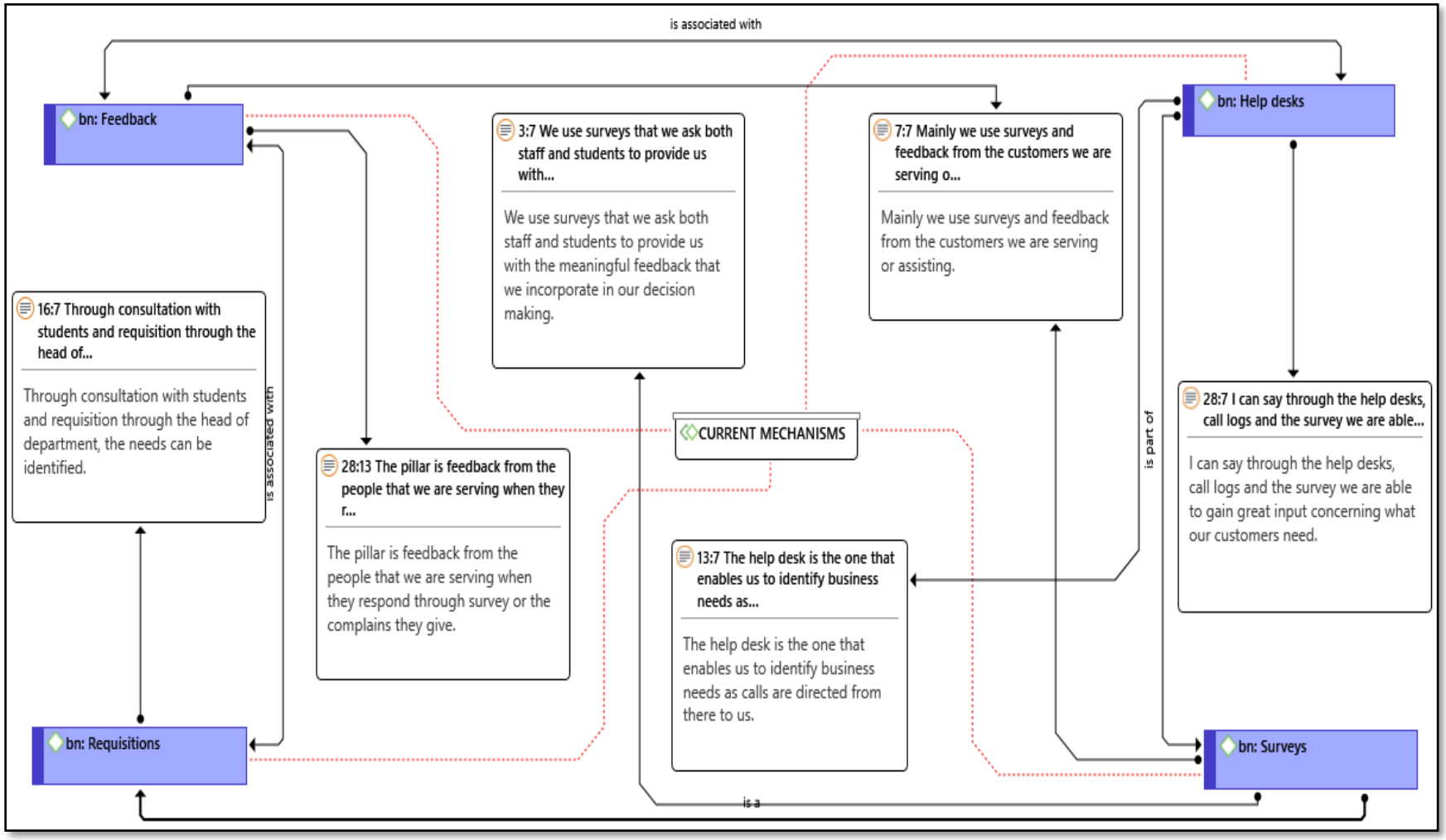

Figure 5.6: Mechanisms to identify business needs and directions to follow network
Source: Mechanisms to identify business needs and directions to follow using ATLAS ti

5.3.2.1 Hardware and software reliability and user friendliness

The manner in which the Higher Education Institutions ensure that the hardware and software are reliable and user friendly was investigated and the themes that emerged form data analysis are updating consistency, support provision, need oriented procurement, and established procedures and standards, and these are discoursed in this section.

(a) Updating consistency

With regards to the way in which the higher learning institutions ensure that the software and hardware systems are user friendly and reliable, updating consistency was noted to be one of the mechanisms being used. This was evidenced by the expressions of Respondents 1, 2, 3, 11, 17 and 21 and these are shown in the following extracts:

Ref		Discursive analysis
R1	We make sure that our software is updated to meet the staff and students' needs.	Updating consistency
R2	Software and hardware are constantly updated at all times to ensure that the users thus staff and students are happy and able to use them.	Updating consistency
R3	Being up to date with the changing technological trends as we do not operate in a vacuum but in a volatile technological environment.	Updating consistency
R11	By ensuring that hardware is up to date and the software is constantly updated to meet the user needs.	Updating consistency

R17	We constantly have system upgrades for both software and hardware systems to keep up with the needs of the university needs.	Updating consistency
R21	We ensure that the systems are up to date. We are in the 5th industrial revolution and things are ever changing.	Updating consistency
R24	I can say through the help desks, call logs and the survey we are able to gain great input concerning what our customers need.	Updating consistency

Based on the above evidence, it is pertinent to note that the respondents submitted that software and hardware are constantly updated at all times to ensure that the users, thus staff and students are satisfied and are able to easily use them and also to ensure that they keep up with the needs of the institution. The respondents also added that they ensure that they are constantly up to date with the changing technological trends in a bid to align with the volatility of the technological environment. This implies that constantly updating the software and hardware supplemented by constantly aligning with the technological changes in the environment provides the premise for ensuring that the software and hardware are reliable towards meeting the needs of the customers or employees. This entails that continuous updating the software and hardware is integral towards their reliability and user friendliness.

(b) Support provision

The results showed that support provision is another mechanism that is used in the Higher Education Institutions towards ensuring that the hardware and software are reliable and user friendly. Support provision is evidenced by the expressions of Respondents 13, 16, 22, 24 and 25 as indicated in the following quotations:

Ref		Discursive analysis
R13	By providing support to staff and students in the use of both software and hardware.	Support provision
R16	This is done mainly by ICT support but what I do is to ensure that I provide student with information that they can understand.	Support provision
R22	Hardware, I refer them to access point, switch, internet cable, software controls we log into our system control and make sure that our system is working and rectifying the errors.	Support provision
R24	We provide support regarding the use of the hardware and software, we do not just provide these and ignore the challenges that the user may face when using them.	Support provision
R25	We do not distribute anything before we test them then when the user is available, so we provide support and confirm the functionality of the hardware or software.	Support provision
R26	Providing on and after support on the use of the software and hardware. Also, we buy what is in line with the changes in the market.	Support provision

With regards to support provision, the respondents posited that by providing support to staff and students in the use of both software and hardware, their reliability and user friendliness is attained. The respondents further postulated that they do not just provide hardware and software to the students or staff, but rather they have also established a

mechanism where they provide support on the use of the hardware and software. The respondents also extended that they provide on and after support on the use of hardware and software, and ensure that these are procured in line with the latest technological demands. This entails that the on and after support provision supplemented by procuring hardware and software aligning with the technological changes provides the premise for ensuring that hardware and software are user friendly.

(c) Need oriented procurement

Need oriented procurement was also established as another mechanism that is being used within the Higher Education Institutions towards ensuring that the hardware and software are reliable and user friendly. This was evidenced by the sentiments of Respondents 5, 8, 20, 26 and 17 as indicated in the following excerpts:

Ref		Discursive analysis
R5	Hardware is bought that is compatible to the user needs and software are purchased as per every department request. We make sure that both hardware and software are compatible to those needs.	Need oriented procurement
R8	Identify whether software and hardware meet current usability and security guidelines.	Need oriented procurement
R20	That is mainly done by IT but our role is to ensure that the head of department request software and computers as per our specification.	Need oriented procurement
R26	Providing on and after support on the use of the software and hardware. Also, we buy what is in line with the changes in the market.	Need oriented procurement

R27	By requesting the procurement to provide up to date systems and maintaining the available systems.	Need procurement	oriented
R28	Before we purchase anything thus hardware and software we make sure that it is form a reliable source and licensed.	Need procurement	oriented

The results in this study have revealed that need oriented procurement provides the basis for hardware and software user friendliness and reliability. This is evidenced by the respondents who proffered that hardware that is bought is compatible to the user needs and software are purchased as per every department request. The respondents submitted that they ensure that both hardware and software are compatible to those needs of the customers or staff. The results also showed that before software and hardware purchases are done , supplier checks or assessments are done to ensure that the suppliers are reliable and the software and hardware are licensed. It was also revealed that procurement of hardware and software is in line with the changes in the market. This means that need oriented procurement supplemented by technological change alignment provides the basis for ensuring that the hardware and software are user friendly as they will be in line with the specifications of the customers or staff.

(d) Established procedures and standards

The results have shown that established procedures and standards have been noted to be another mechanism that is used to ensure that the hardware and software are user friendly and reliable. The respondents postulated that the software and hardware are installed or set up based on the set procedures and rules and standards and they do not operate based own individual solutions. The established procedures and standards also denote that the hardware and software are procured aligning with set standards and procedures which entail ensuring that they are from a licensed supplier. The other established procedures and standards is not inserting USB's from the diverse individuals except that of the user which reduces the risk of the hardware or software being corrupted.

This implies that established procedures and standards provide the basis for ensuring hardware and software reliability and user friendliness.

Ref		Discursive analysis
R6	For our software to be user friendly we make sure that they are straightforward providing quick access to common features. And for hardware we ensure and make sure that they are safe.	Established procedures and standards
R9	In ICT we make sure that the hardware and software are available on the website for accessibility.	Established procedures and standards
R14	By only allowing licensed software and buying hardware from reliable companies.	Established procedures and standards
R18	I always contact It department if I experience a problem. I do not accept to use other people's USB instead I request them to send the document through email for proof reading or printing.	Established procedures and standards
R28	Before we purchase anything thus hardware and software we make sure that it is form a reliable source and licensed.	Established procedures and standards

Figure 5.7 provides a summary of the mechanisms that are used to ensure that software and hardware are reliable and user friendly.

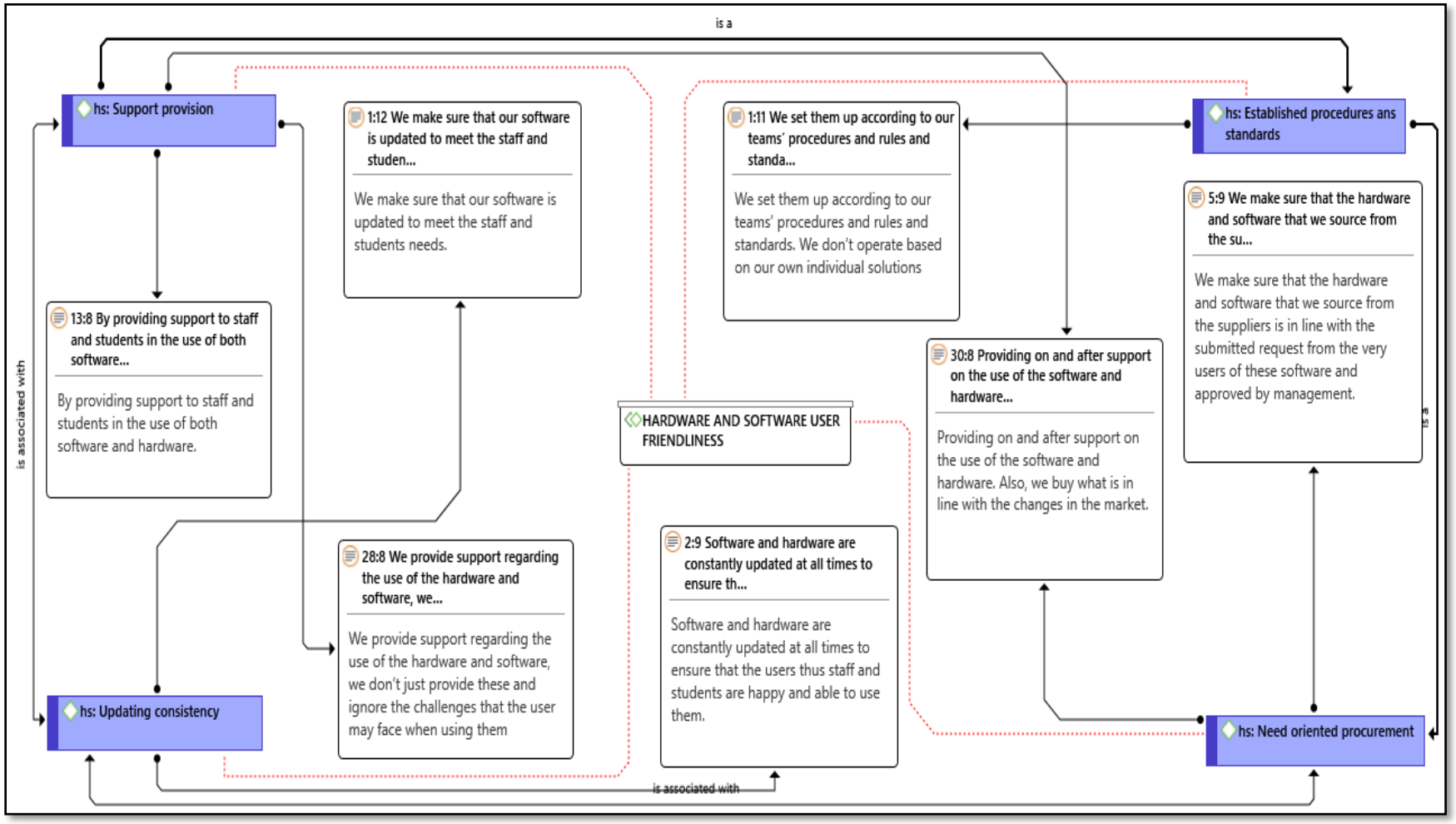

Figure 5.7: Hardware and software reliability and user friendliness network
Source: Hardware and software reliability and user friendliness using ATLAS ti

5.3.2.2 Hardware and software meeting current business needs and directions

The mechanisms that the Higher Education Institutions adopt towards ensuring that the hardware and software systems meet the current business needs and direction was investigated and the themes that emanated from data analysis include continuous upgrading and constant evaluation. These are discussed in the following sections.

(a) 5.3.2.5.1 Continuous upgrading

Continuous upgrading was noted as one of the mechanisms that are being used to ensure that the hardware and software meet the current business needs and directions. This was evidenced by the sentiments shared by Respondents 2, 3, 6, 7 and 11 as shown in the following extracts:

Ref		Discursive analysis
R2	As I indicated earlier, continuous upgrading systems and updating them ensure addressing current needs.	Continuous upgrading
R6	We keep our software and hardware updated every time by improving or upgrading them when we have to.	Continuous upgrading
R7	Software is continuously updated and we make sure that we request procurement to purchase current computers and hardware.	Continuous upgrading
R11	By ensuring that they are constantly up to date and are in line with the problems they have to solve.	Continuous upgrading

R13	By ensuring that they are up to date in line with the current needs and problems.	Continuous upgrading
R14	By keeping up to date with the latest software and hardware and also attending training.	Continuous upgrading
R16	Again, this is the issue of ICT to ensure that these things are continuously up to date.	Continuous upgrading
R18	IT department always updates the system.	Continuous upgrading
R20	By ensuring that they are regularly updated and upgraded by the IT.	Continuous upgrading
R21	We ensure that the systems are up to date. We are in the 5th industrial revolution and things are ever changing.	Continuous upgrading
R22	By always upgrading and updating them all the time or getting the latest version that is easy and reliable to our customers.	Continuous upgrading
R24	Keeping check with the changing trends for updating and upgrading the systems.	Continuous upgrading
R25	Through continued upgrading to latest developments.	Continuous upgrading
R26	We make sure that we regularly update them based on the dates that are set for updates.	Continuous upgrading
R28	Continued updates and upgrading systems when necessary.	Continuous upgrading

The respondents submitted that continuous upgrading systems and updating them ensures addressing current needs. The respondents extended that software is continuously updated and they make sure that they request procurement to purchase current computers and hardware. This implies that the Higher Education Institutions are continuously upgrading their systems and hardware to ensure that it meets the current needs of the institutional customer, employees or other stakeholders. This also provides the premise for the directions to follow. This implies that continuous upgrading is one of the mechanisms that is being used by the Higher Education Institutions towards ensuring that the hardware and systems meet current business needs and directions.

