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SYSTEMS THINKING: A VEHICLE FOR THE DEVELOPMENT OF KNWOLEDGE-SHARING CULTURE IN THE UNIVERSITY OF TECHNOLOGY IN KWAZULU-NATAL

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Abstract

Knowledge is a fundamental source of competitive advantage for both public and private organisations. This includes higher education institutions as they are under constant pressure to meet the needs of their stakeholders. It is thus critical for such organisations to create conducive environments for knowledge-sharing across functional boundaries. Hence, the purpose of this paper is to examine the significant of systems thinking for the development of knowledge-sharing culture in Universities of Technology (UoTs). The study was qualitative in design. Data was collected, through face-to-face interviews, from employees of UoTs in KwaZulu-Natal (in South Africa). Participants were purposively selected. Thematic analysis was used to analyze data. Hence, study findings indicate that systems thinking serves as a catalyst for knowledge- sharing in UoTs. This suggests that systems thinking plays a key role in creating a conducive environment for knowledge-sharing across the organisation and beyond functional boundaries. Given the need for UoTs to remain competitive, a strong culture of knowledge-sharing across functional boundaries is critical. The original value of this paper is in its approach in uncovering the strengths and weaknesses of systems thinking for the development of knowledge-sharing culture in the UoTs in KwaZulu-Natal.

Keywords: Functional silos, KwaZulu-Natal, Knowledge-sharing, Systems thinking, Universities of Technology

INTRODUCTION

Universities play an important role in society as they are known for knowledge creation and contributing to the social as well as economic development of society (Austin & Jones, 2016). Operating in a business environment that has been described as globally interconnected, there is a need to replace mechanistic and reductionist approaches with systems thinking in order to remain competitive (Randle & Stroink, 2018). In a rapidly changing higher education environment, the ability to be creative and innovative is not only critical for graduates but also for higher education institutions themselves (Lin, Eichelberger & Leong, 2020). According to Botha (2007), creating a conducive environment for collaboration, the creation of ideas, storing as well as sharing of knowledge, including the sharing of best-practices to improve customer service are the precincts for the institutional learning. Correira, Mesquita and Paulos (2011) succinctly state that organisations are going through major transformation as a result of accelerated market volatility, fast response times, and globalization. Thus, stakeholder demands, including new technology, are part of the factors that force organisations to be nimbler if they want to remain competitive. Knowledge management as a phenomenon has received much attention from the researchers and practitioners. Authors of this paper unpacks knowledge-sharing as is the critical aspect of knowledge management. Hence, the element of

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knowledge management is presented from a specific context of systems thinking in UoTs. It is noted that the role of universities is no longer about producing knowledge only, but the expectation is that they also produce graduates who are knowledge producers for the future (Randle & Stroink, 2018). This is a world-wide phenomenon, as a number of different factors are impacting on the operations of universities as much as in other sectors of the economy.

This paper focuses on the use of systems thinking for the achievement of knowledge-sharing within the university context. Ishrat and Rahman (2020) posit that the importance of knowledge-sharing in an organisational context is undeniable. They suggest that further research should be conducted with an intention of assessing knowledge-sharing in an educational sector. This paper covers knowledge-sharing as a vehicle for improving university operations and practices. According to Kularajasingam, Subramaniam, Singh, & Sambasivan (2022), human capital is critical for an organisation to achieve its aspirations. For higher education context, human capital plays a vital role as they should perform their tasks effectively to improve the institution's and students' academic achievement. This only becomes possible where organisational members are able to share knowledge (Randle & Stroink, 2018). Higher education institutions are faced with multifarious challenges that require new approaches and perspectives that make it possible to generate effective solutions. Given the environment in which higher education institutions operate, the focus should no longer be on imparting specialised theoretical knowledge and high levels of technical expertise, but higher education institutions have a role in a broader spectrum of attributes that enable staff and students to become robust, flourish in their lives and become responsible citizens in a complex global world (Hurst & Du Plooy, 2021).

Institutions of higher learning should be able to cope with the competition for students, rising tuition fees, declining of public support, the needs for stakeholders and the use of technology to deliver training content (Featherman, 2014). This highlights the significant link between knowledge-sharing and systems thinking. Institutionalising a culture of knowledge-sharing across functions in an organisation has become possible with the adoption of systems thinking (Bedgood, 2022).

