Cape Peninsula
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A Digital Governance Platform for Knowledge Management and Sharing at a university in the Western Cape

by

XOLANI BONGANI VANDA

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Supervisor: Dr Boniface Kabaso
Co-supervisor: Prof Michael Twum-Darko

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DECLARATION

I, Xolani Bongani Vanda, declare that the contents of this thesis represent my own unaided work and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed Date: 15th November 2022

ABSTRACT

In this digital era, many organisations generate a lot of information that is often not captured or easily available. Institutions generate data or information that is not managed and or shared among them due to a lack of an information sharing and management system in place, resulting in the loss of quality, value and new knowledge. Also adds to a reduced response time, and increased workload among Knowledge Workers (KW) and Knowledge Experts (KE). Salari (2022) says with the increased use of the internet, there is a lot of information that can be used, examined, and used to make important decisions for the development of the organisation (Salari, 2022). It is common for organisations to have strategies to help them manage their process and information flow and measure the efficiency of the services provided. Milakovich (2021) says digital governance provides strategies to apply advanced technologies to manage remote workforces, measure performance and improve service delivery (Milakovich, 2021). To improve or be responsive to service delivery the organisation has to consider the concerns of their stakeholders in relation to the solutions it intends to implement. Ansell and Trondal (2018) says effective governance entails balancing continuity and stability on the one hand with adaptability and experimentation on the other (Ansell & Trondal, 2018). In Higher Education Institutions (HEI), the community needs to access the generated information in an efficient fashion and commonly would request it from the frontline Knowledge workers (KW), who feel overwhelmed by the number of requests for information, while they have other substantive duties to fulfil. The research aims to determine whether an automated Knowledge information system with IM reduces the KEs and KWs workload and improves the organisation's response time to clients. The purpose of introducing a Knowledge Management System (KMS), is for the organisation to systematically retain knowledge and retrieve it easily when needed (Rizal & Harib, 2018).The research is looking at the implementation of an Information Management System (IMS), as a case study at a university to determine by observation if the deployed open-source customer support ticketing system will help to reduce the workload increase the KW are complaining about, while allowing the institution to record and capture new knowledge that can be vetter and authenticated by the Knowledge Experts (KE). This is a qualitative study, collecting empirical evidence that will be measured by looking at the number of queries or tickets received for requested information versus the time taken to resolve the queries by the KW. At the same time looking at the generated knowledge that will be vetted and authenticated by the KE and observe if it contributes to the amelioration of the workload and Institutional Memory (IM). The findings show there is merit in the argument of the KW that they have an increased workload. By implementing the Information Management System (IMS) through the Service Desk platform, OsTicket has gathered enough data to indicate the volume of work the KW has dealt with and the differences between the workload of the KW and the KE.

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My children for being a constant reminder of what my life project is all about – which is them. Looking at them is a constant reminder that giving up can never be an option for me.

To my mother, thank you for your constant prayers, support, and encouragement. Your faith in God is the light in my darkness.

To my father, who is your typical African man, one of few words, but is always enthusiastic when he sees anyone of his children progress in life. Like any son, it always feels good to know that you have measured up to your old man in any small measure.

Above all else, my greatest thank you of all is to our father who sees all and created all. Through his grace, the treasures are being revealed.

DEDICATION

This is dedicated to all four of my late grandparents, whom I had the privilege of having in my life for over twenty years. Something I took for granted at the time, thinking they would always be there.

Both of my grandmothers used to sneak money to me and made me promise not to tell anyone that they gave me money, especially my grandfathers.

Speaking of grandfathers, no man can ever wear a three-piece suit, polished shoes and gentleman's hat tilted to the side to complete the look as they swaggered with no walking stick, as they would always say, "a walking stick is for old men, I am not yet old".

These were different individuals, but they all shaped my life in a profound way that makes me wish to see and hear their approval one more time.

They are one of my greatest treasures whose quiet strength I pray remains the fuel that keeps me going to the next summit of my journey.

For (whomever)

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

With the easy availability of mobile devices and affordable bandwidth, there has been a proliferation of sharing perceived expert information, from sources that have not been vetted or established as reliable or tested in specialised closed communities, where the players need experts and trusted knowledge to do their day-to-day work. Chetty et al. (2013) states that broadband penetration is increasing in South Africa, particularly on mobile devices (Chetty et al., 2013). They argued that the lack of empirical data made it difficult to measure the broadband performance metrics that would help users audit their connectivity cost and regulators to make informed decisions about policies. Seymour (2016) adds to the argument that broadband has the ability to improve the lives of citizens as it can help with ICT and improve the way they access education (Seymour, 2016). According to the 2019 Independent Communications Authority of South Africa (ICASA), an estimated average of 65% of households in South Africa had access to the internet(ICASA, 2019). In 2020 Statistics South Africa (Stats SA) released a report that showed the percentage of households with access to the internet in South Africa to be as high as 85,2% and the lowest at 58,4% (Stats SA, 2020). Everyday people generate data that is collected and analysed and can be used to improve the operation of institutions or organisations. Nisar et al. (2019) cite Bell and Grant (Bell, 1973, grant 1996), stating that the power of knowledge has become an important resource for organisations to develop expertise, solve problems, increase organisational learning, and initiate new situations for both the individual and the organisation now and in the future (Nisar et al., 2019). They qualify this statement by adding the observation, “the amplified velocity and dynamic nature of the new economy and advances in technology have created a need for many organisations to reconcile and utilise their knowledge to generate value over a sustained period”. Hupperz et al. (2021) punctuate the view, stating that modern businesses rely on efficient management of their data assets, and data management and analysis have become decisive success factors for organisations (Hupperz et al., 2021). The research observes the implementation of a Digital Governance Platform for Knowledge Management and Sharing at a university in the Western Cape, by identifying a department or unit within the university that serves as the case study for the research. Tiwari (2022) says the concept of digital governance contributes to the improvement and development of an organisation's social and work structures (Tiwari, 2022). Adding that it aims to ensure that digital businesses are mature and minimise the effort and costs associated. Williamson (2016) says educational institutions and governing practices are increasingly augmented with digital database technologies that function as new kinds of policy instruments, facilitating the generation, calculation and circulation of the data required (Williamson, 2016). Almeida et al. (2020) say governance should be viewed as an institutional solution to collective action problems, as the digital world is a complex undertaking, done in non territorial spaces with multiple actors and big cultural, political, economic, and social differences (Almeida et al., 2020). In the case of the research the collective action problem is around the need of the organisational community to access diverse and complex information that has been generated but not vetted and authenticated by the KW and the KE. The

research approach is qualitative as it observes the implementation of a customer support ticketing system to help the organisation manage queries for information and reduce the workload pressure felt by the KW and KE while enabling the institution to capture and generate new knowledge. According to Erkut (2020), it is the creation of a governance structure that involves people in decision-making processes and has a sustainable transition to digital governance (Erkut, 2020). Adding, that through digitisation people may have more power to change policies.

According to Galgotia and Lakshmi (2022), knowledge developed in academic institutions is not adequately preserved or gathered (Galgotia & Lakshmi, 2022). They base this on their research findings and add that it has been observed that the majority of knowledge developed in academic institutions is unknown to the general public and is categorised as literature review. They define Knowledge Management (KM) as the method of purposeful integration of humans, processes, and technology dedicated to developing, capturing, and executing an organisation's creative infrastructure. The aim will be to observe how the community shares information in a closed platform and generates reliable information that will be vetted by professionals in the organisation for its reliability and authenticity. The objective will be to find out if the implementation of the Knowledge Management System (KMS) will help to produce and or generate new knowledge while helping to ease the increased workload of the frontline knowledge workers (KW) who feel overwhelmed by the increased volume of queries from clients requesting access to information.

1.1 Background

Onwuchekwa (2011) says the value of information in organisations cannot be overemphasised, as volumes of information are generated, transmitted, and stored of such immense proportion that without adequate organisation, the retrieval process would be cumbersome and frustrating (Onwuchekwa, 2011). The amount of information generated daily by organisations would be difficult to access and use if it is not gathered and stored in an organised manner. Organisations generate data that can be used to know more about it and could be used in many ways that would be beneficial. Zakaria et al. (2015) say organisational learning and knowledge management have become established research fields in organisation and management studies (Bukari Zakaria & Mamman, 2015). Their journal paper focused on organisational memory loss in organisations and the need for organisational learning and this research will touch on those specific elements. Just like individuals learning through experience, the same can be said about organisational or institutional memory as records or data that can be used to inform decision-making in the future. Byrne (2014) says memories are as changeable as human memory, evolving in response to professional imperatives, community expectations and opportunity (Byrne, 2014). Additionally, those memories often lapse into myth and legend, extenuated from the original fact or occurrence but taking on the force of belief and ritual.

The research comes from the realisation that a lot of data generated by organisational employees

is not being captured as part of Institutional Memory, and decisions are often subject to the individual employee's recollection or memory. Some of the baseline information indicates that employees rely on anecdotal information that has been passed from person to person and or based on personal experience. The frontline staff members are often faced with queries from stakeholders in the community or clients who are seeking access to the organisational information, and they are without a clear route to follow in accessing the information without re-inventing the wheel, by starting the process of sourcing it again. Thus much of their time is consumed searching for information that already exists within the organisation. Some of the information being used is data gained from experience or learned knowledge by those who are at the forefront of the information process and sometimes used to make decisions that affect the whole community of people in the organisation or ecosystem.

In organisations, information is commonly shared among a group of people with a common concern and need to manage how the information is disseminated amongst themselves and their clients. This is a closed community of people with a shared need for reliable information that will help them in their daily function in their organisation. Often the frontline persons to process the information generated and or requested from them are usually your frontline staff who are the Knowledge Workers (KW). There often is no way of telling if the information is based on fact or presumptions, as it is common for the information to be acquired through online means due to the easy access to the internet and other forms of sources of data. This data is often not vetted by experts or Knowledge Experts (KE) in the field or area of work to authenticate its reliability.

1.1.1 Anecdotal information

It is a common occurrence that people would make decisions based on personal observation and learned experience. This understanding is often shared among people as factual information or knowledge without any empirical evidence to support its validity. Though there is evidence of research done on anecdotal information and anecdotal evidence, this is commonly taken from the humanities research study approach with varied or subjective definitions that speaks to the author or researcher's need or purpose. Enkin and Jadad (1998) say anecdotes are powerful tools that humans use to make decisions (Enkin & Jadad, 1998). They add that, despite their power and influence, they are misused and undervalued. Cubitt (2016) affirms that anecdotal evidence is nurtured in the humanities field, and states that its unique stance can teach researchers as much as statistical samples or hypotheses (Cubitt, 2016).

This means that anecdotal evidence can be used in research in the same or similar manner hypotheses are used in research, by allowing a scientific process to test its validity. This can be a quantitative method where information can be tested or experimented on to establish its reliability and authenticity through the KE. Alternatively, this could be a qualitative method where interviews and or surveys can be done to establish the veracity of the information.

Anecdotal information is typically the information people base on experience, where the phrase "this

is how we have always done it" trumps all reason. In an investigation conducted by Madathil and Greenstein (2018), they stated, "the availability of anecdotal information on the internet through social media and peer support groups has increased the risk of the dissemination of misleading information (Madathil & Greenstein, 2018) They found age, gender, educational level and public report usage, as significant predictors of consumer use of anecdotal information on the internet. People find it difficult to accept it when information contradicts their already established anecdotal beliefs. A lot of the information generated becomes knowledge that allows the KW to perform their duties in a manner that is arguably satisfactory to the clients of the organisation. Often the KWs have a better understanding of the organisational functioning, its processes and mostly what is best practice, as they share information among themselves. This is information shared often by word of mouth or conversation, email and other means that are not recognised nor form part of the official organisational means of communication, such as social media platforms. Through the interaction with their clients community members new data is generated but remains in the realm of the KW as undocumented information. This also means the information is not vetted and authenticated by the Knowledge Experts (KEs) who are specialists in the respective fields and often not tested.

1.1.2 Institutional Memory (IM)

Organisational memory (sometimes called Institutional or Corporate memory) is the knowledge accumulated from past experiences, which resides in the organisation and can be used towards making decisions. It is built through processes that facilitate information acquisition, integration, retention and retrieval (Bhandary*, 2016). It is the accumulated body of data, information and knowledge created during an individual organisation's existence. It is a knowledge tool for managing people and process in an organisation (Rizal & Harib, 2018). The KWs and Kes often use these tools as they proceed with their daily activities in the community or organisation with accumulated knowledge they may perceive to be logical or tacit knowledge and respond to direct instructions or requests as in their daily function without much consideration. Rizal and Harib (2018) state that tacit and explicit knowledge that is not captured is becoming a challenge for organisations these days as it is not preserved or retained (Rizal & Harib, 2018). Given the internal and external challenges facing organisations or institutions, the processes and systems associated with knowledge management could serve as a resource for performance improvement and greater levels of effectiveness and efficiency (Marsh, 2016). The tacit knowledge regarded as anecdotal that remains undocumented, tested, vetted and authenticated, is a loss to the organisation as their IM, resulting in the regeneration of knowledge that is also in existence within the community but remains undocumented and or validated.

1.1.3 Increased workload

When information or knowledge is not captured as part of the institution, it opens up a gap for the regeneration of information, adding to the time value or workload increase for those who have to process the information, who are often the frontline KW. The process is repeated every time a client enquiries about the same topic or process. Knowledge of how a matter is resolved is lost and has to be regenerated with a set of new challenges, adding to the workload of the frontline KWs and KEs because they have to repeat the same processes. When a KW moves or leaves the institution, they leave with the information and knowledge they have generated as anecdotal or tacit knowledge, and at times with explicit knowledge of the institutional processes. This means that the next or replacement KW and or KE will take more time to acclimatise to the environment and generate or acquire the knowledge.

1.1.4 Challenges

A lot of time is spent by KWs and KEs generating and locating knowledge in the institution that already exists but is not captured in a fashion that makes it accessible to the benefit of the client or community. It is difficult and time-consuming to access as it is often undocumented. Some of the knowledge is localised to individual staff who share it as anecdotal or tacit information that is not tested or vetted by KEs and is usually not authenticated. Available methods of capturing, sharing and analysing the data are inefficient, resulting in the loss of valuable knowledge and while valuable data remains untested as it is only shared among the KWs as anecdotal. This makes it difficult to determine the value and or reliability of the information and knowledge being used that informs the decisions taken by the institution and given to service its clients. The KWs and KEs through experience have a wealth of knowledge they have gained through time and are often invaluable, and can be a big asset if harnessed and managed appropriately. Many organisations and or entities generate information within areas of their function that could be useful in providing a better service that could benefit communities and organisations if the information is managed and shared in a manner that all who need it can access it. Often this data or information is localised to a few individuals who are KWs and KEs without being shared as a resource to the rest of the organisation or community. Many of the KW working in the community and organisation have an opportunity to observe the people they are serving and thus have first-hand information that could be of use to the rest of the community by providing an improved quality of service. With the advent of open source, these issues can be easily captured and managed.

1.1.5 Open source

Open-source software is software that users can run, copy, distribute, study, change, share and improve for any purpose (Randhawa, 2008). It does not have the initial cost of commercial software and makes it possible for institutions to have control of their data or information. Open-source technology can comprise software, hardware and hybrid solutions, enabling interoperability and reducing the capital costs of designing and implementing new solutions (Damjanovic-Behrendt & Behrendt, 2019). However, most people are not aware they are using open-source software and

cloud accounts for their personal use and data storage, including social media which by its nature stores valuable data that one could learn from about their community of friends and family. In the same vein, organisations are increasingly using open-source platforms as part of their communication strategy for easier communication that is more immediate and can help transmit messages, bringing about quicker action. Though some of these open sources are exposed and can pose a security risk for personal information, some are encrypted to offer some level of privacy.

1.2 Background to the research problem

Data, information and knowledge have increased within organisations over time. However, IM is lost or wasted through organisational staff attrition via retirement or seeking greener pastures. This could have a great economic or competitive advantage if the intellectual capital is used wisely. Time, money and energy are wasted when the same task, research and findings need to be done repeatedly (Rahah Hamidi & Jusoff, 2009). This has led to the KWs and KEs complaining of being overloaded as they often have to repeat work already done due to IM not being captured or recorded, thus constraining their time for completing other tasks.

There are limited contributions in understanding knowledge sharing in HEIs when compared with other sectors (Al-Kurdi et al., 2018). In a university setting, a lack of knowledge sharing could be alarming since universities are considered knowledge-intensive organisations, and this would impact research output and teaching activities. Findings suggest that there is disproportionately little knowledge-sharing research in HEI compared to the commercial sector. The review revealed that existing research on HEIs does not consider the determinants of knowledge-sharing culture comprehensively. Research on knowledge sharing in commercial and HEI in developing economies like Africa, the Middle East and South America was found to be limited (Ali et al., 2014)

1.3 Research Problem

Organisations generate a lot of data or information that is not managed and or shared within them due to a lack of an information sharing and management system in place. As a result, quality and value along with new knowledge are often lost and not shared with its stakeholders.

Furthermore, KWs complain about overloading as they have to regenerate knowledge that already exists within the organisation, making it a laborious and time-consuming exercise as it adds to their daily workload. A lot of information or learned knowledge is not recorded and lost to the organisation, while some are regarded as anecdotal or tacit knowledge as it has not been tested or authenticated by KE. Much of the generated knowledge is localised with individuals not benefitting the rest of the organisation.

When the newly generated knowledge is not captured, analysed and authenticated by the KE the

organisation and its clients do not benefit from it, and they may not be able to offer better and improved quality of service gained from the vetted information or knowledge. The KW and KE generally through experience have a wealth of knowledge they have gained through time and is often invaluable which can be a big asset if harnessed and managed.

By introducing an information sharing and data management platform, the organisations and or communities would be in a better position, as the quality of the service provided would improve and save lives or improve the quality-of-service experience by the communities.

The research will observe the introduction of an information sharing and management system that allows for the organisation to be able to capture, analyse and vet information by KE in the organisation and allow for answers or knowledge to reach clients inquiring without always going to the KW, thus decreasing the workload experienced by the KW and KE, while the organisation can capture and authenticate new Knowledge generated.

1.4 Problem statement

Organisations generate a lot of data or information that is not managed and or shared among them due to a lack of an information sharing and management system in place, resulting not only in the loss of quality and value along with new knowledge but also an increased workload among Knowledge Workers (KW) and Knowledge Experts (KE). Asrar-ul-Haq and Anwar (2016) state that knowledge is the lifeblood of the organisation, and it must be managed like other assets in the organisation (Asrar-ul-Haq & Anwar, 2016). The information must be shared within the institution's community, as the lifeblood needed to sustain the organisation. North and Kumta (2018) state that the specific set of knowledge and competence of organisations supports their ability to offer unique products and services and enables operational effectiveness in creating customer value (North & Kumta, 2018). For organisations in the higher education sector, access to knowledge is important. However, the sharing is subject to the members of that community understanding the importance of sharing the accumulated information. Al-Kurdi et al. (2018) found that there are limited contributions to understanding knowledge sharing in Higher Education Institutions (HEI) when compared with other sectors (Al-Kurdi et al., 2018). To encourage information sharing, there is a need to introduce an information-sharing mechanism that will help to ease the workload increase for the KW and the KE. For this reason, there is a need to test the hypothesis that the introduction of a knowledge management platform does not mitigate the problems created by the lack of it.

1.5 Rationale and significance of the study

This research pays close attention to this learned or new knowledge as it is vetted by the various experts in their respective fields of knowledge, then disseminated to the organisation to use or implement to improve the service provided and increase client engagement and interaction.

Essentially the study observes the online client support system and evaluates how this helps improve the organisation's business activities.

These experiences allow the experts in the field and or sector to study the effectiveness of their theoretical or learnt knowledge and measure it against the practices, and manage the new data being generated. The data collected and or generated is first vetted by professionals and industry experts in that sector, ensuring that the information being shared is managed properly and does not result in harm risk to the users or clients.

1.6 Aims and objectives

Appropriately formulating research aims and objectives is one of the most important aspects of the thesis, as they determine the scope, depth and overall direction of the research (Dudovskiy, 2018). The broad perspective is the deployment of the customer support ticketing system that collects data as queries submitted to the KW by the university community. This is a qualitative approach that collects the queries as empirical data to be observed and analysed to determine the effectiveness of the ticketing system that has been deployed.

Aims and objectives are the foundation on which the thesis is built, written in a short and easy-to-understand manner (Lempriere, 2019). Based on Lempriere (2019) the thesis aims to give scope and direction that will be taken while painting an overall view of the depth that will be taken. Achievement of the research aim provides an answer to the research question (Dudovskiy, 2018). The two-author statement, in summary, aims and objectives give the trajectory of the research thesis and how it intends to achieve what it promises. This is in two parts, where the aims indicate the general idea of what the research project intends to do and the objectives give the breakdown of how the research process build-up follows, indicating the divided parts or areas that are addressed separately. This view is further affirmed by Patidar, who "highlights how the researcher has to proceed, with clear, concise, truthful statements derived from the purpose of the study which provides direction to investigate" (Patidar, 2013).

The aim in this research is to gather empirical data that once analysed, supports or disputes the hypothesis. This is by measuring the time and volume of queries submitted in a monthly bases and observing the time taken to resolve the tickets. The same process is repeated for every month of the year in a period of three years and no less than two years. Taking note of times and seasons that might be an anomalies and observe how the affect the workload of the KW and the KE. The use of statistical analyses to draw a picture for ease of analysis to better articulate the findings.

1.6.1 Aim

The aim is to determine whether an automated Knowledge information system with IM reduces the

KEs and KWs workload and improves the organisation's response time to clients.

1.6.2 Objectives

The objectives for this study are to establish if the implementation of the IMS has any impact on the workload increase complained about by the KW and see if it helps the KE generate new knowledge in the university by vetting and analysing the captured data generated by the KW through the customer support platform OsTicket. This is done through a systematic literature review process that, according Nightingale (2009), systematic reviews aim to identify all studies that address a specific question and their methodology has been developed to minimise the effect of selection, publication and data extraction bias (Nightingale, 2009). To best demonstrate this, the research uses a conceptual framework that helps to draw or map its path. Van der Waldt (2020) says, conceptual frameworks serve as visual organising tools and mental maps to direct and guide research (Van der Waldt, 2020). Adding that, by using a descriptive approach the article aims firstly to outline the necessity, purpose, nature and scope of the conceptual framework. Secondly, provide a guide on the design. Taking the literature review, the research identifies other researchers who have done similar work and identifies gaps that have been identified by other researchers in the field or related. This includes noting research gaps that can be considered for future research.

The research takes a positivist research paradigm as its philosophy, as it uses a qualitative approach to collect and observe empirical data from the IMS that is deployed in the identified case study in the academic department of the university. According to Alharahsheh and Pius (2020), the positivist paradigm enables the researcher to have more statistical reliance and generalisation leading to development of universal findings (Alharahsheh & Pius, 2020). In their discussion they state, positivism is counted on the philosophical stance of natural scientists that is working with observable reality within society leading to production of generalisation. Park et al. (2020) affirm that positivist research does not always rely on quantitative methods, and give an example that experimental study examining the effects of an intervention through qualitative analysis fits within the positivist paradigm.

A hypothesis is drawn from the literature review findings, that will be the basis of the investigation, taking a qualitative approach to make observations while collecting empirical data or evidence that supports or disproves it.. Mukrimaa et al. (2016) state, a hypothesis is a prediction of the relationship between variables, and is proven through the disciplinary insights gained in the research process (Mukrimaa et al., 2016). Further says the researcher has to have read on the topic and is familiar with it before making a final decision. Making sure the topic is researchable in an interdisciplinary sense, there is sufficient published material on the topic in the literature. Shelke (2019) describes the hypothesis as helping to narrow the scope, bringing clarity, precision and focus in a scientific inquiry (Shelke, 2019). Adding, after framing a hypothesis the researcher needs to examine the variables and an association between the variables. The literature review has shown that

organisations have various IMS deployed in their institutions that serve different information needs and varied purposes and approaches to the use and functions of these systems. There are also a number of customer service desk platforms that are available and perform similar functions, thus this speaks to the variables noted by the above cited researchers and articles.

Looking at the formulated research problem and or question, the hypothesis is drawn as the following two:

H0: There is no significant relationship between the size of IM and the workload of KW and the response time of the system.

H1: The increase in the size of IM reduces the KW overload and overall response time.

Find a case study that is in-depth exploration in a real-life setting. Case studies are used in design research to analyse a phenomenon, to generate hypotheses, and to validate a method Teegavarapu (2008). According to Takahashi and Araujo (2020) a case study allows for numerous possibilities, and offers the researcher diversity rather than a monolithic research method (Takahashi & Araujo, 2020). Meaning it allows for either qualitative or quantitative research approaches.

In the process create a baseline for the study to assess the knowledge or awareness of the KW and organisation regarding the implementation of the information sharing and management platform.
Create a baseline study to assess the knowledge or awareness of the KW and or organisation concerning the implementation of the information sharing and management platform.
Find a suitable open source that will best serve the case study in the deployment of the application and identify the people, and track their use of the platform for the research data collection and analyses.
Do the data analysis by testing the hypothesis.

1.7 Research process

The research uses readily available information and makes a quantitative observation of the day-to-day organisational interaction with data obtained from various sources within. This is a collection of numerical data based on the received and observed complaints by KW and KE of the increased workload when clients submit their queries. The study used a sample population in a higher education sector in the Western Cape, South Africa, drawing from the staff members and clients seeking information from the KW in the organisation using the open-source online information sharing and knowledge management platform.

The data is collected from the open-source KMS, using the ticketing system, the opened queries, time is taken to resolve it and give feedback to the clients, and the report on the ticket status, preferably the closed state.

The research process is based on the diagram by Macilwaine (1978) and broken down into boxes as depicted to illustrate the process. This will unpack the research process, giving a map of how the research will unfold, as indicated by the boxes with red borders.

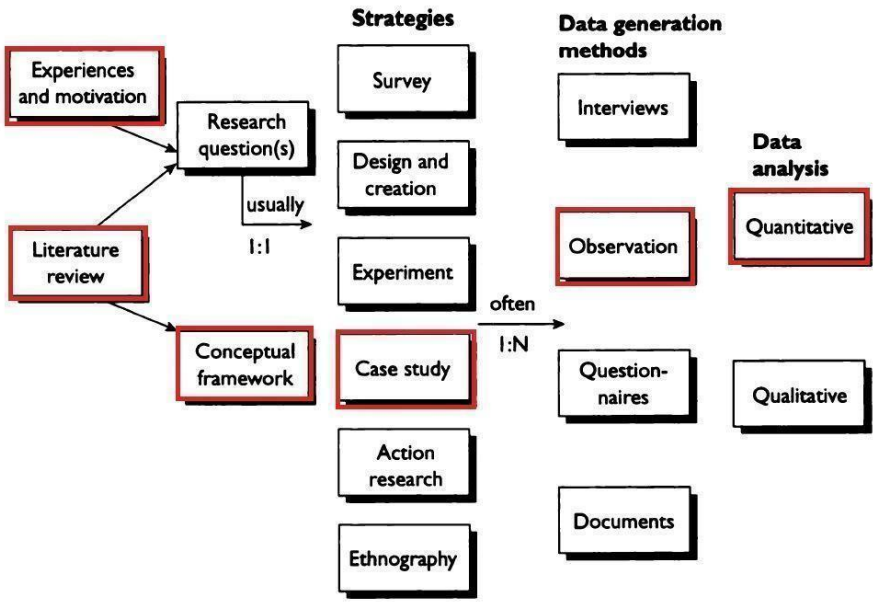


Figure 1.1: Research process workflow (Macilwaine, 1978)

1.7.1 Experiences and motivation

As data is generated daily by the organisation, a lot of it goes missing within the organisation as it is not captured or catalogued properly in any system easily accessible by the organisation and its users. Resulting in a loss of valuable information that could be of value to clients and the KW, including the KE, they would have more time to focus on other areas of their work.

Due to information not being captured and or stored using a system that allows for harnessing and accessing the data when KW receive queries from clients, they have to regenerate information that already exists in the organisation as it has not been catalogued They can not know if the information is reliable and can be shared without being detrimental to the organisation. Clients are not pleased that they have to wait for extended periods for information-based assistance.

Therefore, creating a need for an information-sharing and knowledge-management system that can assist the organisation to accessing and maximising its tangible and intangible knowledge resources. That is a platform to enable the organisation's end-users to share information that has been vetted by experts in the field or areas of specialisation by KE within the organisation. This system should be able to be accessed remotely or locally online and the information can be updated constantly as information is not static.

1.7.2 Research process literature review

Literature review in this process will assist in identifying other researchers who have done similar work and show what gaps were identified in their thesis, journal papers and conference proceedings. This helps to identify other possible research questions that could be useful for future research.

It will help to analyse other ideas, find relationships between different ideas and understand the nature and use of an argument in research (Hart, 1998). In his explanation, Hart (1998) discusses examples of how you analyse other researchers' ideas that constitute the body of knowledge on the topic of your research as you acquire an understanding of your topic.

A literature review is a summary and an evaluation of a specific topic (Knopf, 2006). In this light, the paper will take into consideration the body of knowledge as presented through the literature review process, analyse and summarise the common opinion of the researchers concerning their findings, identifying the visible gaps in the research areas of the topic being discussed.

1.7.3 Conceptual framework

The conceptual framework is more of a blueprint of the research project and speaks to how the topic will be unpacked. Going through the factors that will influence the choice of topic. Leshem and Trafford (2007) described the conceptual framework as an approach for fulfilling an integrated function between theories that explain the areas of investigation (Leshem & Trafford, 2007) further explained the conceptual framework as providing scaffolding within which strategies for the research design are determined and fieldwork can be undertaken. They offer an extensive explanation that conceptual framework offers the potential to shape the research conclusion within their respective theoretical context by providing traceable connections between theoretical perspectives, strategy, design, fieldwork and the conceptual significance of the evidence. Adom & Hussain, Emad.Kamil. and Joe.(2018) say it guides the path of the research and gives it the foundation for establishing its credibility, and is a mandatory requirement in a thesis as it shows the researcher's map of the study that is being undertaken (Adom & Hussain, Emad.Kamil. and Joe, 2018). The focus provided by the framework will also help to guide the researcher from deviating during the search for literature that supports or refutes their hypothesis or the assumption they might have and lead to the investigation they have taken. While searching or investigating, one would come across many articles that are curious to read and can easily confuse the focus of your research. Having a conceptual framework serves as a reference to the focus and or purpose of the investigation.

The diagram below is the basic conceptual framework for this research, demonstrating the information flow and interaction between the clients requesting information or knowledge, the platform and the relationship with the KW, including the KE and their respective roles in the research process.

The research seeks to understand through observation the interaction and process of the clients seeking access to information from the organisation through the frontline KW, and how this impacts

their time and workload. While also observing the implementation of a service desk system that will be used as a KMS, to manage the queries coming and the time taken for their resolution. Based on this framework, the research will measure the time taken by the clients to access the quested information using the deployed IMS, the open-source service desk called the OsTicket that will be the interphase between the client and KW, versus the time taken for the KW to gather the information that may not be readily available in the system or information repository or institutional repository (IR).

Chandran (2010) described IR as a concept that captures organised information or data, and manages collections of digital content generated by faculty, staff and students, made available through the internet and the intranet in the institution relevant to the users in a digitised format (Velmurugan Chandran, 2010). In this research, the captured data will be the gathered data from the KW in response to the submitted queries coming in as tickets from the OsTicket system of the service desk, shared and or escalated to the KE. It will be vetted for authenticity and reliability by the KE, experts in their respective fields before being shared or deposited in the IR.

Asadi et al. (2019) highlight the benefits of IR as enhanced visibility of the academic institution, improved teaching and learning, and research development by the scholars of the institution, as they were found to be the main benefits of IR (Asadi et al., 2019). They further discuss that IR has received considerable attention from researchers across disciplines as they have the potential to increase the public value, ranking and visibility of research in the relevant universities. However, they also point out that little effort has been made to systematically review and integrate the findings from previous research or to examine the current state of study regarding IR's.

However for this research, it will be limited to observing if the role that the IR will play will assist the institution in capturing and retaining IM, and see if that helps to reduce or ease the increased workload burden the KW have raised concern about.

1.7.4 Research question(s)

A research question essentially indicates what the research or thesis is about. Mattick et al (2018) say a research question is a question that a research project sets out to answer (Mattick et al., 2018). They add that most research questions will lead to a project that aims to generate new insight, but the target audience and the methodology will vary.