(b) Constant evaluation

The results indicated that constant evaluation is another mechanism that is being used towards ensuring that the hardware and software systems are continuously meeting the current business needs and directions to follow. Evaluation is imperative towards ensuring that deviations are identified and corrective measures are taken.

This implies that through constant evaluation, software and hardware systems can be maintained to ensure that hardware and software meet the current business needs and directions. Constant evaluation as a mechanism towards ensuring that hardware and software systems continuously meet the current business needs and directions is indicated by the expressions submitted by Respondents 4, 23 and 24 in the following extracts:

Ref		Discursive analysis
R4	We constantly evaluate them.	Constant evaluation
R23	By managing and maintain 24/7 in the access control so that if there is any device that goes down you can speedily replace with a new one.	Constant evaluation

R24	Keeping check with the changing trends for updating and upgrading the systems.	Constant evaluation

Figure 5.8 provides a summary of the ways that are used in Higher Education Institutions to keep the software and hardware systems to meet current business needs and directions.

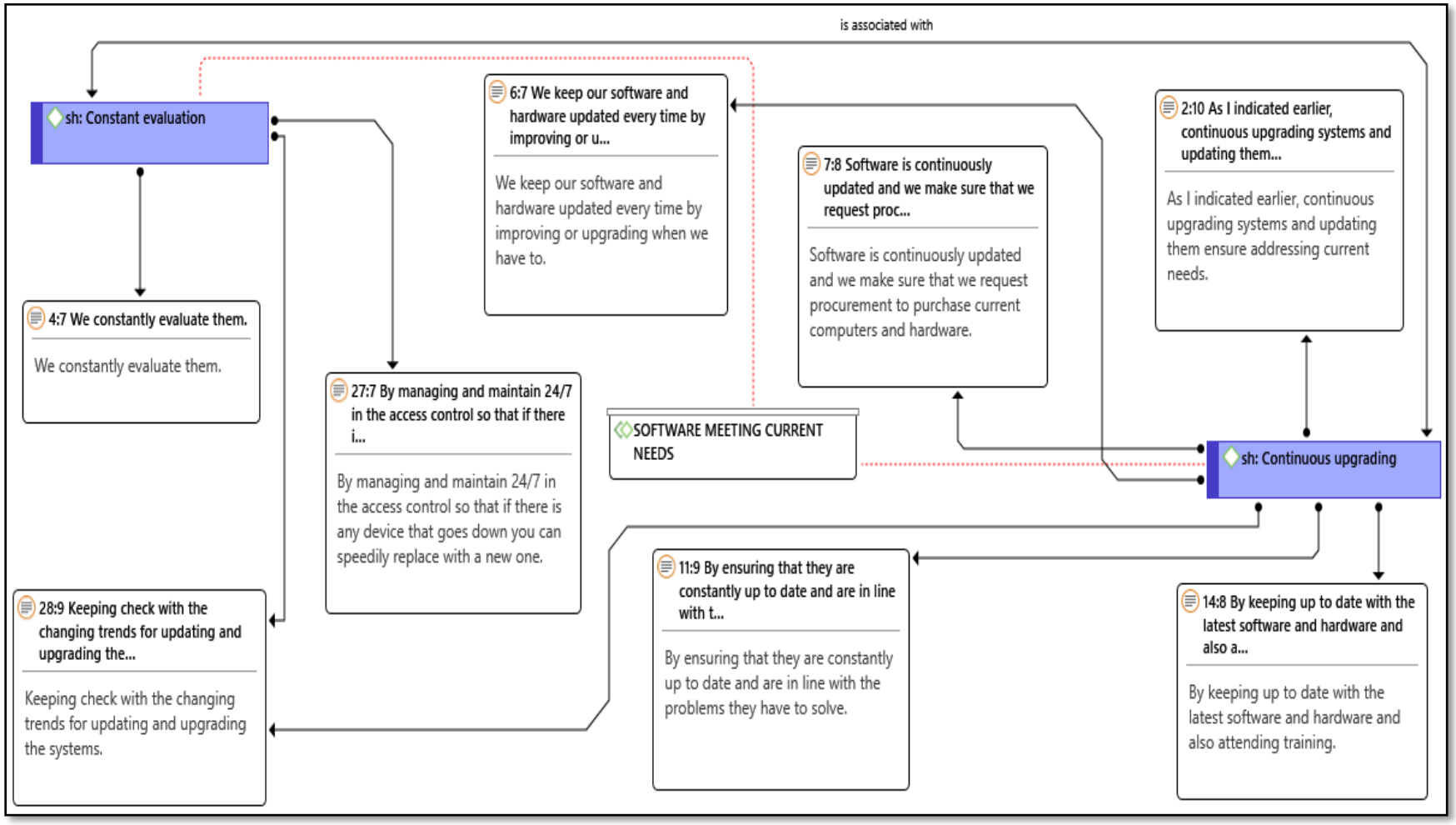

Figure 5.8: Hardware and software meeting current business needs and directions network
Source: Hardware and software meeting current business needs and directions using ATLAS ti

5.3.2.3 Digital information management capability implementation challenges

This study also investigated that the digital information management capability implementation challenges. The sub themes that emerged from data analysis are inadequate infrastructure, lack of knowledge, manpower shortage, network problems and technological change resistance and these are discussed in this section.

(a) Inadequate infrastructure

Lack of infrastructure was established as one of the challenges pertaining to digital information management capability. The respondents proffered that the lack of the appropriate system that can accommodate traffic especially during application and release of results is detrimental to effectiveness in the implementation of the digital information management capability. This implies that the lack of the appropriate infrastructure that supports the implementation of the digital information management capability is detrimental to effectiveness in the implementation of such initiatives and consequently, negatively affects the attainment of operational excellence. Inadequate infrastructure as a challenge was evidenced from the sentiments shared by Respondents 3, 16, 20 and 23 as shown in the following extracts:

Ref		Discursive analysis
R3	Lack of the appropriate system that can accommodate traffic especially during application and release of results. The website will end up being down at times.	Inadequate infrastructure
R16	Us academics it takes a very long time to be given the necessary equipment such as laptops and this affects our efforts.	Inadequate infrastructure

R20	Network problems and the lack of the proper infrastructure are prevalent challenges nowadays.	Inadequate infrastructure
R23	Shortage of equipment that can detect any failure of connectivity in the connection of fiber cables.	Inadequate infrastructure

(b) Lack of knowledge

The results showed that lack of knowledge is another challenge that is impeding the digital information management capability implementation. This is evidenced by the sentiments submitted by Respondents 4, 14, 17 and 28 as indicated in the following excerpts:

Ref		Discursive analysis
R4	We work with many people and some wont easily grasp and understand digital information management.	Lack of knowledge
R14	Majority of university staff members are not open to new technologies and they don't attend trainings provided.	Lack of knowledge
R17	Dealing with many people who don't understand digital information language.	Lack of knowledge
R28	Keeping up with the changes in technology and digitization is always a challenge.	Lack of knowledge

Based on the evidence above, it is imperative to note that lack of knowledge entails lack of understanding of the digital information initiatives and is detrimental to the execution of tasks related to the implementation thereof. This implies that lack of knowledge entails lack of capacity among the staff members which also results in resistance towards the

adoption of digital information management initiatives. This implies that lack of knowledge is detrimental as a challenge in the digital data information management capability within the Higher Education Institutions.

(c) Manpower shortage

The results also revealed that manpower shortage is another challenge that is threatening digital information management capability implementation in the higher education institutions. With regards to manpower shortage, Respondents 6, 7, 13, 23, 25 and 26 shared the sentiments indicated in the following quotations:

Ref		Discursive analysis
R6	We work and help a lot of people thus thousands and addressing their needs with less manpower seem to be a critical challenge as we receive many calls but less people to attend them.	Manpower shortage
R7	We are understaffed and network is not always available whilst we need it at all times. There is no cooperation in all departments which makes the tasks difficult.	Manpower shortage
R13	Manpower shortages which leads to one person having a work overload and network problems are another challenge we experience.	Manpower shortage
R23	The strategy of operational excellence need more employees to save time and avoid consuming time when providing the service.	Manpower shortage
R25	Here we are only five people who provide this service and at times the work will be too much.	Manpower shortage

R26	Resources are always a challenge because implementation requires resource availability.	Manpower shortage

Considering the above evidence, it is imperative to note that the workload that the respondents have is outweighed by the number of the employees that are available. This implies that the mismatch between the available human resources and the tasks that need to be executed is detrimental to the implementation of digital information management. Hence manpower shortage was found to be one of the challenges of digital information management capability implementation.

(d) Network problems

Network problems were found to be another challenge within the digital information management capability implementation. The respondents postulated that their role in the institution within the digital implementation perspective is dependent on network connectivity and its absence results in ineffective operations.

It is pertinent to note that connectivity is imperative towards effective digital information management capability implementation. This implies that network challenges result in the digital information management implementation goals not being realized. Network problems as a challenge was evidenced by the sentiments shared by Respondents 7, 9, 18, 20, 21 and 27 as indicated in the following quotations:

Ref		Discursive analysis
R7	We are understaffed and network is not always available whilst we need it at all times. There is no cooperation in all departments which makes the tasks difficult.	Network problems
R9	Network connectivity sometimes is a challenge and limits people for attending meetings and classes.	Network problems

R18	"The system (internet) is down sometimes which makes it difficult to work on some packages e.g. ITS integrator emails and my access.	Network problems
R20	Network problems and the lack of the proper infrastructure are prevalent challenges nowadays.	Network problems
R21	Our role in the in the institution is highly dependent on network connectivity and without it we can't operate effectively. We have been experiencing poor network connectivity which threatens our efforts.	Network problems
R27	Network is an issue, and it may make the staff to log in a query.	Network problems

(e) Technological change resistance

Technological change resistance was also established as another challenge that is detrimental to digital information management capability implementation. Respondents 14, 17, 24 and 29's assertions pertaining to technological change resistance are indicated in the following quotations:

Ref		Discursive analysis
R14	Majority of university staff members are not open to new technologies and they don't attend trainings provided.	Network problems
R17	Dealing with many people who don't understand digital information language.	Network problems

R24	Lack of prioritization and resistance of IT efforts by customers as people just have that belief that every IT efforts are complicated.	Network problems
R29	Change refusal as people fear new technological developments as they fear losing jobs.	Network problems

Based on the above evidence, it is should be noted that there is a reciprocity between technology and digital information management implementation. The resistance to adopt new technologies and the fear of change or refusal to align with the technological changes is a factor that negatively affects the digital information management implementation efforts. The results have indicated that some of the personnel within the Higher Education Institutions do not understand the digital language and are not willing to align with digitization efforts and this is detrimental to the overall digital information management capability implementation.

Figure 5.9 provides a summary of the digital information capability implementation challenges that are faced in the Higher Education Institutions.

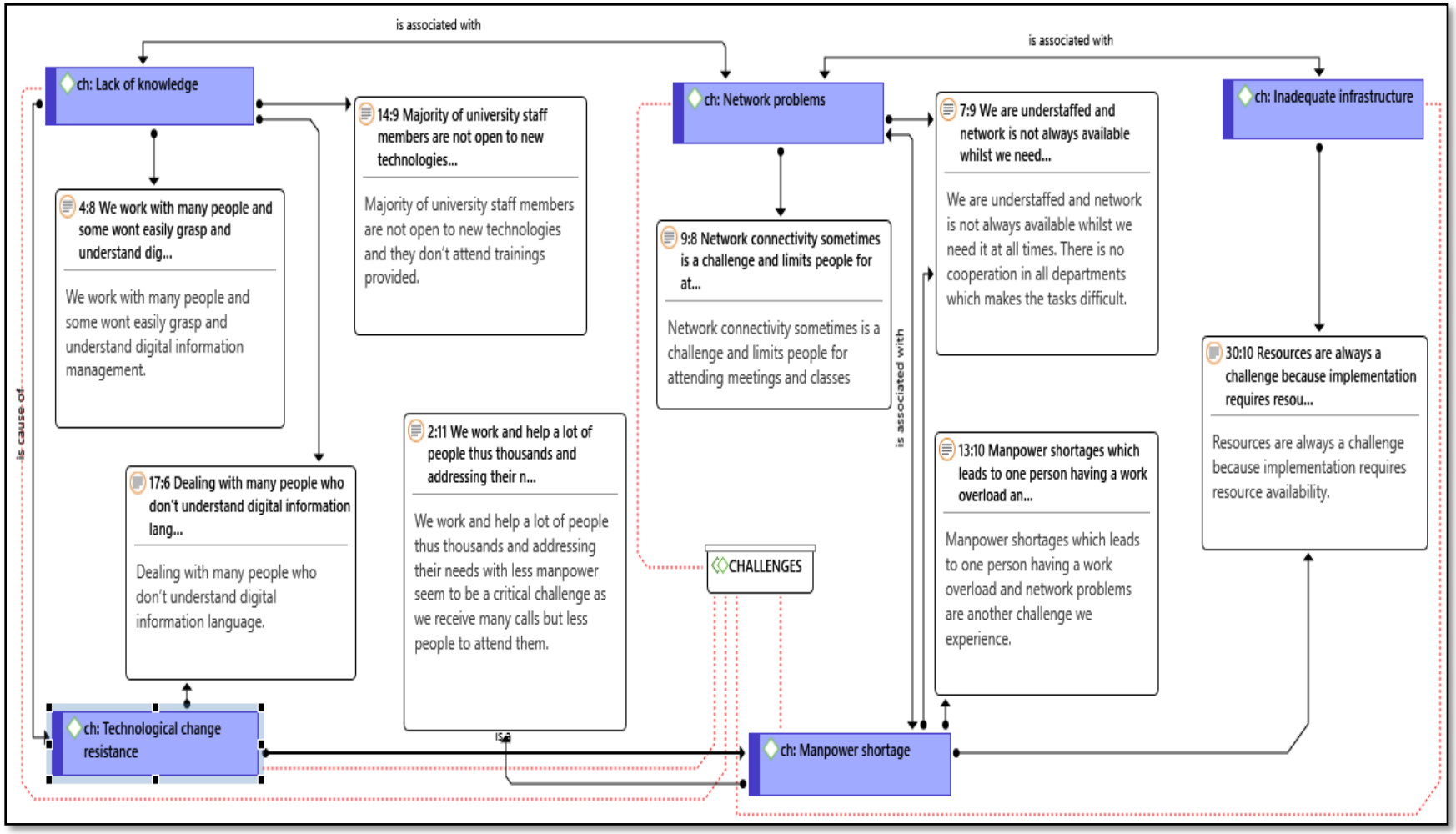

Figure 5.9: Digital information capability implementation challenges network
Source: Digital information capability implementation challenges using ATLAS ti.

5.3.3 Customer management capability

The customer management capability within the Higher Education Institutions was also investigated and the themes that emanated from the analysis of data are discussed in the following sections.

5.3.3.1 Customer determination or targeting

The ways in which the Higher Education Institutions determine or target customers, customer groups and or market segments was also investigated and the sub-themes that emanated from the analysis are institution enrolment/employment, department and position assessment, website users and need categorization and these are discussed in the following section.

