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Modified Delphi techniques use in social media cognition and knowledge transfer

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Background: Knowledge transfer (KT) (awareness, disseminating and applying experiences for innovation or competitiveness) faces complex social and technical challenges across individual, organisational and international domains.

Objectives: The purpose of this article was to explore social media (SM) factors offering some potential solutions to innovative environments, rooted in Social Technical Theory.

Method: Expert opinions were gathered using a mixed Delphi technique and snowball sampling, resulting in 31 refined responses from an initial 51. Data analysis was conducted using International Business Machines Corporation (IBM)'s Statistical Package for the Social Sciences (SPSS) and Microsoft Excel.

Results: The success of KT via SM depends on system design, tasks, and organisational factors like structure, leadership, technology and culture.

Conclusion: Emphasising the need for interdisciplinary collaboration, the study highlights the fusion of expertise from diverse fields, fostering innovative solutions and addressing critical issues such as innovation through technological integration. In essence, this study provides a holistic understanding of KT using SM in navigating the intricate interplay of organisational structures, groups and interconnections, a complex network within which KT unfolds. Social media perspectives are a catalyst in shaping ethical technology innovation or advancements with societal values.

Contribution: The study contributed by generating propositions in SM use in business collaboration tasks and KT. Key methodological contribution has been the application of the modified Delphi technique in the collection, analyses of data and interpretation of results.

Keywords: innovative business environment; knowledge transfer; social media; social technical theory; Delphi technique.

Introduction

In the swiftly evolving landscape of modern businesses, understanding knowledge transfer (KT) through social media (SM) is paramount. Knowledge transfer challenges like Africa's brain drain necessitate investment, governance, and North-South partnerships to address these issues (Khatun et al. 2022; Tchawe 2019). This article delves into the complex factors impacting KT via SM in dynamic, innovative business environments. The central research question focuses on identifying these factors and comprehending their impact on effective knowledge dissemination. Two sub-questions are explored: firstly, the facilitators that enhance KT through SM in innovative business contexts, and secondly, the challenges hindering the same process.

Knowledge transfer, a multifaceted concept, is complex to grasp and implement efficiently. What makes it even more complex is the interplay of multiple disciplines, each contributing a unique perspective. Leadership strategies in KT are often ambiguous, especially concerning systems, business processes, tacit knowledge and organisational knowledge. Scholars like Dalkir (2016) and Muninger, Mahr and Hammedi (2022) highlight this challenge. Their work spans organisational science, management and psychology, underscoring the interdisciplinary nature of the KT challenge.

Knowledge transfer, fundamentally a form of communication, involves various components including encoding, decoding, noise, source, feedback, channel, message and recipient (Liyanage et al. 2009). Noise include the physical (external distructions), semantic (term or language), physiological (mental stress) and cultural noise. Knowledge transfers comprise of

insights from communication studies, linguistics, and psychology to understand how information is engaged and revealed. There are various channels for KT. Some include in-person conversations, written messages, training workshops, casual social exchanges, formal meetings, and tech-facilitated approaches (Yates & Paquette 2011). Social networks, organisational design and personnel mobility are among the diverse channels identified by Argote et al. (2022), emphasising the complexity of KT mechanisms, which span fields like sociology, organisational behaviour and management. Highlights of the article include strategies for mitigating these factors, including continuous training, creating awareness, considering SM usage at work for positive effects and reinforcing non-disclosure policies.

In organisational contexts, the characteristics of knowledge profoundly influence its utilisation and transfer, an aspect examined by Argote et al. (2022). Their work integrates insights from social sciences, emphasising the interplay between individual and organisational behaviours. Despite advancements, KT remains a challenge. Ncoyini and Cilliers (2020) identify pivotal factors influencing knowledge management systems (KMS) designed to enhance KT, including organisational efficiency, motivation, trust, reciprocity, organisational culture, structure, human factors and technology, emphasising the intersection of technology, psychology and management.

This study, rooted in the backdrop of these challenges and complexities, ventures into exploring the factors shaping KT through SM in innovative business environments, drawing from a diverse range of disciplines. By addressing these intricacies and their interdisciplinary nature, this research aims to shed light on the intricate interplay between social, technical and organisational elements, providing valuable insights for effective KT strategies in contemporary businesses that have to navigate the complex web of KT across multiple disciplines.