PROBLEM STATEMENT

A lack of knowledge-sharing culture in UoTs

Existence of silo practices encumbers knowledge-sharing beyond functional boundaries in an organisation (Hurst & Du Plooy, 2021). This is the case with the UoTs as well (Bedgood, 2022). A lack of systems thinking does contribute to a lack of knowledge-sharing across the UoTs. Mazorodze and Mkhize (2022) succinctly stated that knowledge-sharing is critical for both knowledge-generators and knowledge-seekers in higher education institutions. They state that knowledge should be shared to improve institutional effectiveness. However, the barriers to knowledge-sharing include a lack of the best organisational culture that inspires organisational members to share knowledge in the best possible manner (Adogboye, 2018). Phaladi (2022) adds that the successful implementation of a knowledge management concept relies on many factors, including human resources, organisational structure as well as the

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organisational culture. Hence, the lack of a most effective knowledge-sharing process between organisational members at different levels of the organisation becomes a barrier (Adegboye, 2018).

This study discusses the literature that was considered, methodology used, study findings, the implications of findings for policy and practice, conclusion as well as future research.

THEORETICAL CONSIDERATION FOR THIS STUDY

This section covers the theoretical perspective that relates to knowledge-sharing and systems thinking in a university context. Knowledge-sharing and collaboration across functional boundaries in organisations, knowledge-sharing and systems thinking concepts in an organisation and the higher education institutions as systems are theoretical aspects that underpin this study.

Knowledge-sharing and collaboration across functional boundaries in organisations

Knowledge is an essential asset that every organisation needs for the creation of successful ideas (Sindakis & Theodorou 2017). The sharing of knowledge across the organisation is one area that contributes towards the improvement of processes and practices in an organisation. It is therefore critical to have an overarching philosophy to promote a knowledge sharing-culture in an organisation. Systems thinking has been identified as a concept that is effective in helping organisations to remain competitive. It also plays a role in creating supportive ecosystems within the organisation. Knowledge is a combination of skills, experience, expertise, information and intelligence that creates a person's intellectual resources (Baltzan, 2014). Discussing the importance of knowledge in an organisational context, Bedgood (2022) accentuates that an organisation is only as good as the knowledge it possesses. According to Huie, Cassaberry & Rivera (2022), knowledge is a very important resource, given the rapidly changing business environment in which organisations operate. Therefore, they describe knowledge as a key factor for an organisation to remain competitive. Access to knowledge leads to academic and professional opportunities and as a result, it becomes possible to formulate new methods and applications (Sindakis &Theodorou, 2017). In other words, the sharing of knowledge is necessary for continuously improving organisational operations. In addition, they view human capital and organisational knowledge as critical factors to achieve an organisation's competitive advantage. The authors posit that the need for knowledge sharing emanates from fierce competition and this drives organisations to explore and exploit new knowledge (Sindakis &Theodorou, 2017). This argument also relates to higher education institutions. Dalkir (2020) defines knowledge management as a concept that deals with the creation, storage and sharing of wisdom and expertise accumulated in an organisation, which relates to its processes and operations. This is achieved through the promotion of creating, sharing and applying knowledge as well as sharing of valuable lessons learnt and best-practices into organisational memory to foster continuous organisational learning. From this definition, it is clear that knowledge sharing is a critical element of the knowledge management concept. Botha (2007) views knowledge management as non-negotiable, and it should be managed effectively for the benefit of the enterprise.

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Knowledge-sharing and systems thinking concepts in an organisation

In the context of what is commonly known as the knowledge economy, organisations rely on knowledge to improve their operations and remaining competitive (Adegboye, 2018). With this understanding, systems thinking becomes critical to facilitating knowledge-sharing beyond functional boundaries in a university. Understanding the broader organisational goals of a university is important and therefore members of the organisation must always be willing to share knowledge for the benefit of their organisation. According to Bedgood (2022), members of the organisation are bearers of knowledge and it is necessary to share their knowledge to achieve organisational goals, meet stakeholder needs and outsmart competitors.

