ICTs for enhancing Knowledge Management amongst academics at the National University of Science and Technology, Zimbabwe

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This study investigated the use of Information and Communication Technologies that are used to for knowledge management amongst academics at the National University of Science and Technology (NUST) based on anecdotal evidence that inadequate IT resources have always hampered knowledge management among academics. The purpose of the study was to investigate how ICTs are used to enhance knowledge management amongst academics at the NUST. Anchored on the interpretivist paradigm, the study used qualitative research method in a case study design where interviews were conducted with six deans of faculties across the university and one ICTs officer. Data was gathered through face-to-face in-depth interviews and analysed using themes. Findings indicated that NUST provides the academics with desktop computers for knowledge management and laptops are provided only on request. Academics are offered training when the ICTs department introduces new software. It also emerged that mistrust and bureaucracy in the university affects lecturers' knowledge management. The study concluded that academics at the university are aware of the importance of ICTs in managing knowledge, but weak and unreliable internet connection were major barriers to knowledge management amongst academics. The study recommends adequate provision of technologies such as laptops since some academics are reluctant to share knowledge using personal resources.

Keywords: explicit knowledge; Information Communication Technologies; knowledge; knowledge management; National University of Science and Technology, tacit knowledge

1 Introduction

Information communication technology (ICT) is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computers and network hardware and software, and satellite systems. It also includes services such as video conferencing and distance learning. Broadly, ICT covers any product that stores, retrieves, manipulates, transmits, or receives information electronically in a digital form such as personal computers, digital television, email, robots and other devices (Sulisworo 2012). Information communication technologies are considered as drivers of innovation (Jumba, Bundi & John 2020; Mezher 2007; Subashini, Rita & Vivek 2012) because of their facilitative role in the acquisition, storage, dissemination, sharing and utilisation of individuals' experiences and knowledge in knowledge management. This role as observed by Martelo-Landroguez and Cegarra-Navarro (2014), makes ICTs enablers of interactivity among individuals by enhancing the individual's ability to store, access, manipulate and use information in a variety of ways that improve communication among the individuals. This renders interactivity a central activity in knowledge management. In an organisation knowledge management refers to systematic and organizationally specified processes of acquiring, organizing, sharing, updating, and communicating both tacit and explicit knowledge of employees such that all employees and the organisation can use each other's knowledge to become effective and productive in their work. Use of ICTs in the knowledge management processes has led Sireteanua and Grigoruta (2007) to view knowledge management as a collection of learning processes associated with exploring, exploiting, sharing, and disseminating human knowledge using the most appropriate technology, under the influence of the cultural environment.

The higher education sector uses ICTs in a variety of teaching and learning activities that include research and collaboration, accessing teaching content, preservation, and dissemination of the content. Indeed, for this purpose, ICT is needed to support and manage knowledge effectively and also to encourage the sharing of knowledge, particularly amongst lecturers. Yusof and Muda (2015) believe that apart from providing a conducive teaching and learning environment, lecturers need knowledge to fulfil their responsibilities as educators. Through ICT, experts and professionals

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in different fields are empowered with an opportunity to share and contribute their knowledge towards the body of knowledge management (Passerini & Wu 2008). Organisations need to capture and retain tacit and explicit knowledge in order to ensure continuity in business operations even after the exiting of an employee with expertise on how to perform specific tasks. It is therefore incumbent upon organisations to harness and retain important organisational tacit and explicit knowledge (Dewah 2014). In knowledge management, ICTs play an important role in capturing and retaining vital tacit and explicit knowledge which is at risk of loss; sharing knowledge is one way of capturing it. However, the nature of knowledge sharing processes depends on an organisation's cultural and structural factors. Yahya, Ahmad, Mohamad and Rodzi (2016) have noted that different types of knowledge management systems (KMS) have been used extensively in many disciplines that include higher education.

2 Theoretical framework

The study was anchored in the Knowledge Sharing Capability Model developed by Kim and Lee (2006), to examine the impact of the organizational culture, organizational structure, and information technology (OCSIT) among employees in public and private sector organizations in South Korea. According to Kim and Lee (2006:10), "employee knowledge sharing capabilities is the ability of employees to share their work-related experience, expertise, know-how, and contextual information with other employees through informal interactions within or across team or work units." The model was developed to test key variables affecting employee knowledge sharing activities such as performance-based pay systems, social networks, and information technology (IT) applications focusing on end-users. The KSC Model (Kim and Lee, 2006) posits that knowledge sharing is determined by the organizational culture and organizational structure.