No one research paper or thesis can address all the questions. The researcher has to be aware of this and determine clear focus areas they wish to investigate and draw a research question or questions. So one would have to identify a problem worth investigating after having established that it has not been investigated or done before through a literature review or a lived experience. Majid (2017) says the problem has to be compelling and important to an audience (Majid, 2017). He

affirms several ways to find a research problem can be through personal observation, experiences, discussions with peers, and colleagues, learning and reflections from literature, etc. The research has observed that the KW feel overwhelmed by the number of queries for information from the clients seeking access to information that requires them to take time to seek and gather the information. Literature has shown there is not enough research being done at HEI that deals with KMS. Ferreira and Carayannis (2019) argued there is a need for Knowledge Transfer (KT) in universities due to globalisation and greater access to research data.(Ferreira & Carayannis, 2019). A lot of data is generated daily by the organisation, but it is not recorded or captured and organisations lose a lot of knowledge capital. Challenges in preserving knowledge in an organisation become an issue since tacit and explicit knowledge are not being captured (Rizal & Harib, 2018). Findings suggest that HEIs have disproportionately little knowledge-sharing research compared to the commercial sector. The review revealed that existing research on HEIs does not consider the determinants of knowledge-sharing culture comprehensively. Research on knowledge sharing in commercial and HEI in developing economies like Africa, the Middle East and South America was found to be limited (Ali et al., 2014).

Since the introduction of the CRIMS project has partly captured and generated new knowledge through the recording of IM, the research will look at the role of the KMS.

- What role and effect will the introduction of the KMS have on the workload of KW?
- Will it reduce or ease the workload burden experienced by the KW?
- What new knowledge will be generated by the KE, coming from the escalated queries the KW could not address?
- Has implementing the KMS helped to ameliorate the workload of the KW and the KE while increasing customer satisfaction by making information more accessible to them in the university?

1.7.5 Strategy

The strategy in this research project is to look at a way that can best answer the research question. This will be by way of a case study as the vehicle or subject of investigation. The case study will allow for the observation of an information-sharing and management platform that will be implemented in the organisation and study its effects on the processes taking place. It will allow for programme-based services to be studied in detail in a real-life context (Crowe et al., 2011). The case study will make it possible to observe the implementation of the information sharing and management system and how it impacts the workload of the KW and KE in the organisation and determine if the introduction of a mechanism for the retention of IM has an effective role or influence as well on the workload of the KW and the KE. Schoch (2020) defined a case as involving a detailed and intensive analysis of a particular event, situation or organisation (Schoch, 2020). In terms of

scope, a case study is an in-depth investigation of a contemporary phenomenon within its real-life context.

The Information Technology (IT) Department will be the case study subject, where it will observe the implementation of the ticketing system, analysing the data collected through the KW and the KE, and focusing on the number of queries received by the KW and the time taken for the resolution to the satisfaction of the client.

This will be a case study of the implementation of the open-source ticketing system in the IT Department of the FID at the CPUT as the subject of investigation in data capturing, analysis, evaluation or authentication. The aim is to find out if the workload of the KW is on a decrease with more efficient access to information by the client to the organisation's clients. A detailed insight into the data generation process as an information depository will be made available for data collection and evaluation by the KE, and in turn, made easily accessible to the clients who log in to the system online anywhere in the world.

1.7.6 Data generation method

Data will be generated through the deployment and use of the KMS, OsTicket, a help desk service platform that allows users to communicate with the organisational service desk through automated mechanisms or computers online. According to Rats and Pede (2020), these are software-based user support that offers an automated service desk solution to support users (Rats & Pede, 2020). They detail that OsTicket features include help topics, categories, canned response templates, search and embedded media and links.

Prasetio et al. (2021) found the application beneficial to the users and service providers as it helps improve services with well-documented reporting that is immediately accepted by all service provider members as it has an impact on the efficiency of the internal performance (Prasetio et al., 2021). They add that the application provides information about reporting problems reported by users, and there is a comment feature for communication between users and service providers. Data will be generated by observing the workload of the KW and KE in the organisation and the time it takes for queries to be resolved once received. Then the implementation of the information sharing and knowledge management system will be observed to ascertain the effect it has on the workload of the KW and the KE in the organisation, including the organisation's ability to generate and retain IM.

1.7.7 Data analysis

A quantitative data analysis approach will be used as the research will be to focus on the number of queries received by the KW and the time it takes for them to answer. The observation will include

the volume of work received or generated by the queries to establish if the hypothesis can be tested, that is to prove or disprove it. This will include the workload generated for the KE and how this influences or contributes to the IM. Thus the analysis will look at how the KE responds to the queries in the organisation and the time it takes for them to be resolved. Observing the implementation of the information sharing and knowledge management system will help in the generation of data and or information that, after being vetted by the KE, will be part of the IM. Part of the observation and analysis would be to work out a formula that will make a calculation to test the research hypothesis.

A statistician will be employed to assist in the analysis of the data and the use of various statistical data analysis tools such as Excel, Python and ANOVA. The statistician on what will determine the best tool.

1.8 Research area

The research area is on the implementation of the open-source information-sharing management platform, and observes the impact it has on the workload of the KW and KE while monitoring the capturing of IM and analysing how different areas are affected by the implementation of the system in congruence with the repository, focusing on time saved and client satisfaction based on the of closed queries. It will see if there is a change in the sharing of data in the organisation that will indicate the uptake or resistance to the implemented information-sharing management platform.

1.9 Research Methodology

There are different approaches or definitions of research methodology, which is often confused with research methods. According to Igwenagu (2016), research methodology is a set of systematic techniques used in research to guide on how to conduct research, by describing and analysing methods, throwing more light on their limitations and resources (Igwenagu, 2016). While Goundar (2019) describes it as the science of studying how research is to be carried out, using a systematic way to solve a problem (Goundar, 2019). “It is defined as the study of methods by which knowledge is gained”.

Mishra and Alok (2019) described research methodology as a research approach in which research troubles are thoroughly solved by scientifically studying how research is conducted systematically (Mishra & Alok, 2019). They differentiate research methods by including all the techniques and methods for conducting research. Walliman (2011) describes research methods as tools and techniques for doing research, an investigation that is intended to uncover new facts that have been rigorously carried out to reflect quality results (Walliman, 2011).

This research will address the research problem, that there is a lot of data being generated by the university which is not captured while the KW have complained of an increased workload due to queries submitted to them by clients. The request from the clients is usually basic access to

information that is not readily available, resulting in the KW being compelled to generate the information that exists in the university but is not being captured or stored. The faculty had implemented a pilot project called Customer Relations Information Management System (CRIMS), that in part dealt with queries submitted by the clients to the frontline KW, seeking access to service information. This is done through the launch and implementation of the online service desk system, which will aid the KW in the management of queries coming to them. The research will study the implementation of the IMS, systematically collecting and analysing the data received to establish if the system will reduce the workload of the KW. This will also find out if the KE can collect new data or knowledge that will be made available to the community of clients and find out if it contributes to client satisfaction by analysing the number of queries handled through the Information Repository (IR) automated to be accessible to the online client. The research aims to observe and analyse the implementation of the KMS, using a service desk ticketing system. The data collected through the system will be the bases of the research project and will take a quantitative research approach. This allows the researcher to keep the project subjects anonymous and focus on the number of tickets generated versus the time taken to resolve the queries.

This means the research will use a quantitative research approach to collect data. Samuels (2020) says quantitative data is factual information involving numbers and categories, focused on descriptive statistics testing as a common form of data analysis (Samuels, 2020). He further explained that statistics is an academic subject that involves presenting, interpreting and reasoning about summary quantities derived from data sets. Common statistical quantities are measures of middle values, such as average, mode and median, and measures of spread. The data used in the research will be taken from the online help desk system used as an IMS and will be analysed as described by Samuels (2020), to see if the implementation of the system, can demonstrate the workload and the workload increase experienced by the KW. Using this statistical analysis will also test the hypothesis.

H0: There is no significant relationship between the size of IM and the workload of KW and the response time of the system.

H1: The increase in the size of IM reduces the KW overload and overall response time.

The analysis will be used to prove or challenge the hypothesis and present factual statistical evidence based on the outcome of the collected data. Therefore, the research will present empirical evidence-based findings as described by Bouchrika (2021) as “any study whose conclusions are exclusively derived from concrete, verifiable evidence, guided by scientific experimentation using real-world evidence in investigating its assertions” (Bouchrika, 2021).

The aim is to determine whether an automated Knowledge information system with IM reduces the KEs and KWs workload and improves the organisations' response time to clients.

This will be done by collecting primary data from the OsTicket system deployed to help and assist in KM. The data will be observed and analysed to determine if the platform’s deployment has helped

ease the workload burden experienced by the KW and how much new information is being generated that can be vetted and authenticated by the KE for accuracy and reliability.

The ITD in the FID is the chosen setting for a case study as it is the only department that has launched the CRIMS project as a pilot. Making it ideal for the research to focus its activities. A case study is described by Schoch (2020) as involving a detailed and intensive analysis of the subject in the organisation(Schoch, 2020). In this instance, the subject is the deployed IMS through the OsTicket Service Desk platform that manages information and queries from clients. The research observes the processes by collecting data from the system and making evaluations, drawing statistical evidence that will show the workloads of the KW and the KE.

Bosu et al. (2019) say the service desk system ensures that organisations can manage these requests effectively whilst at the same time providing superior service to their clients (Bosu et al., 2019). They add that customer support staff, that would be the KW, are responsible for addressing requests received from clients. This claim will be measured using statistical results from T-test and the Paired T-test to show the averages or means of the volume of work addressed by the KW and the KE respectively. This will be measured in terms of days, months and years, focusing on the resolution times when the queries are submitted.

All data analysis will be done on the basis of testing, proving or disproving the hypothesis so it may draw a clearer picture of the work being done.

1.10 Experiences and motivation

At the Cape Peninsula University of Technology, Cape Town, KW has complained that the number of queries received from clients adds to their workload as they have to dedicate time and resources to find or regenerate information and gather it from other departments at times. Often this is information and or knowledge already existing in the organisation and among organisational employees. A lot of the existing knowledge has to be regenerated as no clear or accurate records are kept and there seems to be no explicit data sharing in the organisation. Most of the shared knowledge is shared among colleagues who work closely or are familiar with each other and is generally anecdotal. This tacit information has not been vetted and verified for authenticity by the organisational KE. It is commonly shared through non-official or recognised means that may not benefit the organisation.

Figure 1.3 depicts the siloed approach to information and knowledge that organisational employees tend to have, as they seem to be protective of the knowledge they possess. There is a disconnection between people in the organisation with information, they keep it to themselves as office or departmental knowledge that is not shared with the rest of the organisation. In the observation, the information and knowledge are centralised within the individual possessing the information, often with no visible mechanism to capture, store and share information generated during daily business functioning. A depiction of the siloed manner in which most of the KW and KE work in isolation, and

the information they can gather is usually not tested for authenticity.

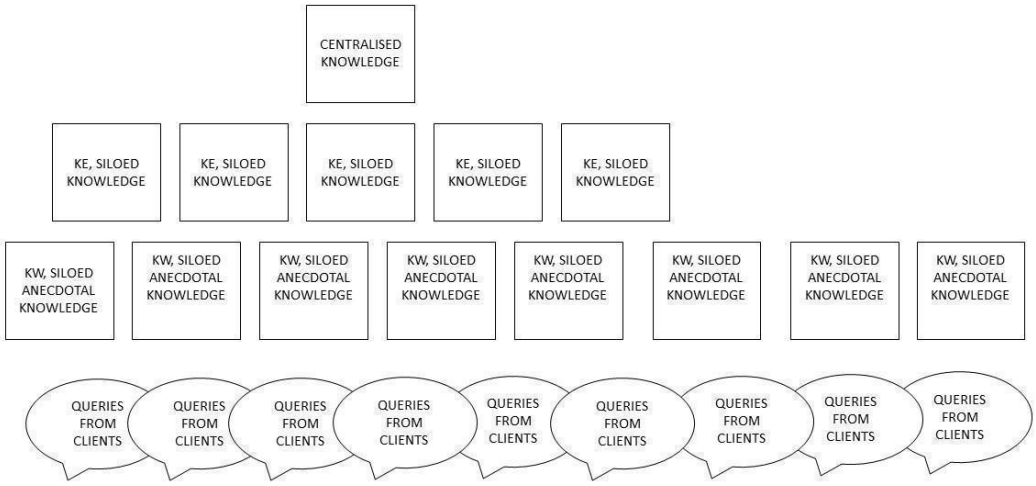


Figure 1.3, siloed knowledge

One of the key elements as depicted by the diagram in figure 1.3, shows that information is siloed among individuals and the managerial hierarchy.These clients who are often students and members of the public share and consult with each other regarding what they, including their need to access reliable information from the organisation. Often centralised to one person who has the authority or is charged with the responsibility of managing the organisational knowledge without new data being freely shared. The information is often stagnated with no way of telling if it is still relevant or outdated.

Meetings and workshops are currently the dominant means of sharing new information and knowledge. This includes strategic, tactical, and operational information or knowledge that speaks to the well functioning of the organisation. Institutional information is shared through the in-house notice board and the newsletter system shared via the organisational email system to staff and students. Changes in operational procedures are communicated in the same manner, resulting in some of the stakeholders not being able to access the information, and the new procedures are not commonly known as they are not accessible to the end users. This inefficient access to information makes it challenging for the KW and the KE as they are not informed of the new procedure and policies, especially if they miss out on a single meeting. Due to the organisational policy of segregated meetings, there is a reliance on section managers to share and make sure the required operational information filters through to the operational staff members and services the clients who are often the students. There are no clear mechanisms to ensure tactical information filters through to the operational level. Decision-making is informed by the centralised views of KE, while operational matters are decided on by siloed decision-making of the KW. Many

of the KW experts do not share information with the KE, and vice versa. Solutions and or resolutions to the common problems of the clients have to be repeatedly regenerated to resolve the client queries as existing knowledge is not captured or shared.

The argument the research seeks to prove is, with the introduction of the IMS, there is a possibility of an improved information-sharing mechanism that will help improve information-sharing business models as new knowledge will be captured instantaneously as it is being generated. This makes it possible for updated knowledge to be available for and ameliorate the increased workload burden the frontline KW are complaining about, at the same time, this will make it easier for the KE to acquire and observe new knowledge within the organisation.

The research will observe if the implementation of the IMS with the knowledge depository will help in making it possible and easier for the clients to access information and or knowledge they need via the organisational webpage or online, thus negating the need for them to request the attention of the KW and assistance from the KE.

A baseline study has been done with the IT Department where they have been using an open-source helpdesk ticketing system to manage the number of queries coming from their clients who are students, staff, and members of the public.

So far, they have been able to direct all queries to the correct KW and data collected and viewed by course coordinators and HoD who form part of the KE. They have been able to evaluate and authenticate most of the data coming in the form of queries, and matters are dealt with efficiently. This has become part of the CRIMS project initially planned by the university, however, it has not reached a launch phase and remains under discussion, allowing the Faculty of Informatics and Design (FID) to pilot the project as a litmus test that could prove valuable to the university.

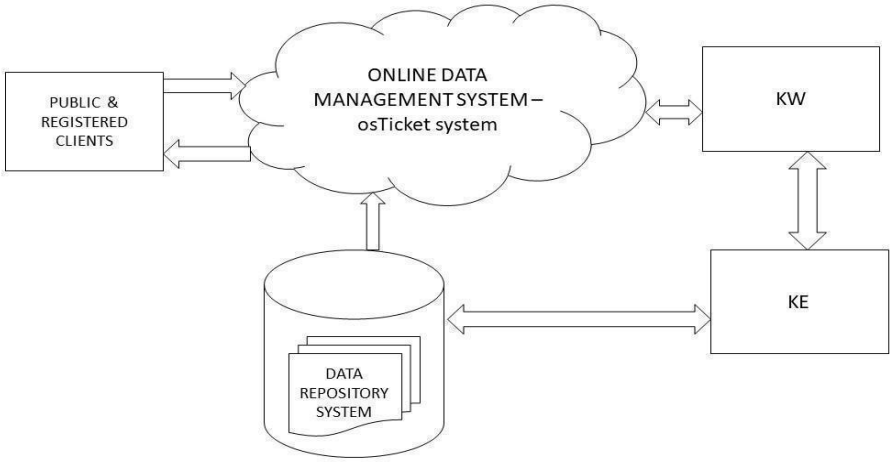


Figure 1.4, an information flow diagram

The IMS was deployed in the Information Technology Department (ITD) in the FID. As depicted in figure 1.3, enables members of the public and students to submit queries as tickets to the system made available online through the OSTicket system. The resolution of the queries and the time taken to resolve them allows the organisation to understand the kind of challenges faced by the clients, KW and the KE, including the time it takes to resolve the queries.

The idea was conceived at the time of the introduction of an online or cloud storage system that can be accessed by clients who are students, staff and members of the public. The idea at the time is a research project that will aim to alleviate the pressure on the KW and be able to generate and capture data that could be analysed, vetted and authenticated as reliable knowledge in the respective fields. An online data repository that will store information online or cloud storage that will be accessible to clients was gathered from the queries.

1.11 Literature review

South Africans have a large digital footprint they can learn from, which could help to improve institutional information and knowledge management systems that can improve the standard or quality of services being rendered in the organisation (Finestone & Snyman, 2005). More people are using smart devices to connect and communicate using mobile devices that generate a lot of data. They also access a lot of data resources for their social activities through social network platforms, while some even conduct business activities on these platforms. Much information is generated and shared outside of formal business policies, and that information often does not benefit the organisation. According to Reid (2003), in business knowledge sharing is capturing, organising, reusing, and transferring the vast and unique knowledge that resides within the organisation and making that knowledge available to others in the business(Reid, 2003)

In the new type of economy, the affluence of intangible resources has replaced the scarcity of tangible resources, and the economic theories of resource optimisation and profit maximisation have been aligned to knowledge creation and business sustainability. The engine of the knowledge economy is the knowledge-based organisation, where the pressure of efficiency and productivity should be relaxed (Bolisani, 2018). To address the argument by Bolisani (2018) the introduction of an information-sharing platform that will be accessible online will make it possible for the KW, KE and clients of the organisation able to access the information they need without being forced to have face-to-face contact. The affluence of intangible resources refers to the knowledge generated by the organisations that is often not captured and tested by the KE for its reliability. As the generated data is not shared in the organisation, it remains with the KW as anecdotal information without any reliable way of ascertaining its veracity and poses a risk to the organisation. This also means through the natural attrition process, the knowledge that has not been shared is lost by the organisation, especially if it has not been captured as part of the IM.

This means a level of Knowledge Transfer (KT) has to be assured by the organisation, allowing

others to be able to access the information. According to a study by Carayannis, et al. (2013), as cited in Ferreira & Carayannis,(2019), KT in a broader sense refers to multiple ways organisations can share knowledge to create economic, and social value and competitiveness. This suggests that knowledge is a commodity and can be monetised or economically valuable to the organisation.

In an editorial journal, Lombardi finds many issues related to KT and organisational performance and business processes remain to be resolved, highlighting the need for the knowledge to be assessed and validated (Lombardi, 2019).

This means there is value in the knowledge generated by organisations and or KW that can be transferred into either tangible or intangible assets if it is validated and authenticated by the KE in the various disciplines and or sectors. On the balance of the above-cited authors, KT is important as it enables the organisation to have a strategy in place for the sharing of information. Thus making it possible for anecdotal information to be shared by the KW. This brings the research closer to showing there is a need for a mechanism that will allow for the sharing of data that has been authenticated by the KE, and ameliorate the need for the KW to regenerate knowledge that already exists in the organisation.

The introduction of a digital information sharing and knowledge management system (Kumar & Gupta, 2012), will help to determine how to alleviate the workload of the knowledge generators, i.e. KWs and KEs and allow for better information and knowledge management. Such systems are a branch of Information Systems (Alavi, Maryam, E. Leidner, 2016).

In a closed knowledge system where created knowledge is shared, the workload of the KW and KE decreases or goes down when an information management platform or system is implemented or deployed (Montgomery & Damian, 2017). As clients or end-users generate more and more queries, the workload of the KW increases exponentially, particularly when data is not shared within the IM. In some instances, knowledge is generated but not shared, and it is localised with the KW or KE. Organisation-created knowledge is often not shared or vetted by experts or KE and KW (Edwards et al., 2017), and it is localised within the community and not part of IM. There are various systems and applications available and being used for knowledge and information sharing. Information sharing platform developed by Zha and Jia (2008) claimed to be used in any domain but lacks the IM.

Knowledge preservation is becoming an issue in organisations since tacit and explicit knowledge is not being captured (Rizal & Harib, 2018). A lot of data is generated every day by organisations. However there often is no mechanism in place that ensures the data is captured and the knowledge is preserved. This is a collection of facts, concepts, experiences, know-how and best practices held by KW or members of the organisation, about what they have done before, how they avoid reinventing the wheel and how to build upon best practices (*Institutional Memory*, 2011). Knowledge Management (KM) is a high priority with many organisations that want to have firm leverage on core competencies, to have the ability to leverage their collective wisdom to increase innovation and

responsiveness (Moorman & Miner, 1997). Moorman and Mliner (1997) further state, “Wisdom is the end result of collecting data, grouping the data into meaningful patterns (information), collating known information with the familiarity of experience, and finally coupling what is true or right with good judgement”.

The productivity of KW is crucial not only for organisational innovation and competitiveness but also for sustainable development. In the context of knowledge-intensive firms, the implementation of knowledge management is likely to increase KW productivity (Kianto et al., 2019). Kianto et al. research finds Knowledge creation and utilisation impact KW productivity positively. However, knowledge sharing does not have statistically a significant impact on KW productivity.

When insufficient attention is given to support issues, their escalation to management is time-consuming and expensive, especially for large organisations managing many customers (Montgomery & Damian, 2017). According to Montgomery (2017), support analysts (KE) are key stakeholders in gathering bottom-up requirements and proper management of support ticket escalations can allow them to do their job with less attention to escalations.

The introduction of a digital information sharing and knowledge management system (Kumar & Gupta, 2012), will help to determine how to alleviate the workload of the knowledge generators (i.e. KWs and KEs) and allow for better information and knowledge management. Such systems are a branch of Information Systems (Alavi, Maryam, E. Leidner, 2016).

In a closed knowledge system where created knowledge is shared, the workload of the knowledge worker/generators/producers decreases or when an information management platform or system is implemented or deployed (Montgomery & Damian, 2017). As clients or end-users generate more and more queries, the workload of the KW increases exponentially, particularly when data is not shared within the IM. In some instances, knowledge is generated but not shared, and it is localised with the KW or KE. Community-created knowledge is often not shared or vetted by experts or KE and KW (Edwards et al., 2017), and it is localised within the community and not part of IM. There are various systems and applications available and being used for knowledge and information sharing. Information sharing platform developed by Zha and Jia (2008) claimed to be used in any domain but lacks the IM.

1.12 Conceptual framework

The conceptual framework is the graphic representation of the research that speaks to its aim and objective while depicting exactly how the information flow is understood and the hypotheses. Much of the quantitative data collection will be based on the structure of the conceptual framework, which is the blueprint of the research project. The study is an observation of the implementation of the KMS implemented in the ITD, and FID at the CPUT. As described by Fauzi et al. (2021) the helpdesk system will track the process of working on the problem until is finished (Fauzi et al., 2021). They add that admin (KW and KE) will be facilitated in documenting reports in documents that can be

downloaded. The diagram below, figure 1.5 is the conceptual framework illustration that depicts the information flow process, and the research project will observe and analyse the results.

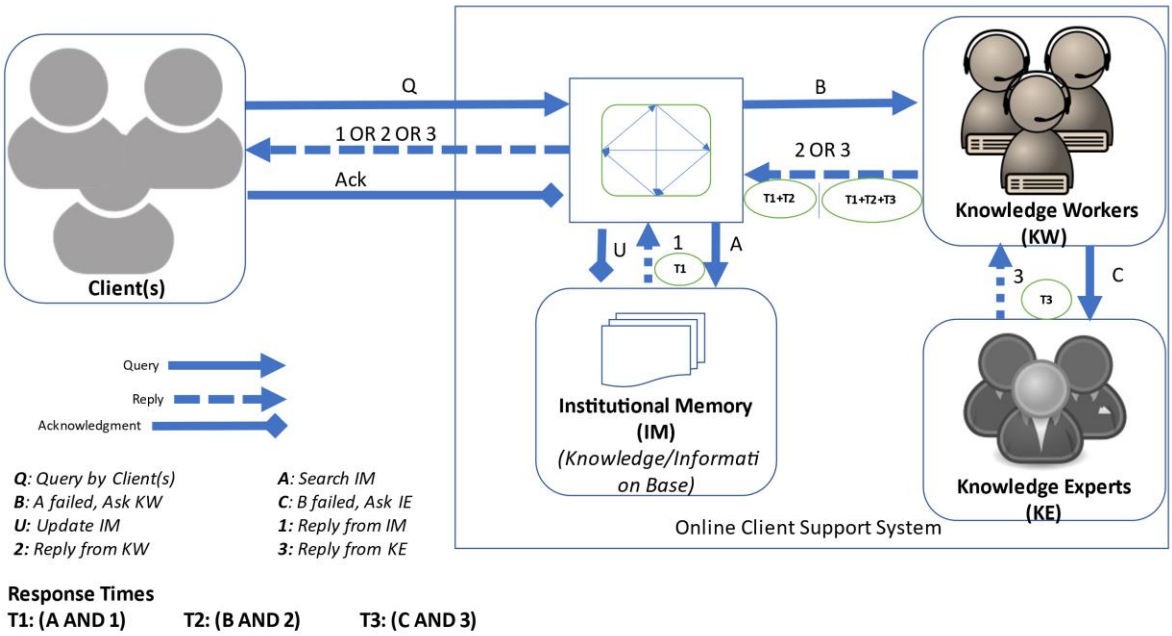


Figure 1.5, Conceptual framework illustration

Unlike other systems, the osTicket system discussed by (Pugibet, 2011) enables the integration of IM into online client support systems. This research will be carried out on the system based on Pugibet (2011). Figure 1 shows the flow when the client submits a query to the system, and how the process flows to acquire the required information.

The queries made by clients are answered in three stages depending on the availability of the requested data.

These three-stage are:

Answered by the system within time T1

Answered by the KW within time T2

Answered by the experts (KE) and or subject professionals within time T3

The workload of the KW and the average service time of the system is related to the number of tickets in the closed state in the institutional memory. Meaning information queries to the organisation made by the client or end-user determines the workload endured by the KW in the organisation or closed community. The generated and captured data is analysed and vetted by experts and professionals in the respective field (KE) and made available to the organisation as part of the institutional memory.

Using a mathematical equation, it is possible to measure the workload of the KW while

demonstrating the process of information sharing and management through an open-source information-sharing platform. The work increases when there is insufficient data in the IM, leading to more time spent for the KW in search of the correct information that speaks to the client's required information and is subject to their satisfaction to determine its validity or value.

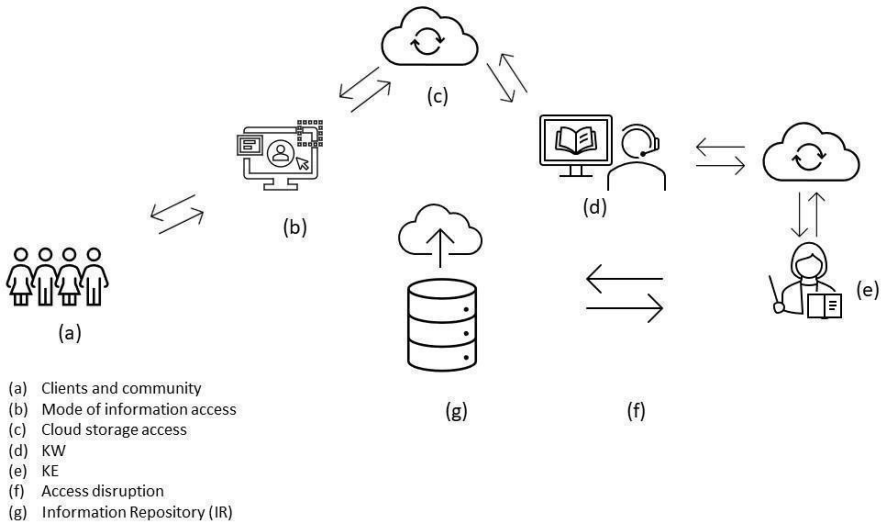


Figure 1.6: Workflow of an Online Client Support System

In this closed community, the client searches for information through the institutional database. The client values the time it takes them to get a response for the information they seek and acknowledgement to the organisation that they are satisfied or not with the information received efficiently and that it has been vetted by experts or professionals (T1).

When they cannot get the information they are seeking, they contact the institution via telephone and or email to request assistance. The time (T2) it takes for the client to receive the information or feedback determines customer satisfaction, subject to the information and or data being validated. This also adds to the time spent by the knowledge worker gathering the requested data by the client. Information not captured as part of the IM is directed to the KW, who has to generate or search for the requested information within a certain time frame (T2) and send or respond to their client.

In the event the KW may not be knowledgeable on a particular query he/she has to escalate (T3) the query to experts who will generate and vet the data or information, verifying its authenticity before making it available to the KW who in turn makes it available to the client. Upon feedback or acknowledgement from the client (end-user), the information is then part of the IM.

When the client or end-user acknowledges receiving the information and feedback, then the query is regarded as closed, indicating the completion of the task. The information is also made available

in an organisational database or IM, eliminating the need for the KW to generate the data as it will be available through the IM or knowledge-sharing platform.

If a repository or database that forms the IM is available, queries are responded to efficiently. The data or information is already vetted and verified by the experts in the organisation as reliable and the time spent – T1 and KW is significantly shortened, and the client is satisfied based on the feedback they can give. The workload of the KW could decrease as the end-user or client merely accesses the required data from the IM or repository.

1.13 Research question

- What effect will the implementation of a KMS have on the workload and work efficiency of the KW and KE in an organisation?
- Will the implementation of a KMS that accommodates the generation of IM help topo ease the workload pressure experienced by KW and KE?
- How is the introduction of a KMS going to help the organisation offer a more efficient service to its clients, while it eases the increased workload burden on the KW and KE?

1.14 Research hypothesis

H0: There is no significant relationship between the size of IM and the workload of KW and the response time of the system.

H1: The increase in the size of IM reduces the KW overload and overall response time.

1.15 Data generation method

The ticket system will be the platform and method of data collection. A logger programme will be deployed to extract and log the data.

The research will observe the implementation of an open-source ticketing system that will help manage data being generated and make it easily accessible to their users or be shared. This is an IT service management platform that provides solutions to clients connected to the organisation remotely or locally. It is a helpdesk service to get clients to have an efficient service (Gohil & Kumar, 2019).

It will observe the number of queries or tickets submitted through the system and the time taken for the matter to be resolved as part of a measure to see if the system will affect on the workload pressure of the KW. At the same time, it will also look at the amount of data generated, and analysed and as well as the information made available to the organisation and clients, calculating if that has

helped to reduce the number of queries that have to be managed by the KW. As part of the observation, it will be able to see if the data generated influences the manner business is being conducted to the client's benefit or satisfaction.

1.16 Data analysis

The research will take a positivist approach as it assumes that the introduction of the ticketing system will help to reduce the burden of an increased workload by the KW, while the introduction of the information repository will help the organisation better generate new knowledge that will be authenticated by the KE, thus improving the service quality offered to clients. The positivist approach in the research will deal with the actual numerical observed values of response time, the workload of KWs, and the size of the IM, where the size of IM is determined by the number of tickets in the closed state. Positivism is a paradigm in which researchers understand reality by observing human behaviour. Positivists have an objective or unbiased view of a subject being observed or experimented (Nakamura, 2008).

Quantitative research deals with quantifying statistical techniques to answer questions like, who, how much, what, where, when, how many and how. It is also described as the method of explaining an issue by gathering data in numerical form (Apuke, 2017). Since this research uses numerical values, this research is quantitative (Oates, 2006). Quantitatively, it will observe the data generated by the KW who are at the frontline and receive the queries from the clients who consist of students, staff and the public. Looking at the time it takes for the queries to be resolved or the matter to be closed to as per client satisfaction.

1.17 Chapter Summary

The thesis investigates the implementation of a KMS in an organisation where KW have expressed concerns about the increased workload every time they have to address or service queries coming to the organisation from clients, staff and the public. A framework has been drawn that will be the blueprint for how the research project will unfold. A literature review has been done that supports the research hypothesis, which seeks to establish if the introduction of a KMS will help the organisation reduce the workload pressure on the KW and KE by increasing its IM, making access to information and knowledge generation more efficient.

Some of the salient points of the research are broken into pieces and unpacked in this chapter for a better understanding of the research approach and the background of the research problem.