(a) Institution enrolment/employment

With regards to the determination of target customers, customer groups or market segments, the respondents alluded that it is determined by virtue of being registered in the institution or being employed within the institution. This implies that the target customers or customer groups are determined by being enrolled within the institution or by being a student of the institution. Hence institutional enrolment or employment provides the premise for the determination of the target customers within the Higher Education Institutions. This is evidenced by the expressions of Respondents 7, 11, 13, 20, 21, 22, 23 and 25 as indicated in the following extracts:

Ref		Discursive analysis
R7	We focus on the number of students registered, the staff members and the request from the helpdesks and we understand our segments.	Institution enrolment/deployment
R11	Our customers are determined by the eventuality of students registering or staff being part of the	Institution enrolment/deployment

	university as students and staff are our customers.	
R13	I think we do not determine them but they are already established by the virtue of being part of the institution.	Institution enrolment/deployment
R20	The determination of the customers is based on the number of students registered in our department.	Institution enrolment/deployment
R21	By the virtue of registration. We just ensure that online systems are kicking and ultimately those who apply or register are our target customers.	Institution enrolment/deployment
R22	Our customers are university staff members and students; we determine them when they log a call or email.	Institution enrolment/deployment
R23	By registering all emails of the staff in the system so that we can know if he or she is registered.	Institution enrolment/deployment
R25	Students and staff who have laptops or tablets; university tablets are our target customers.	Institution enrolment/deployment

(b) Department and position assessment

The assessments of the department or position of the staff was also established as the premise of determining or targeting the customers, customer groups or market segments. The respondents postulated that all the determinations of the customers are based on the positions or levels or departments of the customers. This implies that within the customer management capability, customers are being determined based on their positions, levels

or departments within the Higher Education Institutions. This is evidenced by the sentiments shared by Respondents 4, 17, 23 and 26 as indicated in the following extracts:

Ref		Discursive analysis
R4	We check the department and position level.	Department and position assessment
R17	All determinations are per positions and levels of the staff.	Department and position assessment
R23	By registering all emails of the staff in the system so that we can know if he or she is registered.	Department and position assessment
R26	We normally are guided by the position of the customer whether its management, academic, operational staff or students	Department and position assessment

(c) Website users

Website users were also found to be another premise which provides the basis for the determination of the customers or the premise for targeting customers. The respondents proffered that the target customers are determined by the number of people who visit the site and the students and staff who regularly use the site. This means that the customers within the higher learning institutions are also determined by making use of the institution's website. Thus, the customers are determined or targeted through having the thorough perspective of the website users. Hence website users were noted as another mechanism being used in the determination of customers or targeting customers thereof. This is evidenced by the views of Respondents 3 and 9 as indicated in the following excerpts:

Ref		Discursive analysis
R3	Our target customers are determined by the number of people who visit the site and the students and staff who regularly use the site.	Department and position assessment
R9	By making the advert on the website and they apply online using ICT system.	Department and position assessment

(d) Need categorization

The results in this study indicated that need categorization is another way through which the higher learning institutions determine their customers. This was based on the views submitted by Respondents 2 and 22 as indicated in the following extracts:

Ref		Discursive analysis
R2	By understanding that students and staff needs are different hence staff and students form two different segments.	Department and position assessment
R22	Our customers are university staff members and students;we determine them when they log a call or email.	Department and position assessment

The respondents postulated that through understanding the distinction in the needs of students and staff provides them with the premise to determine or target customers and this enables them to determine the segments that they will be serving. This implies that understanding the needs of both customers and staff can be made possible through diverse mechanisms such as help desks, customer determination or targeting. This means that need categorization is another approach through which Higher Education Institutions determine or target their customers.

A summary of how Higher Education Institutions determine or target customers, customer groups, and/or market segments and how they include customers or competitors and other potential customers and/or markets in this determination is shown in Figure 5.10 below.

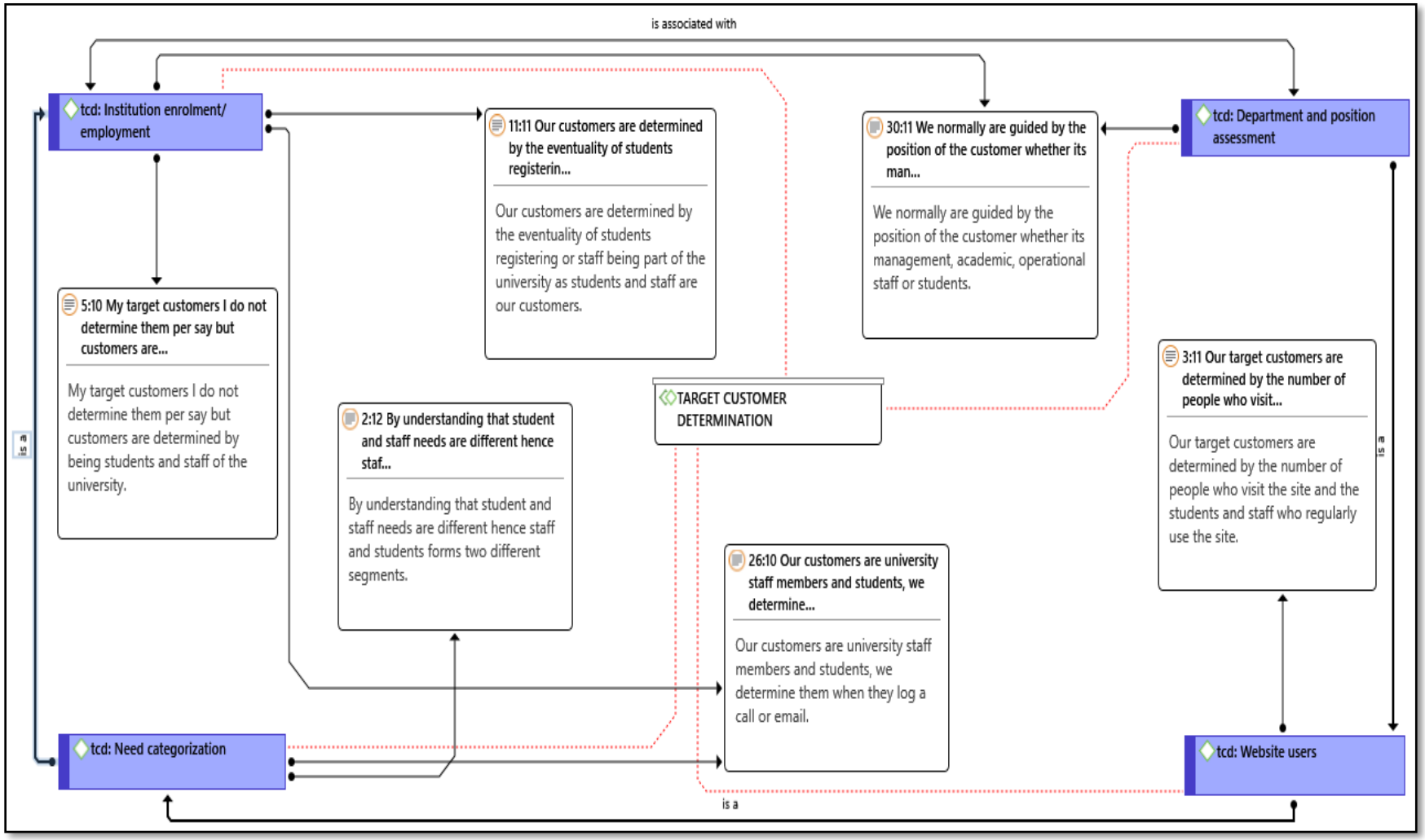

Figure 5.10: Customer determination or targeting network
Source: Customer determination or targeting using ATLAS ti.

5.3.3.2 Interactions with customers to determine key customer requirements

In this study, the mechanisms or approaches that the Higher Education Institutions use to interact with customers towards the determination of key customer requirements including product/service features and their relative importance/value to customers' purchasing decisions for purposes of product/ service planning, marketing, improvements, and other business development were investigated. The results showed that there are four mechanisms that are used and these are department consultation, emails, website and telephone. These mechanisms are discussed in the following sections.

(a) Department consultation

Department consultation was indicated to be one of the mechanisms that the Higher Education Institutions use to interact with key customers to determine key customer requirements. The respondents postulated that before making any purchase, they first consult with different or various departments and they engage with these various departments mainly through heads of departments. This engagement with the various departments provides the platform to have a comprehensive understanding of the key customer requirements that include product or service features and their relative importance to customers' purchasing decisions for purposes of product or service planning, marketing, improvements, and other business development. Respondents 17, 22 and 26's sentiments pertaining to department consultation as a mechanism are shown in the following quotations:

Ref		Discursive analysis
R17	Before making any purchase we first consult with different or various departments.	Department consultation
R22	By asking our customers the main problems that they are facing with networking and being able to solve them.	Department consultation

R26	We engage various departments mainly through heads of departments.	Department consultation

(b) Emails

The results showed that emails are another mechanism that is being used in the determination of key customer requirements in the Higher Education Institutions. The respondents alluded that interactions are based on the resources or infrastructure that are provided by the Higher Education Institutions and these includes emails. This implies that the email system is being used to interact with both the students and the staff. This entails that in the determination of the key customer requirements and advancing the customer management capability, emails paly a fundamental role. This is evidenced by the assertions of Respondents 2, 5, 9, 18, 21 and 25 as indicated in the following extracts:

Ref		Discursive analysis
R2	I can say we mostly use the website for interactions and or emails.	Emails
R5	Interactions are based on the resources provided by the university that is emails, calls and dashboard to mention but a few.	Emails
R9	We interact with student and staff via telephone calls or via emails for services that they need.	Emails
R18	I usually send them emails or call them telephonically.	Emails
R21	The systems that we use for interactions are emails for both student and staff, university website and phones.	Emails

R25	Mostly through emails, also through phone calls and various ITS platforms that we have including Teams.	Emails

(c) Website

Websites were noted as another system that is used in the Higher Education Institutions to interact with customers towards the determination of the key customer requirements. This means that the use of websites is another mechanism that is being used to enhance the customer management capability.

The respondents alluded that they interact with the customer through the infrastructure provided by the institutions and the website is one of modes used for these interactions to make the determination of their requirements a possibility. This is evidenced by the sentiments shared by Respondents 2, 3 and 25 as indicated in the following quotations:

Ref		Discursive analysis
R2	I can say we mostly use the website for interactions and or emails.	Website
R3	Through feedback survey on the website.	Website
R25	The systems that we use for interactions are emails for both student and staff, university website and phones.	Website

(d) Telephone

The results also showed that the use of telephone also enables interactions with customers in Higher Education Institutions and provides the premise for the determination of the key customer requirements. This is evidenced by expressions of Respondents 9, 13, 18, 21 and 24 as indicated in the following quotations:

Ref		Discursive analysis
R9	We interact with students and staff via telephone calls or via emails for services that they need.	Telephone
R13	Through phone calls, emails and the helpdesk dashboard.	Telephone
R18	I usually send them emails or call them telephonically.	Telephone
R21	The systems that we use for interactions are emails for both student and staff, university website and phones.	Telephone
R24	Mostly through emails, also through phone calls and various ITS platforms that we have and Teams.	Telephone

The respondents postulated that they also interact with the students and staff through telephone calls. This implies that telephones are being adopted as an interaction system or mechanism towards the determination of the key customer requirements that include product or service features and their relative importance to customers' purchasing decisions for purposes of product or service planning, marketing, improvements, and other business developments.

A summary of how Higher Education Institutions interact with customers to determine key customer requirements and their relative importance/value to customers' purchasing decisions for purposes of product/ service planning, marketing, improvements, and other business development is provided in Figure 5.11 below.

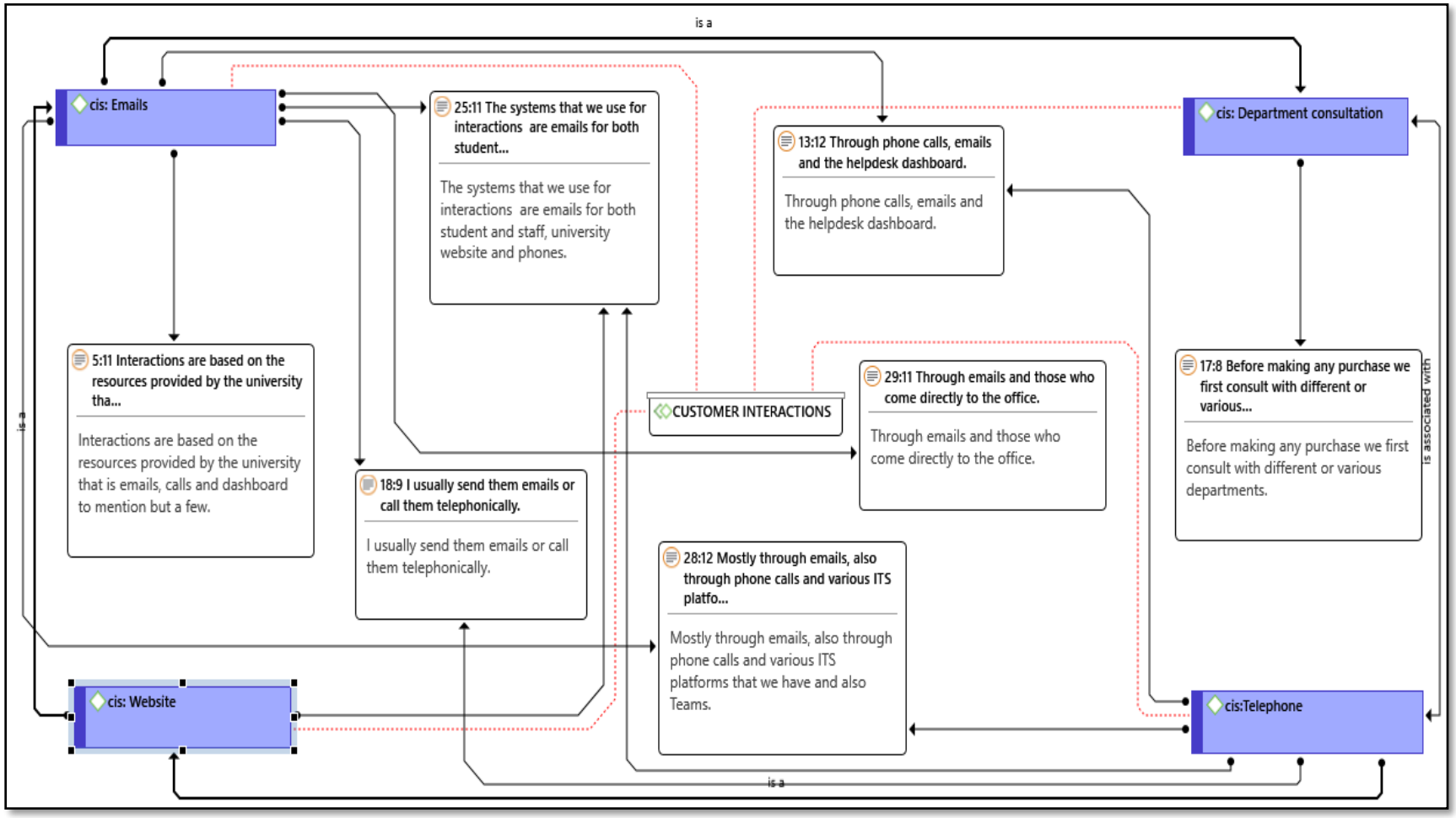

Figure 5.11: Interactions with customers to determine key customer requirements network
Source: Interactions with customers to determine key customer requirements using ATLAS ti.

5.3.3.3 Interactions with current methods in business needs and direction determination

The researcher also investigated the methods that are used by the Higher Education Institutions in keeping interactions with current methods that determine business needs and directions. The sub themes that emanated from the analysis of data are workshops, surveys, help desk, emails and meetings and these are addressed in this section.

(a) Workshops

Workshops were found to be one of the mechanisms that is used to keep interactions with current methods that determine business needs and directions to follow. This was evidenced by the sentiments shared by Respondents 2, 5, 6, 8, 16, 17, 26 and 28 as indicated in the following extracts:

Ref		Discursive analysis
R2	Through workshops and staff engagements where latest issues are deliberated on.	Workshops
R5	I can say through workshops and trainings to ensure that I am up to date with the changes in the market.	Workshops
R6	Interactions with the current methods to meet business needs is achieved by educating our staff through training.	Workshops
R8	By attending training workshops to keep up to date with current methods.	Workshops

R16	We attend workshops and training such as blackboard training and new software workshops.	Workshops
R17	By hosting workshops and trainings.	Workshops
R26	Through workshops and exposing one to the large volumes of data and information out there.	Workshops
R28	I make sure that I attend both online and contact workshops and training that are provided by the university.	Workshops

Based on the above evidence, the respondents in this study proffered that through workshops and trainings, they ensure that they are up to date with the changes in the market. The respondents further alluded that through workshops supplemented by exposing oneself to the large volumes of data and information, they are able to interact with the current methods that determine business needs and directions. This implies that workshops provide the premise for the determination of business needs and direction that must be followed by Higher Education Institutions.