3 Statement of the problem

When knowledge is not properly managed it can easily get lost or be destroyed (Dewah & Chitha 2019). Managing knowledge in higher education is often very difficult because of several bureaucratic and cultural factors which present obstacles (Tippins 2003). Numerous universities have begun developing their Knowledge Management Systems in order to improve their performance (Opera 2011). A KMS is an effective IT tool that enables and supports the KM process of knowledge creation, storage/retrieval, transfer, and application in an organization (Dorasamy, Raman & Kaliannan 2013; Alavi & Leidner 2001). Anecdotal evidence gathered by the researchers indicates that the NUST technology system that facilitates knowledge management is not fully utilised by the academics and in most cases, knowledge is communicated through emails. It seems the university also does not provide lecturers/academics with adequate IT resources such as computers to facilitate KM.

There is loss of tacit knowledge from expert academics as the knowledge they possess is not captured, shared nor retained, and when they leave for greener pastures, retire, or get dismissed from work they leave with their know-how and know-what. When a faculty or staff member leaves or retires, the college or university loses the social capital, that is, the sum total of all connections, and resources associated with those connections, that the person brings to the college (Agarwal & Marouf 2014). Thus, the new staff has to rely on the lecturers that they find in their departments as there is no documented knowledge to guide them; be it in teaching or research or outreach services. Technologies play an important role just as auxiliary tools in KM (An and Wang 2010) and in facilitating KM processes, but human beings are at the center. Chua (2004) avers that in KM processes technology serves as a repository in which knowledge can be reliably stored and efficiently retrieved. Dikotla (2019) observes that technology factors take into consideration technological infrastructure to support KM initiatives. Indeed, technologies continue to be an essential tool for KM implementation, and for support of all human activities in organizations and enterprises. The study therefore sought to investigate how ICTs are used to enhance knowledge management amongst academics at the National University of Science and Technology. The study sought to answer the following questions:

- What are the available ICTs for knowledge management at NUST?
- What role is played by ICTs to create, transfer, share and store lecturers' knowledge at NUST?
- How do NUST academics exploit the existing KMS to manage their knowledge under the prevailing organisational, cultural, and structural factors?
- What is the level of IT support in knowledge management at NUST?

4 Review of the literature

This section reviews related theoretical and empirical literature that is relevant to the trends of thought on how academics use ICTs to enhance the management of their knowledge. The two main areas reviewed and pertinent to providing the conceptual framework of this research are: (i) Knowledge Management and Information Technology support in universities; and (ii) Organizational, cultural, and structural factors.

4.1 Knowledge Management and Information Technology support in universities

The primary role of colleges and universities is imparting knowledge. Colleges and universities exist to create and share knowledge (Serban & Luan 2002) and a university depends on its ability to create, manage and use knowledge in the most effective way (Sulisworo 2012). Knowledge management in higher education is the art of increasing value from selected knowledge assets which could improve its effectiveness and entails all processes of identification, sharing and creation generation, use, and application of knowledge. To learn and acquire new knowledge, individuals should interact and share implicit (tacit) and explicit knowledge with each other (Nonaka & Takeuchi 1995).

Most researchers of knowledge management classify knowledge into tacit and explicit (Agarwal & Marouf 2014; Cross & Baird 2000; Nonaka & Takeuchi 1995; Polanyi 1966). Tacit knowledge is that which resides in the minds of faculty staff, students and the knowledge gained through life experience where we can know more than we can tell (Polanyi 1966). Cross and Baird (2000) say that individuals primarily absorb this knowledge through social interaction – by working with those who are applying knowledge gleaned from past endeavors. Explicit knowledge is documentable and sharable through information technologies, whereas tacit knowledge resides in employees' minds, behaviours, and perceptions (Al-Hawamdeh 2003). Geng (2005) identifies course syllabi, textbooks, and other documents as examples of explicit knowledge. Along with tacit and explicit knowledge, the other types of knowledge are work processes and support systems. For example, when a college or a university votes in a new curriculum or comes up with a new student or faculty policy manual, then the experience and knowledge of all those working on arriving at these documents become part of the work process guiding the college or university (Agarwal and Marouf 2014).