1.18 Outline of the dissertation

The thesis will be structured into six chapters as follows:

Chapter 1: Introduction - The chapter aim is to introduce the thesis to the readers by proving a brief overview of the research problem, aim, objectives and questions and the structure of the thesis.

Chapter 2: Literature Review - This chapter will present the study literature review. Included in the chapter will be the two theories that will be used to underpin the study.

Chapter 3: Research Methodology - The chapter will discuss the steps the researcher will undertake to achieve the research objectives. Research strategy, design, data collection and analysis will be presented in this chapter.

Chapter 4: Case studies overview - The study will be based on the two case studies. This chapter will present an overview of the cases studied.

Chapter 5: Data analysis and findings interpretation - This chapter will present the analysis of the collected and the interpretation of findings from data analysis.

Chapter 6: Conclusion - In this chapter, the research process comes to an end. The thesis contribution, recommendations and conclusion will be presented.

CHAPTER 2: LITERATURE REVIEW

2. Background

This chapter discusses the systematic literature review of the thesis, which deals with the implementation of KMS in organisations that deal with customer queries and the role played by IM in ameliorating the workload of KW and KE.

It will be organised as follows:

2.1 Systematic literature review of the KMS in organisations
2.2 IM in organisations
2.3 KW and KE fatigue
2.4 How has the problem been solved in the literature

2.1 Systematics literature review of the Knowledge Management Systems in organisations

Introduction

The research uses systematic literature review as described by Lame (2019), to synthesise scientific evidence to answer the research questions in a transparent manner that can be reproduced, including published evidence on the topic (Lame, 2019). In addition, Torres-Carrion et al. (2018) adds, it is important for identifying research questions and justifying future research (Torres-Carrion et al., 2018). Through the systematic literature review, seeks to address the research question and establish scientific evidence to find out what effect the implementation of a KMS will have on the workload and work efficiency of the KW and the KE in the organisation and will it accommodate the generation of IM to help ease the workload pressure experienced by the frontline KW and KE. In addition, find out how the introduction of a KMS helps the organisation offer a more efficient service to its clients, while it eases the increased workload burden on the KW and KE.

Ryan (2018) says there are three commonly known philosophical research paradigms used to guide research methods and analysis: positivism, interpretivism and critical theory (Ryn, 2018). He describes as follows:

Positivism resulted from foundationalism and empiricism; positivists value objectivity and proving or disproving hypotheses.

Interpretivism is in direct opposition to positivism; it originated from principles developed by Kant and values subjectivity.

Critical theory originated in the Frankfurt School and considers the wider oppressive nature of politics or societal influences, and often includes feminist research.

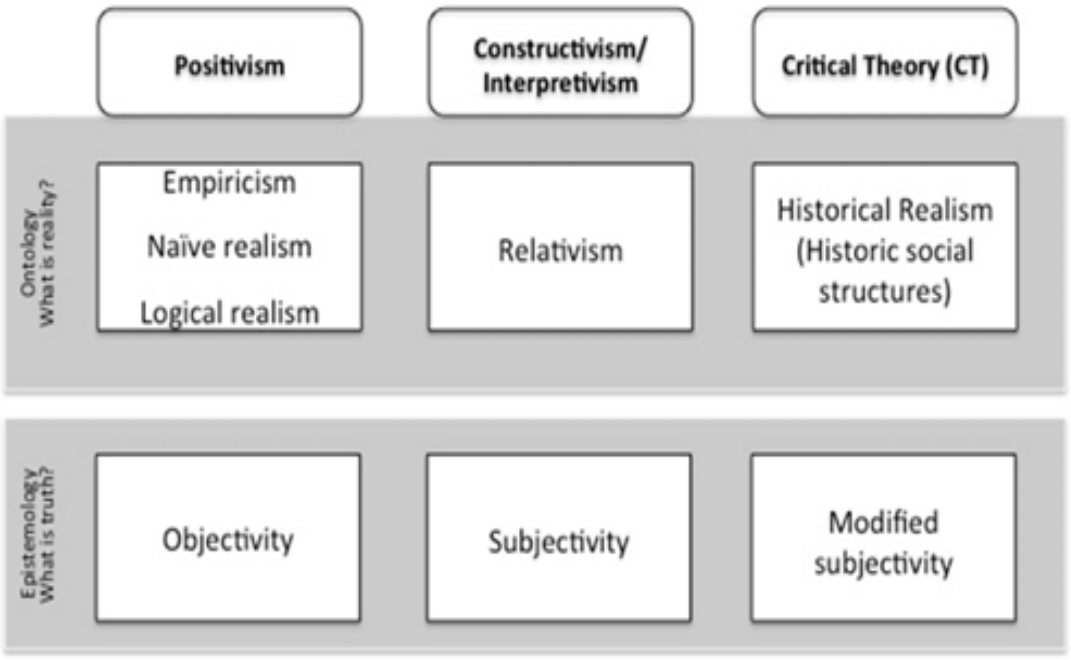


Figure 2.1 Philosophical paradigm, Ryan (2018)

The above illustration by Ryan (20180) depicts the elements that inform each paradigm from an Ontological approach (what is reality) in the above shaded horizontal column,and Epistemology (what is truth). Goertz and Mahoney (2012) say qualitative researchers adopt a semantic approach and work hard to identify the intrinsic necessary defining attributes of a concept, while quantitative researchers adopt an indicator-latent variable approach and seek to identify good indicators that are caused by the latent variables (Goeetz & Mahoney, 2012).

Organisations rely on some form of information and may even require empirical information to help them base their decision-making. According to Dan (2019), empirical methods involve systematic collection and analysis of observed data or evidence and primarily use quantitative research (Dan, 2019). This is simplified by Apuke (2017), that quantitative research methodology, involves the utilisation and analysis of numerical data using specific statistical techniques to answer questions like who, how much, what, where, when, how many, and how (Apuke, 2017). The research has collected data to be analysed to determine if the introduction of the KMS helps to reduce the workload pressure the KW are complaining about.

Noor et al. (2019) say, Higher Education Institutions (HEIs) are more excited about Knowledge Management (KM) because of its primary goal of knowledge creation and sharing (Noor et al., 2019). In their findings, they say cloud-based knowledge management elevates the institution's success and results in the provision of best knowledge sharing practices in the organisation. This

further assists in decision making processes to be more accurate and efficient with robust data reliability. Further stating their results indicate that cloud-based knowledge management offers cost effective technological and methodical solutions and elevates the institution's success with an upward shift in the educational methodology. The findings by Sahibzada et al. (2021) recommend that KM processes can significantly foster structural and innovative knowledge, which in turn advance and upsurge operational processes in HEIs (Sahibzada et al., 2021)

It is important to understand the kind of information they are dealing with, especially when it comes to established organisational knowledge (OK), which is explicit and tacit knowledge accumulated through some means that will be addressed later in the chapter. One of these is the day-to-day learned information from observation by the KW. Gao et al. (2008) observed that KM is not simply about recording and manipulating explicit knowledge but also needs addressing that which is implicit and from which benefit can therefore be derived through a process rather than content. It is important to understand the relationship between the value of information or knowledge and the purpose of the system within the organisational success. Lipaj (2013) states that in the fast-moving and continuously changing world, where the needs and preferences of clients change quickly, organisations have to keep up with innovations and adapt to the situation by making adjustments in their business processes to remain sustainable (Lipaj & Davidavičienė, 2013). While the research focuses on the implementation of the KMS, the relationship between KM and the changing business processes that require reliable information to be accessible and easily accessible to the community or audience will be revealed in the literature. This will present a systematic selection of material from past research that will serve as material for new theory development (Okoli, 2015). It looks at existing research work from other researchers to understand what has been experienced in this particular field and work that has been done, and form an opinion based on that body of knowledge to form a theory that can be tested. According to Okoli and Schabram (2012), a systematic literature review explicitly extracts and synthesises the elements of theory from primary studies (Okoli & Schabram, 2012). This research will work on material that deals with KMS implemented in other organisations and extract their findings to form a view or theory.

As part of understanding the research, this literature review starts by understanding the basic elements that make up or inform what is defined as IM breaking it down into manageable components that delineate the review. This process will be unpacked by breaking down the basic elements that form the research. This will start with a broad-stroke definition of the basic elements that make up knowledge, data and information.

2.1.1 Data

Knowledge, data and information are words that tend to have a similar meaning, subject to the

context they are being used, and often used interchangeably.

Data in research is defined as the record of factual material collected as evidence that can be used as part of theory or belief that can be collated or interpreted or to form information subject to the views of the author or interpreter. Baral (2017) defines it as facts or unrefined information that, when processed, organised, structured or presented in a context, makes it useful and is called information (Baral, 2017). Further adding that data in themselves are useless; only when they are interpreted and processed to determine their true meaning do they become useful and can be called information.

Zins (2018) says the word data commonly refers to records or recordings encoded for use in a computer but is more widely used to refer to statistical observations and other recordings or collection of evidence (Zins, 2018). So, it is a set of facts or items that can be interpreted to have a meaning that, when put together, form a narrative regarded as information.

Data can be seen as puzzle pieces that can be joined together and reveal information that can be applied to generate knowledge. These puzzle pieces are formed every time a system or process is applied and or not applied. This data is the result or outcome of that particular action. The action can be recorded based on a particular theoretical manner that would make it possible to make certain observations or sets of anomalies that can be collected and recorded. This recording is called or regarded as data or raw data that has to be analysed to have a particular form or outcome that would be viewed as information.

2.1.2 Information

There is no one clear definition of what information is. It is generally defined within a particular context it needs to be used. Losee (1997) says the term information is used differently by different people from various backgrounds, from specialists in information-based sectors, such as communication, media and information management, computing and cognitive sciences and people involved in scholarly pursuits(Losee, 1997). This means the definition of information is based on the context in which it is needed and used. Meijer (2013) says information theory implies that information can both be described as an entropic element in which the impact of information is inversely related to the probability that it will occur versus the concept that information reflects the certainty of a message and is directly related to its probability and meaning (Meijer, 2013).

In the context of this research, information is regarded as a set or collection of data that is delineated, vetted and interpreted to have an agreed meaning. This is the stance that this research will take in a scientific approach to show a clear differentiation of the contextual meanings. The common definition or understanding of information is often regarded as facts provided or learned.

To better illustrate the meaning of information in the context of this research paper, we look at the definition of information within an Information System (IS). Information is a set of data collected and

interpreted into information that can be used.

2.1.3 Knowledge

Knowledge is factual information based on learned or acquired skills through experience and or education. Biggam (2001) says knowledge is broadly defined as factual knowledge, practical knowledge, including knowledge of people, places and things which is derived through experience or as a result of rational thought or a combination of both (Biggam, 2001).

Bolisani 2018) views it as the creation of the mind amplified and integrated into Organizational Knowledge (OK) by social interaction based on the subjective and or objective attributes that comprise knowledge (Bolisani & Bratianu, 2018). In this instance, subjective knowledge is information learned or acquired through experience, subject to the environment or ecosystem of the KW and the KE in the case of this research, and has been previously described as anecdotal knowledge and or, as per other definitions, tacit knowledge. KWs become familiar with this knowledge through their day-to-day activities but may not have been tested or verified by any process or KE in the field. Objective knowledge is based on education and or some form of training. Both explanations are subject to agreed understanding and maybe a combination of both as they are perceived in mind This understanding that makes Bolisani and Bratianu further conclude that knowledge is an abstract concept metaphorically described as explicit and implicit. However, Olomolaiye (2005) took a slightly different approach that does not contrast too much and says knowledge is more organic than mechanical as it is created by people and their behaviour (Olomolaiye & Egbu, 2005). They imply that knowledge is not static and can not be confined to a system as it will be influenced by culture or the people that generate it. They differentiate the two, with explicit knowledge being technocratic, while tacit is more behavioural than explicit. This means explicit knowledge is based on more formal training and education with knowledge systems in place, with the knowledge that is authenticated by some form of KE, while tacit knowledge is based on observation and learned experience but remains untested or vetted by experts who are KE in the field of practice.

Tacit knowledge is described as a concept without consistency or a clear foundation used in many fields of research as it is broadly applicable (Gourlay, 2002).

Bennet and Bannet (2009) say it is the knowledge that is essential to our ability to manage and apply knowledge most efficiently and effectively (Bennet, Alex; Hughes Bannet, 2009). They further elaborate that it is pragmatic in that it is based on taking effective action and biological because it is created by the human mind. In congruence, Bratianu (2018) conclude in their research that “Knowledge is created by the human brain and then it is amplified and integrated into organisational knowledge by social interaction. That means that knowledge comprises both objective and subjective attributes. Objective attributes can be conceived as independent of the social context, but the subjective attributes are context-dependent and cannot be transferred easily to other similar contexts.” (Bolisani & Bratianu, 2018). Meaning objective knowledge is based on information or

data that experts have vetted in the concerned field without the influence of the immediate social condition, and these experts are the KE in this context. Subjective knowledge is influenced by social conditions and, at times, may not be scientifically tested or authenticated by the KE. This could also mean that knowledge might be anecdotal or not acquired through normal processes or recognised by the organisation.

Collectively, this is regarded as the knowledge accumulated by the organisation. Igbinovia and Ikenwe (2018) put it as It is information that has undergone a distillation process which makes it context-based and applicable in the handling of real-life situations (Igbinovia & Ikenwe, 2018). Again, this speaks to Biggam's (2001) statement that knowledge elements are derived from experiences, or as a result of rational thought, or a combination of both. That is what we have been taught formally and what we have learned through observation or experience goes through a process of distillation to form a view that the human mind is in concord with others.

Alavi and Leidner (2016) suggest that knowledge is the organisational asset that enables the sustainable competitive advantage of the organisation against its competitors (Alavi, Maryam, E. Leidner, 2016). How knowledge is defined is subject to the context for which it will be used in the organisation and how this will help yield benefits. This makes it difficult to have an absolute definition of knowledge and information as both are dependent on subjective interpretation as to the relevance of their purpose and benefit to the business or institution. There is a set of assumptions about what knowledge is or what constitutes it, making it difficult to understand and define it as that becomes a subjective argument on its own based on which perspective one approaches the question and what research question one needs to understand.

2.1.4 Organisational Knowledge (OK)

All businesses and organisations generate knowledge and depend on that knowledge they have gained to allow them to continue being in business through understanding their business environment based on the knowledge they use to remain competitive in their business sector.

OK is described by Bratianu (2018) as a conceptual construct that reflects the convergence of all individual knowledge fields in an organisation, including all explicit and tacit knowledge fields, or changing the paradigm of all cognitive, emotional, and spiritual fields of knowledge (Bratianu, 2018). The literature appears to agree with its approach to the definition of knowledge that both metaphoric descriptions of knowledge as being tacit and explicit are perceived constructs in the mind that put together the collective understanding of individuals into an agreed notion of knowledge. It views the cognitive and emotional, with the understanding of the co-dependency of explicit and tacit knowledge as both learned through structured or technocratic means and tacit through observed and or experienced means that are not always formal. In this understanding, he states that OK is a strategic resource in business development that can be transformed into a sustainable competitive advantage for the organisation.

If that knowledge is both objective and subjective, organisations need to be able to distinguish between the two. In organisations that do not have KM as part of the organisation or KMS in place, they are subject to the beliefs of the manager's subjective view to inform them on what kind of decision they would take to better compete in the market or when dealing with clients without a point of reference as to what informs the decision being taken. On the other hand, the experience of the employee or manager could be a reference point used to inform the decision. Damian and Manea (2018) say that an organisation's ability to use and leverage knowledge depends heavily on its employees or human capital, who create, share and use that knowledge (Damian & Manea, 2018).

Both the employees, as the human capital or human asset to the organisation, and the entity itself are not immune to forming or creating knowledge based on subjective attributes that can not be quantified and, therefore, intangible or tacit. The opposite is also true that organisations and employees can base their knowledge on formal or scientifically plausible attributes that can be quantified as tangible evidence or explicit knowledge. While this statement is ambiguous, it is subject to the collective agreement or view that it is an absolute truth from the vantage point of the individual, collective, organisation or society. Amid this ambiguity, it becomes necessary to introduce the concept of tacit and explicit knowledge as it unpacks the idea of what knowledge is, concerning KM, OK and KMS, especially on how it all relates to the IM.

Employees or KW at their skills level or academic qualification generate a lot of information that has not been vetted or authenticated by the organisational KE, who are often specialists in that field. They take decisions on the organisation's processes based on this information, as in their minds, it had worked before and thus regard as suitable. Some of this information is anecdotal, and it is being passed from KW to KW through various means of communication, like emails, telephone or verbal communication, in response to a query. The KW usually have a lot of work and practical experience, thus sharing the information among themselves as anecdotes for best practice through word of mouth or conversations or other means not recognised as the formal means or processes of the organisation.

The information often used by KW and at times by KE is commonly differentiated as tacit knowledge, for it is more a gut feeling based on the existing experience of the individual or individuals in the organisation. While explicit knowledge is usually balanced on some form of qualification, information and knowledge are not static as they continue to change and evolve as new data is discovered and realised into knowledge, not neglecting that, in essence, information and knowledge are based on the mindset of the people who generate it. Olomolaiye (2005) argues that two ways of looking at information in the KM sphere are the technocratic view that knowledge is explicit, and the behavioural approach that views knowledge as tacit (Olomolaiye & Egbu, 2005).

Technocrats are people or employees like the KE who are specialists in their respective fields, and their decision-making is often based on their academic knowledge of the subject matter and tap into that knowledge as a resource that encourages decision-making from an academic point of view to

benefit the organisation and give it a comparative advantage. The basic definition of the two is given below to highlight the fundamental differences.

In literature, researchers have broken down this kind of information as tacit information or knowledge based on the experiences of the KW and what they have learnt to be best practices. Smith (2001) called it knowledge based on common sense while referring to explicit knowledge based on academic accomplishment (Smith, 2001). He further concludes that organisations that recognise and use their employees' tacit and explicit knowledge have a competitive advantage.

Some of the findings, as in Muthuveloo et al. (2017), concur that tacit knowledge management has a significant influence on organisational performance, pointing to the importance of knowledge generation management (Muthuveloo et al., 2017).

In the organisation, a lot of data is generated, and, commonly, the employees will regard this data as the knowledge they are likely to share in exercising their duties or functions at work.

2.1.5 Knowledge Management (KM)

This is the process of collating Knowledge in the organisation contained in the individual employees or existing within the entity, including the one generated and shared systematically that benefits the organisation and its stakeholders by giving it the best competitive advantage. Yee et al. (2019) describe KM as the systematic management of an organisation's knowledge assets to create value and meet tactical and strategic requirements (Yee et al., 2019). They add that it consists of the processes, strategies and systems that sustain and enhance knowledge creation, storage, and sharing.

Further expansion on the meaning of Organisational Knowledge by Tsoukas and Vladimirou (2001) is the capability of members in the organisation to develop and draw a distinction in the process of carrying out their work in a clear context by enacting sets of generalisations whose application depend on historically evolved collective understandings (Tsoukas & Vladimirou, 2001). This means the employees in the organisation will take the knowledge they have gained by doing a work process repetitively that they have learned and gained data that is translated into knowledge that can be repeated and passed on in the execution of the organisational processes to complete an organisational function satisfactorily. Tsoukas and Vladimirou (2001) conclude that knowledge is distinct to an organisation through the formulation of a vision statement or policies that guide or give collective understanding that allows members or employees to act within a particular context, with the understanding that there is room for discretion and innovation.

In congruence, Hutchson (2001) says most industries have become increasingly dependent on information and knowledge as an asset and strategic resource, to which KM and IM assume greater importance (Hutchison, 2001). In this understanding, it is clear that there is a close relationship between IM and KM, in the sense that IM is the asset that needs to be wisely managed through KM.

In trying to understand KM, Dayan (2017) says KM and organisational strategy are both important to the success of an organisation, as managers at various levels consider knowledge as a strategic resource in their company, and the company's success depends on how well they manage their knowledge (Dayan et al., 2017).

Bhojaraju (2005) says KM is the process of gathering, managing and sharing organisational capital knowledge throughout the organisation, thus enhancing the business processes, introducing more efficient and effective business processes, and at the same time removing redundant processes (Bhojaraju, 2005). In his paper, Bhojaraju concludes that KM is not easy to implement as it depends on the voluntary participation of the employees. Further emphasising the knowledge-sharing culture can only be well grounded if it is supported by top management with proper incentives,. pointing out that KM requires structural changes in the policy of the organisation.

Marsh (2016) says research has shown that private industry has a better grasp of KM concepts and practices than the higher education sector (Marsh, 2016). Pointing to the internal and external challenges facing institutions of higher learning, the processes and systems associated with KM could serve as a resource for performance improvement and efficiency.

Developments in the world are causing an increased demand for space in higher education, while the availability of digital access and South African digital footprint has made it even more critical for universities or institutions of higher learning to be able to provide more diverse services that require systems to be in place and need data to be captured, analysed and shared within the university. In short, developments in the world and the country have made it necessary for organisations, and universities, in particular, to invest in KM and KMS. Shropshire et al. (2020) cite shrinking budgets, technological innovation, and changes in staffing for causing organisations to relook at traditional customs and motivate managers to utilise new ways of thinking to manage workflow and address evolving institutional activities. (Shropshire et al., 2020)

Though the literature reveals a symbiotic relationship between IM and KM, many organisations and managers struggle to identify the link between the two. Many organisations choose a PM approach when dealing with KM and IM, often not seeing it as part of the organisation's strategic plan. It is common for projects to be rejected as additional burdensome work to the managers and employees and would yield when these are driven by senior management.

In his findings and conclusion, Dayan (2017) asserts that many managers see KM as a project or programme with a beginning and a scheduled end and identifies that parties in the organisation have a specific task for it and a budget (Dayan et al., 2017).

Damian and Manea (2018) say organisations gain efficient value by managing knowledge, generating new knowledge or creative combinations, and from existing knowledge, new products or services can be created (Damian & Manea, 2018). They add that organisations also learn from the experience and actions of individuals. There is no individual organisational learning. However, organisations only learn thanks to the experiences and actions of individuals, further adding that

knowledge is the most strategically important intangible resource of the organisation. In this case, there is a vague distinction between tacit and intangible knowledge as both are usually not recorded in the organisation nor formally recognised, though they influence and at times inform the decision processes of the organisation at all three levels of organisational business hierarchy, illustrated below in figure 2.1

Figure 2.1 – Business Management Hierarchy

The accumulated OK is used during strategic planning and influences those decisions.

Organisational strategy done by KW is part of the organisational knowledge assets that have to be managed through a tactical system that allows for strategic value to be generated and sees the organisation using the knowledge generated in a manner that adds value to the organisation through the assets. That is, the KW, KE, and clients have a mutually beneficial gain or access to the knowledge. This will require resources to be in place for the information or knowledge to be collected and made accessible to the stakeholders who need to benefit from it in the interest of organisational benefit.

2.1.6 Knowledge Management System

Alavi and Leidner (1999) state that many organisations develop Information Systems (IS) designed specifically to facilitate the sharing and integration of knowledge because of barriers to knowledge that render it of strategic importance (Alavi & Leidner, 1999). They emphasised that knowledge is the organisational asset that enables a sustainable competitive advantage, pointing out that though KMS are emerging in organisations, little research and field data exists to guide the development of the implementation of such systems or even to guide expectations of the potential benefits of such systems (Alavi & Leidner, 2016). This seems to suggest that in almost twenty (20) years, there is still insufficient knowledge understood about KMS and their strategic organisational role in in

enabling competitive advantage. Organisations are faced with challenges as they continue to limit the use of KMS for managerial and professional or KE and break the barriers of siloed individuals.

In a closed KMS where created knowledge is shared, the workload of the knowledge worker/generators/producers decreases or goes down when an information management platform or system is implemented or deployed (Montgomery & Damian, 2017). Many organisations, in one way or another, are closed communities with controlled access or access management systems to manage their information flow better. Technocratic systems help the organisation have a more tangible process in place that helps manage information sharing and KM. This means organisations must have their own defined systems that have clearly defined protocols to help better manage the organisational processes. In these systems, a lot of data is generated and needs a data management and storage system to be in place.

South Africans have a large digital footprint they can learn from, which could help to improve institutional information and knowledge management systems that can improve the standard or quality of services being rendered to their communities (Finestone & Snyman, 2005). The new type of economy is where the scarcity of tangible resources has been replaced by the affluence of intangible resources, and the economic theories of resource optimisation and profit maximisation have been aligned to knowledge creation and business sustainability. The engine of the knowledge economy is the knowledge-based organisation, where the pressure of efficiency and productivity should be relaxed (Bolisani, 2018). The introduction of a digital information sharing and knowledge management system (Kumar & Gupta, 2012) will help to determine how to alleviate the workload of the knowledge generators (i.e. KWs and KEs) and allow for better information and knowledge management. Such systems are a branch of Information Systems (Alavi, Maryam, E. Leidner, 2016).

As clients or end-users generate more and more queries, the workload of the KW increases exponentially, particularly when data is not shared within the IM. In some instances, knowledge generated is not shared but is localised with the KW or KE. Community-created knowledge is often not shared or vetted by experts or KE and KW (Edwards et al., 2017), and it is localised within the community and not part of IM. There are various systems and applications available and being used for knowledge and information sharing. Information sharing platform developed by Zha and Jia (2008) claimed to be used in any domain but lacks the IM.

Unlike other systems, the osTicket system discussed by (Pugibet, 2011) enables the integration of IM into online client support systems. This research will be carried out on the system based on Pugibet (2011). Figure 1 shows the flow when the client submits a query to the system and how the process flows to acquire the required information. The queries made by clients are answered in three stages depending on the availability of the requested data.

It consists of the processes, strategies, and systems that sustain and enhance knowledge creation,

storage, and sharing. There is a staggering increase in the price tag for data, and it is expected to grow further.

For a long time, storytelling has been used to pass on knowledge and history that may yield wisdom by many African elders regarded as the custodians of the information or knowledge of the community. This, in a way, was a form of KM and information sharing as they determined when and how it was told or shared. Yee (2019) describes KM as systematically managing an organisation's knowledge assets to create value, meeting tactical and strategic requirements (Yee et al., 2019). Just as in storytelling by the village elders in the community, the stories told allowed the information to be passed on to the community to understand the purpose and strategy of the leaders. Similarly, organisations share information to meet their tactical objectives, and the knowledge gained can be used to inform any strategic planning to be implemented by the organisation.

Hasan (2002) states that knowledge is recognised as a primary source of an organisation's wealth (M. Al-Hawari & Hasan, 2002). Further citing Miller and Hasan (Miller,1987 as cited by Hasan, 2002), that knowledge is a valuable resource for organisational growth and sustained competitive advantage (M. Al-Hawari & Hasan, 2002). There is a varied understanding of KM and its purpose or function within organisations or communities of people. However, they all have some key elements that remain common; KM is essential to the organisation's longevity and competitive advantage in their respective areas of operation.

According to Igbinovia and Ikenwe (2018) knowledge and, by extension, knowledge management has been an electromotive force for social, economic and educational advancement in any nation (Igbinovia & Ikenwe, 2018). Many organisations generate a lot of information that become an electromotive force as the information or knowledge becomes a commodity. In short, knowledge is a form of an intangible asset to the organisation that needs to be managed like any other asset as it is an influential force in their daily running or processes. Kamasak et al. (2009) define knowledge assets as a source that helps organisations determine the competencies and capabilities essential for growth, competitive advantage and human development (Kamasak & Yucelen, 2009).

2.2 IM in organisations

Institutional Memory is the recording and capturing of Organisational Knowledge accumulated in the process of conducting business activities and preserving it for future use and benefit to the organisation. Rizal and Harib (2018) define it as the accumulation of data, information and knowledge created in the course of the organisation's existence and used as a tool in managing people and the organisation's processes (Rizal & Harib, 2018).

Byrne (2014) described libraries as transmitting experience and creativity across the borders of time and space, language and custom, and tribe and individuality (Byrne, 2014). He adds that institutions have their memories enshrined in their collections and buildings and are as mutable as human

memory. “Those memories each through the institutions, shaping expectations and possibilities.” This suggests that, like human memories, IM is organic and subject to change as it grows and goes through different permutations in its life span.

Brownlie takes a more operational than business approach and describes IM as referring to the notion that institutions have founding aims, ideology, official history and practices, which are remembered and passed on within the institution (Brownlie, 2016). She punctuates her assertion that memory of ideology and practices strongly shapes the behaviour of the members of the institution.

The authors essentially focus on the business and humanities definition of IM as they influence the institutions in which they exist—demonstrating that IM memory plays an important role in the business processes and the cultural behaviour in organisations that speaks to how members of the organisational community interact with the knowledge. Much of the literature continually mentions tacit and explicit knowledge as the most basic concerns regarding IM and general organisational learning that influences and or affects decision-making. Rizah and Harib (2018) point out that the challenge in preserving knowledge is the lack of capturing tacit and explicit knowledge, requiring the institution to be organised to retain knowledge through the implementation of proper systems. This will enable the organisation to have a system to retrieve information or knowledge when it is needed.

2.3 KW and KE fatigue

The advances in technology worldwide have meant greater consumption and generation of data or information throughout all organisations. This has led to a greater demand for organisations to provide an efficient service for their clients in the shortest possible time, resulting in pressure being felt by the KW, who are often the frontline service staff in organisations and the KE, who are usually specialists in their respective fields. Organisations without KMS lose a lot of information that could have been of economic benefit to them.

They have complained of the increased workload when they have to search and/or generate information when queries are received from internal and external clients to the organisation. KW spends a lot of time regenerating information that already exists within the organisation. There is no system in place allowing for the capturing and recording of new data generated by the KW and KE in the organisation.

KW is complaining about being overworked and overloaded as they are inundated with queries from institutional clients and stakeholders. The process is laborious and time-consuming and adds to their daily workload. Much of the information already exists in the institution but is difficult to locate because it is not always stored in a centralised space where it can be easily accessed by the community or designated members.

Some of the clients and/or stakeholders prefer face-to-face communication as it is physically easier than communicating over media that requires typing or telephone (Gibson & Cohen, 2003). Some of the information is learned through experience by the KW and the KE, often used as tacit knowledge with no obvious way to establish its origin in the organisation or vetted by the KE. At the same time, the information and knowledge are located in siloed environments with no clear or easy way to access or know that it exists unless you have been with the organisation for a considerable time or even rely on historical knowledge, including recollection or something one overheard. Some of the processes are repetitive because the information is located in an automated system with protocols that hinder ease of use. These become barriers in the organisation making it difficult for the KW and the KE as broken down below.

2.3.1 Knowledge barriers

One of the most fundamental activities in any business is sharing information with the community or organisation that will help them perform better, saving time and money. Mohammed et al. (2016) find sharing electronic information important to ensure service delivery (Mohammed et al., 2016). They argue that information sharing is one of the important aspects of improving the quality of the business and organisation. Further, Information and Communication Technology (ICT) is needed to support decision-making in many organisations, including HEI.

However, it is often a challenge for KW to access information or knowledge through tacit means from their colleagues not be able to share what they know as it may be outside of what they think is part of the organisational process or structure information gathering and may not understand how their tacit knowledge can be of benefit to the community.

It is common for people to feel the need to protect the information they have acquired through personal and/or professional knowledge in the organisation. For some organisations, cultural barriers discourage members of the community and KW from sharing information, and they would rather share it with each other as anecdotal information. Disterer (2001) says society has deep cultural traditions which tend to discourage knowledge sharing while acknowledging it is necessary to share knowledge in the organisation to use it efficiently and effectively in the critical success factors of today (Disterer & Stadtweg, 2001). They further conclude that attitudes of conflict avoidance can prevent people from sharing information that may be beneficial to the community and organisation, as that might contain new knowledge and/or innovative ideas.

The process of gathering information or knowledge is repetitive and difficult to get through as many barriers are in place that lead to the system experiencing unnecessary bureaucracy or bureaucratic protocols. Some systems are not integrated and function in silos, with no incentive to share with the rest of the organisation. Equally, there is often a lack of system buy-in from the organisational stakeholders. Often, the KW is accustomed to an organisational cultural practice that supports a lack of trust or interest in anything new or change. Some KW do not see themselves as part of the

organisational ecosystem or contributing to the change and organisational evolution. Khurana et al (2011) say that the need for successful information sharing has been identified as critical to effective innovation and development (Khurana et al., 2011). They have found that the crucial barriers are financial, technological and organisational barriers to integrating information sharing.