Literature review

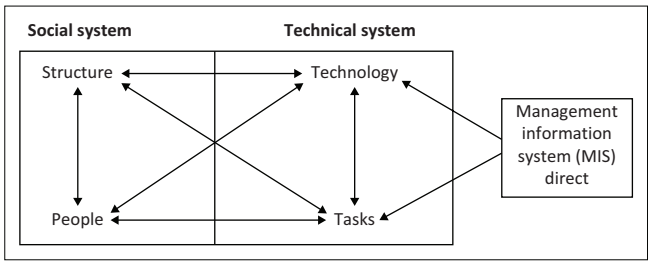
Understanding KT in the context of SM involves synthesising insights from diverse disciplines. Key authors in the KT field, such as Findlay (1978), Davenport and Prusak (1998), Liyanage et al. (2009), Becerra-Fernandez and Sabherwal (2010) and Argote et al. (2022), provide foundational frameworks. Findlay pioneered the interchangeability of KT concepts, emphasising knowledge sharing, flow and acquisition, while Liyanage et al. (2009) intricately map KT processes involving awareness, acquisition, transformation, association and application of knowledge.

This article proposes integrating SM into KT processes. Social media, defined as tools managing knowledge flows within and across organisational boundaries for innovation, offers multifaceted advantages. These include enhancing market territories, strategic engagement, productivity and socialised e-commerce (Ram & Liu 2018). Yemer and Wassie (2020) categorise SM into collaborative projects, blogs, content communities, social networking sites, virtual social worlds and virtual game worlds, aiding in comprehending the diverse applications of SM platforms. Social media acts as an innovation enabler, driving connections between firms, stakeholders and fostering data-driven innovation (Bhimani, Mention & Barlatier 2019). However, the utilisation of SM presents challenges. McFarland and Ployhart (2015) highlight how SM affects cognitive processes, concentration and socialising routines. To address these challenges, interdisciplinary insights from Novikova et al. (2020) are vital. The insights include political, financial, infrastructure, qualification, and information and communication tools essential for effective KT. In addition, Bidgoli (2021) emphasises comprehensive security systems incorporating biometric and non-biometric measures, physical security, access control, virtual private networks and data encryption. Furthermore, there are limitations and gaps in research on the use of SM for KT in the context of communication, SM marketing (SMM) and social change, requiring further research (Ihsaniyati et al. 2023; Singh, Singh & Gupta 2024). Knowledge transfer can be unintentional through leaks via common channels, such as mobile devices, social networks and other online platforms. In countries such as the USA, Canada and Germany, Timiyo and Foli (2023) found that KT issues can have severe consequences, negatively impacting a firm's competitive position and profitability, with estimated losses of billions annually, preventable by strategies to protect their explicit knowledge from theft, imitation and leakage.

Incorporating these interdisciplinary perspectives, this article explores the nuanced dynamics of KT through SM, bridging the gaps between KT theories, information technology, innovation management and cybersecurity. This comprehensive approach ensures a holistic understanding of KT in the digital age, leveraging the synergies of various disciplines to tackle the complexities of SM-enabled knowledge exchange.

Socio-technical theory

Socio-technical theory (STT) is a valuable framework for understanding KT, organisational processes and the factors that impact organisations, which are people, tasks and technology. Cartelli (2007) explains that information and communications technologies (ICTs) enable the socialisation, externalisation, combination and internalisation of knowledge management (KM). Scholars such as Trist (1981), Bijker and Wiebe (1995), King (ed. 2009) and Nguyen (2020) summarise the significance of technology from a socio-technical perspective. The key elements of the STT environment include strategic leadership, organisational infrastructure, technological infrastructure, organisational learning and knowledge culture. These key elements are found in multiple disciplines. The technical subsystem of STT comprises processes, tools and technologies that allow users to transform inputs into outputs and perform specific tasks. The social subsystem includes users, knowledge, values, relationships and reward systems. These subsystems



Source: Ncoyini, S.S. & Cilliers, L., 2020, 'Factors that influence KM systems to improve KT in local government: A case study of buffalo city metropolitan municipality, Eastern Cape, South Africa', *SA Journal of Human Resource Management* 18, 1–11. https://doi.org/10.4102/sajhrm.v18i0.1147

FIGURE 1: Socio-technical theory.

work together to optimise outputs (Šajeva 2010; Sawyer & Jarrahi 2014). Socio-technical theory is based on two main principles: the interaction of technical and social factors. This interaction forms a framework for organisational performance, encompassing both linear causal relationships and non-linear, complex relationships that may have unexpected outcomes. Figure 1 illustrates the STT.