Knowledge management has been adopted in colleges and universities, and the higher education sector in general. Past research has sought to highlight the importance of implementing KM in higher education (Balakrishnan & Chandramalar 2019; Sallis & Jones 2002), however, there is a lack of a clear template for KM implementation that university leaders and administrators can adopt (Agarwal & Marouf 2014). While universities expect publications from faculty, there is often little to no guidance in the form of research groups, mentoring, collaboration, or regular research meetings such that young professors have solitary, lonely journeys in their tenure process (Cohen, March & Olsen 1972). Universities serve as the platform to enable academics to speak of their ideas and insights. One of the common functions of knowledge management used in universities is to serve as the knowledge repositories. In fact, it has always been a practice in almost all higher educational institutions to store all relevant documents contributed in house in the knowledge repository or the database. Storing information is not new in universities, but what is new is to share the available knowledge and to allow members to utilize the information generated within the community (Agarwal & Marouf 2014).

Rowley (2000) studied Canadian universities and noted technology as a facilitator of knowledge management and suggested revisions in organizational structures and reward systems. Abdualla, Selamat, Jaafar and Sura (2008), in the context of six Malaysian universities, had similar findings where they found technology ready to facilitate KM, but knowledge sharing culture and organizational structure were yet to reach optimal level. In a study conducted by Fari and Ocholla (2015), Nigerian academics cited as challenging, the inadequacy of infrastructure and utilities such as electricity, inadequacy of both print and electronic resources, poor research management and support, poor communication of and access to conferences, seminars and workshops, and poor attitude towards knowledge management amongst academics. Technologies allow users to access knowledge content in context of the situation and process. They also use the service management system to query data and visualize knowledge-related and knowledge-impacted operational and performance metrics, providing feedback, as relevant, to IT users, management, and executives (An and Wang 2010). Social media can be used as a means of organizing knowledge and in placing it in a form which is acceptable to other organizational members. Similarly, using Slide Share tool, users can upload presentation and share knowledge with employees so easily. With Slide Share, users are given an opportunity to rate, comment on and share the content with other members of the community for business purposes (Kamatula 2017).

4.2 Organisational, cultural and structural factors

Culture can be considered in terms of institutional or organizational culture, national culture, and of course, knowledge sharing culture itself. Taylor (2013) defined knowledge sharing culture as a culture that has achieved distinguishable levels of competency at managing, sharing, and employing information and knowledge that positively influence the organization's ability to achieve its goals and objectives. This definition perhaps most effectively highlights all aspects of KM practices and emphasizes the skills and understanding needed to establish such a culture and achieve the optimum desired outcome (Kurdi & Haddadeh 2018). Organizational culture is defined as the shared values, beliefs, and practices of the people in the organization, reflected in its mission, vision and shared goals (McDermott & O'Dell 2001). Knowledge management is influenced by cultural factors such as motivation to share knowledge, management support, trust, and a

spirit of teamwork. IT cannot alone achieve effective knowledge sharing in the absence of factors such as trust, culture, organizational climate, and leadership support (Enakire, 2020; Kunthi, Sensuse & Tobing, 2017). In fact, some studies found that systems and technology tools had a detrimental impact on knowledge sharing (Riege 2005). Organizational management plays an important role in selecting the correct technology to fit the existing organizational culture. Kim and Lee (2006) observed that knowledge sharing depends on top management intentions to create and maintain a culture of knowledge sharing in an organization. Knowledge sharing is facilitated by leaders who are able to reconcile centralized and shared leadership (Kurdi & Haddadeh 2018). Unwillingness to share knowledge by faculties can be attributed to a lack of systems and policies to protect their intellectual assets (Kim and Ju, 2008), the individualistic nature of academics and research, the complexity of academic departments and loyalty to the discipline rather than the organization.