In some organisations or institutions, the knowledge barriers are also caused by structural segregation, especially if the institution like a university is located on several campuses and the distance from each other is essentially a geographical barrier and members of the community or KW and KE find themselves working in their mental siloes within the organisation. Gibson and Cohen (2003) find that virtual teams separated by geographical distance find the process of developing a shared information understanding more challenging, as members rely heavily on technology to mediate their day-to-day communication, do not share the same work context, and do not have geographic proximity. All of these are factors that inhibit knowledge sharing and shared understanding (Gibson & Cohen, 2003)

2.3.2 Organisational silos.

KMS that are not integrated or collaborative tend to work in silos, isolated from each other and create more work for the KW as they have to understand and remember where each one is located, including the content and/or purpose related to the information needed. The segregation of the information serves a particular purpose but can slow the process of access to information by the KW or relevant stakeholders. According to Bento (2020), there are concerns about forming silos and structural communication barriers across formal and informal network structures (Bento & Tagliabue, 2020). They add that several organisations have implemented measures to bridge network clusters to bridge processes. In their concluding argument, they found that silos are barriers to organisational goals as they threaten internal cooperation. It is not uncommon for the KW and KE to work in isolation while dealing with fundamentally the same knowledge concerns that feed into each other and organisational needs. The same can be said about trans-departmental communication, cooperation and collaboration with the organisational structures working on the same operational knowledge needs.

Fenwick et al. (2009) describe silos as organisational units where there is a breakdown in communication, cooperation and coordination, arising within as a result of silo mentality, and organisations themselves becoming unduly limited as they unintentionally limit their connections with other organisations or units. Additionally, they are often detrimental to the resilience of the organisation and community (Fenwick et al., 2009). Furthermore, there is a need to improve the way silos are managed in the interest of organisational and community resilience through good internal management practices that build bridges that will improve organisational collaboration. Their research findings continue to highlight that silo mentality at the intra-organisational level has the potential to interfere with intra-organisational resilience, pointing to the need for good

management that will supplement specific initiatives to reduce or eliminate challenges that may arise.

2.5 How has the problem been solved in the literature

Over time as organisations grow and business activity increases, a lot of data or information is generated, and organisations need a way to retain this information for the benefit of their clients and business. Organisations are using Customer Retention Management (CRM) strategies to help them manage the information they are generating and avoid loss while satisfying their stakeholders. Nataraj (2010) says CRM evolved when organisations realised the need to retain lost customer knowledge,improve service, and regain lost market share (Nataraj, 2010). His work supports the idea of using a CRM-orientated platform or mechanism for information and or knowledge retention in the organisation. Thus many organisations realise the need to have a customer mechanism in place, as it will help keep their clients satisfied. Dat et al. (2021) say investment in effective CRM software brings high efficiency and helps save costs to organisations, especially CRM, which is easy to use and offers free support and unlimited time (Dat et al., 2021)—stating that businesses or organisations can access leading customer information management software without spending extra money on hardware and software.

There is no specific literature that speaks specifically to IMS and CRM as a single subject or point of discussion. This research is concerned with existing solutions for capturing and recording IM for more efficient information management and retention. The research focuses on the increased workload experienced by the frontline KW when faced with increased demand from clients for information that is often not captured or systematically made available at the push of a keyboard. The organisation's employees have to sort through the myriad of queries that come from clients and members of the public seeking access to information. They have voiced their unhappiness at the volume of queries that make it difficult for them to complete the rest of their substantive duties as they have to take time out to gather information that often exists in the organisation but is not captured in an easy-to-access manner.

The findings by Tajpour et al (2022) state that sustainable business entities have the KM component, and it is applied in all parts of the organisation, as they create value and sustainable competitive advantage and effective participation in the organisational social network, including activation of KM and value creation (Tajpour et al., 2022). The created value can be generated information and knowledge contained in individual organisational members and structures that are often not formally captured. Much of the literature shows that organisations would be better off investing in some form of customer retention or CRM mechanism as part of the fundamental operational aspect of their daily business conduct. Nataraj (2010) says effective retention programmes have to identify customer needs and facilitate their satisfaction (Nataraj, 2010). Additionally, organisations must adjust, adapt, and modify previous practices to meet contemporary

needs. These ensure that organisations have a sustainable creative approach to KMS that services both the customer and the organisation, including the KW, who are part of the organisational social structure and its network.

This addresses the employees or KW who feel overwhelmed and incapacitated to do their functions, find it difficult to streamline their work, or engage with the clients as they scramble to find information and knowledge that exist in the organisation. The information or knowledge they are trying to find is likely not captured and recorded as IM, demonstrating the need for a cost-effective means of capturing and recording information and knowledge as part of the IM.

The IT service desk is the focus of this research, as many help desk solutions are available as open-source solutions that make it easier and cost-effective for organisations to retain their clients and facilitate the implementation of their CRM strategy. Harcenko and Dorogovs describe an IT service desk as an end-user single point of contact services in one form or another that can be found in almost any organisation which makes use of IT service support, with the added auditing possibilities of operations of the service desk (Harcenko & Dorogovs, 2014). Thus, organisations will be able to make reliable observations of their operations by using the data that would have been accumulated in the service desk deployed in the organisation. Introducing a self-service system for user support will allow users to find answers to their questions or resolve incidents by contacting the service desk. Thus, implementing such a system can noticeably decrease service desk operators' workload, that is, the KW, and therefore save up resources. "Commonly, such systems consist of a knowledge base that contains sorted user frequently asked questions (FAQ), possible incident solutions, instructions, downloadable files, etc.

According to Carcillo et al (2010), adopting the system will improve efficiency and timeously provide the requested information while allowing clients to communicate via email (Carcillo et al., 2010). The introduced information management system can improve service delivery to the clients by allowing the KW to be efficient as they receive queries that are systematically sent to the relevant KW better suited to deal with the query. In their conclusion, they found that important improvements in organisational and managerial matters have been realised with the ticketing system adoption as every request was traced and every ticket managed from the request to the answer.

Taking the higher education sector on which this research is focused, a lot of the literature shows there are challenges in Higher Education Institutions (HEI) with sharing and managing the information and knowledge they generate despite the fact they are regarded as major generators of knowledge. According to Marsh (2016), private sector organisations have a better grasp of KM concepts and practices than HEI (Marsh, 2016). With challenges facing the higher education sector, the processes and systems associated with KM could serve as a resource for performance improvement and increased efficiency. Marsh's findings indicate that HEI managers (Deans) agreed the capture, dissemination and subsequent transfer of KM, both explicit and tacit, is of value in the respective institutions.

Asiedu et al. (2022) found that KM is popular in many disciplines in HEI though the concept is highly practised by corporate entities compared to HEI (Asiedu et al., 2022). They claim their findings show inadequate literature on KM strategies in HEI. Their study suggested strategies like communities of practice, knowledge partnering and knowledge harvesting.

According to Al-Kurdi et al.. (2018),Knowledge Sharing (KS) in HEI is fragmented and does not comprehensively consider numerous factors that influence academics to share their knowledge (Al-Kurdi et al., 2018). The lack of a CRM and/or Helpdesk system does not allow for a mechanism for information sharing or an access point to existing institutional knowledge. HEI are big organisations that typically would benefit from having a customer service or help desk and an information resource or depository that would allow them to store new information or knowledge accumulated by the organisation. This is also in easing the increased workload experienced by the frontline KW, who have complained of the increased workload when clients are seeking information.

In the course of the research, it has become apparent that many employees and KW have become accustomed to working in silos or being isolated from other KW in the organisation. They, too, are working with the same or similar knowledge sets. Fenwick et al. (2009) described silo mentality as the organisational unit breakdown in communication, cooperation, and coordination with external parties (Fenwick et al., 2009). Further stating silos are detrimental to the resilience of the organisation and community.

Brown (2017) proposes an alternative to the silo-based approach and argues that future accountability efforts must be integrated by examining the knowledge domain of other silos to successfully navigate the changing environment of HEI (Brown, 2017). In light of the argument that KS in HEI is fragmented, the consideration of alternatives to silo-based approaches is the introduction of an information-sharing platform that will allow for the governance of the system through communicative activities between KW and KE as they process the information coming to them the queries being made by the clients or in the case of HEIs, students, members of the public and or stakeholders. Savolainen (2017) suggests that IS and KS have more communicative similarities, depending on the information and knowledge being shared, and the multiple interpretations of the concepts of information and knowledge (Savolainen, 2017).

Brown (2017) argues that future accountability efforts must integrate by examining the knowledge domains of other silos to successfully navigate the changing environment of higher education (Brown, 2017). In his thesis, he states that higher education has been characterised by persistent change and advocates that in future, there must be an integration of the successful knowledge domains to navigate the changing social context. In this, the consistent change has been the increased access and use of Information Communication Technology (ICT) by members of the community and organisational stakeholders, which in turn means an increased information enquiry traffic that comes to the frontline workers or KW. Dogruer et al. (2011) state that the internet is the source of spreading information quickly to a large audience and going beyond the limitation of time

and space, thus it is important to encourage students to use it as a resource to get any kind of information they need for their academic studies (Dogruer et al., 2011). Available literature appears to concentrate on KMS through Database Management Systems (DBMS) that focus on record keeping and not on the need for information and knowledge management that is not static but is in a constant state of change and growth as new data and or information is being generated that needs to be processed and authenticated as verified knowledge or IM for future organisational decision making. The growing digital footprint of society means more people are active online or on the internet, making it logical to introduce some form of a KMS that, as stated by Health et. al. (2015) will be free of errors, efficient and less time consuming due to the care taken to develop it (Health et al., 2015). In other words, the system will be fit for purpose. They contend that the integrated student database system will capture and maintain longitudinal data of clients and provide accurate and reliable data or information. Continuing their findings, manual and disintegrated electronic systems have numerous disadvantages, for they are prone to inconsistent data capturing, data redundancy, difficulty in updating and maintaining data, security vulnerability, and difficulty in imposing a constraint on data and backing up information.

The purpose of these systems is usually aimed at ensuring an efficient system that helps to ameliorate the pressure on the KW and KE as they, in essence, are engaged in Customer Information Retention Management (CIRM), understanding the needs of the customer in a way it helps the organisation make better decisions beneficial to them and or the customer. They have to do this by accessing accurate and up-to-date information and knowledge that will be most useful to the customer and beneficial to the organisation. Padmanabhan et al. (2011) proposed the building of a Business Intelligence (BI) dashboard as an innovative approach for increasing retention by identifying potential indicators based on a combination of predictor variables (Padmanabhan et al., 2011). There is no effective use of the abundant information that informs and drives business operations. Essentially, the information is abundant if collected in a manner or system that can be used to predict or understand customer needs better. In a lot of cases, the queries and complaints from clients are usually feedback or customer experience data that can be analysed as information that generates knowledge on the service or services being provided, including a product that is being produced. Organisations need to identify this data for what it is worth to them and their clients. Faed and Forbes argue that most organisations are unaware of the value of using customer complaints to improve organisational quality and determine how the resolution of complaints can be beneficial or valuable(Faed & Forbes, 2010). They add that entities deal with massive data that comes in as customer feedback that can be used to improve the lack of a good complaint management system. The same is true that HEI can use or put management systems in place to help them better manage the queries and complaints that come through the KW and are often filtered through to the KE. Having a KMS will assist in the management of these queries, where they are gathered through a system that helps in analysing or assisting in the interpreting data into information that generates knowledge valuable to the organisation so that it can be stored as IM.

Therefore, it necessitates creating or building a dedicated system of handling the information coming to the organisation as raw data that is analysed into information that can be used or regarded as generated knowledge. According to Kurnianda (2018), designing an administrative information system to support systems operations has several stages that become determinants of the scope to be designed to give optimal efficiency for customer retention and built on the analysis of results(Kurnianda, 2018).. This identifies a DBMS tailored or best response to the needs of the entity concerned and what it will be used for. In short, it has to be built for a purpose. In this approach, the KW and the KE become the customers as they will be the end-users of the DBMS that will be built to ease their workload while retaining IM and offering an organic community information-sharing platform. The community information and/or knowledge being shared is not static as it continues to grow and evolve through the organic changes of community and/or customer needs, while knowledge is constantly being generated, analysed and vetted by the KE.

This system will be devised as a solution and means to mitigate the workload complaints from KW and KE and take a customer Retention Management (CRM) approach where it seeks to keep the institutional client and community informed of the current and relevant information that is continuously vetted by the KE with ease of access by the KW and clients with the necessary protocols in place. Nataraj (2010) says that to be effective, such programmes must embrace a customer-centric management approach that identifies customer needs and is modified to meet contemporary needs by providing information that helps them become more informed (Nataraj, 2010). In his conclusion, Nataraj says empirical evidence shows CRM strategies contribute to organisational well-being by helping to identify customer satisfaction and keeping them informed while stating that programmes are often misunderstood as organisations frequently rely on IT solutions that often fail. IT solutions frequently used by organisations can easily be based on the need for organisations to handle multiple sources of information and find the logical approach to the solution to integrate various systems. King and Burgess (2008) state that systems can help organisations manage client interactions more effectively if critical success factors of appropriate implementation practices are encouraged, while they acknowledge in their conclusion that organisations face considerable challenges in implementing large-scale integrated systems (King & Burgess, 2008). These challenges are faced by organisations.

2.5.1 Existing solutions

Most organisations use IMS to help them monitor their daily business activities at the operational level to help streamline their business processes. These are generally open-source systems that are more focused on data management, not on the management of new knowledge generated and acquired by the organisation. They often do not have a specifically designed system capable or enabled to collect data specifically intended to be analysed and vetted by experts in the concerned field or area of speciality and can later be shared in the real-time scenario and become a knowledge resource. This could be influenced by the siloed approach, where reconnaissance is regarded as the function of the tactical or strategic levels of authority.

In the HE sector, there are existing information management systems that focus on data capturing to manage the day-to-day data generation better

To address the challenges faced by organisations in KM and retain valued OK through harnessing IM, many organisations opt to use a desktop helpdesk customer support system to collect, organise and analyse the knowledge generated in a manner that will better enable them efficiently secure customer satisfaction while having easy access to an organisational leader with the knowledge for informed decision-making. They have to consider the cost benefits of these systems as organisations would not necessarily have the funds to install and implement any hardware that would be disruptive to the existing infrastructure. Serbest et al. (2015) say accessing information the classical way is expensive and time-consuming for organisations, while Information Systems (IS) can provide correct, coherent and reliable information accessed by individuals and the organisation (Serbest et al., 2015). They continue that making correct and coherent decisions by the managers (KE) helps organisations to have a competitive advantage as the support systems are set to increase efficiency and customer satisfaction. According to Al-Hawari (2019), the system acts as a single point of contact between users and the KW. It supports the KE to define the services, administer the user roles, manage tickets and generate reports. It also allows clients to report and/or request services and allows KW and KE to exchange information with the systems administrators, and simultaneously support email notifications amongst collaborators for further action (F. Al-Hawari & Barham, 2019). They conclude in their paper that the system enables users to report any query, submit a service request and communicate with an agent through the help desk tickets. “It also supports prioritising a ticket, classifying a ticket, assigning a ticket to an agent, editing a ticket description using a rich text editor, exchanging ticket comments amongst collaborators, and changing the ticket status. In addition, it allows managing services, administering user roles, generating automatic email notifications, and producing reports that help management in decision making”.

2.5.2 DGCP4KS – Comparing Ticketing systems

Many systems offer tiered support that enables organisations to better support and/or sustain themselves and their clientsThis section compares the various open-source ticketing desktop help-desk systems to show how much they have in common. These systems essentially help manage queries from the clients by providing an automated service system that makes it possible for them to receive an instantaneous service from the service provider by eliminating the time delays and need for physical presence at the front desk of the organisation.

Hundreds of these systems are available, and equally, as many open-source systems that are more cost-effective for organisations to consider without going through big expenses.

Here is a brief sample as sourced from the blog page Helpjuice on the following URL:

https://helpjuice.com/blog/it-ticketing-system#spiceworks

1) Spiceworks
2) HubSpot
3) osTicket
4) ServiceNow
5) ConnectWise
6) SolarWinds Web Help Desk
7) Jura Service Desk
8) Jitbit
9) Zammad
10) Freshdesk
11) Request Tracker
12) Zendesk

As described in Al-Hawari and Braham's (2019) conclusion, these systems enable users do the following:

- to report issues
- submit a ticket
- classify it according to the query
- assign an agent, which can be the KW and or KE
- edit the ticket description
- Collaborators can exchange or share comments
- Change the ticket status, meaning whether the matter is resolved or not.

In addition, protocols can be added that will allow administrators to generate protocols or rules for the users and managers, generate automatic email notifications and produce reports that help managers in decision-making (F. Al-Hawari & Barham, 2019). This essentially means the generated reports form part of the new data and information used as knowledge for the institutional assets or managers to make informed decisions with each evolving report that is produced. Thus, making it possible for organisations and/or HEI to devise means of harnessing the data and information and analysing it into knowledge that will be an asset and part of the IM.

The benefits of these systems as KM tools, as found by Aradati et al. (2019), lead to a greater than 80% decrease in the average time taken to resolve a query and a 28.9% increase in the first contact resolution (Aradati et al., 2019). Based on these findings, the workload of the KW and KE would be significantly ameliorated by the introduction of the system as all the queries will not necessarily come to them as the systems allow for the generation of frequently asked questions to be readily accessible, as the client or member of the community interacts or engages with it. This results in fewer issues requiring the time and action of the KW. The collaboration abilities offered by the KMS make it possible for the KW to escalate issues or queries to the KE or field specialists. The KE, in turn, can collaborate with others in the field or transdisciplinary collaborations that are relevant to the query.

The flexibility of the systems makes it easy for end users to misunderstand their functioning and might end up duplicating and complicating the information flow and negatively affecting the user experience of others or the organisation. Larson (2015) found that many of these customer-requested features or functionalities were unnecessary (Larson, 2015). This indicates that there is still a need for a systems administrator who can serve as an overall advisor to the managers or KE in the organisation.

2.5.3 How do the solutions differ from each other

One of the critical functions in many organisations is the ability to provide customer support and retention. Many organisations use KMS to help manage and maintain their customer support functions while having the ability to continue collecting important information that can be used as organisational knowledge. Reddy et al. (2022) say organisations cannot be successful without a KMS as they are the backbone of any customer support in the organisation, allowing for smooth customer support (Reddy et al., 2022). They further state that the relationship with KMS should be mutually beneficial and allow for measuring the effective usage of the system in understanding customer support demands in the organisation.

Schmitt (2022) highlights that the foremost function is to effectively inform and involve their stakeholders (Schmitt, 2022), pointing to the importance of prioritising the KMS approach of choices that will enable common language to the organisation's KMS that will be comprehensive and consistent enough to allow auditing and accreditation.

The possibilities that come with using KMS have made it necessary for organisations to use the systems as they can enable them to efficiently service their clients while being able to vet and have a comprehensive data collection mechanism. They are moving to automated online-based systems to capture and notify the service provider of a pending query, through a computer-aided IMS that will assist them. Bosu et al. (2019) affirm that the system is supported by an automated system that ensures stakeholder requests are received by the organisation and managed effectively while providing service to the clients (Bosu et al., 2019). They note that Information Technology Services Management (ITSM) is relied upon by organisations to provide efficient and quality services. They state that this is a set of process guidelines that organisations adopt to improve the quality of their services, thus building a good relationship with their clients. This is supported by Prasetio et. Al (2021),;it helps in customer retention in the long term with good service, allowing the organisation to increase its client satisfaction and minimise loss through improved service quality (Prasetio et al., 2021)

The basic principle of the systems is that they are designed to allow the end-user to provide an information management system by categorising queries into tickets or issues that can be assigned to the best-suited person to deal with in a timeous manner with little or no disruption to the daily operations or productivity. As more organisations depend on some form of computer network systems to assist in their operations and functioning, it becomes important to have a computer-

aided information sharing and governance system that will help in the management of the newly generated knowledge and provide up-to-date information to the clients vetted and authenticated by the organisational KE, as this forms part of the reduction of the workload complaints from the KW. Some organisations have existing systems intended to assist clients in gaining access to information already on record. For example, libraries in HEI use Ticketing systems to assist clients who experience challenges in finding the books or information they need. These Ticketing systems make it possible for the librarians (KW) to engage with the client online in real-time through text messaging. They can also escalate the queries to the subject librarian (KE), who is skilled in sourcing the information needed. Once the information is sourced, the KW communicates with the client via email to inform them and give them a link to the library page with the information.

Zhang (2020), states that the continuous innovation of network technology, modern technology in the information age is increasingly updated, and more advanced technologies are being used (Zhang, 2020). This view is relevant to the use and application of the helpdesk ticketing systems being used by organisations to help them learn about their client's needs and provide answers or responses efficiently, which reduces the pressure or increased workload complaints received from the KW and KE.

As most organisations use computers as their basic means of storing information, there is a need for a more user-friendly and accessible way of engaging with the client and the employee (KW and KE). The existing alternatives for most organisations have been using cloud storage that requires little or no installation. Many systems are open source and often offer trial versions for a limited time, giving the organisation the time to test drive them before fully committing. Sunyaev (2020) describes cloud computing as giving organisations and individuals the ability to have on-demand network access to a shared platform or managed resources, such as servers, storage and applications (Sunyaev, 2020). This technology is also available and supported by the IMS used for HelpDesk ticketing, allowing organisations to generate information based on the ticketed queries they receive through their frontline staff, who are usually the KW and are authenticated by the KE, who in turn can store the knowledge in a cloud storage service. The organisation has the prerogative to make the information accessible to the clients, subject to the protocols in place. For example, many HEI online libraries, as is the case with the CPUT, use a ticketing system integrated into their library search platform to help and assist students or staff looking for books or related resources. They have online agents (KW) who offer real-time helpdesk services to the clients and go as far as responding on email if the material of books being searched is found. As confirmed by Dave et al. (2013), cloud computing allows organisations to better manage their knowledge and gives them an advantage in using IT and catering to their clients and organisational needs following the continuously changing requirements of the clients. They further state that cloud storage also empowers organisations and the stakeholders or organisational community. At the same time, their findings also highlight the need for caution and security to ensure that the systems implemented are responsive to client data.

The table below represents a random selection of available IMS as ticketing systems that can be used by any organisation. These systems help organisations determine how to deal with client or stakeholder concerns. The table is set up to highlight some of the features in installation or usability and the business advantages they will offer to the organisation compared to other similarly specified IMS. It focuses on the storage ability or mode of storage with a bias toward cloud-based storage systems as opposed to localised hardware data storage systems that would be prone to security concerns and data corruption or loss.

Table 2.1 Sample of open-source online help desk

Ticketing System	Custom purpose	Virtual storage	Installation	Online availability	Tickets	Prospective Advantages
Spiceworks	Inventory management, remote support, network monitoring	Cloud support	Open-source, online	Yes, free and customizable, with a sponsored advertisement in the backend.	Yes, with no device or ticket limitations	Uses email to send and track tickets, cloud-based with no need for server procurement
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
HubSpot	Organise, and track customer support, one dashboard accessible to the entire team. Node managers can see and monitor entire ticket process.	Cloud support, hosted by Amazon	Open source developed by third parties, online with a free CRM	Free, hosted online through a cloud account	Automatically creates a ticket when a customer fills out a form, sends an email and or live chat.	Managers can track performances, SLA, dashboard agreements, Agent collision avoidance
OsTicket	Preferential customization IT support ticketing system	Cloud-hosted version for a monthly subscription.	Free open source is available as an option.	The choice for a free opensource version or a cloud-hosted version for a monthly	Ticket system with rules and route incoming tickets	
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
ServiceNow	Consolidate all IT operations – from ITSM, governance and DevOps.	Online service accessed through the cloud	Open source	Marketplace with a large number of extensions and applications	Customisable ticket system that can be configured to suit the customer and or manager	Focus on efficiency, create your own workflow,
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
ConnectWise	Designed for business automation platform for organisations with various support workflow.	Open API	Open API and 300+ integrations	Flexible contract management that helps to manage multiple service contracts	Help desk ticketing system for automation of business processes.	Suitable for PM, time tracking, reporting, billing and procurement
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
SolarWinds Web Help Desk	Designed for customer requests and asset management only.	Web-based storage	Offers both free and purchased downloadable program	Available dependent on continuous internet connectivity.	Manage support tickets, IT assets and change management	Set up SLA alerts, integrates with 3rd party tools for IT assets management, native integration with Active Directory and LDAP
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Jira Service Desk	Suitable for ITSM and customer service	Web-based storage	Online download – open		Ticket	SLA Customer satisfaction reporting (CSAT)

			source			
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Jitbit	Simplicity, automated helpdesk, asset management	Both cloud and self-hosted		Mobile help desk app	Ticket	Automated triggers that allow automatic replies, assign technicians tickets, and set due dates.
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Zammad	Enables IT service provision via several channels like telephone, social media and email.	Open-source	Web-based		Ticket system that can be audited by going back to any moment in time and seeing who	Search both ticket and file attachments, individual escalation rules and ticket solution time limits, autosave and collision detection
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Freshdesk	It supports the ticket system with all plans, including management, team collaboration, social ticketing and reporting.	Cloud-based ticket system	Web-based	Website and social media availability through multiple channels, chat, email	Ticketing support system for IT support	Contact management hub where contacts and associates with tickets are made easier to manage communication. Various criteria to ensure all ticket issues are filtered to their addresses on time.
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Request tracker	Enables you to keep track of tickets and manage workflow processes	Web-based interface	Open-source. Paid support plans can be purchased	Web-based and can be accessed on any device for users' requests.	The ticket system can respond to tickets using a mobile browser or email application	A secure solution that comes with complete PGP support for signing, encrypting and decrypting files
	Custom purpose	**Virtual storage**	**Installation**	**Online availability**	**Tickets**	**Prospective Advantages**
Zendsek Support	IT support ticketing solution designed for general customer service.	Cloud-based storage	Offers a free trial for a limited time.	Not specified	IT ticketing solution	Multi-channel support. Tickets can be created from a myriad of sources, including social media sites.

Table 2.1 Sample of open-source online help desk

2.5.3.1 Summary in bullet point

The sampled Helpdesk ticket systems mostly have the following features in common:

- The support system that gives an option for subscription payment and open source allows organisations to drive them first before making a definitive choice to purchase. Makes it possible for a systems administrator to do better reconnaissance of multiple systems in a controlled closed or open system with many features that can be customised to suit the client or organisational needs.
- They are cloud-based storage systems that do not need servers to be installed locally, thus saving costs to organisations. Cloud storage makes it possible for clients, KW and systems

administrators to have remote access anywhere in the world.

- They allow users or administrators to set up their governance and security protocols.
- A few are multi-channel support systems that can be accessed using mobile devices like cellular phones and social media, etc.
- Come with some measure of security features dependent on the customer needs, like different forms of encryptions, and
- Allows for the capture and management of the workflow processes.
- Offer secure solutions that come with encryption and decryption support.
- Tickets can be audited by going back in historical times to see who actioned or made changes, or resolved the queries.
- Offer API, allowing users to integrate other organisational applications or software, making it possible to manage different functions on one application or dashboard.
- Preferential customisation IT support and agent collision avoidance. Meaning the system can be customised by the organisation to its preferred protocols, and a built-in system that allows tickets or queries to be assigned and tracked to a KW or KE (agent) as per the agreed protocol without duplication of tasks.

The ticket systems are engineered to be customisable to the customer needs while others are configured to more specific technical IT needs, as many organisations would likely have an IT professional (scrum or scrum leader) do the design configuration during the installation of the system. Many IT projects have project teams called scrums, and the project leader or coordinator is the scrum master, who mostly like to be the one charged with the selection and installation of the system by himself or the delegation of the project team or scrum members.

It is also possible for organisations to have more than one system in use when they have a siloed governance structure where various units can be semi-autonomous functionally with little need for sharing information inter-departmentally.

The primary need for ticketing systems is to help organisations optimise their customer relationship through a structured governance framework that is easier to manage. The ease of access to online communication has led to increased demand on the frontline staff, thus increasing their workload as they spend an increasing amount of time responding to client queries. These ticketing systems help organisations categorise and set priorities to ensure queries are responded to timeously.

For most of these support systems, the tickets or queries are generated automatically and can be configured in a manner where the tickets are immediately assigned to the correct KW (agent) suited to deal with them. Thus, saving waiting time for the information and reducing the pressure placed on the KW, who would have spent much time searching for the information or relevant person to address the query. The queries can be prioritised for faster response time, leading to more efficient use of time and resources. Ideally, this should reduce any backlog of queries as the KW can prioritise them, provide solutions or information timeously and gain the trust and confidence of their

clients.

Some of the systems have a multi-channel platform that allows for interdepartmental support and/or data sharing across the organisations, helping consolidate generated data. Concerning this study, this feature makes it possible for the collected data to be consolidated and sent by the KW to the relevant KE timeously. It is also possible to have a Service Level Agreement (SLA) that can be third-party support to the existing services with the organisational community, thus enhancing the quality of service rendered to the clients.

SLA allows the organisation to set up protocols or rules for dealing with the queries and time frames for resolving the queries and making it possible to institute improvements that will help alleviate the workload increase experienced by the KW while contributing to knowledge generation. This enables the systems to consistently have queries going through the same portal, making tracking the queries and/ or similar queries easier.

The ticketing systems not only make it easier to track issues submitted by clients through the KW, but they also make it possible for records to be kept; thus, some information can be made available on the organisational website or any other means of information dissemination to be accessed by the clients. As most of the systems allow for other means of communication, such as email, community members and clients have access to and history of the ticket, with an opportunity to accelerate the matter, and the KW or KE (agents) dealing with the ticket can accelerate the matter to someone who would be suitable or has the needed knowledge for its resolution. This also means the KE can collaborate where needed and provide an organisational or community solution. This also makes it possible for a consultative process to take place within the community, thus adding to the new knowledge generation. The collaboration makes it possible for queries to be dealt with internally without exposing the client to mundane organisational processes the KW and KE have to deal with. Communication can be exclusively between the KW to KW, KW to KE and or KE to KE.

These platforms also make it possible for KW to continue their collaboration with each other or with the KE by sharing private notes that do not include the client, making room for discussion or further exploration into the query submitted that could assist in solving future queries. Therefore, several KW and KE can work collaboratively on the same query and have differentiated solutions if needed. This can make it possible for faster query resolution as many heads are better than one.

Generally, the online availability of the ticketing systems makes it possible for anyone within the community to access the system from anywhere in the world. At the same time, a wealth of data is generated that can be collected and collated in a useable fashion for the organisation to be able to determine and measure the quality of service being provided to the community and clients, including getting insight into the areas that need more focus or improvement as guided by the set SLA.

2.5.4 Implications of using IMS solutions

The Information Management System (IMS) used in this study is the ticketing system that helps organisations have a quick response time to the clients and streamline their engagement with their customers, including their stakeholders, while monitoring the information requirements expected from them as the service providers. Ideally, the use of the ticketing systems is to help ease the burden of frontline KW from being inundated with queries from clients and members of their work community, which they have said works over and above their usual day-to-day work requirements. The introduction of the system will also help in allowing a culture shift from the side of the customers as they will slowly understand there is a more efficient way to access information that will help them. A lot of information will be made easily available on the website or page the client will access as they begin their search to gain clarity on what they need to be serviced with, thus allowing them to identify the person or department relevant to the service they need. The organisation will better manage the information being generated in its community and stakeholders, allowing them to verify and authenticate the data received before it is shared with the community.

This will lead to the more cost-effective use of time and resources as queries are logged online by clients and members of the closed community, with no need to use paper and telephones that have to be manned for queries to be responded to.

The introduction of the ticketing system will enable the organisation to time and track the queries while gathering new knowledge generated in the course of its day-to-day business operations as gathered or received by the frontline KW. This will make it possible for it to be shared with the KE, who are specialists in their respective fields of knowledge. Organisations such as HEI have several IMS that could benefit from the knowledge being captured or received by the KW, which may be siloed at the time of data generation. This data can be integrated into the organisational processes and governance structures where possible to benefit the rest of the community, especially in the HEI sector,—making it possible for the knowledge shared by the KW as tacit knowledge to be authenticated and vetted by the KE in their respective segregated areas of function. Thus, anecdotal knowledge that would normally only exist among the frontline KW can be shared and introduced into the institutional knowledge base. The introduction of the IMS in the organisational community as part of the information-sharing platform makes it possible for this new knowledge to be vetted and authenticated by the institutional KE.

Most important is reducing the workload for the frontline KW through some interventions facilitated by the IMS interface on the webpage, for example, Q&A that provides some of the key answers or knowledge areas needed to assist the clients.

The need for face-to-face contact is ameliorated, and this is especially beneficial in light of the recent COVID-19 pandemic, which will likely be with the world for some time to come.