Arnorld and Wade (2015) aver that systems thinking has been defined and re-defined in different ways. Systems thinking is defined by Randle and Stroink (2018) as a cognitive paradigm with which people perceive themselves and the world to be dynamic entities that continuously displaying emerging patterns from the interactions amongst many interdependent connected components or elements. Hassan, Obaid, Ahmed, Abdelrahman, Adam, Yousif, Mohammed and Kashif (2020) define systems thinking as a holistic approach to understand how the system elements interact with each other over time. Systems thinking is governed or informed by General Systems Theory (Gero, Shekh-Abed & Hazzan, 2020). Unpacking systems thinking, Trochim, Cabrera, Milstein, Ghalagher & Leischow (2006) describe systems thinking as a general conceptual orientation that focuses on interrelationships, interactions and interdependence between parts of a system. In other words, a system is regarded as a functioning whole, which is also often understood within the context of an even greater whole. Balle (1994) posits that systems thinking is a practical way to challenge old logic and supplant the traditional way of thinking and approach to the world.

As stated previously, higher education institutions are systems with sub-systems. According to Stowell (2020), it is important for all systems to adapt in order to survive and also to remain relevant. Organisations in all sectors of the economy exist in a turbulent environment where change has become unpredictable. It is in this context of change that Verd (2019) makes a point that even "change has change". Spender and Scherer (2007) emphasise that modern work requires what they call social interaction and networking between individuals who were previously working in isolation. The application of systems thinking makes it easier for organisations to understand the external environment and, as a result, it becomes possible to improve organisational operations. Stowell (2020) accentuates that systems thinking helps organisational members and practitioners to appreciate the organisation or a situation in its entirety. Moreover, they view collaboration as a key driver for knowledge management. Accordingly, knowledge management is viewed by practitioners as driven by competitive pressures and the need to effectively manage the organisation's intangible assets (Spender & Scherer, 2007).

Higher education institutions as systems

Higher education institutions are part of a system and they themselves are made up of internal systems and sub-systems. Austin and Jones (2016) succinctly state that higher education is a

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system in which higher education institutions are organised, coordinated and governed. This is at a macro level where higher education institutions are subjected to regulations from national or provincial spheres of government. Furthermore, government plays an oversight role over institutions of higher learning to ensure accountability (Austin & Jones, 2016). In simple terms, a higher education institution is a system operating as part of a system. Systems thinking concepts relate to the interrelationships, interconnectedness and interactions of a system's elements. These elements function to achieve a common goal. According to Bensberg, Allender & Sacks (2020), systems thinking originates from System Sciences that are concerned with the interrelationships between the parts of a system, with emphasis on understanding the functioning whole instead of individual components. In a systems thinking context, organisations are viewed as systems. Jackson (2003) argues that organisations are social institutions that should be well-functioning for the benefit and well-being of society. Systems thinking treats organisations as 'wholes' instead of individual parts (Beckford, 2002). This is an understanding that is generally lacking from organisational members in higher education institutions. Unfortunately, the lack of this understanding promotes silo practices and it becomes difficult to share knowledge and best-practices across the institution. This article presents systems thinking as a possible solution to that particular problem. Systems thinking emphasises the ineffectiveness of mechanistic or reductionist approaches to deal with current and complex challenges (Randle & Stroink, 2018). According to Lin et al. (2020), systems thinking may be the most appropriate to operate effectively in a complex environment.

Manning (2012) describes higher education as a complex enterprise. As a result, higher education institutions operate in a rapidly changing environment. He further asserts that these institutions have a limited ability to adapt quickly to market-driven curriculum changes and stakeholder needs. The interconnected world in which universities and colleges operate require nuanced approaches to continuously improve their processes and practices (Manning, 2012). A point has been made by Austin and Jones (2016) that higher education institutions play a critical role in economic and social development. Universities in particular are regarded as research and innovation systems (Austin & Jones, 2016). Understanding university governance is important given the role they play in society. Knowledge-sharing is as vital in a university context as it is in other sectors. Hence, Manning (2012) states that expansive knowledge and expertise is critical as old approaches and models are being replaced with new models of collaboration. The next section discusses the methodology considered for this study.

METHODOLOGY

This study adopted a qualitative approach, which is one of the major paradigms to conduct social research (Nagy Hesse-Biber, 2017). This choice was informed by the nature of the study. Leavy (2017) describe qualitative research as a research method that relies on non-statistical or non-numerical data. In addition, Harding (2019) defines qualitative research as a research approach that is used to examine and understand the phenomenon from the participants' perspective. Qualitative research was appropriate as the primary purpose of this study was to explore, describe and explain the phenomenon being investigated (Leavy, 2017).