Knowledge sharing in universities is influenced by cultural values of staff such as norms, beliefs, uncertainty avoidance, insecurity, and collectivism. Cultural differences such as uncertainty avoidance significantly impede knowledge sharing behavior of staff in universities. Studies have shown that individuals avoid sharing knowledge because of the fear of the unknown and also because they felt that they could be demoted or lose their jobs if they shared their skills and expertise (Riege 2005). Important factors of organizational culture are organizational structure, leadership, process, structure, reward system, motivation, trust, interaction, IT system and people (Enakire, 2020; Kunthi, Sensuse & Tobing, 2017; Kim & Ju 2008). Organisational structure consists of rules, policies, procedures and processes, hierarchical levels, departmentalisation of employees and systems of motivational incentives, and coordination of work processes within a firm (Ajanaku & Mutula 2018). Policies of higher education systems are often characterized by a lack of consistency and an inability to reach agreement, which makes universities difficult to manage. For instance, knowledge sharing processes are not integrated in the daily routines of faculty and staff.

4.3 The administrative context of the National University of Science and Technology

The National University of Science and Technology was established by an Act of parliament, the National University of Science and Technology Act of 1990 and opened its doors to 270 pioneer students in April 1991, with 28 Academic staff, 41 Administrators and 11 support staff (NUST 2011). NUST has since grown immensely and now has seven Faculties which include Applied Sciences, Built Environment, Commerce, Communication and Information Science, Industrial Technology, Medicine, and Science and Technology Education. There are 40 academic and 23 administrative departments at the university (NUST Yearbook 2019). Besides having a mandate to hold examinations and confer degrees, diplomas, certificates and other awards, the university is also mandated to promote research with emphasis on scientific, technological, industrial, and developmental projects, with particular reference to the developmental needs of Zimbabwe (NUST Act 1990). The university's mission is to be a world-class centre of excellence in teaching, research, innovation and entrepreneurship for sustainable development and its mission is to contribute positively towards the advancement of humanity through the provision of knowledge-based solutions to scientific, technological, economic, and social challenges (NUST Yearbook 2019).

The roles of the academics include research, teaching, community service, innovation, and industrialization which all lead to the generation of knowledge. Dewah and Chita (2019) conducted a study to establish whether academics in the Faculty of Communication and Information Science at NUST share knowledge freely with a view to enhance research output, teamwork, and collaboration. Their findings revealed that the Internet was not reliable and mobile technologies (smart phones, tablets, laptops) held great potential for communication and sharing of knowledge with senior management. However, the current study focused on the KM of all faculties. According to Agarwal and Marouf (2014), there have been fewer studies investigating KM readiness in universities and as such, this study sought to fill in this gap by investigating how NUST academics took advantage of available ICTs to create, store, share and transfer knowledge across a cultural cosmopolitan organisation, and among academics from the seven faculties.

5 Methodology

The study used qualitative methodology in a case study design. Data were gathered using interviews with six Faculty Deans and one ICTs official. Out of the seven planned interviews, the researchers managed to conduct six interviews (with five Deans and the ICTs official). The interviewees were purposively sampled because they were information rich considering their positions in the university. As such, they were most likely going to provide useful information and help people learn (Creswell 2014) about the ICTs and KM. Maximal variation sampling strategy was chosen since the researchers sampled individuals that differ on some characteristics or trait, for instance age group. The qualitative data was analysed and presented in themes. Qualitative data was generated in the study through interviews. The data collected through the interview was tape-recorded with the participants' permission and these were transcribed into texts. Thematic analysis shaped the presentation of the findings. In order to hide their identity and maintain their confidentiality

the deans were coded as Dean A, B, C, D and E. Ethical approval for the study was obtained from the University Registrar while an informed consent letter was attached to the interviewee guide for the participants to read and sign before taking part in the study.

6 Results

This section presents a summary of the major findings organised according to the themes raised by the research questions of the study.

6.1 Available ICTs for knowledge management at NUST

Interviewees were asked whether the university provides academics with adequate resources like computers, cellphones, and iPads to enable them to manage their knowledge. They reported as follows:

> The ICTs Director: *"The university provides desktops for lecturers and laptops were provided on request by the faculty. People want to chase technology but with the current economic situation, it is not possible. The university has a partnership with a company whereby the university gets a lease for laptops for about 3 years then after that buys them. This enables the university to own more computers for both the students and the lecturers".*
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> Dean C: "*Lecturers buy laptops through research grants to use for knowledge generation, storage and sharing*."
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> Dean E: "*Academics use the desktop computers mostly followed by personal mobile phones or tablets and the USB drives, laptops, emails for knowledge management. They also use social media platforms like Twitter, Facebook, and Instagram. Very few uses video conferencing and fax machines for knowledge management*."