2.6 Conclusion

The implementation of the IMS exists within organisations to serve various functions in information exchange, including those of higher learning. It is used for various purposes with the same ideal of managing shared information in the organisation. For example, the CPUT library uses a Ticketing System to provide an online information service platform where students or clients can text online in real-time during working hours. They can leave messages after working hours that are responded to as soon as the library is operational or during normal working hours. These solutions' limitations are influenced by the siloed business approach within organisations, which in turn does not openly accommodate community information sharing. Multifaceted organisations often have segregated processes whose similarities are not easy to highlight as they are not openly shared or have a centralised information depository where everyone in the community can access and share information. In such situations, it is common for the staff or community members to start sharing with each other tacit and or anecdotal knowledge that has not been tested or vetted by KE, who is the authority in the respective field or generally has acquired a wealth of knowledge that comes through experience and often referred to as IM due to the historical referencing in informing decision making. This knowledge goes untested or vetted as there is often no way to capture and authenticate it.

The literature has consistently maintained the role and importance of tacit knowledge concerning knowledge sharing and governance in the organisation as part of the decision-making process.

Gibson and Cohen (2003) conclude that shared understanding in teams can lead to improved performance by helping teams anticipate the behaviour of others, better coordinate their work by improving implementation, and increase team members' motivation (Gibson & Cohen, 2003).

Data, information and knowledge have increased within organisations over time. IM becomes wasted due to retired staff, death or replacement to another department. This could have a great economic or competitive advantage if the intellectual capital is used wisely. Rahah et al. say time, money and energy are wasted when the same task, research and findings need to be done repeatedly (Rahah Hamidi & Jusoff, 2009). This leads to the KW and KE complaining of being overloaded as they often have to repeat work already done due to IM not being captured or recorded, thus constraining their time for completing other tasks.

Al-Kurdi et al. (2018) find found that there are limited contributions in understanding knowledge sharing in HEIs when compared with other sectors (Al-Kurdi et al., 2018). In a university setting, a lack of knowledge sharing could be alarming since universities are considered knowledge-intensive organisations, which would impact research output and teaching activities. Findings suggest that HEIs have disproportionately little knowledge-sharing research compared to the commercial sector. The review revealed that existing research on HEIs does not consider the determinants of knowledge-sharing culture comprehensively. Research on knowledge sharing in commercial and HEIs in developing economies like Africa, the Middle East and South America was found to be limited (Ali et al., 2014)

IMS using the ticketing systems are mostly similar, with very few differences that elicit a big diversion from the previous systems' technical methodology or processes, that is, differences in how the machines fundamentally work. They all work similarly though some have features that render them ideal for specific IT and/or retail CRMS in mind. By and large, they all cater to the same basic functionality that makes it possible for the client to be spoiled for choice and a certain level of design or configuration that suits their organisational community needs. This is further facilitated as most of them are open source, and those that require subscriptions often come with a free trial version.

Chapter 3: Research Methodology

3.1 Introduction

This research paper tests the hypothesis by looking at the complaints from the Knowledge Workers (KW) who have voiced their unhappiness at an increased workload they are experiencing due to the number of queries they have to deal with when clients come to them for access to university information. They feel this consumes much of their time and keeps them from completing their substantive duties, leading to a backlog. In the context of this research KW are the frontline staff members who deal first-hand with requests for information from the university community consisting of students, staff and members of the public. The definition is subjective to the purpose of the research and points to a category of employees with a particular designation of dealing with organisational knowledge. Drucker (1994, as cited in Zhan et al. 2014) refers to a KW as an individual who works primarily with information or one who develops and uses knowledge in the workplace (Zhan et al., 2014). Surawski (2019) says KW perfom complex tasks, focus on problem-solving, creating knowledge, distributing it and applying to achieve results (Surawski, 2019). They add, these workers use documents and Information Communication Technologies (ICT).

The faculty in the university has decided to initiate a Customer Relationship Information Management System (CRIMS) to address the information management aspect, including implementing a customer retention strategy. In part, the strategy is also concerned with the loss of knowledge that is not being retained when a skilled staff member leaves the institution through retirement or greener pastures.

The above is the upper layer that has influenced the research on the Digital Governance Platform for Knowledge Management and Sharing (DGC4KMS). It looks at the implementation of a Knowledge Management System (KMS) using an open-source digital online Service or Help Desk system that will help the employees, referred to as the Knowledge Workers (KW) who are often the frontline staff dealing with the information queries that come into the university's department.

The above background informs the research methodology defined by Kothari as systematically solving the research problem by applying a scientific study based on the various steps generally adopted by a researcher in studying the problem along with the logic behind it (Kothari, 2004). He states, "when we talk of research methodology, we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or others."

In his republished book chapter, Goundar (2019) defines research methodology as a systematic way to solve a problem, a science of studying how research is carried out (Goundar, 2019). Additionally, it is the procedures by which researchers go about their work of describing, explaining and predicting phenomena. The study of methods by which knowledge is gained aims to give the work plan of the research.

Both authors, Kothari (2004), and Goundar (2019), agree that this is different from research methods which are essential techniques used for conducting research.

This is a quantitative study of the implementation of the KMS, through the CRIMS project, to observe the role or influence of the ticketing system as a help desk for information management on the workload of the KW and the KE.

The problem identified by the research is that many organisations generate a lot of data which leaves many KW overloaded by the enormous amount of queries, resulting in KW and KE bearing much pressure and leading to complaints about work overload resulting in a reduced response time for the client query. This leaves clients, staff, students and public members, frustrated as they are not getting the information they need timeously. They find it difficult to access the information they need as they don't have one central point to source the information they are looking for. Much anecdotal information is shared among the KW but is often not tested for validity by the KE for authenticity and reliability. This results in the clients moving from pillar to post trying to access the services they require, while the same is true for the KW, who may not always have all the information they need or memory recall as to how a query can be resolved. This also results in the organisations not being able to benefit from the anecdotal or non-formalised information that exists unofficially within the organisation in the form of IM. That translates into inefficient service provision that could be costly to the organisation, resulting in loss or damage to the institution's reputation. This is an empirical research approach it observes the implementation of a Information Management System (IMS) that generates Institutional Memory (IM) capability in addressing the problems of KW work overload and slow response time. Bouchirika (2021) defines empirical research as any study whose conclusions are derived from concrete, verifiable evidence guided by scientific experimentation in real-world evidence investigating its assertions (Bouchrika, 2021). Citing Bhattacharya (2008), Bouchirika (2021) says, "empirical research is based on the view that direct observation of phenomena is a proper way to measure reality and generate truth about the world." (Bhattacha, 2008 as cited in Bouchirika, 2021).

The research seeks to observe the implementation of the CRM system through a ticketing system after KW complained of the increased workload and added pressure over and above their normal workload, which resulted in delayed services to the clients.

Organisations generate a lot of data or information that is not managed or shared within the organisation due to a lack of an information sharing and management system. As a result, quality and value, along with new knowledge, are often lost and not shared with its stakeholders.

This further compounds the KWs' complaints about overload as they must regenerate knowledge that already exists within the organisation, making it a laborious and time-consuming exercise that adds to their daily workload. Much information or knowledge is not recorded and lost to the organisation, while some are regarded as anecdotal or tacit knowledge as it has not been tested or authenticated by KE, while much of the knowledge generated is localised with individuals and does

not benefit the rest of the organisation.

The research will be inductive, looking at a positivist approach that will be justified using the quantitative methodology to demonstrate the empirical findings.

Thus the quantitative research approach will allow the thesis to observe and measure the number of queries received by the frontline KW and establish the time taken to resolve the queries and ease their workload.

This chapter will look at the research approach that will be adopted, which will inform the research processes that will be followed for the investigation. Choosing the correct research paradigm will be a complex process as elements of a quantitative research approach are strong, but the qualitative approach is also necessary as it will address some observations of the project that has been rolled out in the organisation. The focus of this research is to find out if using an online ticketing system that assists in Customer Retention Management (CRM) to deal with client information queries can ease the increased workload experienced by KW. It seeks to find out if the introduction of the ticketing system will help to ameliorate the increased workload experienced by KW and collect data or information that can be vetted and authenticated by KE. The use of the online customer support system, commonly known as a ticketing system, is new to many staff members, and not many students know about it and understand it. Thus the research will look at the number of client queries received by the frontline KW and the time it takes for those queries to be resolved using the ticketing system, which is a quantitative element as it deals mainly with the number of tickets received measured against the time taken to resolve those queries. However, the introduction and deployment of the system will have to be observed as the findings may be influenced by user experience (UX), which may necessitate the need to understand the rollout process. This will help to understand if there was a stakeholder buy-in or resistance in implementing the system and if it has a positive effect on the established organisational culture.

Many organisations or entities generate information within areas of their function that could be useful in providing a better service that could benefit communities and organisations if the information is managed and shared in a manner that allows access to all who need it. This data or information is often localised in one individual (KE/KW) without being shared as a resource to the rest of the organisation or community. These individual persons, generally, have a wealth of knowledge they have gained through time, which can be a big, invaluable asset if harnessed and managed. However, this information has not been validated or authenticated by any expert in the field. So, there is no way of knowing if the information used is reliable and beneficial or counterproductive to the organisational business. An empirical approach needs to be taken to have a clear process of invalidating the generated data and offer a system that will make it possible for this data to be analysed by the organisation. This data is generally regarded as anecdotal data that does not come from the recognised formal channels or organisational processes. However, it can be argued as empirical data as it is part of the KW experiences and observations. This would be the direct

experience and recording of evidence and shared information among the KW and what they eventually share with the KE. It would not be easy to regard the data as quantitative or qualitative in this situation. This research will focus on applying the quantitative approach and partially using qualitative analysis to understand the data or research findings better.

The research seeks to determine if implementing a Digital Governance Platform for Knowledge Management and Sharing (DGC4KMS) system will help ease the workload of KW and generate data that can be vetted and authenticated by the KE for its reliability and for the organisational and community benefit. The approach to the research methodology will be unpacked through the following headings:

3.2 Research Strategy

After conducting a systematic literature review, the research has drawn clear research questions and hypotheses. This is a positivist research approach using the qualitative observational method to collect empirical evidence. Joseph (2012) says positivism has proved that any inquiries can be tested through scientific means (Binu Joseph, 2012). According to Park et al. (2020), positivist research studies focus on identifying explanatory associations or relationships through quantitative approaches, where empirically based findings from large samples sizes are favoured (Park et al., 2020). Adding, that generalizable inferences, replication of findings and controlled experimentation are guiding principles of positivist science. This research observes the implementation of the IMS, to test the hypothesis which says:

H0: There is no significant relationship between the size of IM and the workload of KW and the response time of the system.

H1: The increase in the size of IM reduces the KW overload and overall response time.

The implementation of the IMS is observed, and data is gathered to find out if it supports or disproves the hypothesis. According to Ciesielska and Jemielniak (2017), observation is one of the most important research methods that can be used in a range of research strategies, like case studies (Ciesielska & Jemielniak, 2017). They say the researcher/s do not necessarily have to personally observe or participate in the life of a community or organisation to be able to conduct social research, including organisational research. The research collects empirical data from the IMS – OsTicket platform, which is an open-source customer retention medium that allows the research to collect data without being directly involved with the clients. Research must have a clear understanding of the route it will take in its research process or strategy that must be informed or unpinned by a particular philosophical approach that will help to inform its trajectory. According to Park (2020) “understanding paradigm-specific assumptions helps illuminate the quality of findings that support scientific studies and identify gaps in generating sound evidence (Park et al., 2020). Ryan (2018) says choosing the correct paradigm will guide the research method and analysis and

help decide which philosophies are appropriate to the research context, and inform its design, methodology and analysis (Ryan, 2018).

The research observed the OsTicketing system's implementation in a close organisation. This is a case study of the ticketing system implementation in response to the complaints received from the frontline KW who complain about the added workload when they have to resolve information queries received from clients and how the organisation generates a lot of data that is used as information without authenticating its credibility or trustworthiness.

Gerring (2004) defined a case study as a single-entity study to generalise across a large entity (Gerring, 2004). He expands on the elements of a case study being reliant on the same sort of covariational evidence utilised in non-case study research. This infers that it is based on assumptions on the observation that gave rise to the research question or hypothesis resulting in the case study. Zainal (2007) offers a more detailed definition that a case study is a method of in-depth exploration and understanding of complex issues through a robust research method for a holistic investigation or examination of a specific context (Zainal, 2007). Continuing his explanation, he states thatit selects a small geographical area or a very limited number of individuals as the subjects of study to explore and investigate real-life conditions through detailed contextual analysis of a limited number of events or conditions and their relationships. As cited by Zainal (2007), Yin (1984:23) defined the case study research method “as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context are not evident, and in which multiple sources of evidence are used” (Yin, 1984, as cited by Zainal, 2007).

3.2.1 Empirical research approach

There are different approaches to the definition of empirical research with general elements that describe it. The most casual understanding of empirical research is the lived experience, as in what happens in a real-life situation, observing what you know based on the recorded experiences, and evaluating if any consistencies can be measured. Thus this approach brings one to understand that there are many ways to approach the research method based on what you wish to investigate. This can either be a qualitative or quantitative approach to which the empirical reasoning in the research can be applied with a similar but divergent understanding.

Many scholarly points of view seem to be divergent regarding

the meaning, including implications of the empirical research approach, with a general view that empirical research is essentially a qualitative process. Dan (2017) puts it as “Empirical methods typically involve systematic collection and analysis of data (i.e., observation and evidence). They are used primarily in quantitative research involving an original collection of data, but also in secondary analyses and increasingly in qualitative research” (Dan, 2017). The most common

discussion in empirical research literature is that it explores, describes, and explains behaviours, and phenomena in humans and animals in real-world conditions. However, Gaskell's (2000) divergent yet marginally different description is that the empirical research method comes from observation and experience to a research question instead of being based on only a theory; thus, their methods tend to be qualitative (Gaskell, 2000). To substantiate the point, he says "experience and observation are subjective to the individual researcher," thus concluding that these are qualitative methods which provide "rich sources of information which, in many cases, suggest new lines of enquiry as the research subjects provide the researcher with unexpected perspectives on the research questions". Thus her views support a methodology that takes into account the subjective attributes of the researcher in considering the scientific merits of the research.

This is in contrast to Dan (2017), as cited above, which holds and or supports a quantitative approach that focuses on a systematic collection and analysis of data through observation and evidence.

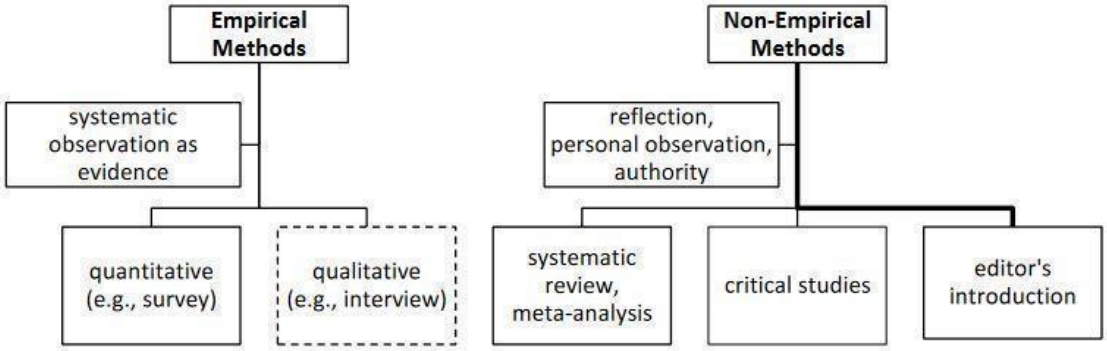


Figure 3.1 Empirical and non-empirical methods (Dan Viorela, 2019)

The empirical research approach will draw data that will be verified for authenticity through the sample community of KW and KE within the organisation. This will be based on the numerical data, which looks at the number of queries or tickets received as tickets from clients/users, the time taken to have those queries resolved and the amount of knowledge generated by and for the KE that will be authenticated. Some of the observations will be through the received information that the KE tests as the queries are received, and they analyse the requested information. The introduction of the information management system can be viewed as being inductive as it will be coming from the logic that the introduction of the OsTicket system will help to alleviate the workload increase experienced by the frontline KW and help in the retention of IM as more data will be collected and authenticated by the KE. This generated data will be deducted from queries, and the frequency of the type of queries will be tested and evaluated for reliability and authenticity based on the feedback

from the clients, stakeholders and the KW.

The inductive aspect of the research is the observation and measurement that will be done to identify the number of tickets received against the time it is taken for those queries to be resolved by the organisation through shared knowledge. Kakulu (2014) describes inductive reasoning as an open-ended approach that explores, observes, measures, detects patterns and regularities, and formulates some tentative hypotheses that can be explored and the development of a general conclusion or theory (Kakulu, 2014). The hypothesis here is the introduction of the OsTicketing system for data management that will alleviate the pressure and workload exerted on the KW and reduce the turnaround time for clients when they are seeking information from the organisation, while new data will be collected for the KE to vet and or authenticate its validity, thus increasing the organisational knowledge generation.

For the most part, the research will take a quantitative approach to the study as it looks at the use of a ticketing system that will deal with queries from clients who are made up of students, staff and members of the public seeking information from the organisation. Swanson and Hilton (2009) say quantitative techniques are better suited to study a large number of people and make a generalisation from the sample group while giving a strong detailed understanding of the sample (Swanson & Holton III, 2009). The literature informs the decision to use a quantitative approach on the topic of digital governance and community platforms for knowledge sharing, which offers a lot of qualitative research approaches. The quantitative approach is informed by the hypothesis which is that implementing an online information management query system will help to reduce the increased workload of the KW as a result of the number of queries at the frontline received from clients that add to their existing workload. Thus a quantitative research approach will enable the researcher to observe and calculate the number of queries received by the KW and the time taken for the queries to be resolved. This is based on Apuke's (2017) description of quantitative research as the utilisation and analysis of numerical data using specific statistical techniques to answer research questions (Apuke, 2017). This means there will be the observation of the implemented ticketing system that will be used by the KW, KE and clients, with the focus on identifying the implementation of the system and seeing if it ameliorates the workload of the KW. This is to understand how implementing the system affects or changes the concerns identified in the organisation that the hypothesis suggests a solution to the identified problem. In the process employed in the strategy, it will look at the implementation of the KMS, through an open-source IMS that will be customised to capture queries coming to the university or department in an efficient fashion that can save time and effort to seek the requested information by the KW. Thus ameliorate the amount of time spent by the KW sourcing the information which results in them complaining of the added workload pressure. At the same time the KE will have the opportunity to source new data they can vet for authenticity and reliability to help the organisation to gather IM that will be of benefit to it.

This will be a positivist approach as it explores the relationship of the closed organisation community

interaction with the implementation of the data management system by observing the deployment and use of the ticketing information query stem. It will measure how the implementation of the system alleviates the increased workload pressures experienced by the KWand the time tickets are received to the time they are resolved. This is following in Park et al (2020) description of positivism as focusing on identifying exploratory relationships through quantitative approaches, where empirically-based follows in Park et al.'s description of positivism as focusing on identifying exploratory relationships through quantitative approaches, where empirical findings from large samples are favoured (Park et al., 2020). They further state that these findings can be replicated, and controlled experimentation is a guiding positivist science principle. Dudovskiy (2019) states in positivism that authentic knowledge is derived from the positive affirmation of theories framed by strictly scientific methods based on gathering empirical, observable and measurable evidence related to the specific aim of reasoning. Positive affirmation denotes that the observed data collected by the researcher is a measurable one, and positivism focuses on findings being able to be repeated for the same mathematical outcome to be reached. This observation is not part of the study or environment in which it is being investigated and the data is observed from a neutral or objective disposition.

3.2.2 Quantitative research methodology

The choice of a research methodology is informed by the researcher's intent, looking at their assumption. This is supported by the findings of Murshed and Zhang (2016) who state that both quantitative and qualitative research methods are appealing, but researchers with analytical thinking styles choose quantitative research methodology even when it may not be optimal (Murshed and Zhang, 2016). They assert that understanding the researcher’s preference for one methodology over the other has broad relevance and can affect the research results.

Quantitative research takes an empirical approach as its intent is the observation and collection of data that can be numerically quantified and analysed while qualitative research takes the epistemological approach.

Quantitative research is a systematic investigation of phenomena by gathering quantifiable data and performing statistical and mathematical analysis. It is the collection of information from existing conditions or real life, using the sampling method, survey, polls and questionnaires with results that can be represented numerically. Sampling can differ in size and is used to represent the research target audience or sample community. Sampling can be used to prove or disprove the research assumption or hypothesis.

The data is represented by tables, charts, and graphs, to make it easy to understand the data being collected and prove the validity of the hypothesis.

3.3 Data collection

Data collection is described by Kabir (2018) as the process of gathering and measuring information on variables of interest in an established systematic fashion that enables the researcher to answer their research question, test their hypothesis and evaluate the outcome (Kabir, 2018). He explains that it is to ensure an accurate and honest collection of data and capture quality evidence that translates to rich data analysis, allowing for the building of a convincing and credible answer to the research question. In addition, he states that quantitative data is numerical and can be mathematically computed and measured on different scales.

The data collection approach is quantitative, as cited by Kabir (2016), as it has the advantage of being cheaper to implement and standardised so comparisons can be easily made and the size of the effect can be measured (Kabir, 2016). He adds that quantitative data collection methods rely on random sampling and structured data collection instruments that fit into predetermined response categories and produce results that can be summarised, compared, and generalised. In his explanation, he says data gathering strategies include experiments, observations, recording and obtaining relevant data from IMS. They rely on random sampling and structured data collection instruments that fit diverse experiences into predetermined response categories. They produce results that are easy to summarise, compare, and generalise. In the event of generalising from a large population, the researcher can employ probability sampling to select participants.

In the research, data is collected through the OsTicketing system used as the data management system, collecting the recorded data. The system is established as an institutional data management system, generating data daily in the organisation, particularly in the sample department with the OsTicket. The collected data allows the research to learn more about the data being requested and shared between the affected stakeholders and KW, by measuring the number of queries received through the OsTicket system against the time the queries are resolved This is to find out implementing the IMS reduces the number of queries received by the KW, thus reducing their workload, as more information is readily available to the clients or consumers and members of the organisation. The OsTicket system deployed to collect large data in the form of queries received from clients by the organisational KW and KE, which is recorded for analysis to describe the activities in the ticketing platform from the observed number of queries or tickets created and the time it took to be resolved by measuring client satisfaction.

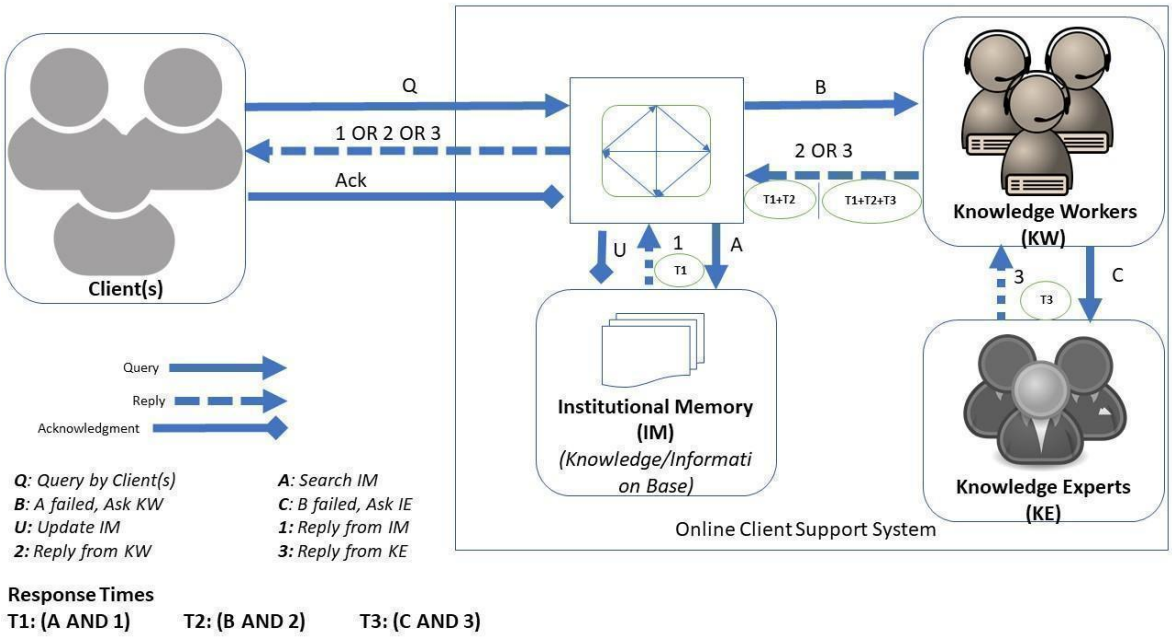


Figure 3.2 Conceptual framework, depiction of information flow

The conceptual framework (Figure 3.2) best depicts the information flow that occurs when the client submits a query using digital platforms like the OsTicket system, which is available to the public, students, and staff members looking for information. This is the basis of the research project as it depicts the entire information flow being observed, measured, and analysed without the researcher being directly involved or interacting with the participants and becoming biassed in the process.

Looking at the first line (Q), the client submits the query using online means of accessing information or interacting with the organisation. The query is acknowledged, and information is received immediately without any interaction with the KW because the information is made available on the landing page of the online site.

In the event the information is not easily accessible, it is captured as a ticket by the KW, who will research and escalate the requested information for the client. This escalation process is observed, measured by the researcher. Once the correct information is acquired, it is made available to the client, and the time taken is measured.

Where some of the requested information is not easily available, it is authenticated or verified by the KE, who vets the information. This is part of the process that also helps to capture generated information that is often not captured as tangible knowledge by both KW and KE.

Once the information is fed back to the KW, it is made available online as part of the IM mechanism that is authenticated, vetted, and reliable information available to the clients and members of the public as governed by the organisation. The information is updated as the process continues to add new information and operational processes change and improve. When the information is already

available on the landing page and the client is satisfied with it, that time is measured against the kind of query. Frequently asked questions are noted and made available on the landing page as part of workload amelioration to the KW. If the required information is not available, then it is to proceed to the KW. This is the critical point where the research seeks to understand the time it takes the KW to generate the requested information and how often they are confronted with this or these particular sets of questions.

The raw data is imported from the IMS, OsTicket, to the Microsoft Excel programme for easy use. This is done through the use of another open-source application called JavaScript Object Notation (JSON) format, which is a data representation format that allows for data to be transferred from the server, in this instance organisational OsTicket client account server, to the client or researcher's cloud account. This data is then opened or accessed using Microsoft Excel for ease of reading the data or information that will be presented. The importance of using JSON is because it is regarded as a lightweight format, ideal for handling complex data collected and received from the OsTicket, that otherwise would have been too complex and cumbersome to manage without the aid of this tool. To give a simple explanation without being bogged down by technical jargon, JSON translates the computer language from OsTicket to Microsoft Excel or Word document that will be used at the time to present or plot the data in a manner that can be easily read.

3.4 Data analysis

As part of the quantitative research approach, the data analysis will measure the data collected through the OsTicket system. Lutabingwa and Auriacombe (2007) say data analysis allows the researchers to summarise and describe information variables (Lutabingwa & Auriacombe, 2007). In the case of this research, the collected data will be analysed to find the relationship between workload reduction through the implementation of query management systems or OsTicket system and find out if the implemented system will help reduce the increased workload experienced by the KW when they have to deal with client queries. The analysis will describe the gathered data into coherent, usable information.

The collected data will be segregated following the year it was generated, measuring the time it took for the query to be resolved. This will also look at the volume and kind of queries received to establish what the most concerning areas are .

Lutabingwa and Auriacombe (2007) site Welman et al (2005) statement that data analysis using statistical techniques assists in investigating variables and their effect, relationship and patterns of involvement within our world (Welman et al. 2005) cited by Lutabingwa & Auriacombe, 2007). Most of the collected data will be numerically quantifiable as they are essentially a calculation of tickets created by the clients and the time taken for them to be resolved. Ahmad (2018) says the evidence to be looked at is contingent on the methodology chosen and its specific assumption (Ahmad, 2018). He continues that the method adopted for an inquiry would be determined by the existing body of

knowledge that deals with the phenomenon being investigated, the conceptualisation of the phenomenon, formulated problem, research questions or hypotheses and the research design, adding that data analysis involves examining and counting the resulting data. In the case of this research, we will be looking at statistical data that will have been collected using the OsTicket query management system as the primary source. Samuels (2020) describes statistics as involving presentation, interpretation and reasoning about summary quantities derived from data sets which are measures of the average modes and median and are measures of the spread such as the range and standard deviation (Samuels, 2020). This will be achieved by measuring the number of tickets or queries received from the clients and the time taken for each query to be resolved to prove or disprove the hypothesis that the introduction and implementation of the OsTicket system will reduce the workload pressures felt by the KW.

This will be done by plotting the data in the R Studio application used in data analysis. According to Allaire (2011), R Studio is an open source intended to combine the various components into one seamless workbench, and it runs on all major platforms like Windows, Mac OS X, and Linux while able to be used as a remote server (Allaire, 2011)

As the research data will be sourced from the OsTicket system as primary data, this will be analysed using the T-test to measure the averages or means, looking at the frequency and volume of tickets or queries generated to the KW and KE respectively per day, month and for the year.

The data analysis will be done using a statistician to work with the results categorised on an Excel spreadsheet with the personal information of the clients hidden. The iteration will solely be based on the volume and frequency of the tickets generated.

The primary data will be sourced from the OsTicket system and analysed with the assistance of a statistician who will use several iterations to determine the averages or means that will be measured using the T-test and the Paired T-test. This will take all the data or number of tickets generated by the KW and KE, respectively, and calculate their averages.

These averages or means will be represented on a table and a graph in the following fashion:

- Month and year total workload for the KW and KE
- The month-to-month total workload for the KW and KE
- Line graph representing each month and the number of monthly queries
- A hypothesis to test theories by calculating averages for the KW and KE using ANOVA
- Average resolution period per year
- Maximum resolution period per month
- Minimum resolution period
- Scatter plot for resolution periods
- Heatmap for average resolution

The analysis tools are subject to the preference of the statistician, subject to their expert view of

what tool will be accurate. Bowden et al.'s (2018) scatter plot provides an immediate picture of the causal-effect estimate for each variant (Bowden et al., 2018). Thus the scatter plot will help to give a visual representation of the data analysis and highlight anomalies where they might occur. Dy et al. (2022) say a data visualisation is a powerful tool for exploring these complex solution spaces, but there is limited research on its ability to support multi-objective decisions (Dy et al., 2022). They looked at several chart types, including scatter plot matrices and heat maps, and found no strong performance benefit for one type over another for accuracy.

3.5 Limitations and potential challenges

The quantitative research approach is focused on gathering factual information that can be numerically quantified. It is commonly not concerned with the researcher's more complex subjective or personal experiences. It seeks to find factual information that can be proven to support or dispute the hypothesis or research project. It relies on empirical evidence to support its reliability, recording the observations without being directly involved in the community or research sample population. Queiros et al (2017) describe quantitative research as a methodology that seeks to obtain accurate and reliable measurements that allow a statistical analysis (Queirós et al., 2017). They further state that the qualitative method intends to understand a complex reality and the meaning of actions in a given context.

Daniels (2016) says the researcher's detachment from the participants is also a weakness within the quantitative research approach. Researcher detachment means that he is an "observer" or an "outsider looking in". With this type of researcher/participant relationship, it will be difficult to thoroughly study the phenomena within their natural settings (Daniel, 2016). He says researcher detachment can be seen as a strength of the quantitative research approach, meaning the researcher is not directly involved in the sample community of the research subject, which can be seen as a disadvantage from the other angle. The researcher is detached from the research and is often the observer. This research will be observing the implementation of the KMS to see if it can mitigate the workload complaints from KW who feel overwhelmed with the number of client queries they have to resolve over and above their normal workload. By choosing a quantitative approach, based on the literature, the researcher will remain objective and involved in the community of KW and the clients who are part of the sample community. Factual statistical data will be gathered without getting involved with the in-depth reasons that qualitative research approaches would take.

In short, quantitative research mainly looks at factual information that can be quantified using numerical data collected. It looks at data and analyses the relationship between the numbers and results. It does not take into account the reasons or complexities of the reality of the subject. This addresses the chosen quantitative method that will not focus on the aspects that influence the general stakeholder behaviour towards the implementation of the information management system but merely observe its impact on the community of KW, KE and the clients. It will not go deep into

why some of the KW might be resistant to the implementation of the system but will mention some areas of the research. This lack of focus on the above elements of subject behaviour can be a reason for further research.

The use of the online customer support system, commonly known as a ticketing system, is new to many staff members. Not many students know about it and understand it. This could be a limiting factor as some have shown resistance since its deployment earlier in 2019. Some have requested training for them and their departments which can be a simple induction into the platform. Furthermore, Ajzen's (1991) Theory of Planned Behaviour, and according to Javadpour and Samiei (2017), the Theory of Motivation and Barriers to participation in virtual knowledge-sharing communities could be a real challenge.