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Selection criterial for participation

Participants in the study included employees operating at different levels at both selected UoTs in KwaZulu-Natal. The study employed purposive sampling. Hence, the participants were selected based on their availability, willingness to participate in the study and relevance of their contributions to the study (Creswell & Creswell, 2018).

Data collection method

Unstructured face-to-face interviews were used to collect data from the participants in order to achieve the objectives of the study. Interviews were audio recorded. This ensured that the interviewer focus on listening, probing, following up and maintaining eye contact with interviewees (Rutakumwa, Mugisha, Bernays, Kabunge, Tumwekwase, Mbonye & Seeley, 2020). Swain (2017) adds that the interview as a data collection method has some advantages, one of which is the opportunity to clarify questions when interviewees need clarity. Interviews are useful to understand the thoughts, feelings, experiences and knowledge of the participants (Dawson, 2019).

Data analysis

The INVIVO programme used to analyse data. This enabled the analysis using themes. Dawson (2019) describes thematic analysis as an inductive approach. The researcher relies on themes that emerge from the data collected.

STUDY FINDINGS

Designations of the Interviewees

The following Table 1 presents the designations of participants in terms of their occupations.

Table 1: Designations of the participants

Participant	Occupation
Participant 1	Quality Specialist
Participant 2	Associate Professor (Arts and Design)
Participant 3	Associate Professor (IT department)
Participant 4	Director Cooperative Education
Participant 5	Assistant Registrar
Participant 6	Director: Academic Development Unit
Participant 7	Manager: Financial Aid Unit
Participant 8	Student Development Officer
Participant 9	Writing Centre Co-ordinator
Participant 10	Head of Department (HoD): HR (Academic Department)
Participant 11	Head of Department: Photography (Academic department)
Participant 12	Deputy Dean: Faculty of Accounting and Informatics
Participant 13	Deputy Dean: Faculty of Management Sciences
Participant 14	Health and Safety Officer
Participant 15	Director: Special Projects

Source: Research data

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The following Table 2 presents the participant's number of years at their institutions.

Table 2: number of years in the institution N = 15

Years	No of Respondents
5	3
10	1
17	2
22	4
23	1
30	1
33	1
37	1
40	1

Source: Research data

The following section present findings as per participant's responses to statements relating to systems thinking in the university context.

Potential for the implementation of a systems thinking in higher education institutions

This section presents responses on the potential implementation of a systems thinking philosophy in their respective institutions. Thus, the following responses indicate participant's perceptions on their willingness of implementing a systems thinking in their respective institutions:

"I would support the implementation of systems thinking at the institution."

"It is central to our institution's strategic plan to deal with silos mentality in the institution and I would embrace it."

"I would embrace systems thinking, I am already embracing systems thinking through e-learning project in the institution."

"I would embrace it because it provides the opportunity for the left hand to understand what the right hand is doing."

"Because of my experience, I understand that the environment in which we operate is dynamic and I would embrace systems thinking whole-heartedly."

"Yes, I would embrace it because it is one of the things I am working towards-working in silos is counter-productive."

For this construct, participant's responses were positive on the potential implementation of systems thinking in the UoTs. Conte and Davison (2020) describe systems thinking as an approach that is used to make sense of complexity. Hence, systems thinking is viewed by Lamont (2020) as a new way for understanding the relationships of elements in a complex organisational system.

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Significant of a systems thinking methodology in the UoT context

This section presents the significant of systems thinking in the context of UoTs. Given the environment in which UoTs operate, participants highlighted areas in terms of the processes and practices that could be improved using systems thinking. Listed below are some of the responses from the participants:

> *"It opens opportunities and enlightens us as to one would need to clearly know what the left hand side is doing as against or opposed to the right hand side. Currently, you find one wants to protect their own empire, yet the empire is the institution."*
>
> *"I am already using part of the systems thinking because for me, one has to understand the environment where you are working and you need to have communication with all the stakeholders around and beyond."*
>
> *"It is my responsibility to ensure that there is a shared understanding of what is the role of a writing centre with respect to students and staff development. So, systems thinking is the way to go. Operating in silos is countable and wastes resources. There is too much duplication, yet we can streamline and use those resources that are wasted by duplication to do other things."*
>
> *"We focus on our tiny silos and forget to look at the bigger picture, especially the trends nationally and globally. Systems thinking is about viewing things holistically".*

Participants were optimistic about the perceived influence of a systems thinking. According to Stowell and Mead (2016), systems thinking is a source of inspiration and serves as a driving force that pushes people beyond job descriptions.