Research methods and design

The Delphi technique, a collaborative research method involving a panel of independent experts, serves as a pivotal approach in understanding KT using SM. This technique, encompassing both quantitative and qualitative dimensions, converges expert opinions to explore complex topics (Skinner et al. 2015). Various forms of Delphi studies, including traditional, modified and future Delphi, offer versatile applications (Roßmann et al. 2018). This study utilised a variation referred to as a traditional study and modified Delphi. In a traditional study, the panel of experts is initially asked open-ended questions in order to generate a list of responses to be rated by panellists in subsequent rounds of the study. A modified Delphi begins with a list of the issues to be explored, which is developed before the beginning of the study. Additionally, a Delphi study in which experts are asked to forecast the likelihood of future events occurring is referred to as a future Delphi study (Roßmann et al. 2018). As a scientific method for data collection, the Delphi method is a systematic and collaborative research procedure for obtaining the opinion of a panel of autonomous experts concerning a specific subject (Skinner et al. 2015).

This study employed a blend of traditional and modified Delphi methods, drawing upon a panel of 51 initial experts, later narrowed down to 31, from diverse regions such as South Africa, Germany, the United Kingdom, Russia and the US. These experts, well-versed in SM's role in KT, formed the unit of analysis (Etikan, Musa & Alkassim 2016). The exploration, distillation, utilisation and reporting phases guided the study, aligning with the approach (Skinner et al. 2015).

The Delphi technique's structured methodology provided a systematic framework for this research, ensuring benefits such as consensus building, future forecasting and harnessing the expertise of geographically dispersed specialists. Anonymity and confidentiality, inherent in the Delphi process, encouraged candid responses from experts, enriching the study's qualitative depth (Hasson, Keeney & McKenna 2000).

The study employed pre-defined prioritisation criteria, with Round 1 focusing on gathering priorities and Round 2 involving expert ratings on research topics using a Likert scale. This dual approach, incorporating quantitative and qualitative data, facilitated nuanced decision-making. Consensus determination, crucial for robust findings, was achieved through statistical measures. Cronbach's alpha analysis, evaluating internal consistency, yielded a reliability score of 0.71, affirming the survey questionnaire's effectiveness.

By amalgamating quantitative rigour with qualitative depth, the Delphi technique provided a comprehensive lens to explore factors influencing KT using SM. The interdisciplinary nature of this research, integrating methodologies from diverse fields, ensures a nuanced understanding of the intricate dynamics at the intersection of social, technical and organisational aspects in contemporary knowledge exchange paradigms.

Ethical considerations

Participants' consent was acquired after the elaboration of the benefits and the risks that were part of the research. Ethical approval for the research was obtained from the Research Ethics Committee (Faculty of Business and Management Science [FBMS]) at the Cape Peninsula University of Technology, South Africa. Greener (2008) defines reliability as the element of consistency or repeatability of the findings using the same methods that a researcher describes. The interview schedule ensured that the researcher stuck to the designed questions to avoid deviating from the context of the study.

Results

Delphi data analysis, procedure, response rate, privacy, identity and findings are presented. Out of the 65 questionnaires distributed in Round 1, a total of 51 participants responded. Out of the 50 questionnaires distributed in Round 2, a total of 31 participants answered. The Delphi technique rounds 1 and 2 are explained next.

Round 1: Delphi procedure (stages 1, 2, 3 and 4)

The section highlights the motives for the selection of the technique and some of its limitations. The Delphi technique in Round 2 followed the exploration (stage 1), distillation (stage 2), utilisation (stage 3) and results reporting (stage 4) as per Laakso and Linturi (2010) and Skinner et al. (2015).