The research approach will observe the deployed KMS that deals with customer queries and workload complaints from the KW and KE, with the objective of information sharing and governance that helps the organisation satisfy and retain its clients by providing accurate and vetted information and knowledge that the KE will authenticate. Thus, choosing to observe the implementation of the Customer Retention Management System through the Information Technology Department as the sample community allows for a controlled community that can be generalised to the rest of the organisation. The quantitative approach serves the purpose of collecting data that will be measured as part of the analysis to determine the effectiveness of deploying a KMS. An interesting observation is made by Daniels (2016), that both qualitative and quantitative research approaches are based on divergent theories and assumptions; one can be more advantageous than the other depending on the nature of the research and data collection methods (Daniels, 2016). Then, one might be convinced by the argument as he cites Denzin and Lincon (2005), who posit that when considering social differences in society and organisations, the quantitative research approach is not well suited to examine the complex and dynamic context of a closed community (Denzin and Lincon, 2005, cited by Daniels, 2016). However, what the quantitative research approach lacks in complex detail engagement, it makes up for in time saved while producing statistical data that can be numerically evaluated. One of the main criticisms of quantitative research is that it is rushed or does not necessarily take a considerable amount of time. Rahman (2016) points out that the qualitative research approach elicits deeper insights into designing, administering and interpreting data and exploring the subject's behaviour (Rahman, 2016). In the same breath, he states that the quantitative research method involves a large sample in a relatively short period to collect data, pointing out that the approach takes snapshots of the sampled population and does not go in-depth, and so can overlook subject experiences and what they might mean.

The collected data will come from KMS used by KW and KE in the closed community as part of a ticketing system designed to assist organisations in managing collected data. As this is a closed system, all data collected can be verified for authenticity as evidence through an observation conducted, including the resulting analysis process used to measure the data, making it empirically viable. Bouchrika (2021) defines empirical research as any study whose conclusions are exclusively

derived from concrete, verifiable evidence guided by scientific experimentation or real-world evidence in investigating its assertion (Bouchrika, 2021). The data collected for analysis is numerical and empirical in the sense that it can be scientifically quantified or measured enough to allow drawing a broad inference based on the observations that will have been made in the research.
The sample population is from the Information Technology Department of the Faculty of Informatics and Design, which currently uses an IMS called OsTicketing system to deal with the challenges experienced by its clients. This is an effort to mitigate the complaints from the KW about an increased workload when they have to deal with queries from clients and shared information that may not be authenticated by the KE shared within the organisation, while IM is generally not captured and lost. To justify the use of this kind of sampling, the approach is based on probability random sampling. As described by Etikan (2017), it is preferable because the research generates the data for the entire community by using a probabilistic method to control bias based on evidence generated by the ticketing system to give statistical data (Etikan, 2017). Based on Eikan (2017), the sampling will be systematic. Only the first unit is selected randomly, and the remaining sample units are selected by fixed periods. He further states that systematic sampling has confident points of improvement over the simple random samples as it is more equally completed to the complete population.

Delice (2010) says a concern for generalisation is essential in quantitative research as it is needed for repeatability and identification of sample size (Delice, 2010). Alluding to the analysis of the data and results would use descriptive statistics that include a few lines of information on the population sample and a few present in the characteristics of the sample in detailed tables.
The data collected is limited to the one accumulated from the KMS – OsTicketing system. It has been accumulated for five years since the establishment and deployment of the ticketing system in the department and pulled from the ticketing platform into an Excel spreadsheet for ease of use while being analysed and drawing a description. It will give a variety of data descriptions that will help to indicate the challenges experienced by the KW and the generated IM that can be used to ease the workload burden experienced by the KW and KE.
During the analysis that will allow for the research to draw and give statistical information, the names of the clients, KW, and KE participating in the process will be anonymised.
All conclusions will be based on real-life evidence or data that will be derived exclusively from the data generated from the KMS guided by a science-based analysis of the data collected and used as evidence of the outcome.

Chapter 4 Case Study Overview

Many facets of any environment or situation can be chosen as research areas of interest, making it necessary to come up with a plan of engagement before one can proceed. This appears to be an oversimplified view of a case study. A case is defined by Crowe et al . as a research approach used

to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context (Crowe et al., 2011). “It is an established research design that is used extensively in a wide variety of disciplines” In this research, the ITD from the FID at the CPUT will be the case study, as defined by Rebolj (2017), to comprehensively study and give a description of the individual case and its characteristics, with analysis that identifies the variables and how it interacts with the theoretical purpose of the research, and assess the performance or practical purpose of the research (Rebolj, 2017). In applying his further explanation, the research will look at the ITD. Wall and Horak (2020) introduce the baseline study to describe an educational context before the introduction of innovation intended to cause change (Wall & Horák, 2020). They continue that data gathering at the baseline stage can serve as a point of comparison when attempting to determine if change has occurred. In this research, the changes as a result of the deployment of the service desk system, OsTicket, as part of the implementation of the KMS to gain IM and ease the workload of the KW and KE vetting the generated information that will be used as a knowledge base will be compared at the time of data analysis.

The research will look at the findings and how they will be analysed, using statistical data analysis, with data sourced from the OsTicket system deployed as an IMS.

4.1 Introduction

The data collected from the ITD through the ServiceDesk system, OsTicket, is intended to find out if the deployment of the service will be effective in reducing the workload pressure experienced by the KW and increase the knowledge retention or IM of the organisation through the information that is captured and vetted for authenticity by the KE in the organisation. The aim is to see if the deployed system can assist in retaining knowledge as part of the IM. The success of Knowledge Retention (KR) is subject to the availability and use of an efficient KMS that will help prevent Knowledge Loss (KL). Levallet and Chan (2019) found that the absence of the right processes for OK capture or retrieval and reuse will lead to KL (Levallet & Chan, 2019). Putting proper systems in place to ensure the capture and retention of generated knowledge is as important as its authentication.

This is based on the assumption of the problem statement that data generated by the organisation is not managed and shared among the stakeholders or community members. The lack of shared knowledge or information is due to the lack of an information sharing and management system, resulting in the loss of quality and valuable information and new knowledge generated by the organisation. The analysis from the collected data will help to establish the assertion by Mendes et al. (2012) that information sharing allows for information exchange and integration between different departments or units, agencies, and institutions (Mendes Calo et al., 2012). Taking from the problem statement that the amount of data generated by organisations without being captured or shared in a structured manner results in a loss of quality and value along with new knowledge, and increase the workload among the KW and KE, Mendes et al. (2012) hold the view that information sharing will allow decision makers to manage information from several sources at the

same time. This implies that information and knowledge-sharing capacitates people in decision-making positions with enough access to the organisational information to be better positioned to make decisions that benefit the organisation and clients. This means the KW will have enough information to make informed decisions that are not based on tacit information. The same can be said about the KE, who will be in a better position to make deductions on information and vet it as authentic and useful knowledge to the organisation.
This supports the objective of testing or observing the findings to determine if there are any benefits in introducing an information-sharing platform that will allow more efficient access and sharing of information through the establishment of the platform.

Further to the observation, the research seeks to find out from the results if the KMS introduced will ameliorate the loss of quality and valuable information or knowledge and decrease the workload pressure among KW and KE. In short, find out if it will reduce the burden created by the lack of a shared KMS.

The essential challenge is the complaints from the frontline KW about an increased workload when they receive queries from the clients (students, staff and general members of the public), consuming much of their time, making it difficult to focus on or complete their substantive duties.
The findings will be focused on the results observed during the implementation of the open-source IMS, OsTicket, as an information management platform. The findings will be analysed using Excel, observing the number of queries submitted by the clients requiring the attention of the KW and the amount of time taken to resolve the query.

The data is collected using the IMS platform called OsTicket, which is an open-source information management system deployed in the Faculty of Informatics and Design (FID), Information Technology Department (ITD) at a university of technology in Cape Town, South Africa.

Most of the queries came from students as the primary clients of the organisation, with a wide range of requests that speak to different and divergent departmental functions. However, many of the support departments work in siloes and do not easily share information. There is also no clear method of getting access to existing shared organisational information. Some of the requested information is the function of another support department that by design, works closely with the ITD.

The information is first farmed to the support department for response before it is served to the client; thus presenting an anomaly from the research problem assumption that the time taken by the frontline KW adds to the workload, as it is not necessary to the added workload, but rather the time delay in acquiring the information from the support unit or department accountable for the information.

The anomaly is compounded by the advent of the Coronavirus pandemic, which has led to an unusual working environment, influencing how normal business has been to the new normal where

people had to culture themselves.

Data collected by the organisations helps them to gain valuable knowledge and gives them an insight into their environment, including clients' needs that normally would be lost without anyone identifying their need or purpose. Some of the information is shared among the employees in siloes as anecdotal knowledge often not vetted for authenticity and accuracy.

The data generated by the IMS supports the idea that there is a lot of work being generated for the KW as stakeholders and clients use the system to make their queries for various reasons. Most of the requested information already exists within the organisation but remains undocumented, and it is common for the information to be outdated. Information is usually based on experience or tacitly acquired knowledge throughout the years most people in the organisations have learned or based on experience with no empirical bases or testing that has been done.

The data collected by the research is empirical, using the quantitative research approach in which the research has collected data by using the number of submitted queries measured against the time taken for the queries to be responded to and the time taken to resolve them.
The results have shown an increased workload experienced by the KW, and more data that the KE can vet as authentic. However, most of the queries are more concerned with operational matters.
The results indicate that there are generally a lot of tickets generated to the KW, mostly the frontline administrative staff who have voiced their concerns about their challenges with the increased workload when they must dedicate time to the various queries that come to them from the clients.

However, there is no evident source of information other than the online or organisational webpage that may contain some or basic information.

There are existing information support systems, such as the Student Management System (SMS), that play several functions, including teaching and learning, access to information by permitted clients and authorised persons who are the KW and KE. This means clients not registered within the organisation do not have access to the information they may need, resulting in the submission of queries to the frontline KW. The number of queries submitted is generally at the beginning and towards the end of the year, followed by a notable increase during the assessment period of the academic programmes.

In observing the increased number of queries and taking a broad look at the nature of the queries, it appears that they mostly seek procedural information regarding anything from inquiries about the assessment marks to requesting access to university facilities.

Many organisations were forced to adapt their daily functions as the world faced the SARS-COV-2 virus, commonly known as COVID-19, making them adopt a different approach to their daily business, since the country was on lockdown due to the Disaster Management Act imposed by the President of the Republic of South Africa.

The findings have been shaped by the advent of the SARS-COV-2 virus, more popularly known as

COVID-19, which has altered how organisations conduct their daily operations processes. The country was placed under a full national lockdown due to the government's implementation of the Disaster Management Act, allowing the President of the Republic of South Africa to impose restrictions on the movement of essential workers and first responders.

All learning institutions utilised a blended learning approach, and work began to be conducted remotely. These changes compelled staff and students to use online communication through open-source platforms. Thus, the IMS, OsTicket, saw an increase in the number of tickets submitted with clients needing assistance not being sure where to go. It became necessary for most students to access the department, with many of them requesting permission to come onto campus to access the computer labs, and to those who were making enquiries about their application and registration status. Several queries were misplaced and could not possibly be responded to by the ITD and needed to be escalated to the relevant departments.

The data will be analysed using MS Excel, which will allow the research to be organised and calculated to determine the time taken to establish the frequently asked questions. That will, in turn, indicate the kind of queries and at which times they come, resulting in an increased demand for the KW. Some of the information that will have been gathered will be identified and vetted by the KE, and its frequency measured.

Some of the information is siloed within departments or other service units within the organisations, thus making it challenging for someone new to the organisation to know where to access the information. This also presents other questions regarding the existing systems used within the community regarding access to information vs end user technological basic skills level. This is especially related to most of the requested information under normal circumstances being available in the student knowledge management system. This begs the question of why the clients are not using that as a resource to access the information.

In the case of the sample population, the findings seem to give credence to the complaints by the frontline KW, as most of the queries are addressed or directed to them for resolution, compelling them to spend more time trying to source the information within the organisation, and consuming a lot of time. This raises another question about how much time is being wasted in searching for information that already exists and why it is not readily available on the organisation’s and department’s web page for clients to easily access.

Much of the collected data is quantitative, as the research gathered numerical data by the number of tickets generated through the IMS, OsTicket. The analysed data will form and shape the results that will inform the conclusion. The findings give conclusive quantitative evidence and open up the research for a qualitative investigation. This includes the idea of finding out why the existing systems within the organisation are not being used, evidenced by the number of tickets concerned with basic information queries that are normally available in the organisation.

Much of the data is quantitative and shows enough information to be analysed to draw a conclusion

that opens the research to further qualitative study to understand better why some of the existing resources and systems do not appear to be used.

Taking a quantitative approach, the research has collected empirical data that will be analysed and measured. The measured data will enable the researcher to collect data that allows for the observation of the provision of accurate information to clients and stakeholders vetted as authentic to the organisation.

A lot of data generated within the organisation is not shared as there are no mechanisms, infrastructure, or information management system in place, resulting not only in the loss of quality and value, along with new knowledge, but also in increased workload among KW and KE. When information or knowledge is not captured as part of the institution, it opens up a gap for the regeneration of the same information, adding to the time value or workload of those who have to process the information, often the frontline KW. The process is repeated every time a client or member of the community makes an inquiry related to the same topic or process.

Introducing a knowledge-sharing platform can reduce the burden created by the lack of a shared knowledge management platform. Because of this, there is a need to test the hypothesis that introducing a knowledge management platform does not mitigate the problems created by the lack of it.

The research aim was to determine whether an automated knowledge information system with IM reduces the KEs and KWs' workload and improves the organisation’s response time to clients.
This will include measuring the time taken to address a ticket that would have been generated as a query.
An overview of the results shows a relatively high amount of information requests submitted as tickets through the OsTicket system, which is the deployed IMS used to deal with and manage the information being generated. Much of the information requests are mainly from students, who are the main target audience that the system has been deployed to assist while helping to ameliorate the workload increase experienced by the KW and help the KE generate more knowledge as they vet and authenticate the data received through the IMS.
The deployment and implementation of the IMS through the OsTicketing system has gradually gained much traction and use from most students who are the primary consumers. Most of the information requested is related to administrative queries, which are part of the normal administrative processes. These queries consisted mainly of information requests related to their academic registration to administrative processes related to their academic record, for example, asking about evaluation marks. This information is available on another established Learning Management System (LMS), where the requested information would be readily available. At face value, this can add to the increased workload of the KW and raise the question if part of the increased workload can be attributed to information not being available at the LMS.
Taking a broad view of the results of the data analysis gives the impression that it supports the view

or gives merit to the complaint of the KW being overwhelmed with the number of queries they must field over and above their normal day-to-day. This adds to their workload burden with queries that consist of questions or information being sorted that could be accessed easily through the organisational webpage, for example, Frequently Asked Questions (FAQ). The case study takes into account data accumulated over five years since the initial deployment of IMS with the closed community of the organisation. Some of the findings seem to indicate the reaction of the community of students and staff due to the COVID-19 pandemic that has disrupted lives and the way people use technology. This also means increased use and more queries submitted to the frontline KW. As the use of the system matures, there is an increased number of tickets generated to the KE.

Most of the queries are related to operational information that would normally be available on the webpage. This could be another research question concerning the lack of updated information on the organisational webpage as one of the leading contributors to the increased queries submitted to the KW and KE. Dated information continues to be displayed without dated contact information, which could result in the clients being unable to source correct information.

Based on the gathered information, an argument for further research can be made for a qualitative study to find out why there seems to be an increased query made to the KW and KE while some of the information is readily available on the organisational website.

4.2 Findings: Description and Analysis of Results

The data was collected using the OsTicket platform, an open-source IMS, and has shown results indicating various fluctuations in the number of requests received mainly from students in the ITD. Some of the requests are functions outside of the scope of the ITD KW and KE. This shows that it would be beneficial to the rest of the organisation if the IMS were implemented throughout the faculty. There might be an opportunity for further research to establish if deploying an IMS would lead to better management of generated new knowledge in the community of people within the organisation.

An overall view of the data shows there is evidence to support the view from the KW that there is an increased workload for the frontline workers who, in turn, face an increased time pressure

According to the data, most of the queries received are addressed or can be attended to by the frontline KW throughout the system's implementation in the organisation in 2019, 2020, and 2021.

However, in 2022, there is an increased request from students to the support staff who are not general support staff, though they are also KW. The relaxation of the Lockdown restriction mainly influenced this change as the world started to better understand how the Coronavirus works and can be managed.

Most of the queries go to the frontline KW in the ITD but should go to other service departments like the FID faculty office had the system been deployed there, thus reducing the number of tickets received by the ITD.

In 2022, most of the queries went to the KW in the ITD, with many concerning registration queries and student blocks (academic, financial and webR for registration). If the OsTicket system had been successfully deployed in the rest of the faculty, the increased workload experienced by the frontline KW in the ITD could arguably have been decreased, and the queries more efficiently resolved with better access to information.

In 2021, there seemed to be an increase in queries seeking information for accessing campus. Looking at the dates, this is the same time as the various lockdown levels due to the Disaster Management Act imposed nationally due to the COVID-19 pandemic.

Some of the 2021 data reveals that a small number of other department staff members were using the system.

Some of the information being queried is generally available and repeated often enough that it is easy to respond to but siloed within sections, departments and units within the organisation and not readily accessible to be shared.

The data is analysed using Excel to identify the number of queries, to whom they are directed, and the time taken to resolve the queries, using the baseline graph as a guide to the quantitative research, as depicted in figure 4.1. The raw data shows the various stages of the university cycle in the year and how the different information requests change, fluctuating as the year progresses, indicating a high number of requests directed to the KW and lower numbers directed to the KE.

There is a low number of requests that have been escalated from the KW to the KE.

However, the lack of an information depository seems to have affected the number of queries submitted by the clients.

4.3 Synthesis of Findings with Literature Review

Much of the information is being generated by the clients who are seeking clarity on the working procedures and services provided by the university, supporting the argument by Olomolaiye (2005) that knowledge is more organic as it is created by people and their behaviour.

Information is kept in silos because it is not commonly shared between departments, and most of it cannot be verified or authenticated by KE.

Most of the information requested is mainly operational and procedure-related queries on the organisational IMS, especially when clients' applications are being processed; information that is usually outside of the IT department and normally based in the faculty office. This leaves the question of how the said office or any other office in the organisation or faculty would have been affected if the IMS was implemented in those units as well. It raises the question that the increased workload of the frontline KW within the ITD could be because of information and knowledge not being accessible to the clients and internal stakeholders, as there is no system in place that allows for ease of access.

Some of the aspects the literature review focused on were undocumented anecdotal or passive information shared among the KW, whose authenticity the organisation cannot verify or validate. However, what is coming out stronger in the research findings is the lack of shared information and working in a siloed office environment without any existing information-sharing platform that would allow for controlled access to organisational information or knowledge.

4.4 Summary

The research objectives have been met with the ITD implementation of the KMS in a real-life setting, and observations made on the role and effect the system had on the department. The baseline study allowed the research to identify some key context areas it needed to focus on. Wall and Horak (2020) assert that a baseline study identifies the characteristics of an educational context before the introduction of an innovation meant to produce change (Wall & Horák, 2020). In the baseline study, it was found that KW felt pressure or increased workload in attending to an increased number of queries submitted by the clients, who are often students, members of the public and staff members. As the frontline KW, they felt they have to spend a lot of time sourcing the information that often already exists in the organisation. Implementing the help desk service online system has helped highlight some of the research assumptions and point out their limitations.

The biggest limitation of the assumption is that implementing an IR will assist the organisation in gathering new data that will be vetted and authenticated by the KE for reliability. This part of the project could not be realised as the organisation was hit with some challenges that warrant further investigation that will help establish a scientific process and collect empirical data to support the

perception. The perception is due to student protest action in the year 2020 at the university, which was followed almost immediately by the national shutdown due to the Coronavirus worldwide, the organisation could not implement the installation of the IR as normal business processes were severely disrupted by the declaration of State of Emergency in the Republic of South Africa (RSA) as a measure to manage the COVID-19 pandemic.

The OsTicket help or service desk system has helped collect data and reveals that more queries or tickets are being generated that are addressed to the KW than the KE. Thus, supporting the assertion by the KW that they have an increased workload that results from the queries for information being submitted to them. Taking an overview of the project, the number of tickets generated seems to support the argument from the KW that there much work results from the queries made by clients seeking access to information that will help them. The research project has met some of its objectives, to deploy an IMS that will be a source for primary data that will be analysed using a quantitative research approach. This will allow for a scientific approach for empirical evidence to be collected. There are distinct differences in each year of the study, from 2019, 2020, 2021 and 2022.

From the 2019 results, most queries are related to the normal academic programme queries, with the information being related to the general knowledge sphere of the KW. Few matters needed to be escalated to the KE. Many of the KE are domain leaders, as in programme leaders and the only persons with authority to address some of these administrative concerns or queries. In the ITD, the course is segregated into programmes called domains. Each one has a Domain Leader responsible for programme coordination, as they have the special skills and knowledge that makes them ideal for the role.

The frequency of tickets or queries in 2020 increased due to the State of Emergency imposed by the RSA government to manage the spread of COVID-19, which saw the country under full restrictions for nearly three years. This resulted in fluctuating data in the years the country was in lockdown as the university was closed for a significant amount of time, with only essential staff allowed on campus. This meant the number of queries increased while the response time increased too. The increased response time can be attributed to the fact that the staff that respect the KW was at home and unable to respond to queries. These observations, especially regarding the different months and years' respective resolution times, may have to be qualified through a quantitative study that can be pursued following this research’s final findings and conclusion iteration.

This could be an indication for further research into why more tickets are being opened and request information that should be available online. The current assumption based on preliminary observation is that online information is often outdated, leading to the clients being frustrated and seeking information directly at the departmental level, resulting in an increased workload for the frontline KW, who are often the first respondents, while much of the generated knowledge is anecdotal with no clear means to vet and verify its authenticity. This means a lot of knowledge that

could have been captured as part of IM is lost. On the other hand, the same information being used with authentication poses a risk to the organisation, running a risk of conducting business or making decisions that could be contrary to the organisational value system.

Chapter 5. Data analysis and findings interpretation

The research aims to determine whether an automated KMS with IM reduces the KWs and Kes' workload and improves the organisation's response time to clients.

The research objectives were to use the ITD as a real-life setting or target community to explore the hypothesis in-depth, creating a baseline study to assess the knowledge or awareness of the KW and organisation concerning the implementation of the information sharing and management platform.

There is no one understanding of what a baseline study is. It is subject to the needs and purpose of the research or researcher. However, there is a basic understanding that this is a form of reconnaissance that details the pre-existing conditions before the research, to be able to note and monitor the changes once a system or process is implemented during the research. Ssekamatte and Okello (2016) discussed that baseline study or data is an intervention for benchmarking progress before gaining knowledge of the situation (Ssekamatte & Okello, 2016). They further state that it helps in testing the hypothesis and can be used as a point of reference in the formative stages of a project if the changes are bigger than what was assumed. In a journal article first published in 2007, Wall and Horak (2020) said baseline studies are used to describe context before the introduction of innovation intended to cause change, and the gathered data can serve as a point of comparison when trying to determine if changes have occurred (Wall & Horák, 2020). In this research, the established baseline is that there is an increased volume of queries received by the ITD from clients seeking access to information. This results in the frontline KW being overwhelmed by the number of queries and they have voiced their concern that this is time-consuming and are unable to finish their substantive duties. There is no established mechanism for the department that allows for the storage and access to information that allows for information sharing that will see KW having a reduced workload while the clients and community members can access information service at a reduced time rate, that is a quicker turnaround time for them to access and have the required information. The study focuses on the introduction of the KMS, and it will be monitored to establish if there is a relationship between the accumulated IM managed through the KMS and the size of the workload of the KW, including the response time of the system, as established by the research hypothesis.

It also found an open-source platform already chosen as a suitable platform in the existing Customer Retention Management System (CRIMS) being piloted by the faculty at the time of this research. The platform works by using the ticket system to efficiently deal with enquiries from clients who are students, staff and members of the public. The idea is to allow clients to access information and generate tickets as enquiries to the KW that will be handled in such an efficient manner that it will allow clients to experience a quicker turnaround time. In turn, if the requested information is not readily accessible to the KW, they would be able to escalate the query to the KE, who most likely would be the specialist in the concerned field of knowledge.

The research objective was to collect data to find supporting evidence that implementing an information sharing and management platform can help ease the increased workload burden experienced by the frontline KW in the organisation. The data was generated through the use of the OsTicket system, which is an open-source information-sharing and management system. This chapter will unpack the data collection and analysis process, touching on some anomalies in the findings and some elements that show the impact of the IMS in ameliorating increased workload pressure experienced by the KW, and if there has been any new information or knowledge captured and vetted by the KE for authenticity.

The data will be analysed using an Excel spreadsheet programme to identify the source and number of queries received by the KW and establish their contribution to the increased workload experienced by the KW and KE, including new knowledge that would have been identified by the KE. Effectively, it will test the hypothesis that the queries submitted by clients looking for information services in the university results in an increased workload for the KW.

5.1 Introduction

This chapter brings back the research to the data collection objective, pulling and tying it together with the literature findings, and drawing out the empirical data analysis to shape and interpret the findings or results from the analysis to either confirm or dispute the hypothesis that states:

H0: There is no significant relationship between the size of IM,the workload of KW, and the response time of the system.

H1: The increase in the size of IM reduces the KW overload and overall response time.

In response to H0, no explicit or decisive findings prove or disprove the above hypothesis as it is subject to the installation of the Information Repository (IR) for storing collected data sourced from the online service desk system, OsTicket. This data would have allowed for a focused analysis of the KW workload to establish if the introduction of the online service desk and the IR have eased the workload pressure. Along with determining the effects of the service desk and the IR, it determines if there is a relationship between the size of the IM that would have been gathered with the IR, and the observation of the KW workload. The response time of the KW compared to their workload has consistently been in a state of flux. This may result from the various changes in conditions of the months and years 2019, 2020, 2021 and 2022, respectively, at the time of the study. The Coronavirus pandemic has contributed enough challenges that make it difficult to rely solely on quantitative data collection and analysis. Referring to table 5.1 below, the findings demonstrate an improvement in the response time of the KW to the queries submitted.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
2019	209	22.45	47.898	3.313	15.92	28.98	0	350
2020	971	17.58	39.766	1.276	15.07	20.08	0	409
2021	1361	10.99	18.145	.492	10.03	11.96	0	212
2022	334	6.84	9.505	.520	5.82	7.87	0	42
Total	2875	13.57	29.759	.555	12.48	14.66	0	409

Table 5.1: Description of resolution time for KW per year

Looking at the years and averages or mean for each year (greyed out columns), the response times have improved as the duration time has decreased, indicating there is a relation between the implementation of the IMS and the response time of the KW. However, this does not answer whether the increased size of IM reduces the workload of the KW, as the IR has not been installed. Furthermore, information management can be visually presented and thus weighed or measured. The question will have to be asked through interview or survey, if not both, to the KW and KE, whether the introduction of the OsTicket as a help desk service has helped them to better manage the queries coming to the department. What is demonstrated now is the number of queries being generated can be monitored and analysed to establish areas of concern.

5.2 Research objectives: summary of findings and conclusions

This section focuses on the findings and conclusion to give an overall view of the research findings on what it set out to do and achieve. It summarises the case study, baseline, and open-source platform for the case study and does a data analysis before concluding.

Real-world life challenges within the organisation influence the research findings as the study faced some turmoil followfollowing the worldwide lockdown restrictions due to the Coronavirus pandemic, which affected how the world conducted itself, including the higher education sector. The turmoil pertained to the student protest action that resulted in the university being temporarily shut down. It was quickly followed by the Declaration of the National State of Emergency by the RSA to deal with and manage the COVID-19 pandemic, thus shaping the ecosystem in which the project exists. Meaning the data ecosystem as defined by Oliveira and Loscio (2018) that data ecosystem isAs defined by Oliveira and Loscio, the data ecosystem means that some actors interact with each other to exchange, produce and consume data (Oliveira & Lóscio, 2018). They said such ecosystems provide an environment for creating, managing, and sustaining data-sharing initiatives. On this question, they concede that there is no one or agreed definition of the data ecosystem, thus it

warrants further investigation. In this research, the ecosystem is used widely, as it deals with data and innovation through the introduction of the IMS. In this particular context, the concern is the unexpected role and consequences of COVID-19 on the research project. The research also looks into the new concept of the innovation ecosystem. As this is a new concept, little has been done to it. Granstrand and Holgersson (2020) proposed the following definition, “an innovation ecosystem is the evolving set of actors, activities, and artefacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors” (Granstrand & Holgersson, 2020). This research looked at the role of data generation and sharing as an innovation aided by the introduction of the IMS in the management of information to ease the workload-increased pressure as purported by the KW. This includes the role played by the KE in capturing, vetting and authenticating generated data from the KW to find out if data capturing, vetting, and making it available to the clients through the IR would have eased the workload pressure of the KW by decreasing the number of queries that have to be addressed by the KW.

COVID-19 changed the ecosystem or sphere and conditions in which the case study exists by compelling different behavioural patterns that were subject to the conditions resulting from the imposition of the National State of Emergency. The findings are subject to the conditions presented by the ecosystem resulting from the COVID-19 Pandemic . Therefore, it cannot be conclusive and warrants further study.

5.2.1 Case study

The research established the ITD as the case study to explore a real-life setting as the only department in the faculty that has initiated and implemented the Customer Relations Information Management System (CRIMS) project. The collection of data met the objective through the open-source online help desk system to help the organisation retain clients by allowing them to access information timeously while the institution, through the system, can record communication processes with their clients. The case study has shown that each year recorded a steady increase in queries received by the frontline KW and the time taken to resolve them. The improvement indicates positive buy-in into the introduction of the IMS. There is no clear way of knowing the motivation for the positive buy-in or uptake to the system without a further qualitative study to establish the driving conditions that resulted in the uptake. The CRIMS project is intended as a pilot deployed through the FID but found traction in the ITD. Implementing the system helped the ITD have a way and means to measure the amount and volume of queries that come to the KW and the KE. As a result of being unable to introduce the IR, it has not been possible for the KE to capture and share information and making it accessible to the clients and so be in a position to find out if the introduction of the IMS does capture IM, which can be useful in ameliorating the workload pressure of the KW.

5.2.2 Baseline study

As part of the baseline defined understanding, the research has observed that most of the information is not being shared in the organisation, possibly leading to the KW recreating the wheel as they regenerate information that already exists within the organisation. However, This is not shared as there is no clear system that deals specifically with their client needs. Many of the KW and KE in the organisation work in silos with little to no formal connectivity with each other and the service units. Some of the information fielded by the ITD is in the custody and area of function of the service department and units within the organisation. As there is no Information Repository (IR) in place for information sharing, much of the information being shared among the KW remains unauthenticated by the KE to verify its reliability. This also means the organisation misses out on capturing any new information that might be valuable to improve IM because the KE does not capture it to vet the information and generate new knowledge.

5.2.3 Open-source platform

The OsTicket system was chosen as the preferred open source system as part of a continued project a staff member initiated during his studies as an undergraduate at the university. According to Pugibet (2011), the system allows customers to create and keep track of support requests as tickets and allow staff members to organise, manage, and respond to them, as all tickets contain all the information related to a customer support request (Pugibet, 2011). This meant the queries normally received through email could now be dealt with as tickets, and clients no longer had to physically come to the university as they could have their queries addressed online through the ticket system. The process of generating a ticket by the clients is described by Paramesh et al. (2018) as the client raising the issued ticket through the IT service desk, which is web-based, and then it is assigned to a proper domain expert group or service desk agent (KW) to resolve the problem ticket depending upon the category of the ticket (Paramesh et al., 2018). They add that web-based service desk systems contain structured fields that help the agents or organisations categorise the tickets. This indicates the system can be configured to suit the organisational needs, allowing it to better manage the queries and aid in the KM.

5.2.4 Data analysis

This section looked at the data results as analysed by the statistician and gave a brief description and implication for each outcome based on the method extrapolated from the data set. The focus is on the queries serviced by the KW and the KE, comparing their workload and time for query resolution in days, months and years.

It also sampled some examples of the queries with contrasts that will highlight the areas that speak to the research objectives and aim and pose some hypotheses that will help to highlight the findings.