(b) Emails and meetings

Emails and meetings were also established as one of the mechanisms used in keeping interactions with the current methods that determine business needs and directions. This is based on the assertions of Respondents 6, 7 and 21 as indicated in the following excerpts.

Ref		Discursive analysis
R6	We interact with our customers via emails most of the times and meetings.	Emails and meetings
R7	Through website and email communication and a helpdesk for everyone.	Emails and meetings
R21	We use online initiatives such as blackboard, emails, teams where interactions are enabled.	Emails and meetings

Considering the above evidence, it is imperative to note that emails and meetings play an integral role in providing the premise for enabling interactions with current methods that determine business needs and directions. This is so because the respondents elucidated that they through initiatives such as emails that their interactions with current methods are enabled. Hence emails and meetings are mechanisms that enable interactions with current methods that determine business needs and directions within the Higher Education Institutions.

(c) Surveys

Survey is another mechanism being used in keeping interactions with the current methods that determine the business needs and the directions. Respondents 3, 7, 25 and 29 expressed their sentiments regarding surveys as indicated in the following extracts:

Ref		Discursive analysis
R3	We use the survey which inform the determination of the business needs.	Surveys
R7	We use surveys and at times survey monkeys to get feedback from staff and students.	Surveys

R25	By constantly researching what is happening in the technological area.	Surveys
R29	By conducting research.	Surveys

The respondents in this study posited that by constantly researching what is happening in the technological arena, the interactions with the current methods that determine business needs and directions are enabled. This means that the use of surveys enables input from various stakeholders which provides the basis for keeping up interactions with the current methods that determine the business needs and directions.

(d) Help desk

Help desks were also established as another mechanism being used by the Higher Education Institutions to keep interactions with current methods that determine business needs and directions to follow. The respondents alluded that one of the current methods that they use to determine business needs and directions to follow is help desk indicating that customers assign their calls there to enable them to identify their problems. The respondents added that customer requirements are determined through the help desk and purchasing decisions are done at various department levels. This implies that the help desk provides the premise for interaction with the current methods and the determination of business needs and the directions to follow. This is evidenced by the expressions of Respondents 11, 13, 22, 27 and 28 as indicated in the following extracts:

Ref		Discursive analysis
R11	Interactions are done through helpdesks where both staff and students have access.	Hep desk
R13	By establishing innovative mechanism based on the requests that are submitted through the help desk.	Hep desk

R22	Our current methods that we use is help desk, customers assign their calls there then we are able to identify their problems.	Hep desk
R27	Maintains the helpdesk so that we can view all the calls that were logged and provide with the solutions.	Hep desk
R28	Customer requirements are determined through the help desk and purchasing decisions are done at various department level.	Hep desk

A summary of the mechanisms used by Higher Education Institutions to keep interactions with current methods that determine business needs and directions is presented in Figure 5.12.

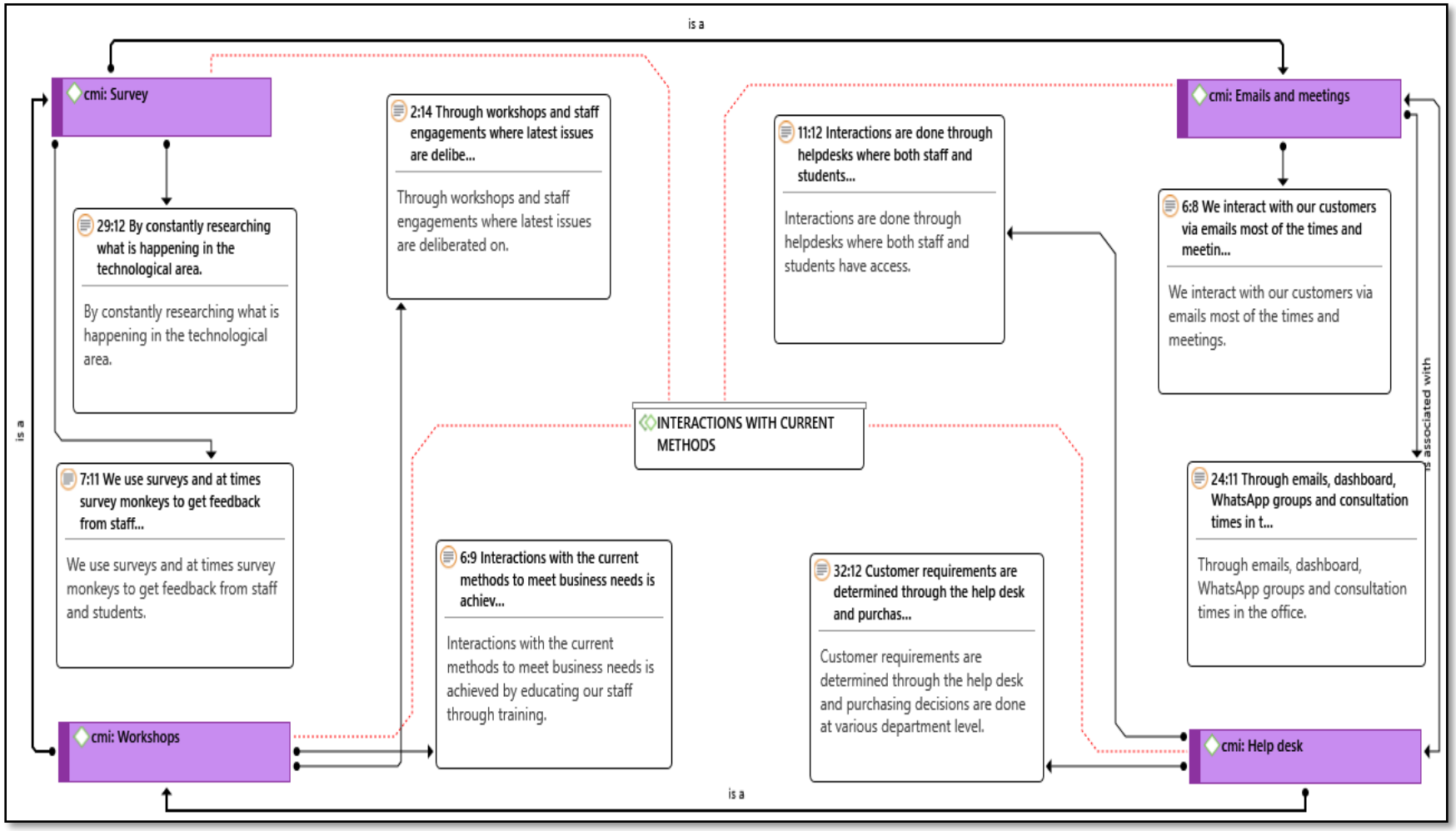

Figure 5.12: Interactions with current methods in business needs and direction determination network
Source: Interactions with current methods in business needs and direction determination using ATLAS ti.

5.3.3.4 Institution relationship building

In this study, the ways that the institutions/ organizations build relationships to acquire, satisfy, and retain customers and to develop new opportunities, as well as how customer satisfaction is determined, were investigated. These results are explained in the following sections:

(a) Problem solving

The results showed that problem solving is one of the approaches that the Higher Education Institutions use in building relationships to acquire, satisfy, and retain customers, as well as to develop new opportunities and determine customer satisfaction. This is evidenced by Respondents 2, 6, 13, 22 and 25 as indicated in the following extracts:

Ref		Discursive analysis
R2	When you solve the problems, either for the staff or the students, relationships are established and it indicates satisfaction of the customer.	Problem solving
R6	Relationship is built by the interaction with the customers and customer satisfaction is determined when the needs of the customer has been met.	Problem solving
R13	By ensuring that the problems that the student and the staff are calling to be addressed are solved.	Problem solving
R22	By fixing the problem that they are facing and also telling them how to overcome it in future so that they do not experience any problems.	Problem solving

R25	When we fix the problems of the customers, satisfaction is determined.	Problem solving

Considering the above evidence, it is important to note that problem solving involves the implementation of processes that are focused on reducing or removing obstacles that prevent one or others to accomplish operational and strategic business goals.
This implies that by effectively addressing a situation that creates a gap between the desired and actual outcomes, relationships are built within the Higher Education Institutions which provide the premise for building relationships to acquire, satisfy, and retain customers, as well as develop new opportunities and determine customer satisfaction.

(b) Criticisms and compliments

Criticisms and compliments were also established to be other ways through which customer satisfaction is determined and relationships are built. This is evidenced by the sentiments shared by Respondents 1, 5 and 16 as shown in the following excerpts:

Ref		Discursive analysis
R1	Customer satisfaction is decided by the responses we get from the staff and students' compliments and criticisms are also some key indicators whether we did good or bad based on that we act on that to build relationships.	Criticisms and compliments
R5	Customer satisfaction is determined by the less complaints that we get from our customers. I think that determines the satisfaction. Relationships are built by ensuring that the customers are satisfied.	Criticisms and compliments

R16	With students, satisfaction is difficult to measure by feedback that I get from departmental survey so criticism and compliments provide the basis for ensuring satisfaction and relation building.	Criticisms and compliments

The results revealed that customer satisfaction is determined by the responses obtained from the staff and students' compliments and criticisms. The respondents alluded that compliments and criticism are also key indicators of their performance and provide the premise for determining customer satisfaction and ultimately relationship building towards acquiring, satisfying, and retaining customers towards developing new opportunities.

A summary of how the institutions build relationships to acquire, satisfy, and retain customers, as well as develop new opportunities and determine customer satisfaction is provided in Figure 5.13.

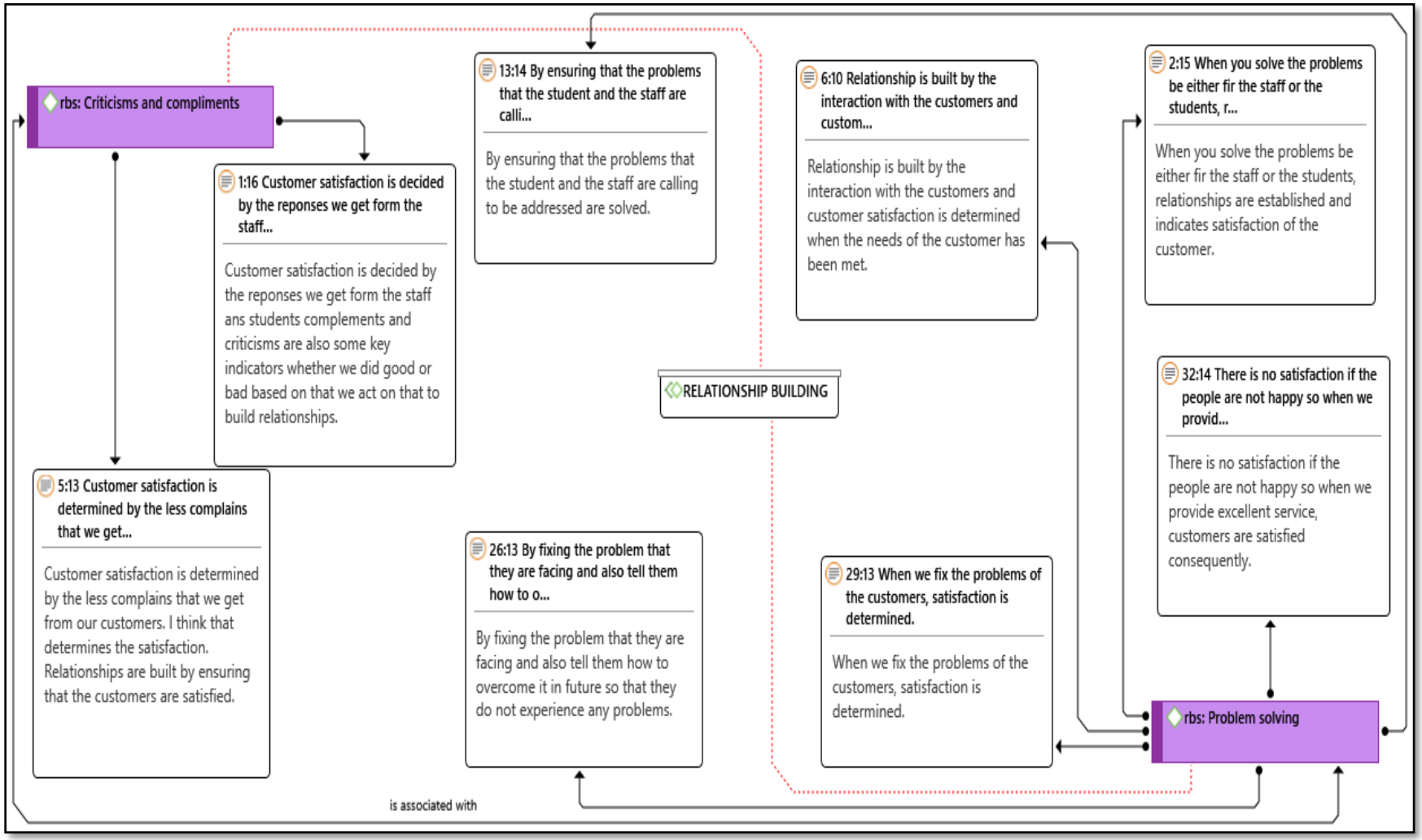

Figure 5.13: Institution relationship building network
Source: Institution relationship building using ATLAS ti.

5.3.4 Process management capability

Within the process management capability, the way in which institutions manage key processes for product and service design and deliver and towards leading to business growth and success was also investigated. The sub themes that emanated from data analysis are discoursed in the following sections and these are teamwork, organizational excellency focus, key role players' deployment and process evaluation.

5.3.4.1 Teamwork

Teamwork was established to be one of the approaches through which organizations manage the key processes for product and service design and ultimately delivery. This was evidenced by the sentiments of Respondent 5, 6, 13, 20, 22, 23 and 24.

Ref		Discursive analysis
R5	I think the processes are managed as a team. Each and everyone involved contributes to the management of key processes.	Teamwork
R6	Through team work and making sure that all efforts are leading to success.	Teamwork
R13	Through collaborative efforts as service delivery at a university is attained through collaboration of different role players.	Teamwork
R20	Through faculty initiatives where heads of departments and the dean manages key processes collaboratively.	Teamwork
R22	In networking, we devote working with each other so that we don't waste time solving one	Teamwork

	problem but making sure we are being able to solve as many problems as we can.	
R23	Continuous communication and an integrative approach in managing key processes.	Teamwork
R24	By consistent or continuous communication and integrating our expertise and knowledge.	Teamwork

The respondents postulated that the key processes are managed through team work, thus an integrative approach is adopted towards managing key processes that lead to business growth and success. It is imperative to note that teamwork is also adopted in the managing of the key processes for product and service design and delivery thereof. This implies that teamwork is one of the approaches that organizations use to manage key processes which also enhances its process management capability.