Stage 1 exploration: The pilot study

In stage 1, the questionnaire included a simple demographic set of closed-ended and open-ended questions to be the

cornerstone of exploring specific information about the participants' experience and content area. Demographic information was meant to 'hint' to the research audience on the importance of the participant profile and credibility of results. To illustrate the number of participants as well as their gender and age range in the Delphi technique: 33 men represented 65%, while 18 women represented 35% of the 51 participants in Round 2. Participants' age in Round 2 showed that the majority of the panellists were categorised into the age range 18 to 24 (2, 4%), 25 to 34 (21, 35%), 35 to 44 (21 making 44%), 45 to 54 (11, 22%) and 55 to 64 (4, 8%), with no one older than 65 years. The ensuing section highlights selected participants' professional qualifications. The majority of participants reflected two (4%) professors and eight (16%) participants with a PhD, 21 (41%) with a Master's (41%), 13 (25%) with a Bachelors (25%) and eight (16%) with a Diploma qualification, while four (8%) indicated that they have a certificate.

The next section concentrates on questions of the factors influencing the use of SM. The study was narrowed to the use of the English language as part of the validation of participants.

Stages 2, 3 and 4: Distillation, utilisation and findings

The research questions (RQs), research sub-questions (RSQs) and findings in Round 2 were also guided by the survey questions (SQs). The distillation, utilisation and findings followed. Distillation was applied to synthesise participants' information and opinions to inform subsequent rounds of questioning and feedback.

Research question 1: What are the factors influencing knowledge transfer using social media in an integrated business environment?

To answer RQ1, two RSQs were posed.

RSQ 1.1: What are the factors that could facilitate effective *KT* using SM in an integrated business environment?

Survey Question 1.1: What are the factors that could facilitate effective KT using SM?

Data were copied from Google Forms online into an MS Word file. Table 1 shows categories that aided the formulation of the final five themes. Table 1 presents factors that could facilitate effective KT using SM.

Table 2 shows the descriptive statistical results of factors facilitating effective KT using SM.

The analysis depicted in Table 2 shows that the standard deviation (SD) of 1.4 is less than the mean score for this, which is 4. This means there was agreement between the participants on the factors facilitating effective KT using SM. The SD is also close to 1 (perfect agreement) and less than the mean. This question was not taken to the next round of the Delphi technique because there was concordance of participants' contributions.

RSQ 1.2: What are the challenges that could influence effective *KT* using *SM* in an integrated business environment?

To answer RSQ 1.2, the excerpts (presented in Table 3) from the Google Forms were exported to MS Excel and then pasted into an MS Word document. The excerpts are responses from participants on survey question 1.2. Table 3 resulted from

TABLE 2: Descriptive statistical analysis of factors facilitating effective knowledge transfer using social media.

Statistics	Results in relation to factors facilitating effective KT using SM
Mean	4
SE	0.707106781
Median	4.5
SD	1.414213562
Sample variance	2
Range	3
Minimum	2
Maximum	5
Sum	16
Count	4

KT, knowledge transfer; SM, social media; SD, standard deviation; SE, standard error.

TABLE 1: Factors that could facilitate effective knowledge transfer using social media.

Number	Concepts Survey Question 1.1: What are the factors that could facilitate effective KT using SM?	Category	Themes	Frequency of factors
1	Ease of use, for instance, speed, convenience	Task, technology	-	-
2	Security	Technology	Technology	7
3	Allow creativity	Task	Task	4
4	Ability to build a reputation	Identity and identification	People	5
5	Learning from the application	Context	Context	5
6	Network connection to the Internet	Technology	-	-
7	Popularity	Identification	Total	21
8	Environment	Situation	-	-
9	KT willingness	People	-	-
10	Capabilities in ICT	People and technology	-	-
11	Trust	Credibility	-	-
12	Presentation of information in a suitable format	Encoding signals by people	-	-
13	Data availability	Technology	-	-
14	The right platform	Context	-	-
15	Infrastructure	Context	-	-

KT, knowledge transfer; SM, social media; ICT, information and communications technologies.

quotes (51) that were copied from Google Forms to create categories that supported the construction of the themes.