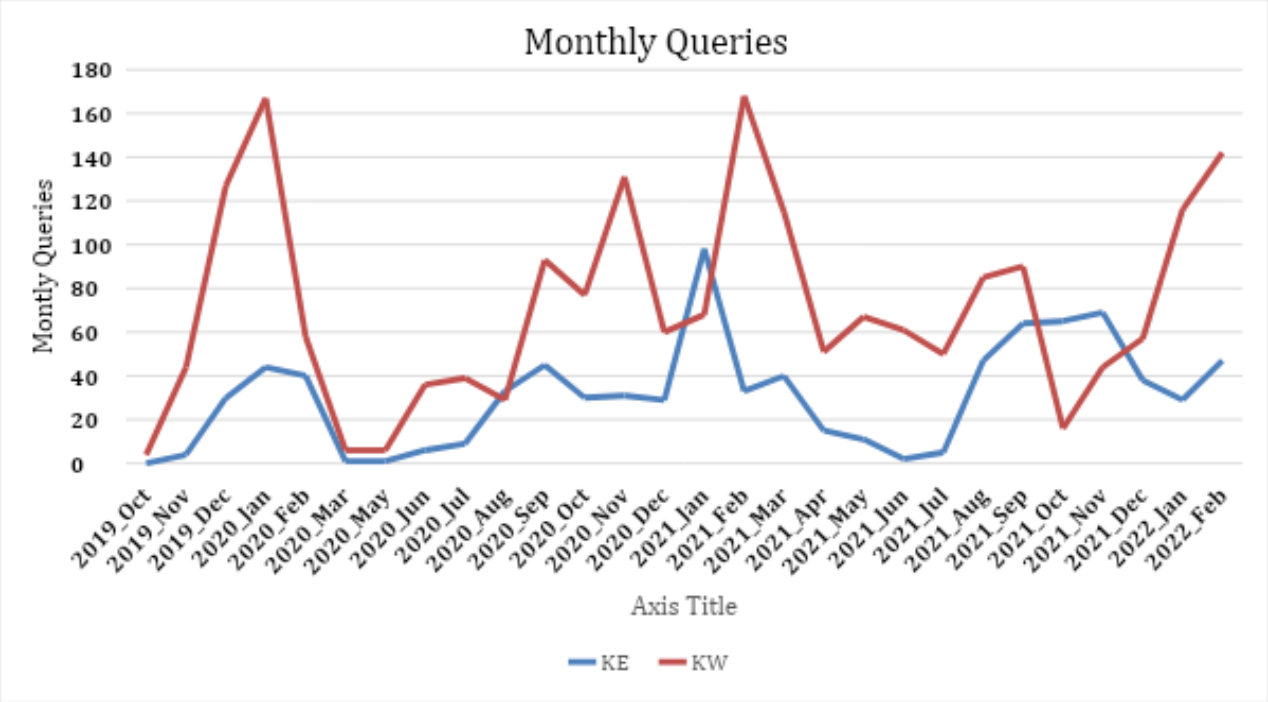
Table 5.1 below shows the monthly queries handled by KW and KE from October 2019 to February 2022. There is a variation in the number of queries handled by these two workers. These variations make it possible to see the volume of work being dealt with by the KW compared to the KE for each month and year. The table helps to demonstrate the volume of work done in response to the number of queries that come into the department, requiring the KW to detach themselves from their general work and focus on the information requested by clients. This table demonstrates monthly, the number of queries received by the KW, and, according to evidence, based on these results, there are a lot more queries for the attention of the KW, compared to the demand for the KE. Looking at the percentages for each month of every year, the results also show higher activity for the KW at rates that are two to three times higher than the KE.

Table 5.2: Monthly Queries Serviced by Knowledge Workers and Knowledge Experts

Month & year	KE	KE	KW	KW	Grand Total
2019_Oct	0	0%	4	100%	4
2019_Nov	4	8%	44	92%	48
2019_Dec	30	19%	127	81%	157
2020_Jan	44	21%	167	79%	211
2020_Feb	40	41%	58	59%	98
2020_Mar	1	14%	6	86%	7
2020_May	1	14%	6	86%	7
2020_Jun	6	14%	36	86%	42
2020_Jul	9	19%	39	81%	48
2020_Aug	33	53%	29	47%	62
2020_Sep	45	33%	93	67%	138
2020_Oct	30	28%	77	72%	107
2020_Nov	31	19%	131	81%	162
2020_Dec	29	33%	60	67%	89
2021_Jan	98	59%	68	41%	166
2021_Feb	33	16%	168	84%	201
2021_Mar	40	26%	115	74%	155
2021_Apr	15	23%	51	77%	66
2021_May	11	14%	67	86%	78
2021_Jun	2	3%	61	97%	63
2021_Jul	5	9%	50	91%	55
2021_Aug	47	36%	85	64%	132
2021_Sep	64	42%	90	58%	154
2021_Oct	65	80%	16	20%	81
2021_Nov	69	61%	44	39%	113
2021_Dec	38	40%	57	60%	95
2022_Jan	29	20%	116	80%	145
2022_Feb	47	25%	142	75%	189
Grand Total	866	30%	2007	70%	2873

This variation can also be seen in image X1. The graph below brings a certain visual clarity to the work periods from October 2019, which is the year the research project initiated its observation after the deployment of the OsTicket help desk system, to February 2022. It is visible that the activities or number of queries increased sharply from December 2019 until January 2020 before gradually declining from February to March of the same year. As with many entities, the institution has its high and low seasons. The graph consistently demonstrates the peak seasons for the KW, which are normal at the beginning to the end of each year and term. However, it is generally clear that more queries are serviced by KW.

Figure 5.1 Monthly Queries volume



These crests (peak of the graph) and crafts (bottom of the graph) demonstrate consistently the busiest times of the departments when the KW are inundated with requests for information or service. At the same time, the lower work volume for the KE is comparable to the KW.

The gold line represents the volume of queries received by the KW, while the blue line represents the query volume of work that requires the service attention of the KE.

Both lines consistently show an increased volume from November to February of each year and the one that follows. This occurs at the end of the year, which is the final assessment time in the university, and the programme applications are usually opened for new applicants in the university,

at which there are seasonal activities in the organisation and department. The beginning of each year shows an increase in the number of queries, and a higher crest in the same or similar months of November, December, and January. This is generally the beginning and the end of the term in the previous and current year, when the students who make up the bulk of the clients are either finalising their academic year or about to return to the university to finalise or continue with their academic programmes. This is also when the university takes first-time students who often require much assistance. The current evidence supports the assertion from the KW that they are inundated with a big volume of queries they must service and consume a lot of their time doing, taking them away from their substantive duties. The above activities are some of the main query topics submitted the most by the clients.

Taking the paired t-test, as illustrated below, further demonstrated that the KW are experiencing a volume of queries that consumes much of their time. The bulk of the work is mostly assigned to the KW by the system. There is a marginal amount of work sent or escalated to the KE, compared to the KW. .

In section 5.3, we confirmed this claim/hypothesis using a t-test

5.2.5 Hypothesis Testing one

This section presents a Paired-test and a hypothesis as follows:

Ho: Monthly queries handled by KE are equal to monthly queries handled by KW

H1: Monthly queries handled by KE are not equal to monthly queries handled by KW

Table 5.3: Paired t-test

	KE	*KW*
Mean	30.93	71.68
Variance	594.66	2159.78
Observations	28.00	28.00
Pearson Correlation	0.33	
Hypothesized Mean Difference	0.00	
df	27.00	
t Stat	-4.82	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.70	
P(T<=t) two-tail	0.00	
t Critical two-tail	2.05	

The results from the paired t-test refute or disprove the Ho hypothesis. The paired t-test results demonstrate and disprove the hypothesis that monthly queries are handled by the KE, and further indicate that much of the work on monthly bases is handled by the KW. The mean values indicate that queries handled by KE are not equal to the monthly queries handled by KW.

Repeating the T-test and assuming unequal variances in table 5.5 below, similar findings are indicated, with the mean value and variance value on both tables being consistent, with the mean at 71.68 for KW and 30.93 for the KE.

Considering the variances on both tables, the monthly queries handled by the KW far out-weigh the number of queries being dealt with by the KE. There is a big margin between the number of queries dealt with by the KW compared to the KE, indicating that the KW, on average, deals with a greater number of queries than the KE.

Table 5.4: T-test assuming unequal Variances

	KE	*KW*
Mean	30.93	71.68
Variance	594.66	2159.78
Observations	28.00	28.00
Hypothesized Mean Difference	0.00	
df	41.00	
t Stat	-4.11	
P(T<=t) one-tail	0.00	
t Critical one-tail	1.68	
P(T<=t) two-tail	0.00	
t Critical two-tail	2.02	

These statistics reject the null hypothesis because P-values for paired t-test (0.00), and t-test assuming unequal Variances (0.00) are less than the P-value (0.05). The descriptive statistics also indicate that the mean monthly queries handled by knowledge experts is 30.93 (31), and that handled by knowledge workers is 71.68 (72). Hence, there is a significant difference between the number of queries handled by these workers monthly.

Table 5.5: Average types of queries handled by KW and KE

Row Labels	KE	KE	KW	KW	Grand Total
C1ID	0	0.0%	1	100.0%	1
C1FR	0	0.0%	1	100.0%	1
C1BB	0	0.0%	2	100.0%	2
C1BA	1	33.3%	2	66.7%	3
C1FB	0	0.0%	2	100.0%	2
C1M	5	71.4%	2	28.6%	7
C1C	0	0.0%	4	100.0%	4
C1NSF	1	7.7%	12	92.3%	13
C1AC	1	6.3%	15	93.8%	16
C1LA	4	19.0%	17	81.0%	21
C1AP	16	20.3%	63	79.7%	79
C1R	90	52.3%	82	47.7%	172
C1EX	13	7.7%	155	92.3%	168
C1ADM	735	30.8%	1649	69.2%	2384
Grand Total	866	30.1%	2007	69.9%	2873

Table 5.6 lists abbreviated types of queries received by the KW and the KE and tabulates the results in the number of days and percentage. When a query is resolved within a day, the value shown will be zero and also shown at 100%.

Figure 5.2: Types of queries serviced by KW vs KE graph

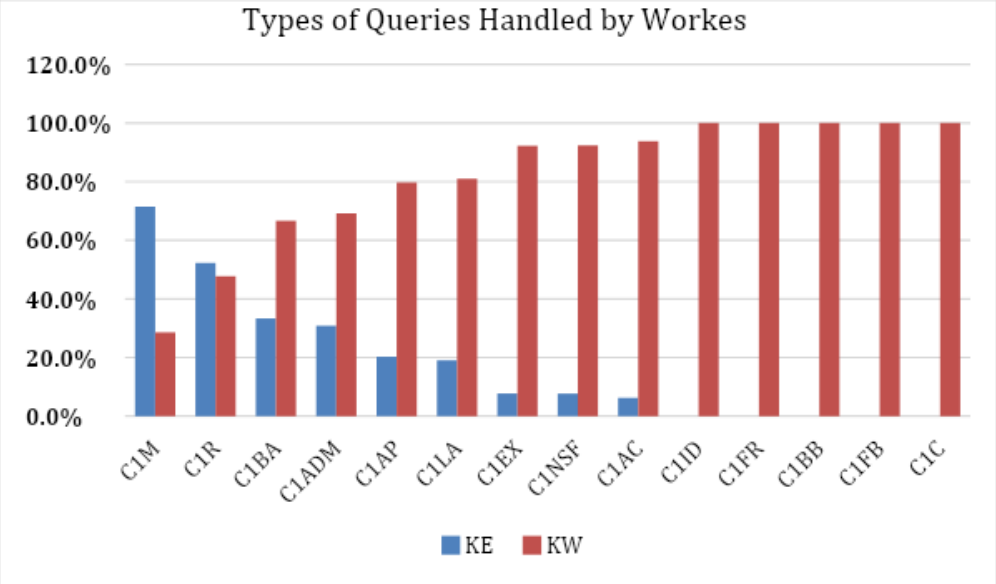


Table 5.6 and graph 5.7 essentially present the same information, which is a generalised reflection of the activities in the research period from October 2019 to February 2022, showing the types of queries submitted without going into greater detail, as stated at the onset of the research proposal. There is no dispute that the KW has a bigger volume of tickets or queries than the KE, but there are some anomalies where queries have been escalated to the KE for resolution as the experts in their respective fields or knowledge areas. For example, C1M is a query code relating to classroom modules and reflects the KE's fastest or highest resolution time.

While C1C relates to information or request for classroom access, it reflects the highest resolution time by the KW.

One can reasonably deduce from the above information that the KW deal with general or operational queries most of the time, and the KE deal with some of the complex or expert knowledge that is more tactical. This does not imply that these information sets are exclusive to each worker category but point to a need for a more efficient method of knowledge management.

5.2.6 Hypothesis Testing Two

This hypothesis seeks to show the correlation between the employee and the kind of work they are doing.

Ho: There is no relationship between the kind of query and work category (The kind of work done by a worker is not dependent on the level of the worker)

H1: There is a relationship between the kind of queries and work category (The kind of work done by a worker is dependent on the level of the worker)

Table 5.6 Chi-Square Test (Query vs work category)

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	104.025[a]	14	0.000
Likelihood Ratio	116.641	14	0.000
N of Valid Cases	2875		
a. 18 cells (60.0%) have an expected count of less than 5. The minimum expected count is .30.			

The p-value (0.00) for the chi-square test is less than the level of significance (0.05). Hence, we reject the null hypothesis and conclude that the kind of work done by a worker depends on the worker's level (there is a significant relationship between the kind of query and level of work). Meaning, the results of this hypothesis indicate that the KE are not just given any work but are given work that is specific to their field. Thus, most of the tickets are initially generated by the KW, who may escalate them to the KE, who is more knowledgeable.

5.2.7 Hypothesis Testing Three, resolution Period

H_o: The resolution period for knowledge workers and knowledge experts is the same

H_1: The resolution period for knowledge workers and knowledge experts is not the same

Table 5.7 ANOVA on resolution period for workers

ANOVA – Resolution Period					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7867.844	1	7867.844	8.909	.003
Within Groups	2537328.017	2873	883.163		
Total	2545195.861	2874			

Table 5.8 Descriptive Stats – Resolution period vs year

Descriptive Stats - Resolution Period								
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min	Max
KE	866	16.09	41.138	1.398	13.34	18.83	0	350
KW	2009	12.48	23.122	.516	11.47	13.49	0	409
Total	2875	13.57	29.759	.555	12.48	14.66	0	409

The P-value (0.03) is less than the level of significance (0.05). Hence, we reject the null hypothesis that the resolution period for knowledge and expert workers is the same. The descriptive stats indicate that queries directed to knowledge experts get resolved faster than those handled by knowledge workers.

H_o: The resolution period is the same through the years

H_1: The resolution period is not the same throughout the years

Table 5.9 ANOVA on resolution period per year

ANOVA					
Resolution Period					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28658.656	3	9552.885	10.898	<.001
Within Groups	2516537.205	2871	876.537		
Total	2545195.861	2874			

Table 5.10 Post Hoc Test - Multiple Comparisons

Bonferroni - Dependent Variable: Resolution Period						
					95% Confidence Interval	
(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
2019	2020	3.705	2.258	.605	-2.26	9.67
	2021	8.032*	2.200	.002	2.22	13.84
	2022	11.711*	2.611	<.001	4.82	18.61
2020	2019	-3.705	2.258	.605	-9.67	2.26
	2021	4.327*	1.244	.003	1.04	7.61
	2022	8.007*	1.878	<.001	3.05	12.96
2021	2019	-8.032*	2.200	.002	-13.84	-2.22
	2020	-4.327*	1.244	.003	-7.61	-1.04
	2022	3.680	1.808	.251	-1.09	8.45
2022	2019	-11.711*	2.611	<.001	-18.61	-4.82
	2020	-8.007*	1.878	<.001	-12.96	-3.05
	2021	-3.680	1.808	.251	-8.45	1.09
*. The mean difference is significant at the 0.05 level.						

Reject the null hypothesis; the following resolution periods are different (2019&2021, 2019&2022, 2020&2021, 2020&2022).

Table 5.11 Total Attention (queries) per Year

Attention	2019	2019	2020	2020	2021	2021	2022	2022	Grand	Grand Total

		(%)		(%)		(%)		(%)	Total	(%)
C1AC	0	0%	0	0%	16	1%	0	0%	16	1%
C1ADM	187	89%	787	81%	1270	93%	140	42%	2384	83%
C1AP	11	5%	34	4%	8	1%	26	8%	79	3%
C1BA	0	0%	0	0%	0	0%	3	1%	3	0%
C1BB	0	0%	0	0%	0	0%	2	1%	2	0%
C1C	0	0%	0	0%	0	0%	4	1%	4	0%
C1EX	11	5%	102	11%	7	1%	48	14%	168	6%
C1FB	0	0%	0	0%	0	0%	2	1%	2	0%
C1FR	0	0%	0	0%	0	0%	1	0%	1	0%
C1ID	0	0%	0	0%	0	0%	1	0%	1	0%
C1LA	0	0%	0	0%	4	0%	17	5%	21	1%
C1M	0	0%	0	0%	0	0%	7	2%	7	0%
C1NSF	0	0%	0	0%	2	0%	11	3%	13	0%
C1R	0	0%	48	5%	52	4%	72	22%	172	6%
Grand Total	209	100%	971	100%	1359	100%	334	100%	2873	100%

Table 5.12 demonstrates queries generated per year from 2019 to 2022. Throughout the years, the C1ADM category has received the highest number of queries, followed by C1EX and C1R. The increase in information requests addressed to administrative staff (C1ADM) handled by KWs supports the assertion of the KWs when they raise concerns regarding the increased workload, as most of the queries are addressed to them. They are the frontline workers and thus deal mostly with general queries. Queries for exclusions (C1EX) are normally best suited to be handled at the faculty office level first. The same can be said about registration (C1R) queries. These are queries that belong to a support or service unit and add time and workload when such information queries are addressed to the departmental secretaries, who are part of the frontline KWs.

5.2.8 Resolution Period – Time it takes to solve a query

This section indicates the time it takes to resolve a query in days. The resolution period indicates the difference between the day a query was created and the day it was resolved in days. A detailed summary is displayed in the descriptive statistics in table 5.3.1 below. A few queries created many months ago have not yet been resolved; hence they are outliers. The table shows the average, maximum, and minimum resolution periods.

5.2.9 Descriptive Statistics on Resolution Period

This section introduces descriptive statistics on the resolution period. Looking at the average resolution period section, it is clear that the average resolution period for administration query(C1ADM) in 2019, 2020, 2021 and 2022 was 22, 17, 11, and 9 days respectively, to the nearest integer. Based on this information or results, the resolution period improves each year, resulting in the decline of the waiting period or number of days a client has to wait for an answer. Regarding the C1AP as a code for an Appeals query, there is no significant difference in the

resolution period 2019 and 2020. However, there is a decline in the resolution period from 2020 to 2022. It could be reasonably argued that spike in 2020 was due to the harsh COVID-19 lockdown that affected the world .

Table 5.13: Average number of days it takes to solve a query

	Year Created					
Average Resolution Period	**Attention**	**2019**	**2020**	**2021**	**2022**	**Grand Total**
	C1AC	0.00	0.00	22.25	0.00	22.25
	C1ADM	21.56	16.79	11.02	8.59	13.61
	C1AP	23.91	24.65	7.63	2.96	15.68
	C1BA	0.00	0.00	0.00	4.00	4.00
	C1BB	0.00	0.00	0.00	2.00	2.00
	C1C	0.00	0.00	0.00	3.25	3.25
	C1EX	36.09	8.05	12.00	4.35	8.99
	C1FB	0.00	0.00	0.00	2.00	2.00
	C1FR	0.00	0.00	0.00	15.00	15.00
	C1ID	0.00	0.00	0.00	1.00	1.00
	C1LA	0.00	0.00	9.00	1.65	3.05
	C1M	0.00	0.00	0.00	0.57	0.57
	C1NSF	0.00	0.00	3.00	2.00	2.15
	C1R	0.00	45.73	7.67	9.64	19.12
	Grand Total	22.45	17.58	10.99	6.84	13.57
Max Resolution Period	**Attention**	**2019**	**2020**	**2021**	**2022**	**Grand Total**
	C1AC	0.00	0.00	68.00	0.00	68.00
	C1ADM	350.00	409.00	212.00	42.00	409.00
	C1AP	58.00	298.00	28.00	19.00	298.00
	C1BA	0.00	0.00	0.00	5.00	5.00
	C1BB	0.00	0.00	0.00	4.00	4.00
	C1C	0.00	0.00	0.00	7.00	7.00
	C1EX	68.00	305.00	45.00	36.00	305.00
	C1FB	0.00	0.00	0.00	4.00	4.00
	C1FR	0.00	0.00	0.00	15.00	15.00
	C1ID	0.00	0.00	0.00	1.00	1.00
	C1LA	0.00	0.00	26.00	21.00	26.00
	C1M	0.00	0.00	0.00	2.00	2.00
	C1NSF	0.00	0.00	4.00	5.00	5.00
	C1R	0.00	305.00	39.00	39.00	305.00
	Grand Total	350.00	409.00	212.00	42.00	409.00
Min Resolution Period	**Attention**	**2019**	**2020**	**2021**	**2022**	**Grand Total**

	C1AC	0.00	0.00	0.00	0.00	0.00
	C1ADM	0.00	0.00	0.00	0.00	0.00
	C1AP	0.00	0.00	0.00	0.00	0.00
	C1BA	0.00	0.00	0.00	3.00	3.00
	C1BB	0.00	0.00	0.00	0.00	0.00
	C1C	0.00	0.00	0.00	0.00	0.00
	C1EX	4.00	0.00	1.00	0.00	0.00
	C1FB	0.00	0.00	0.00	0.00	0.00
	C1FR	0.00	0.00	0.00	15.00	15.00
	C1ID	0.00	0.00	0.00	1.00	1.00
	C1LA	0.00	0.00	2.00	0.00	0.00
	C1M	0.00	0.00	0.00	0.00	0.00
	C1NSF	0.00	0.00	2.00	0.00	0.00
	C1R	0.00	0.00	0.00	0.00	0.00
	Grand Total	0.00	0.00	0.00	0.00	0.00

Based on the findings in table 5.3.1 above, the maximum period it took to resolve the query C1AC (Access to campus) for the years 2019, 2020 and 2022 is zero days, indicating that this query was resolved quickly, within a day at the most. However, the same query in 2021 took an average of 22 days. This was one of the anomalies resulting from the effects of the State of Disaster Act implemented by the Republic of South Africa Government at the time in response to the COVID-19 pandemic that gripped the world. Due to the easing of various lockdown levels and regulations, there was a lot of uncertainty among staff and students. In some instances, permission had to be sought before one could travel or engage in certain activities like visiting the university campus.

The maximum resolution period is 402, and it was an administration-related query (C1ADM). This is recorded in the year 2020, at the height of the COVID-19 pandemic, which created much uncertainty as more people needed information to find out if they would be permitted on university premises. The increase of queries going as administration-related matters that usually go to the KW increased as more people wanted access to information. Unfortunately, at the time, often no one was on campus to man the computers or had access. Some of the queries carried over to the following year of 2021; thus, it reflects a maximum resolution period of 212.

It is worth mentioning that 2019 shows a maximum resolution period of 350 days, as this was the initial year the platform was implemented, and there was some resistance from the KW and KE. This warrants its investigation to find out more about stakeholder resistance or lack of buy-in. This should be noted for further research.

The results on each section of the table permeate different challenges faced by the KW, KE and the clients or community being served. For example, the code C1EX is for exclusions that can be academic or financial reasons that encompass many reasons or challenges faced by returning students. The reason the resolution is high, averaging at a maximum of 305, is because the KW

could not resolve this at the first instance. However, it had to be addressed by the KW first to ascertain if this was an academic matter within the concerned department or it needed to be escalated to an external service unit, like the faculty office or student debts, etc. Much time is spent trying to find answers to the query.

The greatest minimum period to resolve a query is 15 days, and the query is C1FR (subject changes) for the year 2022. Generally, most types of queries were resolved on the day. This is a fairly common request, and the KW tends to have more knowledge guided by the institution's existing policies.

The research went through many changes that were not part of the baseline study and so were not considered. These unanticipated challenges played a role in the anomalies referred to as outliers. The resulting inconsistencies call for further qualitative research opportunities to establish the role and influence of these unpredictable anomalies, such as the effects of the COVID-19 pandemic that affected all facets of business throughout the world.

5.2.10 Scattered plot graphs for resolution periods

The scattered plot graphs will demonstrate the volume of tickets at the time generated or created and the time taken to resolve the concerns. These will be differentiated according to the years, time created and, lastly, the volume of work or tickets received by the KW and KE, respectively. Some of the research findings shave big time differences that are influenced by the time of the query submissions escalated to the KE, mostly lecturing staff members. Thus, some of the queries took a long time to be answered or resolved, as they were generated during the recess period when the KE was not available to check their emails.

Fig 5.3 Scatter plot of resolution periods

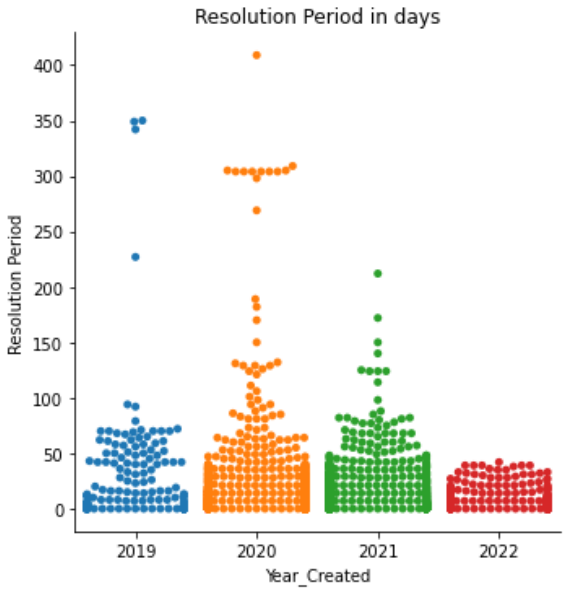


Figure 5.3.2 shows the year created vs the resolution period. Generally, the resolution period seems to be below 100 days. However, 2019 and 2020 had some outlying observations. Considering 2019 alone, this was the year of deployment with many teething challenges, with some stakeholders not understanding the importance of the turnaround time, while other events went without service as they may have been given convoluted subject names or topics. Some of the queries submitted did not belong to the ITD and had to be serviced by an external (outside the ITD) unit like the faculty office, to which the IMS has not been rolled out. In such instances, the KWs are subject to the efficiency of other departments or units and may be prioritising their work first. However, when a query takes more than 300 days (over a year), that could indicate that it could not be resolved and thus extended to the following year. This could also push up the response time of the following year. When comparing 2019 and 2020 against 2021, service quality improved as queries gradually started being solved at an average of fewer than 250 days per year. Queries that took over 150 days per year to resolve seem to be an exception, as most of the queries are resolved within 50 days per year. Some of the data cannot be conclusive as some of the queries have not been responded to; in some instances it took over a year for the query to be closed. Logically, this means the query was not serviced, and the client probably walked away and thus could not be retained.

Fig 5.4 Scatter plot of resolution periods – work volume per worker, outliers

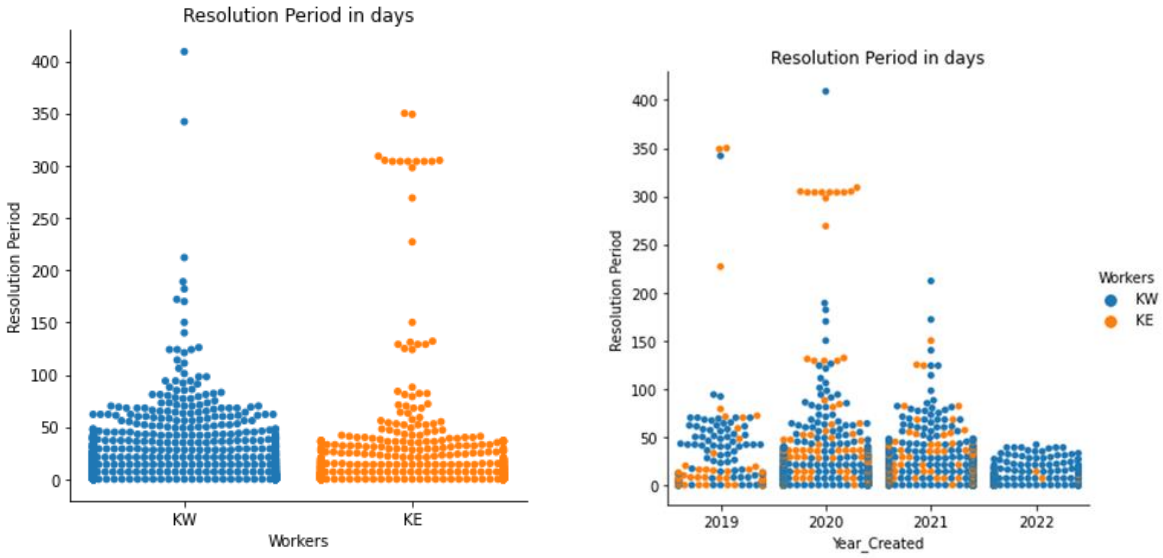
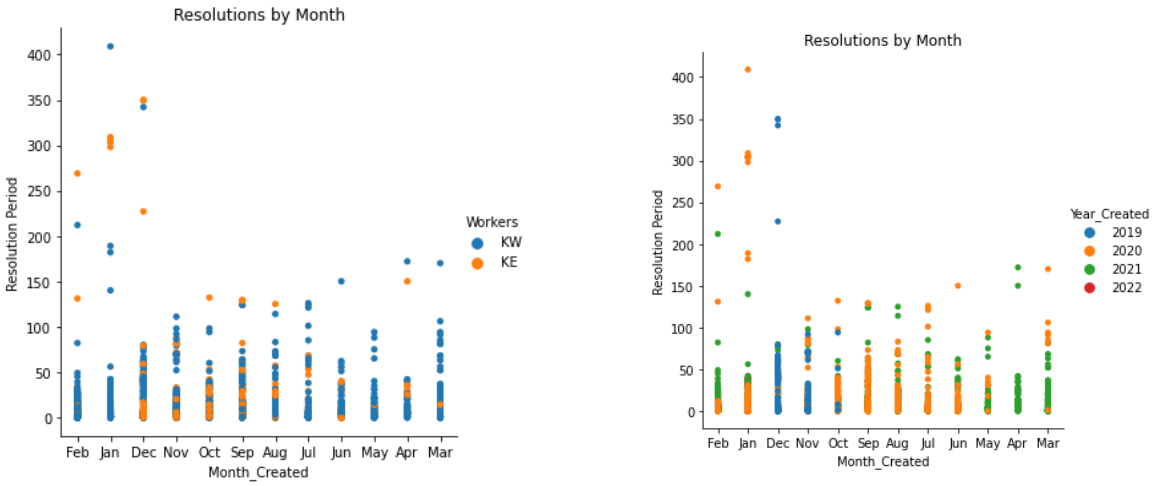


Figure 5.3.3 demonstrates the volume of work or queries that are dealt with by the two categories of workers, the KW (Blue dots) and the KE (Orange dots). Two things stand out the most, the volume of work that is not evenly distributed and the volume of outlying queries. As stated in the previous scatter plot, the reasoning remains similar for the occurrence of outliers, at least for the KW, that these are queries that have not been addressed because they could not escalate them to the knowledge worker or know the informational assistance required.

Focusing on the KW plotted outliers, there are three of them and have contrasting times, with the highest number of days taken before a resolution is reached being just over 400 days. These compare well when you consider the graph on the right side that shows the work volume comparison between the KW and the KE. In these diagrams, it is apparent that the KWs have a higher volume of work or queries to deal with.

Through the years, the KW workload volume has steadily increased more than the KE. This is expected as the KE are generally not frontline workers and are focused on their specialist functions or duties, while the KWs are frontline workers that have to deal with most of the queries.

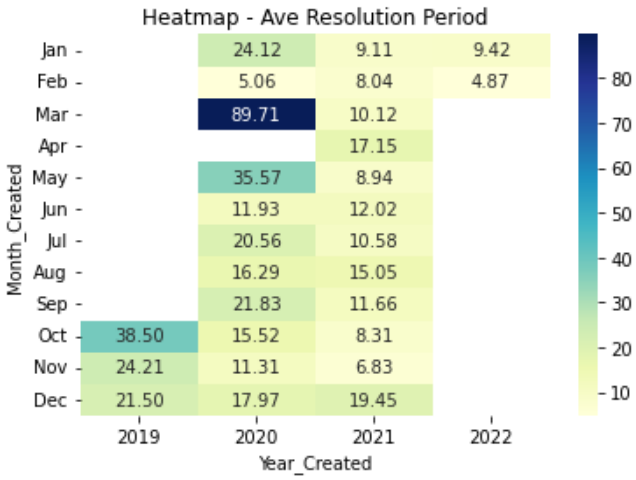
Fig 5.5 Scatter plot of resolution periods – work volume per worker, outliers each month



The above graph is based on the workload per month for the KWs and KEs, respectively, allowing one to see the amount of workload experienced by the workers from month to month. The times or number of days is indicated on the Y axis and the months created are plotted on the X axis on both graphs. Without focusing on the outliers, the KWs have a more efficient response time with a higher volume of queries coming to them, especially in November, December, January, February and March, regardless of the year. This indicates that these are the busiest months or times in the institution. As this is a university, these are normally the final examination times that come with many administrative functions to be done. That is also the time the IMS records its highest levels of activity. This supports the concerns expressed by the KWs that there is an increased workload of clients seeking access to information that requires them to dedicate time to source the required information. The outliers remain consistent with some anomalous queries that have taken more than a year to be resolved, 400 days.