The results show an over-reliance on desktop computers as available technologies for knowledge management, and emails as popular vehicles for conveying knowledge by NUST lecturers. Academics should use modern and new technology to move with the times. Use of desktop computers contrasts Fari and Ocholla's (2019) finding that South African academics use more new technologies for information and knowledge sharing than their Nigerian counterparts. Findings showed that lecturers preferred to use their laptops to manage their knowledge. The university has a Facebook page and a website of its own, yet the academics hardly use them to share, or transfer knowledge. This confirms Agarwal and Marouf (2014) who observed that with academic traditions, such as the faculty-centered lecture, many professors are reluctant to adopt alternative instructional strategies using the computer or telecommunication devices. Dikotla's (2019) study found that inadequate and underdeveloped ICT is a major barrier to knowledge sharing while Alavi and Leidner (2001) revealed that information technology can support the process for knowledge creation, sharing, application and storage.

These findings confirm those of the present research as it emerged that NUST academics buy laptops for the purposes of knowledge creation, transfer and even storage. Davenport and Prusak (1998) observed that the main role of information technology (IT) in KM is to accelerate the speed of knowledge transfer. Findings also show that few academics use video conferencing for knowledge management, confirming Kurdi and Haddadeh's (2018) observation that videoconferencing is still rarely used and is an expensive technology though this situation promises to change in the near future. The authors further opined that videoconferencing is an important technology though it is a long way before it will be reliable and optimally used for learning, but it has great potential for the future. According to Kamatula (2017) the role of information and communication technologies in supporting interaction will become more and more important, since face-to-face meeting often remains impossible while interaction-supporting tools exist, for instance e-mail, instant messaging, videoconferencing, discussion boards and file sharing.

6.2 Type of knowledge created, transferred and stored by lecturers

Academics indicated that they use ICTs to create, share and store knowledge about teaching materials and new ideas and also knowledge on continuous professional development. When asked about the type of knowledge that academics are expected to create, transfer, share and store, comments from deans of faculties were as follows:

> Dean A: *"Lecturers are not into knowledge management; they rarely share research data. The Faculty of Applied Sciences holds successful research seminars and workshops both internally and university wide compared to other faculties. In these gatherings' knowledge is generated, shared, disseminated, and transferred. The Faculty of CIS also holds research seminars every month, however, the attendance is poor."*

Dean B: *"Lecturers are expected to produce publications, course synopses and they also store knowledge on university regulations. Please note that academics use ICTs to manage knowledge on research supervision as they supervise students on their dissertations hence, they transfer and also store the knowledge."*

Dean D: *"In reality, lecturers do not want to share knowledge on what they would be researching on because they do not trust each other. They only avail what they were researching on after completion of the research."*

Dean E: *"Academics manage knowledge about research collaboration and through collaboration lecturers generate and share knowledge using ICTs and mostly via emails."*

Dean C: *Academics use the ICTs to share knowledge about conferences, workshops and seminars, scholarship availability, teaching methods because teaching is their core duty at the university hence, they create, share and store the knowledge about teaching very much. They also create and store knowledge about research supervision as they supervise students on their dissertations so, they later transfer the knowledge.*

The current findings are consistent with Fari and Ocholla's (2015) study findings that academics share knowledge on conferences, seminars, workshops, about part-time, visiting, sabbatical jobs and information on scholarship availability. In a similar study Plessis (2007) noted that the knowledge to be managed by academics includes both explicit, documented knowledge and tacit, subjective knowledge. Regarding collaboration in research, the current findings are in line with those of Al- Hawamdeh (2003) who attested that collaborative applications such as emails, calendaring, scheduling, shared folders and threaded discussions promote knowledge sharing and transfer. Some lecturers collaborate on their research when they find other lecturers with the same interest on what they would be researching on confirming An and Wang's (2010) view that KM's major objective is to connect people and stimulate collaboration.