People, IT in the form of SM, ease of use, trust, credibility, people's will, identity and identification, and attitudes facilitate effective KT using SM.

Using MS Excel, the statistical analysis of the challenges that could influence effective KT using SM is presented in Table 3. The use of MS Excel frequency analysis of Table 3 resulted in the challenges showing a standard deviation (SD) of 6.3, which is smaller than the mean of 9.8. The SD is also further away from 1 (perfect unanimity) at 6.3 and a variance of 41.166. The SD (6.3) is greater than 1.00, indicating that there was no consensus among the respondents in relation to the challenges related to KT using SM. Because of a lack of agreement on challenges related to KT using SM, the question was taken to Round 2 of the Delphi technique.

Round 2: Delphi procedures distillation, utilisation and reporting (stages 2, 3 and 4)

The Delphi technique, Round 2, applied the following stages: (1) exploration, (2) distillation, (3) utilisation and (4) reporting of results. The exploration stage included only one survey question, which did not result in the agreement of experts' responses using the measure of central tendency and was thus brought into Round 2 using SPSS and Excel applications to confirm the correctness of each tool's result.

Round 2: Delphi participant demographics

Demographic information was important to reveal participants' individual social position, class, gender and race. To illustrate the number of participants as well as their gender and age range: the responses of 19 male participants (61%) and 12 female participants (39%), thus a total of 31 participants, were in Round 2. The age of the participants

TABLE 3: Challenges that could influence effective knowledge transfer using social media.

No.	Concepts	Challenges categories	Frequency of challenges
1	Improving *KT* processes in personal and organisational productivity.	Knowledge conversation	6
2	*KT* processes.	Knowledge management	13
3	Transfer processes in personal and organisational productivity.	Knowledge conversation, organisational science	20
4	Creativity and security.	Security	12
5	Personal productivity.	Security	4
6	Creativity and security.	Security	4
7	Creating meaning from experience and interaction with others and the environment.	Sensemaking	80
8	Creating security.	Security	-
9	Knowledge transfer.	Knowledge management	-
10	Personal organisation.	Knowledge conversation	-
11	Understanding, information interaction.	Knowledge conversation	-
12	Security.	Security	-
13	Process, relationship, communication.	Organisational science	-
14	Creating meaning from the environment.	Sensemaking	-
27	Privacy and security.	Security	-
28	False information, reputation being dented.	Authenticity	-
29	Legal prohibitions, remoteness of some areas.	Accessibility	-
30	Information overload.	Information overload	-
31	Technology skills and support.	Personal capability	-
33	Selecting detective equipment, loss of team members, incomplete transfer of knowledge and a lack of recognition.	Incomplete KT	-
34	Data bundles cost, a lack of technology and access.	Accessibility	-
35	The lack of connectivity.	Accessibility	-
36	Network problems, restrictions of the platform, cyber phishing, exaggeration and cyber bullying.	Security, authenticity	-
37	False information.	Authenticity	-
38	Hacking, ethical issues, privacy and security, unproductive behaviour and a lack of trust.	Security	-
39	Loss of jobs.	Security	-
40	Hacking, bullying and wrong information.	Security	-
42	Sometimes, *SM* platforms might not be able to contain big videos or have limited space. People in remote areas might have limited access to the Internet. The risk of security of information of people might be compromised.	Personal capability, social media	-
43	Privacy, confidentiality and security understanding. The individual's propensity to using SM.	Personal capability	-
45	Advantages: speed, convenience, reliability, adaptability, flexibility. Disadvantages: cost, connectivity issues, cyber terrorism, infringement on privacy, hacking.	IT	-
46	Technology dependency: social skills impacted, health.	IT assets, personal capability	-
47	Presentation of information, cost of accessing SM, security issues when using SM.	Accessibility, lack of control	-
48	Bad Internet connectivity, load shedding, facilitator not sure who really pays attention in meetings.	Accessibility, lack of control	-
49	Limited IT skills of the knowledge provider and knowledge receiver, language barriers, organisational policies, a lack of interest in the type of SM, content is usually not regarded as formal knowledge.	Social media, organisational science, content	-
51	Connectivity issues, costs, device settings, a lack of control.	Accessibility, lack of control	-