Presented in the following sections are the themes and sub-themes that emerged from the interviews with participants. Themes that emerged include cross-functional collaboration across the institution, knowledge-sharing, as well as, functional silos. The lack of institutionalised and internalised overarching systems thinking in UoTs, the adoption of systems thinking to achieve broader institutional goals, as well as the multiple perspectives and interrelationships in the institution were the identified sub-themes.

Theme 1: Cross-functional collaboration across the institution

Multi-perspectives are critical, as posited by Stroh (2015), in that systems thinking is able to mobilize diverse stakeholders to take actions that improve the effectiveness of the whole system. Yung and Vakharia (2019) emphasised that dissecting an organisation into silos promotes a culture where the interconnection of various organisational parts is ignored. They further accentuate that in systems thinking, an organisation is viewed as network-based with interconnected departments and other relevant external stakeholders. According to Prakash (2018), dynamic environmental factors compel higher education institutions to adapt in order to be and remain competitive. Hence it is critical to have a conducive environment for collaboration across functional boundaries. Cross-functional collaboration is a theme that emerged from the analysis of participants' responses.

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Theme 2: Knowledge-sharing

Limitations in Reductionism resulted in the development of systems thinking (Flood, 2010). The findings indicated a need to create a conducive environment for knowledge-sharing across the institution. Given the importance of knowledge-sharing in an organisation, Lucas (2010) indicates that organisations continue to experience challenges in terms of successfully transferring information across the organisation. Sharing knowledge in organisations is paramount given the fact that the environment in which organisations operate is becoming competitive and dynamic (Yukl, 2010). It has also been posited by Mazorodze and Mkhize (2022) that a knowledge-sharing culture stimulates the re-use and exchange of knowledge and insights, which helps an institution to achieve its strategic goals. Based on how systems thinking has been unpacked in the literature, it is clear that the theory could play an important role in promoting knowledge-sharing in an organisation.

Theme 3: Functional silos

This section deals with the views of the participants on whether the UoTs' operations were informed by Reductionist approaches. Reductionism is when the parts of a systems operate from their individual perspectives and the whole is ignored. According to Yung and Vakharia (2019), reductionism is regarded as mechanical thinking whereby a systems is broken down into smaller parts and the focus is on them individually. In an organisational context, this will mean that departments focus on their own operations and ignore the broader mandate of their organisation. Based on their responses, participants recognised that there was a silo mentality culture in the UoTs. The question was intended to ascertain if departments and faculties were still operating in silos at the UoTs.

One participant indicated that "he could not generalise in his response, but was sure that in his academic programme people were still operating in silos". Explaining why departments and faculties were operating in silos, one of the participants was of the view that it was because departments and faculties did not want to lose their identities.

In line with the views expressed by the participants, Yukl (2010) states that where there is no systems thinking, organisational members' loyalty is on their functional units and they are concerned about protecting their functional turf. It has also been posited by Bento, Tagliabue & Lorenzo (2020) that silos in an organisational context create barriers in terms of information flow.

According to Swap and Wayland (2013), functional silos divide the university into different disciplines and, as a result, there is no cross-functional collaboration. The findings of this study resonate with this point. The authors further argue that silos promote competition for recognition and funding, instead of collaboration. Bento et al. (2020) accentuate that it becomes difficult to achieve organisational goals where there are silos. The overall findings confirm that there was a strong culture of working in silos in the UoTs, particularly at the departmental and faculty levels.

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Overall responses from the participants revealed that there was a lack of understanding in the institution that one part of the system might affect the other parts of the system. In simple terms, this means that operations in one department might affect the operations of other departments in an organisation. Hence, the following three sub-themes were identified. These includes Lack of institutionalised and internalised overarching systems thinking in UoTs, the adoption of systems thinking to achieve broader institutional goals, as well as, the multiple perspectives and appreciating interrelationships in the institution.