6.3 Organisational cultural and structural factors that influence knowledge management

Regarding the cultural barriers to knowledge sharing, interviewees indicated that academics were not motivated to share their knowledge hence they kept the knowledge to themselves, and that lack of rewards was a cultural barrier to their knowledge management. In terms of how the organizational structure of the university allows free flow of knowledge. Dean A reported that

"There is too much bureaucracy in the university, lack of commitment to decision making and that lecturers have adopted the work ethos of the public sector and do not innovate, they are comfortable where they are." Dean C remarked, "The relationship between top management and the employees is a barrier to knowledge sharing in that the organizational structure is hierarchical and academics feel that the communication line is too long, and it takes too long to reach a decision and this had a negative impact on their knowledge management."

Specifically, about structure, findings showed that there is poor flow of knowledge in the university and too much time is spent waiting for a response from the top management due to a hierarchical structure that makes it difficult for collaboration between departments and sharing of knowledge across departments. This confirms Wang and Noe (2010) who observed that an organizational structure composed of departments and demarcated by function often results in communication silos, which may prohibit the knowledge sharing culture. Indeed, Kim and Lee (2006) observe that factors influencing knowledge sharing are linked to organizational structure, organizational culture, and leadership/management styles. The current study findings indicate that due to mistrust, lecturers find it difficult to share knowledge and can only reveal what they have been working on after completing studies. Dean E revealed that

"There is no coordination amongst lecturers in the university leading to duplication of knowledge" while Dean B said that "There is no spirit of team work amongst academics, there is lack of trust and this is a barrier to knowledge management."

From the study findings it was established that a major cultural barrier that was hindering knowledge management was the absence of a spirit of teamwork. Similar findings elsewhere established that while a social relationship between sharer and receiver is widely believed to motivate sharing (Kilduff and Tsai 2003), organizational cultural factors such as trust, collaboration, politics, power and autonomy do impact on knowledge sharing (Jennex 2007). According to Kim and Lee (2006), a high level of trust enhances effective communication through empowering members of the organization to share personal knowledge freely.

According to Kurdi and Haddadeh and Eldabi (2018) no knowledge management initiatives can be successful without proper assistance and support from the university authority. In the current study, relationship with top management was found to be a barrier to knowledge management confirming Tsai and Ghoshal (1998) who considered social interaction ties as channels for information and resource flows. Balakrishnan and Chandramalar (2019) advise that the leadership at Higher Education Institutions needs to be sensible to KM advantages. Some lecturers felt that the management had so much power and they were only followers as employees, yet Lee and Choi (2003) think that a strong relationship between top management and employees enhances a culture of knowledge sharing and competitiveness of the organization as a whole.

Firestone and McElroi (2003) observe that cultural barriers are often held responsible for failure to share and transfer knowledge in organizations. The study found that lecturers were not motivated to share their knowledge as there were no rewards for doing so, hence they felt that even if they shared or did not share their knowledge, it did not have any impact on them. In a similar study, Schepers and van den Berg (2007) found that Knowledge Sharing was influenced by cultural factors such as motivation to share knowledge, management support, trust and a spirit of teamwork. Dikotla (2019) observed that lack of rewards has an undesirable impact on knowledge sharing.

6.4 Level of organisational ICT support

Regarding the extent of the university management's support with the ICTs for lecturers' use in managing their knowledge, all the Deans concurred that lecturers are provided with desktop computers on appointment. Interviewees remarked as follows:

> *Dean A: "The University fully supports the lecturers in terms of ICTs, I cannot think of NUST without technology. As much as the university supports the lecturers, there is a lack of funding to ensure that they have enough resources to offer the lecturers". The university depended on funding from the government. The university should fund its own activities.*
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> *Dean B: "The university supports some lecturers in terms of ICTs as it does not have adequate resources to acquire all the equipment that is needed. The softwares that they need to execute their work were quite expensive; the desktops that they use are ancient. The university provides for the basic, each lecturer should at least have a desktop and a laptop. The university does try to support for example, it availed the plagiarism software that is used by lecturers."*
>
> *Dean E: "Laptops are provided by the university on special request by a faculty. Most lecturers use personal laptops in executing their work."*
> *The ICTs official: "Lecturers are provided with desktop computers on appointment."*

As to how appropriate the internet connectivity is in facilitating lecturers' research activities as they generate new knowledge, the ICTs official response was that "the internet connectivity is quite good. There is 960 megabits per second. Power outages are the only challenge which affects internet connectivity." They further mentioned that "there is enough bandwidth and NUST does not go for prolonged periods without internet connectivity." On what causes failure to access knowledge at NUST, results indicated weak internet connection and availability, system failure, lack of knowledge and lack of computer technology. While Dean B noted that "The internet connection is not reliable",