SM, social media; KT, knowledge transfer; IT, information technology; SQ, survey questions.

illustrated that the majority of the panellists were categorised into the age range 18 to 24 (3, 39%), 25 to 34 (7, 23%), 35 to 44 (7, 23%), 45 to 54 (10, 32%) and 55 to 64 (5, 16%), while there was no one over 66 years in Round 2. In Round 2, the majority of participants reflected one (3%) professor and six (19%) participants with a PhD, 15 (48%) with a Master's, six (19%) with a Bachelor's and two (6%) with a Diploma qualification, while one (3%) participant indicated they have a certificate. The data collection instrument, SPSS, used Cronbach's alpha coefficient for evaluation (Cronbach 1951). The instrument was deemed reliable owing to Cronbach's alpha at 0.774.

RQ1: What are the factors influencing KT using SM in an Innovative Business Environment (IBE)?

RSQ 1.1: What are the factors that could facilitate effective *KT* using SM in an integrated business environment?

Survey Question 1.3: Rank from 1 up to 4, in order of significance: [a] Individual capabilities, self-efficacy, etc., as factors influencing KT using SM, where 1 = extremely significant impact; 2 = very high impact; 3 = significant impact; 4 = somehow average impact.

For SQ 1.3, participants' responses ranking individual capabilities, self-efficacy, etc., as factors influencing KT using SM, were as follows: for 1 = extremely significant impact, a frequency of 18 (frequency meaning 18 participants selected this option); 2 = very high impact, a frequency of 4; 3 = significant impact, a frequency of 4; and 4 = somehow average impact, a frequency of 3.

Table 4 shows the statistics of participants ranking in order of significance: [a] individual capabilities and self-efficacy, among others, as factors influencing KT using SM.

Using MS Excel, the statistical analysis results presented in Table 4 show that the overall SD (SD = 1.8) is smaller than the mean of 2.8. This indicated that there was agreement among the participants on individual factors influencing effective KT using SM. The SD is also closer to 1 (perfect agreement). Overall, there was agreement in terms of the participants' responses owing to the SD (SD = 1.8), which is smaller than the mean of 2.8.

Finding: People are one of the most important factors influencing the use of SM in KT.

Survey Question 1.4: Rank from 1 up to 4, in order of significance: [b] organisational ability to choose the correct platform for specific tasks, KM and transfer measurement, aligning goals to strategy, policies and ethics, etc., as factors influencing KT using SM, where 1 = extremely significant impact; 2 = very high impact; 3 = significant impact; 4 = somehow average impact.

For SQ 1.4, participants' ranking and frequency in terms of organisational factors influencing effective KT using SM are as follows: where 1 = extremely significant impact, a frequency of 9; 2 = very high impact, a frequency of 11; 3 = significant impact, a frequency of 4; 4 = somehow average impact, a frequency of 2. Table 5 shows the statistics of the analysis of participants' ranking of the frequency in terms of organisational factors influencing effective KT using SM.

TABLE 4: Statistical results ranking participants' responses.

Statistics	Results
Mean	2.75
SE	0.946484724
Median	3.5
SD	1.892969449
Sample variance	3.583333333
Range	4
Minimum	0
Maximum	4
Sum	11
Count	4

SD, standard deviation; SE, standard error.

TABLE 5: Statistics of organisational factors influencing effective knowledge transfer using social media.

Statistics	Results related to organisational factors influencing effective KT using SM
Mean	6.666666667
SE	2.603416559
Median	7
SD	4.509249753
Sample variance	20.33333333
Range	9
Minimum	2
Maximum	11
Sum	20
Count	3

SM, social media; KT, knowledge transfer; SD, standard deviation; SE, standard error.

The results presented in Table 5 show that overall, the SD of 4.5 is smaller than the mean of 6.7. This indicates that there was agreement among the participants on their contribution of organisational factors influencing effective KT using SM. Organisational ability to choose the correct platform for specific tasks, knowledge maintenance and transfer measurement, aligning goals to strategy and policies, among others, facilitate KT when using SM.

Survey Question 1.5: Rank from 1 up to 4, in order of significance: [c] environmental factors influencing KT using SM, where 1 = extremely significant impact; 2 = very high impact; 3 = significant impact; 4 = somehow average impact.