5.3.4.2 Organizational excellency focus

Organizational excellency focus was also found to be one of the approaches that is being used in managing key processes for product and service design and delivery. The respondents alluded that key processes are managed by ensuring that all issues relating to organizational excellency are given the appropriate attention. The respondents added that key processes are managed through providing major focus on the key processes and development prospects thereof. This implies that organizational excellency focus is one of the ways through which key processes are managed towards designing products and services, their delivery and results in business growth and success. With regards to organizational excellency focus, Respondents 3, 22 and 28's views are indicated in the following excerpts:

Ref		Discursive analysis
R3	Through ensuring that all issues relating to organizational excellency are given the appropriate attention.	Organizational excellency focus
R22	Networking organisation manages its key processes by making sure that the whole campus has internet and network and customer are not facing any problem in their offices.	Organizational excellency focus
R28	By providing major focus on the key processes and development prospects thereof.	Organizational excellency focus

5.3.4.3 Key players' deployment

The results also showed that key processes are managed by the deployment of key players within the key processes. This was evidenced by the assertions of Respondents 2, 16, 20, 21 and 23 as indicated in the following extracts:

Ref		Discursive analysis
R2	By ensuring that the relevant key players are deployed at the key processes.	Key players' deployment
R16	By ensuring that the relevant academics are allocated in the relevant modules.	Key players' deployment
R20	Key processes are managed by the experienced and qualified people such as the head of department.	Key players' deployment

R21	By ensuring that key stakeholders are engaged and our key systems are continuously running such as blackboards.	Key players' deployment
R23	By having more employees and dividing the group so that they focus on different problems so at the end they manage to solve the problems in time.	Key players' deployment

Considering the above evidence, the results revealed that the key processes are managed by ensuring that the key role players are deployed within the key processes. These key role players will be having the relevant expertise and knowledge pertaining to the process management thereof which results to business growth and success. This implies that for business growth and success, key players' deployment is one of the approaches being used in managing key processes in Higher Education Institutions.

5.3.4.4 Process evaluation

Process evaluation is one of the ways that was established in the analysis through which key processes in Higher Education Institutions are managed. The respondents proffered that the evaluation of each process provides the basis through which effective execution of tasks can be ensured and ultimately excellent results without disrupting the business goals. This is evidenced by the sentiments shared by Respondents 8, 14 and 16 as indicated in the following extracts:

Ref		Discursive analysis
R8	By evaluating each process' ability to produce good results without disrupting business goals.	Process evaluation
R14	By ensuring that the relevant staff are aware of the latest opportunities in the field.	Process evaluation

R16	By establishing checkpoints and through meetings that we engage with each other and make sound decisions and room for corrective action.	Process evaluation

A summary of how Higher Education Institutions manage key processes for product and service design and delivery that also leads to business growth and success is presented in Figure 5.14 below.

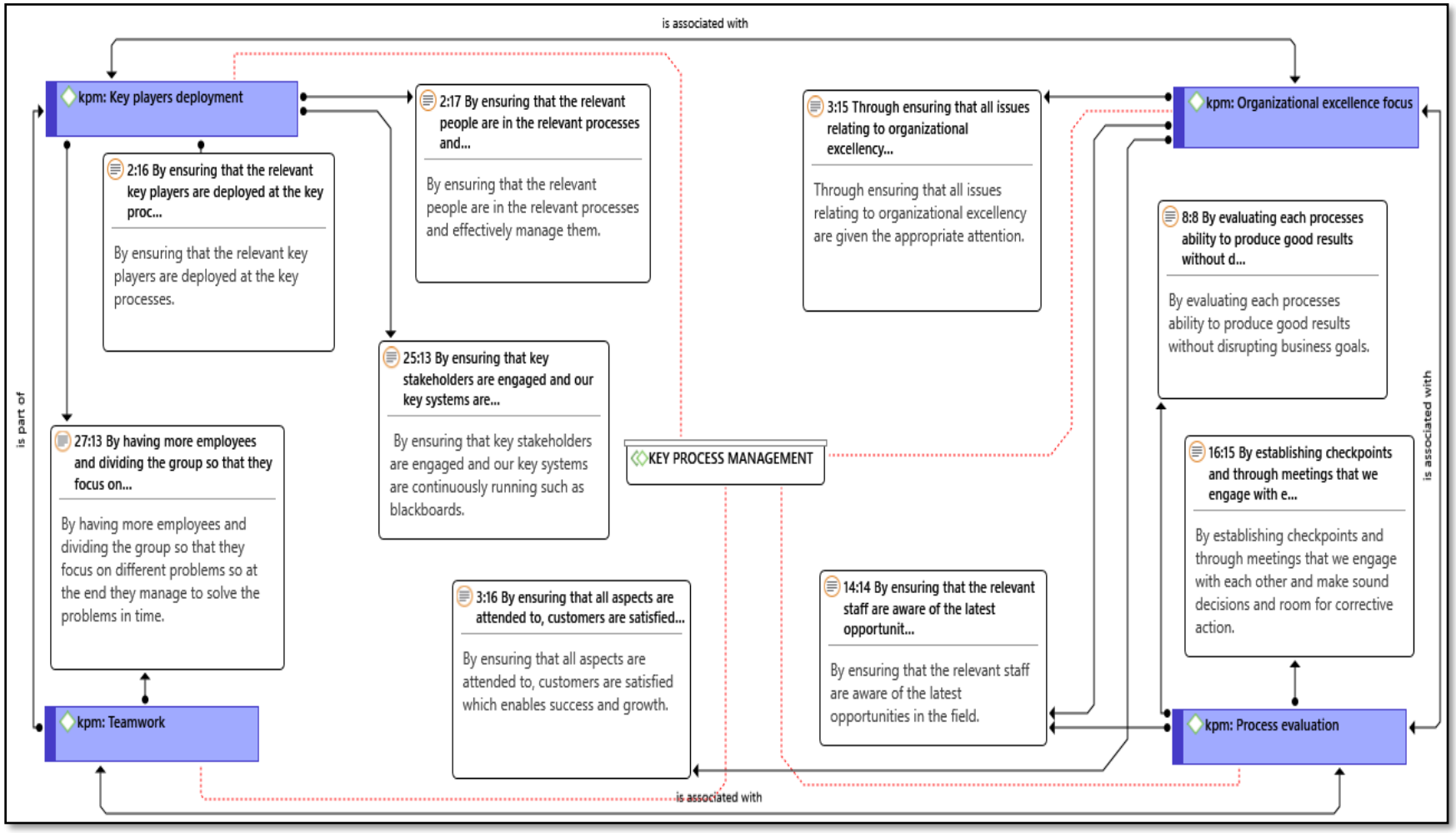

Figure 5.14: Process management capability network

Source: Process management capability using ATLAS ti.

5.4 Conclusion

This chapter has provided the analysis of data and the interpretation thereof. The themes that emanated from the analysis of data were explored or discoursed in this chapter. The focus was to establish the views of the respondents in line with operational excellence in Higher Education Institutions. The next chapter will provide the discussion of the findings that emanated from the analysis.

Chapter 6
Discussion of results

6.1 Introduction

This research focused on assessing the information management capability and operational excellence of the selected Higher education institutions in South Africa. The data was collected, analyzed and interpreted in the previous chapter. This chapter focuses on providing a discussion of the results that emanated from the analysis of data with the past scholastic views that are related to the subject matter.

6.2 Operational excellence

This section provides a discourse of the conceptualization of operational excellence within the higher education institutions. The discussion is presented as follows:

6.2.1 Operational excellence perceptions

This study established operational excellence within eight perspectives thus objectives achievement, effective task execution, effective service delivery, customer satisfaction, effective strategy implementation, synergy of units, governance and awareness of a bigger picture.

6.2.1.1 Objectives achievement

The results of this study revealed that within the higher learning institutions, operational excellence is perceived as the effective achievement of the set institutional objectives in various faculties or departments. These findings concur with the suppositions of Sony (2019) who postulated that operational excellence is the execution of the business strategy in a manner that contributes towards the achievement of the business objectives. This entails that operational excellence is linked to the attainment of objectives. The results also corroborate with Fork-Yew and Ahmad (2014) who elucidated that operational excellence is an outstanding practice in managing the institution and achieving results thus goals.

6.2.1.2 Effective task execution

The results of this study also indicated that operational excellence entails the execution of tasks in an effective and efficient way within an institution towards addressing the established mandates or purpose. It is imperative to note that in line with effective task execution, this study findings corroborate with Aguilera and Ruiz (2019) who postulated that operational excellence is the dynamic capability to realize efficient and effective operational excellence which entails core processes in the value creation chain by utilizing cultural, organizational and technological factors in an integrative way based on the respective strategy.

6.2.1.3 Effective service delivery

Fork-Yew and Ahmad (2014) elucidated that operational excellence reflects the performance of internal operations of an institution in terms of quality improvement, delivery, flexibility, cost and waste reduction and productivity improvement. Within the context of improvement in service delivery, the results of this study concur with Fork-Yew and Ahmad (2014) as it found that operational excellence is perceived as when student, staff and institutional needs are solved and addressed effectively thus effective service delivery.

6.2.1.4 Customer satisfaction

The results also established that operational excellence is conceptualized as when the organization makes its best efforts towards meeting the expectations of the customers. The results also indicated that customer satisfaction is a premise for establishing operational excellence as there is reciprocity between level of excellence and level of customer satisfaction. These findings align with Marie (2017) who elucidated that customer satisfaction is an indication of operational excellence achieved through the reduction of costs and the re-investment of the freed-up resources in the technological context that provides the basis for enhancing customer experiences and satisfaction thereof.

6.2.1.5 Effective strategy implementation

The results revealed that operational excellence is ensuring that the digitization setup and maintenance is implemented in such a way that there will be no complaints from the customers thus the staff and the students hence is grounded on effective strategy implementation. Moktadir, Dwivedi, Rahman *et al.* (2020) elucidated that strategy implementation is a core facet in operational excellence and that effectiveness implementation of that strategy provides the basis for operational excellence hence corroborating with the findings in this study.

6.2.1.6 Synergy of units

Yeo (2019) elucidated that synergy which is also known as synergism relates to the combined effects produced by two or more parts or elements which results in efficient and effective results towards excellence. This implies that synergy also provides the premise for operational excellence. The findings of Yeo (2019) corroborate with this study's findings as it was found that the synergy between all departments thus from student administration staff/departments, academic staff/departments and the Information Technology departments provide the premise for ensuring operational excellence.

6.2.1.7 Governance

The results of this study established that operational excellence is perceived in the context of governance. This implies that operational excellence is attained by the effective governance of diverse systems that results in excellence. These findings align with Muazu and Nashehu (2021) who alluded that governance of organizational activities which is grounded on effectively establishing structures and processes for decision making, accountability and control of operations or activities provides the premise for operational excellence.

6.2.2 Operational excellence enablers

This section discusses the findings of this study regarding operational excellence enablers in the context of pasts studies.

6.2.2.1 Enabling infrastructure

The findings showed that an enabling infrastructure is one of the enablers of operational excellence. It entails the availability of the relevant and proper infrastructure to ensure that the digital efforts of the institutions and operational excellence are attained. Aligning with the findings of this study, Chakraborty, Sharma and Vaidya (2020) aver that an enabling infrastructure provides the basis for achieving operational excellence as it relates to the technology, processes and people practices that enable high levels of productivity in the organization.

6.2.2.2 Human resources

This study found that human resources are the personnel of a business or organization regarded as a significant asset in terms of skills and abilities that contribute towards operational excellence. These findings align with Issar and Navon (2016) who alluded those human resources play a fundamental role towards the organizations attaining operational excellence as they are the drivers of all business initiatives.

6.2.2.3 Information technology infrastructure

This study found that information technology infrastructure provides the premise for enhanced operation or smooth operations as the availability of an enabling information technology infrastructure creates an environment for effective execution of tasks and ultimately operational excellence. The findings of this study align with the suppositions of Chakraborty, Sharma and Vaidya (2020) who assert that an enabling infrastructure provides the basis for achieving operational excellence as it relates to the technology that provides the premise for high levels of performance and ultimately productivity in the organization.

6.2.2.4 Knowledge

Knowledge was found to be another enabler of operational excellence as having comprehensive knowledge regarding an area of operation provides the premise for effective task execution and ultimately operational excellence.

This aligns with Carvalo et al. (2017) who alluded that knowledge that is evidenced by the competencies of the personnel provides the premise for attaining operational excellence.

6.2.3 Principles underlying continuous improvement

This section provides a discussion of the principles that underlie continuous improvement.

6.2.3.1 Commitment

The results of this study found that commitment is an integral principle that results in objectives being attained as it provides the premise for individuals finding new ways to execute their task and ultimately enabling continuous improvement. These findings align with Carvalo *et al.* (2017) who postulated that top management commitment provides the basis continuous improvement and enhanced operational excellence. However, the findings contradict with the sentiments of Carvalo *et al.* (2017) as this study found that commitment is a principle for continuous improvement in all levels of the organizations and not only in relation to top management.

6.2.3.2 Hard work

The results showed that hard work is a critical principle that contributes towards continuous improvements and ultimately operational excellence. Shehadeh, Al-Zu'bi, Abdallah *et al.* (2016) elucidated that it takes hard work to effectively and efficiently implement the strategy of the organization towards achieving operational excellence. This implies that the findings of Shehadeh, Al-Zu'bi, Abdallah *et al.* (2016) align with this study as hard work was noted to be a principle that is integral towards ensuring continuous improvement.

6.2.3.3 Honesty

The results also revealed that honesty embeds various principle such as integrity and truthfulness and implies that within the context of higher learning institutions honesty is a corner stone of their sustainability; hence it establishes the platform for continuous improvement.

This concurs with Shehadeh, Al-Zu'bi, Abdallah *et al.* (2016) who alluded that honesty supplemented with hard work provides the premise for efficiency and effectiveness in organizations which is essential towards attaining organizational goals.

6.2.3.4 Integrity

Shehadeh et al. (2016) postulated that the quality of being honest and having strong moral principles provides the premise for organizations to align with their operational excellence efforts. The findings of Shehadeh et al. (2016) concur with this study as it was found that the quality of being honest and having strong moral principles contributes immensely to continuous improvement in higher learning institutions and ultimately, to operational excellence.

6.2.3.5 Cooperation

The findings of this study revealed that cooperation or team work supplemented with relentlessness, results in the attainment of the intended goals and improved efforts thereof. This aligns with Yeo (2019) who elucidated that a collaborative and integrated approach within organization provides the basis for attaining operational excellence if properly coordinated.

6.3 Digital information management capability

The results pertaining to data information management capability are also discussed in this section.

6.3.1 Data and information availability or access

The results pertaining to data or information availability or access are discussed in this section.

6.3.1.1 Emails

Chakraborty, Sharma and Vaidya (2020) postulated that the formal data sharing platforms that can be used within organizations include emails.

This concurs with this study as it was found that emails are used in the higher education institutions, to ensure that the required information is available or accessed by the supplier/partners and the customers and the employees.

6.3.1.2 My Access

In this study, it was found that My Access is also used as a data and information accessing platform, thus it is used to provide access to data or information to all the registered end-users. Chakraborty, Sharma and Vaidya (2020) elucidated that My Access is an information integrator system that has dominated the institution of higher learning to provide access to information to students and staff in these institutions, hence concurring with this study' findings.

6.3.1.3 Blackboard

Blackboard was noted to be a digital higher education learning solution which ensures that institutions of higher education are able to establish a platform to drive academic effectiveness, learner engagement and enable continuous improvement through education insights. These findings concur with Peneva (2016) who alluded that Blackboard is a tool used in learning institutions to ensure effective delivery of teaching and learning efforts.

6.3.1.4 Dashboard

Hilliger et al. (2020) postulated that Dashboard marks an online integrated learning tool that is being utilized in higher learning institutions to ensure comprehensive delivery of educational services.

Dashboard was found as another interface that is contributing towards enhancing the digital information management capability in higher education institutions as it is being used to ensure that information is made easily available and accessible.

6.3.1.5 Website uploads

A website is a a set of related web pages located under a single domain name that is typically produced by a single person or organization.

The use of websites is another approach that is being used by the higher education institutions to ensure the availability of information and its access thereof. Peneva (2016) corroborating with the findings of this study alluded that web sites uploads are regarded as an approach to ensure that data and information is accessed by various stakeholders of organizations.

6.3.2 Data and information integrity

6.3.2.1 Password and username encryption

The results indicated that password and username encryption is one approach that is being adopted in the higher education institutions towards ensuring data and information integrity, security and confidentiality. These results concur with Khan and Albattah (2017) who postulated that the use of passwords provides the basis for ensuring maximum levels of security as the data or information will be only accessed by the users with the relevant credentials.

6.3.2.2 Limited data administrators

This study also found that limiting the data administrators provides effective control measures to ensure that data and information integrity, confidentiality, security and reliability is ensured within the higher education institutions. Concurring with this study, Harley and Cooper (2021) alluded that towards ensuring the integrity of information and its confidentiality, there ought to be restrictions pertaining to the number of individuals who can access and disseminate it for control purposes.