Sub-theme 1: Lack of institutionalised and internalised overarching systems thinking in UoTs

Responses from the participants suggested that UoTs lacked an institutionalised and internalised systems thinking philosophy. The understanding is that with systems thinking, it was possible to view the institution from a holistic perspective. It was critical to identify challenges and share best-practices across the institution. Drack and Schwarz (2010) state that systems thinking is a useful philosophy to overcome reductionism or traditional ways of thinking in an organisation. The findings indicated a need to have an overarching institutionalised and internalised systems thinking philosophy in the UoTs.

Sub-theme 2: Adoption of systems thinking to achieve broader institutional goals

Responses from the participants indicated that there were strategies in place at the institutional level. Therefore, departmental and faculty strategies had to be in line and should resonate with institutional strategies. However, most participants felt that those who were operating at the management level, including Deans and HoDs, were not doing enough to sensitise staff about systems thinking at an operational level.

Hence, the findings indicate that the strategies of the institutions were not clearly communicated to staff at the operational levels. Keeling, Underhile and Wall (2007) note that schools or faculties in higher education institutions were competing and promoting their own interests instead of the interests of the institution at large. As a result, there was a strong culture where people focused on departmental or faculty goals instead of broader institutional goals. Moreover, this also contributed to a lack of understanding of broader institutional goals,, which suggests that if knowledge-sharing happens, it happens within in silos. Stroh (2015) succinctly states that systems thinking stimulates a shared understanding of complex issues. He further states that, with a shared understanding of complex problems, it becomes easier to formulate a strategy that gives a clear direction for the organisation.

Sub-theme 3: Multiple perspectives and interrelationships in the institution

Systems Thinking is mainly about recognising systems as a collection of various necessary and interrelated components where the relationships between the components are as critical as the elements themselves (Meyer & Pretorius, 2021). Responses from the participants confirmed that there was a lack of understanding how various departments and faculties were interrelated and interdependent. The findings also indicated that the value of interrelationships amongst various functional units was ignored in the institution. However, it was necessary to appreciate

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and optimise interrelationships amongst different parts of the UoT. Bui (2010) considers systems thinking as a tool to bridge the gap between the different sectors in UoTs. Multiple perspectives are critical to deal with complex challenges. Knowledge-sharing is critical in this context. Mabaso and Dlamini (2018) point out that higher education institutions are regarded as centres of knowledge creation and sharing. Given this understanding, an overarching philosophy is critical to promote knowledge-sharing in institutions of higher learning.

IMPLICATIONS OF FINDINGS FOR POLICY AND PRACTICE

The study explored the application of systems thinking to achieve knowledge-sharing culture in UoTs. This was achieved through unstructured face-to-face interviews. Higher education institutions are operating in an environment characterised by globalisation, internationalisation, technological developments and many other complex factors (Dalkir, 2020). Therefore, remaining relevant and competitive has become critical for higher education institutions. Systems thinking stimulates knowledge-sharing and cross-functional collaboration across the institution. Consequently, organisational processes and practices could be improved to gain a competitive advantage (Ishrat & Rahman, 2020). In other words, systems thinking provides a holistic understanding of the university operations, which contributes towards encouraging knowledge-sharing amongst other things. The study reveals that knowledge–sharing is one of the most critical aspects of knowledge management. Responding effectively to the needs of all relevant stakeholders is paramount for a university to remain relevant and competitive.

CONCLUSION

Managing knowledge effectively leads to the better functioning of an organisation (Ishrat & Rahman, 2020). Therefore, systems thinking could be used as a catalyst for effectively sharing knowledge across the university and beyond functional boundaries. Generally, organisational operations and practices in higher education institutions are characterised by functional silos or silo practices. Knowledge-sharing becomes difficult where there is a strong culture of silo practices. Austin and Jones (2016) state that many organisational practices have emerged out of early traditions that were informed by mechanistic thinking. Hence this paper highlights systems thinking as an effective solution to that problem as it has been identified as an alternative to reductionism. Therefore systems thinking becomes a strategic choice to promote knowledge-sharing in a university. Effective sharing of knowledge leads to the continuous improvement of organisational processes and practices. As a result, the organisation gains a competitive advantage and remains relevant.

FUTURE RESEARCH REQUIRED

The study has some limitations which pave the way for further research in future. Authors of this paper focused on UoTs. Other types of higher education institutions did not participate in the study. Future studies on the assessment of the extent to which systems thinking could be used for the development of a knowledge-sharing culture in other institutions of higher learning would be useful.

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