Fig 5.6 Heatmap – average resolution

Month Created	2019	2020	2021	2022
Jan		24.12	9.11	9.42
Feb		5.06	8.04	4.87
Mar		89.71	10.12	
Apr			17.15	
May		35.57	8.94	
Jun		11.93	12.02	
Jul		20.56	10.58	
Aug		16.29	15.05	
Sep		21.83	11.66	
Oct	38.50	15.52	8.31	
Nov	24.21	11.31	6.83	
Dec	21.50	17.97	19.45	



The heatmap registered more activity in January to March, being the busiest of the time as it registers the highest resolution value.

Based on the data presented in figure 5.3.5, as the heatmap, October 2019 was the busiest in that year and the deployment time of the IMS. This is also the time leading to the final assessments period when students tend to want to get their house in order regarding administrative matters, especially their student status. This trend slows down as it approaches the end of the year in December, and slowly picks up again in January 2020, slows down significantly again in February, and spikes up again in March 2020, reaching its highest level.

The graphs above show the resolution period versus the number of threads. In 2022, an increase in threads does not imply an increase in the resolution period. However, in 2021, an increase in threads implies an increase in the resolution period.

5.2.11 Conclusion

Though the results support the assertion from the KW that the number of queries received from the students and public increases their workload as frontline workers, it is challenging to establish conclusively if the deployment of the IMS, OsTicket has made any difference in ameliorating their working conditions. There is a lot expected from the CRIMS project that has not been implemented,

resulting in the research being limited in meeting its stated objective of capturing new data and knowledge that would have been made available for the KW and KE to share in an Information Repository (IR) after being vetted by the KE for accuracy and authenticity, as a contribution to IM.

Much of the work was conducted in siloed spaces or work approaches which meant it could not be tested if there was shared information in the organisation. This also meant the siloed information continued to be kept by individuals and was not shared in a measurable manner that can support or refute the idea that shared knowledge can improve the organisational and operational processes and efficiency.

Much of the data establishes the relationship between the workload of the KW compared to that of the KE and looks at the turnaround time for the client to be serviced by the KW vs the KE. This is a detailed finding comparing the KW and the KE.

It also shows the various times of the year when there is a significant increase in workload going to the KW that correlates with the peak traffic times when the university is at its busiest. Each term of the university brings about different permutations, as each year in recent history has had big contrasts from the previous year, resulting in very dynamic research observations that encourage further study.

Some queries are not related to the ITD but belong to another department or service unit, such as the faculty office. This means that they have to be escalated to those departments, or the KW has to contact those departments and solicit access to the information

Many of the queries are operational and housekeeping questions that could be handled differently by providing the correct contact information to the required departments or units.

Chapter 6 Conclusion

Implementing the IMS through the open-source service desk platform shows results that indicate an improvement in the service being provided to the clients. Each year, the service shows some improvement that is encouraging for the organisation. However, it has not implemented the planned IM mechanism that would have allowed for new knowledge being generated to be captured. As a result, it cannot be confirmed if staff members are using and sharing the correct information, and the correctness of the shared information is likely not vetted by the KE. One of the key objectives of the CRIMS project was the installation of the IR for the faculty. Since this has not yet happened at the time the research concluded, it is not possible to conclude if the installation of the repository and the service desk platform has helped to ameliorate the workload increase experienced by the KWs and if the KEs have been able to generate more knowledge that could be shared in the community of the institution, thus ensuring the capture and sustainability of IM.

The introduction of the IMS and the use of the OsTicket system as a client help desk system has helped the institution identify future research opportunities while making it possible for the organisation to gain data or information that will help enable them in future decision-making and planning that would be in the best interest of all the stakeholders. The collected data has helped highlight the information management challenges faced by the organisation. The introduction of the open-source ticketing system has allowed for a clear representation of the work done by the organisational employees on the frontline of servicing client information requests.

This has been peculiar research as more dynamics came out of it that could not have been easily foreseen or anticipated. The most glaring of these was the hard lockdown of the country in the year 2020 as the world grappled with the Coronavirus pandemic that left many countries taking unusual measures to curb and manage the spread of COVID-19. Many organisations' established plans could not be fulfilled as many had to change how they do business.

As things became fluid and uncertain, the research objectives and hypothesis shifted focus as the CRIMS project in the faculty did not meet all of its objectives, which included establishing and installing an Information Repository (IS) that would allow for an information-sharing platform to be created. The IS was supposed to have created an opportunity for the KE to receive data from the KW, allowing them to vet the information for authenticity and reliability. This would have ensured the generation and capture of new knowledge. A further study on the role played by the implementation of the KMS and IS, is the missing element in the research outcome.

Added to the challenges, there was a drastic increase in the number of tickets being opened during the various lockdown levels as more clients were looking for information on operational matters of the department and some of the institutions.

This has resulted in the project showing a greater dependence on the stakeholders, mainly students looking to the Service Desk system for operational information, thus adding to the workload

burden beyond what was identified in the baseline study.

The research is inconclusive in its findings due to some challenges and changes that occurred in the four years since its inception that made it difficult to establish some of the stated objectives; namely in the deployment of the KMS there could be an establishment of a data depository system for the generated date to be vetted for authenticity and then shared.

However, the ticketing system, as the help desk service, proves that clients request much information and help, supporting the argument from the KW of an increased workload that requires much of their time.

The research aimed to determine whether an automated KMS with IM reduces the KWs and KEs workload and improves the organisation's response time to clients.

The introduction and implementation of an IMS has been useful for the clients, mainly students, to have quicker access to help desk service.

The research was confronted by unexpected challenges that could not have been anticipated, the biggest being the coronavirus pandemic that gripped the world, preceded at the university sample community, by student unrest that resulted in a university shutdown. The online HelpDesk ticketing system was intended to be implemented.

Based on the findings, implementing the help desk service system for KM has assisted the clients as members of the public, students and staff to access the organisation's services through the OsTicket platform, helping to factually prove the assertion of the KW that there is a big volume of work coming to them from the clients of the sample community and clients of the ITD within the FID. However, it is worth noting that not everything that was set out based on the CRIMS project could be achieved, thus limiting the expected outcomes of the research.

There is a clear need and potential for the CRIMS project to be expanded to the rest of the institution incrementally and, most importantly, for the information repository to be implemented with the Helpdesk system, allowing the organisation to have a more efficient way of recording knowledge that can benefit the organisation.

6.1 Contribution to the knowledge

The research duration was affected by several unique challenges to the sample community as an HEI that could have been averted. As with all universities in South Africa, the organisation is recovering from the #FeesMustFall student protests that had many universities forced to reconsider their business operations process, especially how they consume and generate information, including some of their business operations that require easy access to information. This was compounded by the advent of the COVID-19 pandemic, which has shaken the world for nearly three

years.

At the time of the initial hard lockdown in response to the pandemic, the university, like many other universities in South Africa, had already been shut down due to student protests that, at times, were violent. So, it was a double blow to the university, and the relationship between its community and clients changed regarding how they exchange and consume information to continue with the business of higher learning.

This has influenced the research as its data trajectory changed midstream, as more students began to rely heavily on the IMS for information and communication with the department. Thus, there was more traffic than normally expected in the system.

6.2 Recommendations

Many of the requests to the ITD from the IMS were not queries that could be handled or resolved by the department, as they were focused on other university's processes outside the ITD. This indicates that deploying the IMS has the potential to be beneficial to the rest of the faculty and the university. Many IMS deployed in the university also function in a siloed fashion, with the possibility of information not being widely shared and easily accessible to the clients and stakeholders when they need it. This adds to the workload of the KW as it becomes part of their exercise to source the information from the various departments and platforms. Some of the information and knowledge is operational, and with it being siloed, it creates or adds to prolonged bureaucratic processes in the organisation.

The initial expectation during the deployment of the OsTicket system as an IMS was that it would have an Information Repository (IR) that would have been installed, allowing for the generation and storing of new information that would be processed by the KE, which would vet and verify it for authenticity. That information or knowledge would be kept in the repository, IR, that would have allowed access to clients and members of the closed community to consume and use it as part of service delivery to the community.

The implementation of the IR could have ameliorated the workload pressure experienced by the KW. The lack of this feature or tool has made it difficult for the researcher to see what information has been shared with the KE to vet and authenticate new knowledge generated in the organisation. This results in the failure or inability to capture newly generated knowledge that would be the Institutional Memory (IM). Without the IM being in place, it has made it hard for the research project to truly measure and evaluate the role played by the introduction of the IMS with regards to the workload of the KW and allow the KE access to new data that can be analysed, vetted and authenticated for reliability and improve the institutional service delivery. This results in the continued loss of generated new knowledge and the opportunity for the KE to observe anecdotal data for reliability and authenticity or value. This means knowledge learned through experience,

regarded as anecdotal, could continue to be used without knowing its value or the challenge it poses to the organisation.

One of the key lessons learned is that information sharing can improve organisational productivity and helps in the generation of new knowledge that can be used to improve business practices and processes. Implementing and using the IMS can be an asset to the organisation if there is buy-in into the use of the system. However, there is often resistance to buy-in by the organisational end users. This can be another area for further research.

Many queries received by the KW in the ITD are the responsibility of other departments and service units. The search for information or knowledge to respond to these queries also adds to the workload experienced by the KW.

The deployment of the IMS, OsTicket, could benefit the rest of the organisational business practices as the various departments and units would have had the opportunity to gain new knowledge and understand their client needs.

The siloed approach to information sharing and management creates a challenge that leads KW to find themselves recreating information that already exists in the organisation. The newly generated knowledge cannot be vetted for authenticity or validated by the KE, resulting in a loss to the organisation as IM is not being captured and stored.

The lack of an IR defeats the purpose of retaining knowledge through the IM, thus making it challenging for institutions to know if the introduction of a KMS benefits them as there is no way of knowing if the system is improving service delivery. This adds to the workload of the KW and KE as they have to source data that already exists in the organisation every time a query is received. They spend more time sourcing the information and miss out on the possibility of categorising the most requested information and possibly improving its accessibility by making it easily available on the organisation's webpage. Thus it is not enough for institutions to only implement the IMS through the online service desk; there needs to be a system in place that will also capture the generated new knowledge as part of IM.

6.3 Limitations

The research is set in a university setting, thus creating an immense opportunity for much wider research potential, making the scenario ideal for the initial CRIMS project to be gradually implemented in the ecosystem as HEIs' main business is knowledge generation. However, the biggest challenge experienced so far has been the inability to secure stakeholder buy-in, especially from the KW. A greater amount of data can still be explored as the current research is based on a limited area, that is, the ITD in the FID. The research is based on ITD from the FID, which has six departments in total. There was much reluctance from most of the departments, and a buy-in could not be achieved with the rest of the faculty departments. The research will benefit from a further

qualitative research approach that will help to answer some of the questions that have come out of the findings to address why there was a lack of stakeholder buy-in on the IMS.

The advent of COVID-19 played a role in further delaying some of the CRIMS project objectives which have been beneficial for the research study. Part of those resulting limitations is the non-deployment of the information repository system in place that would have assisted the organisation in capturing new knowledge from the data that would have been captured, vetted and authenticated by the KE in the organisation.

The query system is not set up on the main webpage of the organisation as it is not formally part of the collective university web asset, but is rendered as part of the experimental research initiative of the specific faculty and is at its pilot stage.

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LIST OF FIGURES

LIST OF TABLES

APPENDICES

Appendix A: Total Attention (queries) per Year

Attention	2019	2019 (%)	2020	2020 (%)	2021	2021 (%)	2022	2022 (%)	Grand Total	Grand Total (%)
C1AC	0	0%	0	0%	16	1%	0	0%	16	1%
C1ADM	187	89%	787	81%	1270	93%	140	42%	2384	83%
C1AP	11	5%	34	4%	8	1%	26	8%	79	3%
C1BA	0	0%	0	0%	0	0%	3	1%	3	0%
C1BB	0	0%	0	0%	0	0%	2	1%	2	0%
C1C	0	0%	0	0%	0	0%	4	1%	4	0%
C1EX	11	5%	102	11%	7	1%	48	14%	168	6%
C1FB	0	0%	0	0%	0	0%	2	1%	2	0%
C1FR	0	0%	0	0%	0	0%	1	0%	1	0%
C1ID	0	0%	0	0%	0	0%	1	0%	1	0%
C1LA	0	0%	0	0%	4	0%	17	5%	21	1%
C1M	0	0%	0	0%	0	0%	7	2%	7	0%
C1NSF	0	0%	0	0%	2	0%	11	3%	13	0%
C1R	0	0%	48	5%	52	4%	72	22%	172	6%
Grand Total	209	100%	971	100%	1359	100%	334	100%	2873	100%

Appendix B: Total Attention (queries) per Month

Attention	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
C1AC	0	0	0	0	0	0	0	16	0	0	0	0	16
C1ADM	268	319	147	62	85	105	103	174	287	191	319	324	2384
C1AP	47	20	1	0	0	0	0	0	0	1	1	9	79
C1BA	0	3	0	0	0	0	0	0	0	0	0	0	3
C1BB	0	2	0	0	0	0	0	0	0	0	0	0	2
C1C	0	4	0	0	0	0	0	0	0	0	0	0	4
C1EX	115	37	5	0	0	0	0	0	0	0	3	8	168
C1FB	0	2	0	0	0	0	0	0	0	0	0	0	2
C1FR	1	0	0	0	0	0	0	0	0	0	0	0	1
C1ID	0	1	0	0	0	0	0	0	0	0	0	0	1
C1LA	0	17	0	1	0	0	0	2	1	0	0	0	21
C1M	0	7	0	0	0	0	0	0	0	0	0	0	7
C1NSF	0	11	1	0	0	0	0	1	0	0	0	0	13
C1R	91	65	8	3	0	0	0	1	4	0	0	0	172
Grand Total	522	488	162	66	85	105	103	194	292	192	323	341	2873

Appendix C: Total Attention per Month (%)

Attention	Jan	Feb	Mar	Apr	May	Jun		Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
C1AC	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	8.2%	0.0%	0.0%	0.0%	0.0%	0.6%
C1ADM	51.3%	65.4%	90.7%	93.9%	100.0%	100.0%		100.0%	89.7%	98.3%	99.5%	98.8%	95.0%	83.0%
C1AP	9.0%	4.1%	0.6%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.5%	0.3%	2.6%	2.7%
C1BA	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
C1BB	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
C1C	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
C1EX	22.0%	7.6%	3.1%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.9%	2.3%	5.8%
C1FB	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
C1FR	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
C1ID	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
C1LA	0.0%	3.5%	0.0%	1.5%	0.0%	0.0%		0.0%	1.0%	0.3%	0.0%	0.0%	0.0%	0.7%
C1M	0.0%	1.4%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
C1NSF	0.0%	2.3%	0.6%	0.0%	0.0%	0.0%		0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.5%
C1R	17.4%	13.3%	4.9%	4.5%	0.0%	0.0%		0.0%	0.5%	1.4%	0.0%	0.0%	0.0%	6.0%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix D: Total Attention vs Year & Month

Attention	C1AC	C1ADM	C1AP	C1BA	C1BB	C1C	C1EX	C1FB	C1FR	C1ID	C1LA	C1M	C1NSF	C1R	Grand Total
2019_Oct	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
2019_Nov	0	44	1	0	0	0	3	0	0	0	0	0	0	0	48
2019_Dec	0	140	9	0	0	0	8	0	0	0	0	0	0	0	157
2020_Jan	0	47	31	0	0	0	96	0	0	0	0	0	0	37	211
2020_Feb	0	83	3	0	0	0	6	0	0	0	0	0	0	6	98
2020_Mar	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
2020_May	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
2020_Jun	0	42	0	0	0	0	0	0	0	0	0	0	0	0	42
2020_Jul	0	48	0	0	0	0	0	0	0	0	0	0	0	0	48
2020_Aug	0	61	0	0	0	0	0	0	0	0	0	0	0	1	62
2020_Sep	0	134	0	0	0	0	0	0	0	0	0	0	0	4	138
2020_Oct	0	107	0	0	0	0	0	0	0	0	0	0	0	0	107
2020_Nov	0	162	0	0	0	0	0	0	0	0	0	0	0	0	162
2020_Dec	0	89	0	0	0	0	0	0	0	0	0	0	0	0	89
2021_Jan	0	147	2	0	0	0	0	0	0	0	0	0	0	17	166
2021_Feb	0	170	5	0	0	0	2	0	0	0	0	0	0	24	201
2021_Mar	0	140	1	0	0	0	5	0	0	0	0	0	1	8	155
2021_Apr	0	62	0	0	0	0	0	0	0	0	1	0	0	3	66
2021_May	0	78	0	0	0	0	0	0	0	0	0	0	0	0	78
2021_Jun	0	63	0	0	0	0	0	0	0	0	0	0	0	0	63
2021_Jul	0	55	0	0	0	0	0	0	0	0	0	0	0	0	55
2021_Aug	16	113	0	0	0	0	0	0	0	0	2	0	1	0	132
2021_Sep	0	153	0	0	0	0	0	0	0	0	1	0	0	0	154

2021_Oct	0	81	0	0	0	0	0	0	0	0	0	0	0	0	81
2021_Nov	0	113	0	0	0	0	0	0	0	0	0	0	0	0	113
2021_Dec	0	95	0	0	0	0	0	0	0	0	0	0	0	0	95
2022_Jan	0	74	14	0	0	0	19	0	1	0	0	0	0	37	145
2022_Feb	0	66	12	3	2	4	29	2	0	1	17	7	11	35	189
Grand Total	16	2384	79	3	2	4	168	2	1	1	21	7	13	172	2873

Appendix E: Attention vs Year & Month (%)

Row Labels	C1AC	C1ADM	C1AP	C1BA	C1BB	C1C	C1EX	C1FB	C1FR	C1ID	C1LA	C1M	C1NSF	C1R	Total
2019_Oct	0.0%	75.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2019_Nov	0.0%	91.7%	2.1%	0.0%	0.0%	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2019_Dec	0.0%	89.2%	5.7%	0.0%	0.0%	0.0%	5.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Jan	0.0%	22.3%	14.7%	0.0%	0.0%	0.0%	45.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17.5%	100%
2020_Feb	0.0%	84.7%	3.1%	0.0%	0.0%	0.0%	6.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.1%	100%
2020_Mar	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_May	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Jun	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Jul	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Aug	0.0%	98.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	100%
2020_Sep	0.0%	97.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	100%
2020_Oct	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Nov	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2020_Dec	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Jan	0.0%	88.6%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.2%	100%
2021_Feb	0.0%	84.6%	2.5%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.9%	100%
2021_Mar	0.0%	90.3%	0.6%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	5.2%	100%
2021_Apr	0.0%	93.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	4.5%	100%
2021_May	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Jun	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Jul	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Aug	12.1%	85.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.8%	0.0%	100%
2021_Se	0.0%	99.4%	0.0%	0.0	0.0	0.0	0.0%	0.0	0.0	0.0	0.6	0.0	0.0%	0.0%	100

p				%	%	%		%	%	%	%	%			%
2021_Oct	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Nov	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2021_Dec	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
2022_Jan	0.0%	51.0%	9.7%	0.0%	0.0%	0.0%	13.1%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	25.5%	100%
2022_Feb	0.0%	34.9%	6.3%	1.6%	1.1%	2.1%	15.3%	1.1%	0.0%	0.5%	9.0%	3.7%	5.8%	18.5%	100%
Total	0.6%	83.0%	2.7%	0.1%	0.1%	0.1%	5.8%	0.1%	0.0%	0.0%	0.7%	0.2%	0.5%	6.0%	100%

Appendix F: Subject Resolution days vs Month Created

Average Resolution Period	Attention	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
	C1AC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.25	0.00	0.00	0.00	0.00	22.25
	C1ADM	12.38	7.43	14.37	17.37	11.13	11.98	15.23	14.92	16.66	12.98	11.33	19.52	13.61
	C1AP	19.49	1.90	22.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	19.00	26.22	15.68
	C1BA	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
	C1BB	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
	C1C	0.00	3.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.25
	C1EX	7.97	4.70	4.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.33	33.00	8.99
	C1FB	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
	C1FR	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
	C1ID	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	C1LA	0.00	1.65	0.00	3.00	0.00	0.00	0.00	14.00	5.00	0.00	0.00	0.00	3.05
	C1M	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
	C1NSF	0.00	2.00	4.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	2.15
	C1R	30.81	5.58	4.13	17.33	0.00	0.00	0.00	14.00	5.50	0.00	0.00	0.00	19.12
	Grand Total	15.27	6.21	13.55	17.15	11.13	11.98	15.23	15.44	16.47	12.96	11.66	20.01	13.57
Max Resolution Period	**Attention**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Grand Total**
	C1AC	0	0	0	0	0	0	0	68	0	0	0	0	68
	C1ADM	409	269	170	172	94	150	126	125	129	132	111	350	409
	C1AP	298	19	22	0	0	0	0	0	0	8	19	58	298
	C1BA	0	5	0	0	0	0	0	0	0	0	0	0	5
	C1BB	0	4	0	0	0	0	0	0	0	0	0	0	4
	C1C	0	7	0	0	0	0	0	0	0	0	0	0	7
	C1EX	305	45	13	0	0	0	0	0	0	0	68	61	305
	C1FB	0	4	0	0	0	0	0	0	0	0	0	0	4
	C1FR	15	0	0	0	0	0	0	0	0	0	0	0	15
	C1ID	0	1	0	0	0	0	0	0	0	0	0	0	1

	C1LA	0	21	0	3	0	0	0	26	5	0	0	0	26
	C1M	0	2	0	0	0	0	0	0	0	0	0	0	2
	C1NSF	0	5	4	0	0	0	0	2	0	0	0	0	5
	C1R	305	30	29	39	0	0	0	14	8	0	0	0	305
	Grand Total	409	269	170	172	94	150	126	125	129	132	111	350	409
Min Resolution Period	**Attention**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Grand Total**
	C1AC	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1ADM	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1AP	0	0	22	0	0	0	0	0	0	8	19	0	0
	C1BA	0	3	0	0	0	0	0	0	0	0	0	0	3
	C1BB	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1C	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1EX	0	0	1	0	0	0	0	0	0	0	4	4	0
	C1FB	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1FR	15	0	0	0	0	0	0	0	0	0	0	0	15
	C1ID	0	1	0	0	0	0	0	0	0	0	0	0	1
	C1LA	0	0	0	3	0	0	0	2	5	0	0	0	0
	C1M	0	0	0	0	0	0	0	0	0	0	0	0	0
	C1NSF	0	0	4	0	0	0	0	2	0	0	0	0	0
	C1R	0	0	0	4	0	0	0	14	0	0	0	0	0
	Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix G: Classifying the queries assigned to workers

Gaussian Naive Bayes Report:

	precision	recall	f1-score	support
KE	0.29	0.02	0.04	172
KW	0.70	0.98	0.82	403
accuracy			0.69	575
macro avg	0.49	0.50	0.43	575
weighted avg	0.58	0.69	0.58	575

Model Accuracy: 0.69043(69%)

Random Forest Classifier Report:

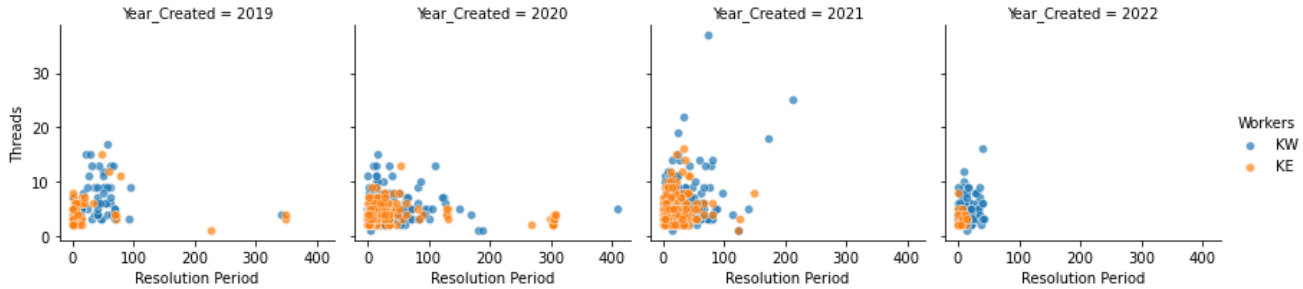
	precision	recall	f1-score	support
KE	0.32	0.22	0.26	172
KW	0.71	0.81	0.75	403
accuracy			0.63	575
macro avg	0.52	0.51	0.51	575
weighted avg	0.59	0.63	0.61	575

Model Accuracy: 0.63130(63%)

ExtraTreesClassifier Report:

	precision	recall	f1-score	support
KE	0.32	0.24	0.28	172
KW	0.71	0.78	0.74	403
accuracy			0.62	575
macro avg	0.51	0.51	0.51	575
weighted avg	0.59	0.62	0.60	575

Model Accuracy: 0.61913(62%)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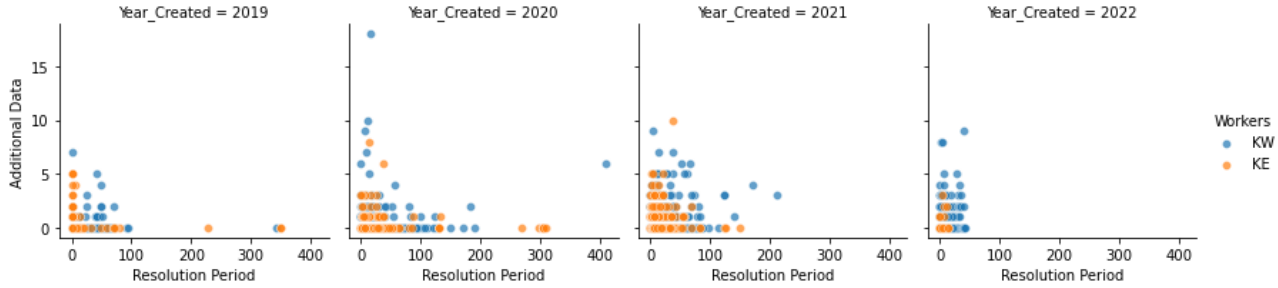
Year_Created = 2020
Year_Created = 2021
Year_Created = 2022
Threads
Resolution Period
Workers
KW
KE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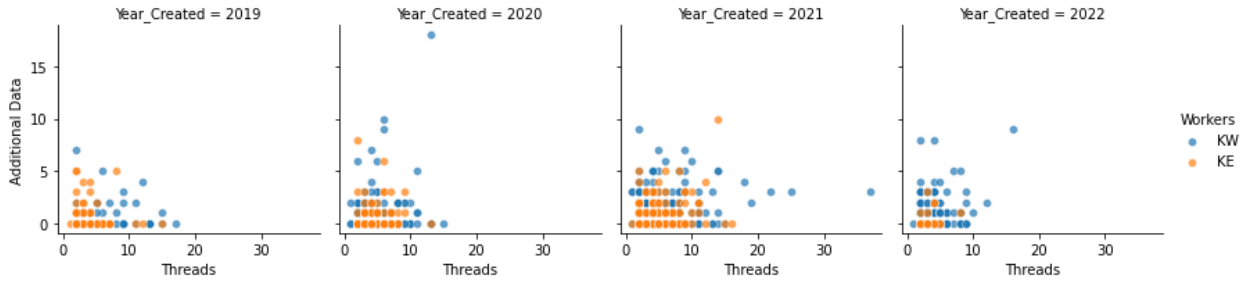
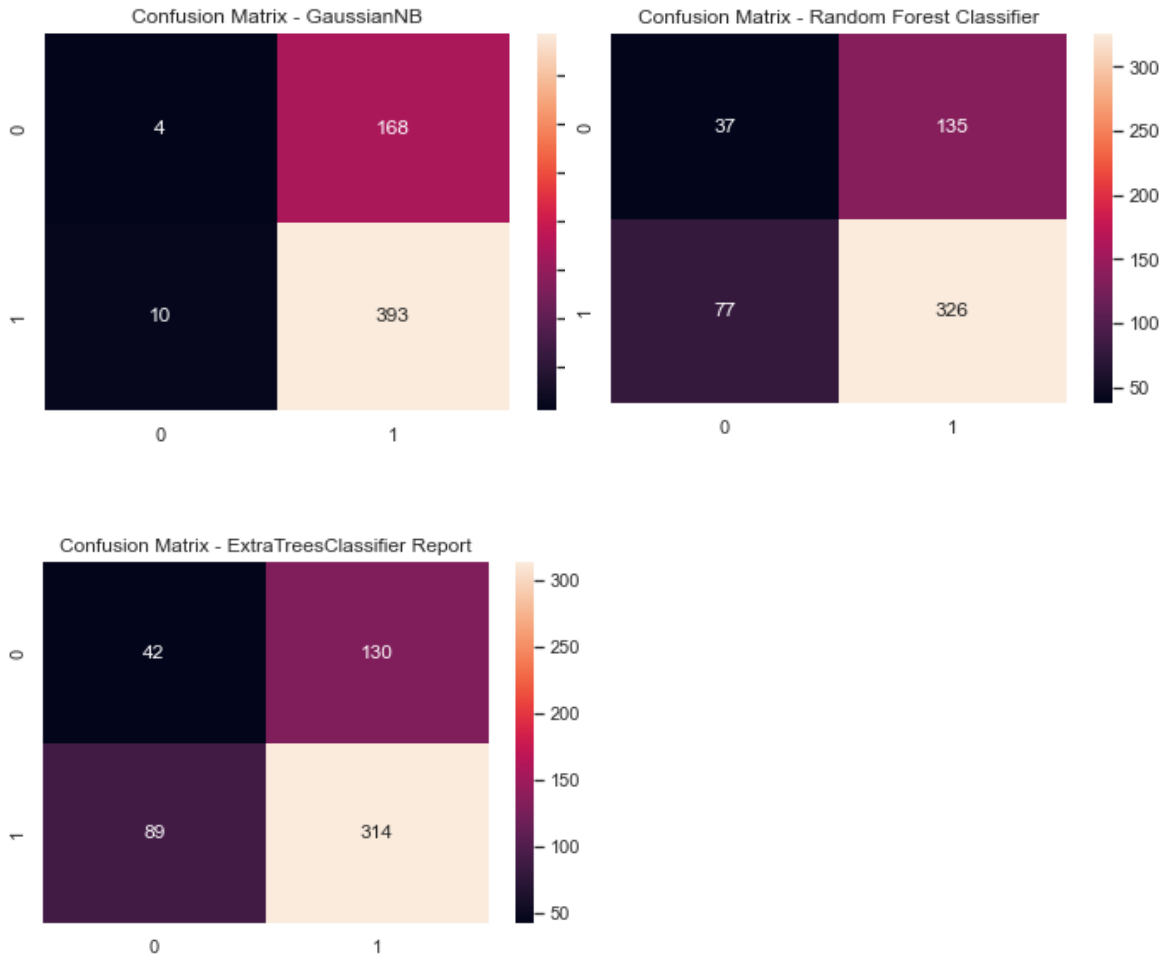
Year_Created = 2020
Year_Created = 2021
Year_Created = 2022
Additional Data
Resolution Period
Workers
KW
KE


Year_Created = 2019
Year_Created = 2020
Year_Created = 2021
Year_Created = 2022
Additional Data
Threads
Workers
KW
KE

Appendix H: Confusion Matrix for classifiers



ABBREVIATIONS AND ACRONYMS

API	Application Programming Interface
CPUT	Cape Peninsula University of Technology
CRM	Customer Relationship Management
CRMS	Customer/Client Relationship Management Systems
KW	Knowledge Worker/s
KE	Knowledge Expert/s
IM	Institutional Memory
IR	Information/Institutional Repository
IT	Information Technology
ITSM	Information Technology Service Management
OK	Organisational Knowledge
OM	Organisational Memory
KT	Knowledge Transfer
DevOps	Development Operations
LDAP	Lightweight Directory Access Protocol
SLA	Service Level Agreement
RSA	Republic of South Africa