6.3.2.3 Effective information distribution

It was also found that the effectiveness of the distribution of the information and data within the higher education institutions provides the platform for ensuring data and information confidentiality, integrity and security and ultimately enhanced digital information management capability. Effective information was also noted by Topa and Karyda (2019) to be an essential approach towards ensuring that the information confidentiality is upheld as information will be channeled where it is needed and in line with the level of information access clearance within the organization.

6.3.2.4 Code of ethics

Code of ethics was found to be another mechanism that is used in the higher education institutions to ensure that information integrity, reliability, security and confidentiality is ensured. Corroborating with these findings, Brinkman, Gotterbarn, Miller *et al*. (2016) postulated that when there are established guidelines within the organization in terms of information access, it provides clarity and sense of direction within the organization and contributes to information integrity thereof.

6.4 Mechanisms in business needs identification

This section provides a discourse of mechanisms used in the identification of business needs.

6.4.1 Surveys

The results indicated that surveys are used for the collection of data from a predefined group of respondents to gain information and insights into various topics of interest as itprovides the premise for the institutions to obtain insights from diverse stakeholders and enable them to identify the needs of these stakeholders and ultimately make informed decisions on the business needs and directions to follow. This aligns with Fafchamps and Woodruff (2017) who alluded that organizations use surveys to have a comprehensive understanding of the expectations of the organizational stakeholders and to determine the strategy to be followed in line with stakeholders' expectations.

6.4.2 Feedback

Feedback that is obtained through surveys and the help desk was found to form an integral part in the identification of the business needs in the higher education institutions as it provides the basis for the directions that ought to be followed. Corroborating with these findings, Fafchamps and Woodruff (2017) postulated that feedback is integral as it provides the basis for strategy revision or strategy enhancement and provides the basis for assessing if the organization is aligned with its strategic intent and needs.

6.4.3 Requisitions

This research also found that requisitions provide the premise to understand the employee needs and is a mechanism through which the business needs can be established as requisitions provide an indication of what is required by various departments across the institutions and enables sound decisions to be made regarding the directions that ought to be followed. May, Atkinson and Ferrer (2017) agree with these sentiments when they assert that requisitions are an integral tool in purchasing and supply function through which the business needs can be identified and the purchasing and supply direction can be established.

6.5 Hardware and software reliability

The findings that were established in this study pertaining to how the higher education institutions ensure that the hardware and software are reliable and user friendly are discussed in this section.

6.5.1 Updating consistency

The results showed that higher education institutions ensure that they are constantly up to date with the changing technological trends in a bid to align with the volatility of the technological environment. This aligns with Foerster, Schmid and Vissicchio (2018) who elucidated that continuously updating the organizational systems enables organizations to be continuously relevant to the market needs and enhances competitiveness as they will be ensuring user friendliness of such systems.

6.5.2 Support provision

The findings also established that providing support to staff and students in the use of both software and hardware ensures that their reliability and user friendliness is attained. This concurs with the findings of Erulanova, Yessenbekova, Zhanysbayeva *et al.* (2020) who postulated that the competencies and the knowledge and uses of hardware and software differs across people and providing continuous support enables their use to be easier to the users.

6.5.3 Needs oriented procurement

The findings also revealed that needs oriented procurement supplemented with technological change alignment provides the basis for ensuring that the hardware and software are user friendly as they will be in line with the specifications of the customers or staff. This aligns with May, Atkinson and Ferrer (2017) who assert that when hardware and software are sourced in the organizations in line with the employee requests, their manipulation will be easier as it will be aligned with the specifications of the users who might be having comprehensive knowledge of such hardware and software.

6.5.4 Established procedures and standards

The results have shown that established procedures and standards is another mechanism that is used to ensure that the hardware and software are user friendly and reliable. This concurs with Al Gamdi and Samarji (2016) who postulated that when there are established procedures or guidelines that must be followed in the utilization and updating of hardware and software, their user friendliness is the ultimate result.

6.6 Hardware and software meeting current business needs and directions

This section provides a discussion pertaining to the results that emanated from the analysis of data regarding mechanisms that the higher education institutions adopt towards ensuring that the hardware and software systems meet the current business needs and direction.

6.6.1 Continuous upgrading

The findings showed that continuous upgrading is one of the mechanisms that is being used by the higher education institutions towards ensuring that the hardware and systems meet current business needs and direction. These findings corroborate with Foerster, Schmid and Vissicchio (2018) who postulated that when the organization's hardware and software are updated on regular basis, task execution becomes effective and efficient and higher levels of productivity are attained.

6.6.2 Constant evaluation

The findings also established that through constant evaluation, software and hardware systems can be maintained to meet the current business needs and direction within higher education institutions. Efnusheva (2019) concurs with this study's findings by alluding that the constant assessment of processes and systems provides the basis for the organizational efforts to remain relevant to the changing demands of customers and enhances its alignment with changes in the market.

6.7 Digital information management capability implementation challenges

This section provides a discussion of the digital information management capability implementation challenges that were established from the analysis of data.

6.7.1 Inadequate infrastructure

The findings of this study showed that the lack of appropriate infrastructure that supports the implementation of the digital information management capability is detrimental to the effectiveness of implementation of such initiatives and consequently negatively affects the attainment of operational excellence. This aligns with Masood and Egger (2019) who elucidated that the absence of an appropriate infrastructure adversely affects the efforts of the employees towards attaining the intended goals and ultimately the overall performance of the organization.

6.7.2 Manpower shortages

The findings revealed that the mismatch between the available human resources and the tasks that need to be executed is detrimental to the implementation of digital information management. These findings are supported by Savic, Lazarevic, Kukic *et al.* (2019) who alluded that manpower is critical towards attaining organizational goals and its shortage results in opportunities and business investment and development being adversely affected and its sustainability thereof.

6.7.3 Network problems

The results also found that network problems result when the digital information management implementation goals are not being realized. This is also supported by Masood and Egger (2019) who elucidated that most if not all organizations within the fourth industrial revolution are internet and network connectivity centric and the prevalence of network problems adversely affect the organization to effectively pursue and enjoy the benefits associated with digitization efforts.

6.7.4 Technological change resistance

The findings also showed that the resistance to adopt new technologies and the fear of change or refusal to align with the technological changes is a factor that negatively affects the digital information management implementation efforts. This is supported by Li, Zhou and Cheng (2019) who elucidated that technological innovation is regarded as the key to survival and success for many firms and is being adversely impacted by the resistance in its adoption in organizational which impedes the effective utilization of such efforts.

6.8 Process management capability

6.8.1 Teamwork

The results showed that processes are managed through team work, thus an integrative approach is adopted towards managing key processes that lead to business growth and success.

This aligns with with Yeo (2019) who elucidated that a collaborative and integrated approach within an organization provides the basis for attaining operational excellence if properly coordinated, hence establishing the essence of teamwork.

6.8.2 Organizational excellency focus

The results also indicated that organizational excellency focus is one of the ways through which key processes are managed towards designing products and services, their delivery and results in business growth and success. This is supported by Antony and Bhattacharyya (2010) who elucidated that when an organisation is excellence oriented,

effectiveness and efficiency are enabled which also enhances the management of the critical processes contributing to the attainment of such excellence.

6.8.3 Key players' deployment

The findings revealed that key players' deployment is one of the approaches being used in managing key processes in higher education institutions that results in business growth and success. This is supported by Mendling *et al.* (2017) who alluded that the deployment of key players to manage processes provides the foundation to attain improved accountability, enhanced reliability and optimum utilization of resources.

6.8.4 Process evaluation

The findings of this study revealed that evaluation of process management provides the basis through which effective execution of tasks can be ensured and excellent results attained without disrupting the business goals.. Mendling *et al.* (2017) concur with these findings when they aver that in the context of process management, these processes ought to be continually monitored and assessed through determination of check points to ensure their going concern.

6.9 Conclusion

This chapter has provided a comprehensive discussion of the findings of this study in relation to the past scholars' contributions. It is imperative to note that the discussion provided the premise for understanding the concurrence or the contradiction of the current study findings with that of past scholars.

Chapter 7
Conclusion and recommendations

7.1 Introduction

The aim of the study was to assess information management capability and operational excellence in the selected institutions of higher education in South Africa. It is pertinent to note that the previous chapters have presented the rationale for and background of the study, literature review, methodology, data analysis, results for the study and discussion of the study findings. Chapter 4 analysed data collected and discussed the findings and major themes that emerged from data analysis in relation to the research objectives. This chapter will now critically establish an understanding of the subject at hand in accordance with the aim and objectives of the study, as well as the research questions of the study.

7.2 Conclusion on research objectives and questions

Thorough review of gaps in the literature, the problem statement of this study was formulated as follows:

Institutions spend large amounts of money acquiring IT-related products for managing information with a view that such investments will benefit them (Aydiner et al., 2019; Chani, 2019). This has also been also attested to by Balzer (2020) who emphasises the need for information capability and use of its efficient management as an important success factor that enables an institution to improve its results and serves as a source of an institution's competitive advantage. In support of the importance of information management capability, Khani, Nor and Bahrami (2011) said, "Although many researchers have conducted research on the notion of the description of Information system, Information Technology, there were no conclusions about their value" (Aydiner et al., 2019). Even though it is imperative for data sources to be reliable and credible, discrepancies arise in the influence of information management and uncertainty (Aydiner et al., 2019). In the era of industrial revolution 4.0 (IR 4.0), sustainability is seen as a serious challenge of contemporary institutions. Access to information as a component of information management affects sustainability (Imran, Salisu, Aslam, Iqbal and Hameed, 2019). The benefits and challenges of managing change in BIM Level 2 remained largely

invalidated and the opportunities for enhancing the benefits and reducing challenges remained relatively unexplored (El Alfy, Gómez & Dani, 2019). This study will contribute empirical evidence on information management capability and operational excellence in selected institutions of higher education in South Africa, approaching the problem from the resource-based view (RBV) and focusing on information as an important resource in higher education institutions. A model that will assist the study to assess the management of information capability as an influence on operational excellence of institutions is desired. The extent to which information management capability influences operational excellence in an institution must be known. A construct of information management capability (IMC) which gathers capacities and skills available for the management of information through its life cycle in an institution will therefore be proposed. The value of information gathered will allow the researcher to assess IMC and operational excellence of an institution directly.

It is important to keep in mind that the study focuses on the selected higher education institutions in South Africa. It can be mentioned that higher education institutions in South Africa have among others, problems ranging from Information technology (IT) adoption, skills for sustainable development, lack of flexibility in academic structures, communications, and other things (Imran et al., 2019). The question that is asked is, "how does IMC influence operational excellence in selected higher education institutions in South Africa?" The study intends to come up with the model that will assist the study in determining how IMC enables operational excellence in higher education institutions regardless of other challenges that exist. The validation of the IMC value and the empirical testing of research questions will be done using data gathered from the selected higher education institutions.

Thereafter, the following three research questions were formulated to address the identified gaps and research problem:

RQ1: How does information management capability of the selected higher education institutions in South Africa link to their operational excellence?

RQ2: To what extent does information management capability contribute to effective utilization of information systems to achieve excellence in the selected higher education institutions in South Africa?

RQ3: What model can best suit the selected higher education institutions in South Africa in achieving operational excellence?

The research questions paved way to the formulation of the following aim and objectives:

- To determine how Information Management Capability influences Operational Excellence
- To determine the degree to which Information Management Capability is improved by Digital Transformation strategies
- To develop a framework of Operational Excellence for higher education institutions in South Africa

7.2.1 Conclusion on the influence of information management capability on operational excellence

In line with Objective 1: *To determine how Information Management Capability influences Operational Excellence,* this thesis now focuses of comprehensively establishing how information management capability influences operational excellence. In this study, it was found that operational excellence is conceptualized in higher education institutions as objectives achievement, effective task execution, effective service delivery, customer satisfaction, effective strategy implementation, synergy of units, governance and awareness of a bigger picture. It is imperative to note that the conceptualization of operational excellence also establishes the premise through which the influence of operational excellence can be recognized. This study found that information management capability (IMC)'s influence can be noted in the context of data and information availability or access; data information integrity; mechanisms to identify business needs and directions to follow; ensuring hardware and software reliability and user friendliness and mechanisms adopted to ensure that hardware and software are meeting current business needs and directions.

Furthermore, it is imperative to note that IMC influences operational excellence within the context of data and information availability or access. This study found that regarding data and information availability or access, higher education institutions ensure information availability through emails, My Access, blackboard, dashboard, website uploads and help desks.

With regards to emails, it was found that emails are being adopted towards distributing or disseminating important information to ensure its availability and accessibility by students or staff or partners. Also, information is made available and accessible through My Access which is a dominating ITS integrator within the higher education institutions in South Africa. Dashboard was also established to be another mechanism used to ensure that educational information is made available to the students by lecturers and to lectures by the IT department.

Additionally, both Dashboard and Blackboard provide learning solutions to higher education institutions and enable these institutions to establish a platform to drive academic effectiveness, learner engagement and continuous improvement through education insights. These mechanisms provide platforms for students to access learning materials, assignments and to enable them to complete their assessments. In addition, this dissertation found that websites uploads are also used to ensure that data is made available and accessed through the higher education institutions's websites. Help desk was also established to be another mechanism being adopted to enhance information availability and accessibility as it is used for logging calls regarding issues that need attention or to be solved by the institution's clients or stakeholders. It is imperative to note that the use emails, My Access, blackboard, dashboard, website uploads and help desk to ensure information and data availability and accessibility is essential towards advancing the operational excellence efforts. This implies that ensuring that data and information is always available and accessible enables effectiveness and efficiency in the execution of tasks and activities which ultimately enhances operational excellency.

Furthermore, it must be noted that IMC influences operational excellence in the context of ensuring data and information integrity. It is pertinent to note that the mechanisms used

in higher education institutions to ensure data and information integrity, reliability, security and confidentiality provide the premise for positively influencing operational excellence. The findings showed that mechanisms used by institutions of higher education in South Africa to ensure data and information integrity, reliability, accuracy, timeliness, security and confidentiality are password and username encryption, limited data administrators, effective information distribution channels and code of ethics.

This study found that through the provision of password and username encryption to the customers, partners and stakeholders, data and information integrity, reliability, security and confidentiality can be attained. In addition, limited data administrators were found to be another mechanism adopted to uphold data and information integrity, confidentiality and security. The findings showed that data shared and the problems experienced by students and staff remain between the administrator, technician and the one being helped thus ensuring high levels of confidentiality.

Furthermore, effective information distribution channel is another mechanism being adopted within the higher education institutions to ensure high levels of data and information integrity, timeliness, reliability and confidentiality. The findings revealed that there are restrictions pertaining to who accesses the data in departments and its distribution thereof which establishes the premise for enhanced information capability management and ultimately operational excellence. Code of ethics was also noted to be another strategy being adopted where the findings showed that all the issues are grounded on ethics, and there are mechanisms in place to ensure that all parties abide by the code of ethics which provides the premise for data and information integrity, reliability, accuracy and security attainment. It is significant to note that this research has revealed that these mechanisms being adopted to ensure data and information integrity, reliability, accuracy, timeliness, security and confidentiality provides the basis for enhanced information management capability which ultimately augments operational excellence.

Furthermore, the mechanisms that enable the higher education institutions to identify the business needs and directions to follow within the digital information management

capability context provides the premise for augmenting operational excellence. The findings showed that the mechanisms being adopted to identify business needs and directions to follow are surveys, help desks, feedback and requisitions. Through surveys, information is obtained from customers which provides meaningful feedback that can be incorporated in decision making to enable sound decision making. In addition, help desks were found to enable the obtaining of comprehensive input regarding the needs or problems of customers through call logs and website interface which provides the premise for identifying the directions to follow.

Moreover, feedback obtained from surveys and help desks in the higher education institutions was found to be pivotal in the identification of the business needs and provides a platform for the identification of the needs and directions to follow. Additionally, the findings revealed that requisitions are another mechanism being adopted to identify the business needs and the directions to follow. This is so because requisitions were found to provide indications of what is required by various departments across the institutions which enable sound decisions to be made regarding the directions that ought to be followed. As a result, it is imperative to note that through surveys, help desks, feedback and requisitions, higher education institutions are able to identify the business needs and directions to follow which ultimately provides the premise for enhanced information management capability to augment operational excellence.