> *Dean A added that, "Power outages is a serious challenge hence when there is no power, lecturers cannot access their knowledge."*

Lau and Tsui (2009) mentioned that KM and knowledge sharing tools such as search engines, internet, intranet, and peer to peer knowledge tool, are helpful for knowledge management. However, some universities are developing online databases and online repositories, while some have developed information portals for ensuring access to the university's intellectual resources and academic services (Kurdi, Haddadeh & Eldabi 2018).

The current study revealed that lecturers were not attending trainings offered by the ICTS department and those who attended would complain that trainings had limited time. On whether the academics received training on how to use ICTs, interviewees responded as follows:

> Dean D: "*The university does try to support the lecturers in terms of ICTs by offering training whenever there is an innovation. However, the training periods may be short, and the lecturers sometimes complained that they would*

not have grasped the concepts that would be introduced, and it takes them quite a while to be fully conversant with the new programs or softwares."

Dean E: *Lecturers are trained to use applications like SPSS as it is quite useful in their research projects."*

The ICTs: *"Yes, we conduct training when introducing new technology to assist the lecturers to manage their knowledge. Lecturers are given an opportunity to attend training when a new software application is introduced, for example, Google Class, TurnItIn and Navision. However, the attendance is quite low. Lecturers believe that they can learn on their own and some cited that they would be too busy to attend the training sessions."*

Riege (2005) confirms that some factors contributing to this barrier of unrealistic expectations of technology in knowledge management is lack of training on the system and a poor usability and design of the system. The ICTs official was further asked on what assistance technicians provide lecturers with for their knowledge management and the response was that "they provide hardware and software support; they are the first line of maintenance when lecturers have problems with their hardwares." The ICTs official also revealed that "Technicians also assist in the upgrading of softwares and making sure that lecturers have anti-viruses in their machines." Regarding the level of IT support in knowledge management at NUST, it emerged that NUST ICT support is not very good. It is said that ICT is the foundation of development as the world is constantly changing at a very rapid rate (Olusesan & Adu 2016; Dewah & Chitha 2019). The study findings revealed that NUST struggles with funding ICT infrastructure. These findings confirm those of Kurdi, Haddadeh and Eldabi (2018) who observed that universities continuously grapple with limited budget, weak and inadequate infrastructure, and lack of resources and facilities.

7 Conclusion and recommendations

The article is based on the study that aimed at investigating the use of ICTs for enhancing knowledge management amongst academics at the National University of Science and Technology in Zimbabwe. The findings were presented based on themes resulting from the research questions covering availability of technologies for knowledge management at NUST, types of knowledge created, transferred, shared and stored by academics; organizational, cultural and structural factors on KM and the level of IT support to lecturers for KM. From the results of the gathered data, it was noted that NUST provides academics with desktops for their knowledge management. However, the academics prefer to use their personal laptops as they are faster and more convenient since it is possible to move around with them or carry them home. The university only provides a few laptops on request. Sometimes the internet connection is slow, and this affects their knowledge management processes. The finding confirmed that information technology was a key factor influencing knowledge management amongst academics at NUST but organizational structure, management support, channels of communication and lack of trust, were clear barriers to knowledge sharing among staff at NUST.

Based on the findings, the study made the following recommendations:

a. The study recommends that NUST should adequately provide modern/ contemporary ICTs like laptops, tablets, and smartphones to academics, improve internet bandwidth and connectivity.
b. NUST should ensure the provision of modern technologies that can encourage and facilitate the establishment of online communities of practice (CoPs) that improve academics' knowledge management leading to increased knowledge sharing, knowledge transfer, diffusion, and acquisition.
c. Academics should attend training programs offered by the ICTs department and training periods should be extended to enable academics to acquire knowledge and skills of managing the knowledge that they create.
d. NUST/ICT department should also work to provide a reliable internet and Wi-Fi connection to ensure that academics get connected to the ICT platforms during their working hours and after hours. This can be achieved by subscribing to a reputable organization that rarely provides interrupted connectivity.
e. Further research can be done including in the faculty of Medicine which was left out due to its location and limited time.

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