Furthermore, it must be noted that this study revealed that information management capability influences operational excellence through ensuring that the hardware and software are reliable and user friendly. This study found that the hardware and software user friendliness is ensured through updating consistency, support provision, need oriented procurement and established procedures and standards. Regarding updating consistency, the findings showed that higher education institutions ensure that the hardware and software is constantly up to date with the changing technological trends to enable the alignment with the volatile technological environment. In addition, through support provision, the findings showed staff and students are provided with support on the use of hardware and software to enhance the reliability and user friendliness both the hardware and software.

In addition, it was also revealed that need oriented procurement also ensures the user friendliness and reliability of hardware and software. This is so because mechanisms are in place to ensure that both hardware and software that are procured, are compatible to the needs of the customers or staff. to Established procedures and standards was found to be another approach through which hardware and software reliability is ensured in the higher education institutions. Through established procedures and standards, it is ensured that hardware and software are procured aligning with set standards and procedures from licensed suppliers.

Hence, this research has revealed that ensuring that hardware and software are user friendly and reliable enables the efficiency and effective execution of tasks which enhances the levels of productivity and operational excellence.

Moreover, mechanisms that the higher education institutions adopt towards ensuring that the hardware and software systems meet the current business needs and direction also provides the basis for rationalizing the influence of IMC on operational excellence. The findings showed that continuous upgrading and constant evaluation are the mechanisms being used by hardware and software systems to meet the current business needs and direction. With regards to continuous upgrading, it was found that hardware and software systems are continuously upgraded to ensure that they meet the current need of the institutional customers, employees and other stakeholders. In addition, it was also found that through constant evaluation of hardware and software systems, deviations are identified and corrective measures taken to ensure that hardware and software meet the current business needs and directions. Thus, when it is ensured that hardware and software meet the current business needs and directions through continuous upgrading and constant evaluation, the information management capability is boosted. When information management capability is boosted through hardware and software meeting current business needs, operational excellence is augmented.

However, it is also imperative to note that digital information management capabilities challenges pose a negative effect on the operational excellence efforts. This thesis revealed that there is a plethora of challenges that impede digital information

management capability implementation and these are inadequate infrastructure, lack of knowledge, manpower shortage, network problems and technological change resistance. Inadequate infrastructure was found to be a challenge impeding digital information management capability implementation. Within the inadequate infrastructure context, it was found that the absence of appropriate infrastructure that supports the implementation of the digital information management capability is detrimental to the effective implementation of such efforts and this adversely affects the realization of operational excellence.

Furthermore, lack of knowledge was also found to be another challenge that threatens digital information management capability implementation. The findings revealed that lack of understanding of the digital information initiatives is detrimental to the effective execution of tasks related to the implementation of digital information capability implementation. Ineffective implementation of information management capability efforts adversely affects the attainment of operational excellence. The findings also showed that the challenge of manpower shortage evidenced by the mismatch between the available human resources and the available tasks is unfavourable to the implementation of digital information management and operational excellence achievement.

Moreover, network problems were found to be another challenge threatening information management capability implementation. The findings showed that information management capability implementation is dependent on network connectivity, and its absence results in ineffective operations and the ineffectiveness of these operations is detrimental to the realization of operational excellence. Technological change resistance was found to be another challenge, thus resistance to adopt new technologies and the fear of change or alignment with the technological changes is an issue that negatively affects the digital information management implementation efforts and ultimately operational excellence. It is pertinent to note that these challenges that threaten and adversely affect digital information management capability implementation, affect a critical pillar of achievement of operational excellence in higher education institutions. This implies that ineffective implementation of digital information management capability

negatively affects the realization or the augmentation of operational excellence in higher education institutions.

7.2.2 Conclusion on Information Management Capability improvement by Digital Transformation strategies

With regards to objective 2: To determine the degree to which Information Management Capability is improved by Digital Transformation strategies, study found that the strategies being adopted by higher education institutions include continuous upgrading and constant evaluation of the hardware and software systems.

It is imperative to note that the findings revealed that continuous upgrading of hardware and software systems ensures that they meet the current need of the institutional customers, employees and other stakeholders. In addition, it was also found that hardware and software systems are constantly evaluated to ensure that deviations are identified and corrective measures are taken to ensure that hardware and software meet the current business needs and directions to improve the information management capability.

7.2.3 Conclusion on operational excellence framework

In line with objective 3: Develop a framework of Operational Excellence for South African higher education institutions, this research now focuses on the findings that were established to provide the premise for the development of the framework of operational excellence for South Africa Higher education institutions. It is imperative to note that the framework of operational excellence is developed within the following four facets: operational excellence, digital information management capability, customer management capability and process management capability.

Within the context of operational excellence, this study found that there are operational excellence perceptions, enablers and principles that underlie continuous improvement. This study found that in the higher education institutions, operational excellence is perceived as objectives achievement, effective task execution, effective service delivery, customer satisfaction, effective strategy implementation, synergy of units, governance and awareness of a bigger picture. The findings also revealed that the enablers of

operational excellence within higher education institutions are an enabling infrastructure, human resources, information technology infrastructure and knowledge. These enablers were found to be providing the premise for the realization of operational excellence in these institutions. In addition, within the operational excellence context, this study revealed that the principles that underlie continuous improvement in higher education institutions are commitment, hard work, honesty, integrity and cooperation. These principles provide the premise for ensuring that continuous improvement is realized in these higher education institutions.

Furthermore, in the context of digital information management capability, this study established the mechanisms used by higher education institutions to make the required data and information available and accessible to its suppliers or partners, customers and employees. The findings revealed that the mechanisms used are emails, My Access, Blackboard, Dashboard, website uploads and help desks. Additionally, within the context of information management capability, the mechanisms used to ensure data and information integrity, reliability, accuracy, timeliness, security and confidentiality were established and these are password and username encryption, limited data administrators, effective information distribution channels and code of ethics.

Furthermore, within the digital information management capability context, the findings revealed the current mechanisms that enables higher education institutions to identify business needs and directions to follow. These mechanisms are surveys, help desks, feedback and requisitions, and they provide the premise for enhanced information management capability and ultimately operational excellence. In addition, higher education institutions ensure that hardware and software are reliable and user friendly to enhance digital information management capability by adopting updating consistency, support provision, need oriented procurement and established procedures and standards.

In addition, this thesis revealed the mechanisms that the higher education institutions adopt towards ensuring that the hardware and software systems meet the current business needs and direction towards boosting information management capability

include continuous upgrading and constant evaluation. More so within the context of digital information management capability, it was revealed that there are challenges that impede the digital information management capability implementation efforts in higher education institutions. These challenges are detrimental to the implementation of digital information management capability and operational excellence.

Furthermore, within the customer management capability context, the findings revealed the ways in which the higher education institutions determine or target customers, customer groups and or market segments. These mechanisms used are institution enrolment/employment, department and position assessment, website users and need categorization.

These mechanisms provide the premise for higher education institutions to effectively determine or target customer groups or market segments. Additionally, mechanisms that the higher education institutions use to interact with customers towards the determination of key customer requirements including product or service features and their relative importance or value to customers' purchasing decisions for purposes of product/ service planning, marketing, improvements, and other business development were established. These mechanisms are department consultation, emails, website and telephone.

In addition, within the customer management capability, the methods that are used by the higher education institutions in keeping interactions with current methods that determine business needs and directions were established and these are workshops, surveys, help desks, emails and meetings. More so, the ways that the higher education institutions build relationships to acquire, satisfy, and retain customers and to develop new opportunities were established in this study and these are problem solving, criticisms and compliments.

Moreover, within the process management capability context, the findings showed the mechanisms that the higher education institutions use to manage key processes for product and service design and delivery and towards leading to business growth and success are teamwork, organizational excellency focus, key role players' deployment and process evaluation. It is imperative to note that based on these findings, the framework of operational excellence for South African higher education institutions is as follows.

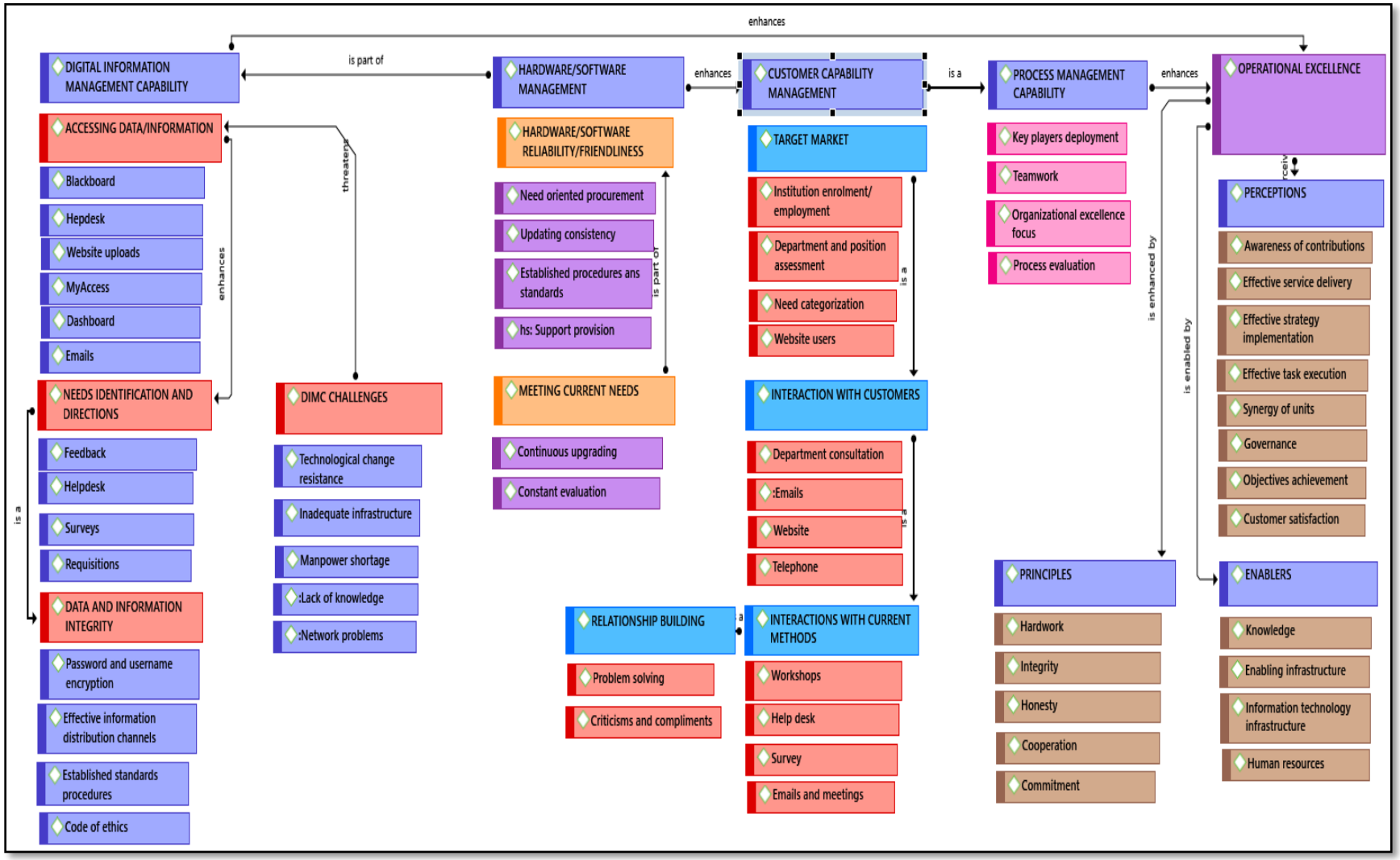

Figure 7.1: Digital Operational excellence framework

Source: Researchers' own construct.

7.3 Contributions of the study to the body of knowledge in the area of research

- From the gap found in the literature regarding information management capability and operational excellence in higher education institutions, this study has the potential to be the one that has identified the range of specific operational excellence perceptions, enablers and principles underlying continuous improvement. This study also has the potential to be the one that has established the following mechanisms used in ensuring information management capability within higher education institutions: data and information availability or access; data and information integrity, reliability, accuracy, timeliness, security and confidentiality; identification of business needs and directions to follow; hardware and software reliability and user friendliness; hardware and software complying with current business needs and directions; and the digital information capability implementation challenges thereof.
- The influence of information management capability on operational excellence identified and recorded by the researcher has the potential to pave way for future inquiry that could enrich and amplify information management capability and operational excellence discourse both for government departments and non-governmental organisations.
- The framework of operational excellence for South African higher education institutions that this study has established provides the premise for comprehensively understanding operational excellence in higher education institutions and its sustainability.

7.4 Implications for theory

The scholar acknowledges the works of pioneers in operational excellence such as Fork-Yew *et al.* (2013); Issar and Navon (2016); Aguilera and Ruiz (2019); Tallon *et al.* (2019) and Tijerina *et al.* (2019) for their immense contribution to the dictates of operational excellence.

However, the matter that needed to be addressed in academic debates was the assessment of information management capability and operational excellence in the higher education institutions in South Africa in both rural and urban settings. Hence

this study contributes immensely to the theoretical arguments pertaining to information management capability and operational excellence in the academic discourse.

The main theoretical contribution of this study is that of the influence of information management capability on operational excellence. The researcher would argue that she managed to determine that higher education institutions are not a homogeneous cohort in their information management capability and operational excellence experiences. The study has established the influence of information management capability on operational excellence and has established the degree to which information management capability is improved by digital transformation strategies. The study has also established that digital information management capability is faced with a plethora of challenges that have an adverse effect on operational excellence and these are inadequate infrastructure, lack of knowledge, manpower shortage, network problems and technological change resistance. It is pertinent to note that the study has developed a framework for operational excellence for South African higher education institutions which is essential in ensuring information management capability and operational excellence sustainability in these institutions.

7.5 Implications for practice and recommendations

It is hoped that this study would be of value to policymakers when they are designing and implementing policies to consider with regards to the sustainability of operational excellence in higher education institutions as this study has shown the essence and reciprocity of information management capability and operational excellence in institution of higher learning. Thus, a recommendation would be that policy makers should implement the necessary policies for higher education institutions on the consideration that they are not a homogenous cohort.

For higher education institutions, the recommendation is that they should ensure that digital information management capabilities are enhanced through the adoption of advanced digital technologies which will ultimately push the boundaries of education and enhance information management capabilities and ultimately operational excellence. There are plethora of challenges that have been noted in this study regarding information management capability implementation in higher education institutions, for instance, manpower shortage. This implies that for the implementation

of digital information management capability as an essential element of operational excellence, higher education institutions must ensure that there is adequate manpower to enhance the implementation of operational excellence efforts. Another recommendation is that higher education institutions must ensure that they provide the enabling infrastructure such as fast connectivity and up to date hardware and software to enhance digital information management capability. Operational excellence dictates must be embedded among the staff and students in higher education institutions and to achieve this operational excellence; workshops, webinars and seminars must be arranged to ensure that everyone is made aware and knowledgeable of the operational excellence dictates which enhance its realization in these institutions.

In addition, the higher education institutions and policy makers should consider the adoption of the framework of operational excellence developed in this study which provides the premise for ensuring the sustainability of operational excellence efforts within the education arena.

7.6 Limitations for the study and directions for future research

This thesis suffered from some limitations:

- The scope of the study was restricted to selected South Africa higher education institutions, and therefore findings might not be generalizable to other areas in South Africa or beyond – to the rest of Africa and/or other developing countries/emerging economies. Nevertheless, some generic conclusions might be derived from the study, albeit with extreme caution.

7.7 Directions for future research

The research findings have the potential to be of value to other researchers in understanding the information management capability and operational excellence dictates. In this regard, the research has provided a window into the influence of information capability management on operational excellence and operational excellence efforts in higher education institutions. The possibility exists of conducting a replicate study within other South Africa higher education institutions. This could help to assess the similarities and differences of operational excellence dictates in different contexts. It is hoped that some of the future research could be conducted using

different methodologies such as quantitative where the views of a wider sample can be obtained to enable a comprehensive understanding of operational excellence dictates.

7.8 Conclusion

This chapter presented conclusions and recommendations based on both the literature review and the findings from this study. The research problem was resolved and the contribution of the study was indicated. Conclusions of the research objectives and directions for future research were provided in this chapter. The operational excellence framework for South African higher education institutions was established. This chapter marks the end of the thesis.

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Appendices

Appendix A:Research budget

Item	Description	Amount	Motivation
Assistance *(Type)* Two (2) Research Assistants _____ Editing	2 Assistant (Masters level) For data collection Proposal (R38-00 per page x 40 pages) and Thesis (250 pages x R38 per page)	R 2500-00 each x 2 assistants= **R5 000, 00** **R11 020, 00**	Collect data & transcriptions Clarity, credibility and professionalism
Consumables *(specify)* Phone (Airtime/ Data) Tape recorder cassettes Exam Pads Black Pens	Data collection purposes	Air time **R300.00** Exam pads (10), **R400.00)/pack,** Pens (10), **R100,00/ pack.**	For gathering data and recordings
Travelling Expenses *(specify)* Interviewing respondents Traveling to external libraries Distributing questionnaires	Trip to Gauteng R3.30 x 1100 km (to and fro) for data collection Trip to Durban R3.30 x 2 120 km (to and from) for data x collection Trip to Cape Town R3.30 x 3 900 km (to and from) for data collection	**R3 630, 00** **R6 996, 00** **R12870, 00**	Permission to conduct research Questionnaires distribution Conducting interviews Collecting data Confirming data
Subsistence *(specify)* Researcher and 2 Research Assistants	Accommodation for 8 days	8 days x R600\ day 3 (Researcher and 2 assistants) **= R14 400, 00**	Data collection
Printing *(specify)* Printing of copies Printing of final research Printing questionnaire copies	Printing of copies for spiral binding	250 pages x 6 x R4.50\ page = **R6750.00**	Copies for school

	Printing of final research for hard copy binding	250 pages x 6 x R4.50\ page = **R6750.00**	
Other *(specify)* Data coding Spiral binding Hard copy binding	Data coding for analysis purpose by a qualitative specialist Thesis binding	**R4000-00** Spiral, 6 x R150.00 = **R900.00** Hard copy, 6 X R300 =**R1800.00**	For data Analysis
Total		**R74 916**	

Appendix B:Ethics approval certificate

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mrs MR Maphangwa

STUDENT NO:
9805404

PROJECT TITLE: **Information Management Capability and Operation excellence of Selected Higher Education Institutions in South Africa.**

PROJECT NO: SMS/20/BMA/02/1108

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof NM Ochara	University of Venda	Promoter
Prof T Ngqondi	UMP	Co - Promoter
Mrs MR Maphangwa	University of Venda	Investigator – Student

Type: Doctoral Research
Risk: Minimal risk to humans, animals or environment
Approval Period: August 2020 - August 2023

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, .the project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project,
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately,
  - New institutional rules, national legislation or international conventions deem it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: June 2020

Name of the RESSC Chairperson of the Committee: Prof Takalani Mashau

Signature:

Director Research and Innovation

Signature: .....

UNIVERSITY OF VENDA
OFFICE OF THE DIRECTOR
RESEARCH AND INNOVATION
2020 -08- 11
Private Bag X5050
Thohoyandou 0950

PRIVATE BAG X5050, THOHOYANDOU, 0950, LIMPOPO PROVINCE, SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9060
"A quality driven financially sustainable, rural-based Comprehensive University"

Appendix C:Request for the permission to conduct a study research

University of Venda

==========

30 May 2022

Dear Sir/Madam,

RE: REQUEST TO CONDUCT RESEARCH INTERVIEWS
TOPIC: OPERATIONAL EXCELLENCE OF INSTITUTIONS OF HIGHER LEARNING IN SOUTH AFRICA

I am a postgraduate student and lecturer in the School of Management Sciences of the University of Venda. My doctoral research studies is, "Information Management Capability and Operational excellence in selected Higher education institutions in South Africa".

I hereby request for a consent to conduct interview in your institution/department.

The purpose of my doctoral research is to assess information management capability and operational excellence of the selected Higher education institutions in South Africa. Information management capability is developed from the resource-based view. This is the very first national and comprehensive survey focusing on information capability and operational excellence in South African universities and my expectation is that there will be some interesting insights emerging from this study. The specific objectives of the study are as following:

1. To determine how Information Management Capability influences Operational Excellence.
2. To determine the degree to which Information Management Capability is improved by Digital Transformation strategies.
3. Develop a framework of Operational Excellence for higher education institutions in South African.

If you are interested in the results from this study, you are welcome to request a copy of the final report by supplying your name and email address at the end of the interviews. Any queries regarding the interviews or the overall study can be directed to the undersigned or to the thesis co-promoter, Prof. T Ngqondi at ngqondit@cput. ac.za and/or thesis promoter, Prof. NM Ochara at muganda.ochara@univen.ac.za.

Please be assured that this information is sought for research purposes only and your responses will be strictly confidential. No individual's responses will be identified as such and the identity of persons responding will not be published or released to anyone. All information will be used for academic purposes only. Your participation is entirely voluntary, and the interview responses will be treated completely anonymous.

Your consideration will be highly appreciated.

Sincerely,

Rejoyce Maphangwa
Lecturer & Doctoral Candidate, University of Venda
Mobile : +27-82 300 4758/+27-082 677 1540
Email : mbonisenimaphangwa@yahoo.com

Appendix D:Permission to conduct interviews Mpumalanga

UNIVERSITY OF MPUMALANGA

Creating opportunities

Private Bag X11283, Mbombela, 1200
Cnr R40 White River Road & D725, 013 002 0001, www.ump.ac.za

10 November 2019

LETTER OF CLEARANCE FROM UNIVERSITY OF MPUMALANGA RESEARCH DIRECTORATE

This letter is to confirm that the Doctoral student Mrs MR Maphangwa, studying at University of Venda, is granted permission to conduct a research titled:

Information Management Capability and Operation Excellence of Selected Higher Education Institutions in South Africa

I hereby confirm that I am aware the study involves conducting interviews of the following:

- Head of IT and Systems
- Head: Systems and Operations
- System support services
- Head Information Management
- Head Human Resources
- Student representative
- Head Academic

Mrs Maphangwa is granted permission to carry out this study under the following conditions.

1. Sensitive information be shared with UMP Management
2. Ethical principles be upheld

Yours faithfully,

Prof Phindile Lukhele- Olorunju
Director Research Management

Appendix E: Permission to conduct interviews Univen (copy of email)

Good Day Mrs Maphangwa MR

You can conduct interviews with the ICT department.

Kind regards,

Sam Khoza
ICT Director
University of Venda
P/bag x 5050
Thohoyandou
0950
Tel : 015 9628102
Fax : 0865828196
Mobile : 0722491288
Email: Sam.khoza@univen.ac.za

Creating Future Leaders

Appendix F: Letter of information

Title of the Research Study: Information Management Capability and Operational Excellence in the selected higher education institutions in South Africa

Principal Investigator/s/ researcher: (Maphangwa Mboniseni Rejoyce

BCom, BCom (Hons) MCOM

Co-Investigator/s/supervisor/s: (Prof. Nixon Muganda Ochara and Prof. Thembisa Ngqondi)

Brief Introduction and Purpose of the Study:

Outline of the Procedures: (*Responsibilities of the participant, consultation/interview/survey details, venue details, inclusion/exclusion criteria, explanation of tools and measurement outcomes, any follow-ups, any placebo or no treatment, how much time required of participant, what is expected of participants, randomization/ group allocation*)

Risks or Discomforts to the Participant:

The overall level of risk to subjects in evaluating the proposed research in accordance with the conditions outlined in the ethical principles of research is considered. An examination of the research plan, research design and methodology in order to determine that there are no inherent flaws that would place research the subjects at discomfort is done. The researcher will use data monitoring plan and protect the subjects' confidentiality by using coded data. This will minimize discomfort or risks to participants. Failure to minimize the risks will result in the protocol being disapproved as written (*Description of foreseeable risks or discomforts to for participants if applicable e.g. Transient muscle pain, VBAI, post-needle soreness, other adverse reactions, etc.)*

Benefits:

The participant will provide information, and it will be analysed and used to come up with policies that will solve problems in the community, and this means that the

participant will have a vital role to participate in the promotion and improvement of the general welfare of the society. The researcher will use the information to advance knowledge, to acquire academic qualification, to prepare research papers and publish them on accredited journals.

(*To the participant and to the researcher/s e.g. Publications*)

Reason/s why the Participant May Be Withdrawn from the Study:

The research participants will participate at their own free-will in terms of the ethical considerations. They will not be forced to participate, they can withdraw if they want, and there will be no adverse consequences for the participant should they choose to withdraw.

(*Non-compliance, illness, adverse reactions, etc. Need to state that there will be no adverse consequences for the participant should they choose to withdraw)*

Remuneration

The participants will fill the questionnaires and be interviewed without monetary gain. They will not be paid for their responses.

(*Will the participant receive any monetary or other types of remuneration?)*

Costs of the Study: No, the participant will be expected to cover any costs towards the study

(*Will the participant be expected to cover any costs towards the study?)*

Confidentiality:

According to Section 14 of Chapter 2 of the Constitution of the Republic of South Africa, 1996 of the Bill of Rights, everyone has the right to privacy and such right must be respected and not violated. In this study, the privacy of participants will be kept safe and participants are free to refuse to give information they deem fit not to deliberate on. Safeguarding information is very important because it creates a better relationship of trust and respect between the researcher and the participants. In this study personal information of the participants will be secured and only the researcher, the participants

and the researcher's supervisor will have an access to the participant's information. Participant's responses will be treated with confidentiality. This will be done by informing all participants that only the researcher and her supervisor will have an access to the answers.

(*Description of the extent to which confidentiality will be maintained and how will this be maintained*)

Research-related Injury:

This research will not expose the research subjects to danger or injury. The research will be basically concerned with investigating governance and developmental government with specific reference to Vhembe District Municipality. It will look for information from the political office bearers, officials, non-governmental organisations, traditional leaders, and the community. This research will avoid any situation that can bring injury to the research participants. Research subjects have a right to seek redress for their injuries through the legal system in case of danger or injury, and this is what must be avoided by the researchers, and their assistants.

(*What will happen should there be a research-related injury or adverse reaction? Will there be any compensation*?)

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher, Maphangwa MR Cell No. 082 677 1540/082 300 4758, my Promoter, Prof NM Ochara Tel No. 015 762 8707/081493 8478 or the University Research Ethics Committee Secretariat on 015 962 9058. Complaints can be reported to the Director: Research and Innovation, Prof GE Ekosse on 015 962 8313 or Georges Ivo.Ekosse@univen.ac.za

Appendix G: Informed consent

TOPIC: INFORMATION MANAGEMENT CAPABILITY AND OPERATIONAL EXCELLECE OF THE SELECTED HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA.

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, (Maphangwa Mboniseni Rejoyce), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: SMS/20/BMA/02/1108,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full name of participant: _____ (Please print)

_____ _____ _____
Signature Date Time

(*Name of researcher*) herewith confirm that the above participant has been fully Informed about the nature, conduct and risks of the above study.

Researcher's name: _____ (Please print)

_____ _____
Researcher's signature Date

Full name of witness (if applicable): _____ (Please print)

_____ _____
Witness's signature Date

Full name of Legal Guardian (if applicable): _____ (Please print)

_____ _____
Legal guardian's signature Date

Appendix H:Case study interview schedule

A. Interviewee Demographics

1 Please provide the following information:

Position:	
Organization/Department:	
Address:	
Date of Interview:	
Venue:	
Duration (Hours):	
Language used during: interview	
Interviewer:	

2. Education and Training:
   _____
3. Age: _____
4. Gender
   (Male/Female):_____
5. Career:
   i) Number of years with the organization/Department/Ministry:
   _____
   ii) Previous positions (in organization, elsewhere):
   _____
6. What is your experience level with ICT in general and e-Government Systems?
   _____
   _____
   _____
   _____
   _____
7. How would you describe your role in the development of Information Management Capability in your institution/Department?
   _____
   _____
   _____
   _____

B. Operational Excellence:

1. How is Operational Excellence viewed/perceived/conceptualized in the organization? Explain.
   _____
   _____
   _____
   _____

2. What are some of the enablers of Operational Excellence in your Organization? Explain.

_____
_____
_____
_____
_____

3. What principles underlie your Continuous Improvement efforts? Explain.

_____
_____
_____
_____
_____

C. Digital Information Management Capability

1. How do you make needed data and information available? How do you make them accessible to employees, suppliers/partners, and customers, as appropriate?

_____
_____
_____
_____
_____
_____

2. How do you ensure data and information integrity, reliability, accuracy, timeliness, security, and confidentiality?

_____
_____
_____
_____
_____

3. How do you keep your data and information availability mechanisms current with business needs and directions? Explain.

_____
_____
_____
_____

4. How do you ensure that hardware and software are reliable and user friendly?

_____
_____
_____
_____
_____

5. How do you keep your software and hardware systems current with business needs and directions?

_____

_____
_____
_____
_____

6. What are the main challenges of Digital Information Management capability implementation?

_____
_____
_____
_____
_____

D. Customer Management Capability

8. How do you determine or target customers, customer groups, and/or market segments? How do you include customers of competitors and other potential customers and/or markets in this determination?

_____
_____
_____
_____
_____

9. How do you listen and learn to determine key customer requirements (including product/service features) and their relative importance/value to customers' purchasing decisions for purposes of product/ service planning, marketing, improvements, and other business development?

_____
_____
_____
_____
_____

10. How do you keep your listening and learning methods current with business needs and directions? Explain.

_____
_____
_____
_____
_____

11. Describe how your organization builds relationships to acquire, satisfy, and retain customers and to develop new opportunities. Describe also how your organization determines customer satisfaction.

_____
_____

_____
_____
_____

E. Process Management Capability

12. Describe how your organization manages key processes for product and service design and delivery?

_____
_____
_____
_____
_____

13. Describe how your organization manages its key processes that lead to business growth and success.

_____
_____
_____
_____
_____

Thank you.

Appendix I: Proof reading letter

Office No. 06

Department of English, Media Studies and Linguistics

University of Venda

P/Bag X 5050

Thohoyandou

0950

04 February 2022

To Whom It May Concern

This serves to confirm that I proof-read and edited the PhD thesis titled 'Information Management Capability and Operational Excellence of Selected Institutions of Higher Education in South Africa' by Maphangwa Mboniseni Rejoyce, Student Number: 9805404.

Regards

NV Demana

Vincent N. Demana

University of Venda
Department of English, Media Studies and Linguistics
Faculty of Humanities, Social Sciences and Education
University of Venda
Tel: +27- 015 962-8363 Cell: +27-739912237
E-mail: Vincent.demana@univen.ac.za
Website: Website:http://www.univen.ac.za/
A quality driven, financially sustainable, rural-based comprehensive university

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mrs MR Maphangwa

STUDENT NO:
9805404

PROJECT TITLE: Information Management Capability and Operation excellence of Selected Higher Education Institutions in South Africa.

PROJECT NO: SMS/20/BMA/02/1108

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof NM Ochara	University of Venda	Promoter
Prof T Ngqondi	UMP	Co - Promoter
Mrs MR Maphangwa	University of Venda	Investigator – Student

Type: **Doctoral Research**
Risk: **Minimal risk to humans, animals or environment**
Approval Period: **August 2020 - August 2023**

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, .the project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project,
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately,
  - New institutional rules, national legislation or international conventions deem it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: June 2020

Name of the RESSC Chairperson of the Committee: Prof Takalani Mashau

Signature:

Director Research and Innovation

Signature: .....

UNIVERSITY OF VENDA
OFFICE OF THE DIRECTOR
RESEARCH AND INNOVATION
2020 -08- 11
Private Bag X5050
Thohoyandou 0950

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950| LIMPOPO PROVINCE| SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9080
"A quality driven financially sustainable, rural-based Comprehensive University"