For SQ 1.5, participants' responses on environmental factors influencing KT using SM were as follows: 1 = extremely significant impact, a frequency of 9; 2 = very high impact, a frequency of 11; 3 = significant impact, a frequency of 7 and 4 = somehow average impact, a frequency of 2. Table 6 illustrates the statistical results for SQ 1.5.

The results in Table 6 show that overall, the SD of 4.5 is smaller than the mean of 6.7. This indicates that there was agreement among the participants' contributions on environmental factors influencing effective KT using SM.

The environmental factors influencing effective KT when using SM pose a significant, very important to extremely important impact.

Survey Question 1.6: Rank from 1 up to 4, in order of significance: [d] security factors influencing KT using SM, where 1 = extremely significant impact; 2 = very high impact; 3 = significant impact; 4 = somehow average impact.

For SQ 1.6, responses from participants on security factors influencing effective KT using SM indicate the following: 1 = extremely significant impact, a frequency of 17; 2 = very high impact, a frequency of 5; 3 = significant impact, a frequency of 4 and 4 = somehow average impact, a frequency of 3. The statistical analysis shows that the overall SD of 1 is smaller than the mean of 4. This indicates that there was perfect agreement of participants' contributions on security factors influencing effective KT using SM. The SD is also equal to 1 (perfect agreement). This question was not taken into the third round of the Delphi technique because of the consensus among participants on factors influencing effective KT using SM.

Finding: IT security is one of the factors that has an extremely significant impact on effective KT using SM.

RSQ 1.2: What are the challenges that could influence effective *KT* using SM in an integrated business environment?

The challenges were ranked at (1) individual, (2) organisational and (3) environmental levels.

Survey Question 1.2.1: Rank from 1 to 3 challenges of KT using SM in terms of: (a) Individual sources e.g., source credibility, perception on easy of technology use or usefulness, attitudes, self-efficacy. (2 = a very high impact and need attention, a frequency of 12; 3 = an average impact and need less attention, a frequency of 7.)

For SQ 1.2.1, participants' responses, ranking challenges of KT using SM at (a) individual level, indicate the following: 1 = the most extreme impact and need urgent attention, a frequency of 18; 2 = a very high impact and need attention, a frequency of 12; 3 = an average impact and need less attention, a frequency of 7. The participants' frequency of responses to SQ 1.2 is shown in Table 7 (descriptive analysis).

The results in Table 7 indicate panellists' consensus that challenges related to individual sources range from posing a very high impact and need attention to posing the most extreme impact and need urgent attention. There was agreement on participants' ranking of individual challenges influencing effective KT using SM, as the SD is 3.5, which is smaller than the mean of 9.5.

Survey Question 1.2.2: Rank from 1 to 3 challenges to KT using SM in terms of: (b) Organisational factors e.g., leadership, tasks, IT, KT measurement, security systems, objectives, processes, culture and trust.

TABLE 6: Statistical results on environmental factors influencing effective knowledge transfer using social media.

Statistics	Results related to environmental factors influencing effective KT using SM
Mean	6.666666667
SE	2.603416559
Median	7
SD	4.509249753
Sample variance	20.33333333
Range	9
Minimum	2
Maximum	11
Sum	20
Count	3

KT, knowledge transfer; SM, social media; SD, standard deviation; SE, standard error.

TABLE 7: Statistical results of individual challenges influencing effective knowledge transfer using social media.

Statistics	Results on individual challenges
Mean	9.5
SE	2.5
Median	9.5
SD	3.535533906
Sample variance	12.5
Range	5
Minimum	7
Maximum	12
Sum	19
Count	2

SD, standard deviation; SE, standard error.

For SQ 1.2.2, participants' responses ranking challenges of KT using SM at (b) organisational level, indicate: 1 = pose the most extreme impact and need urgent attention, a frequency of 15; 2 = pose a very high impact needing urgent attention, a frequency of 13; and 3 = pose an average impact and need less attention, a frequency of 2. The results indicate participants' feedback as showing a concordance that organisational challenges pose a very high impact, needing attention. Very high impact is owing to the mean of 7.5, with the median being 7.5.

Survey question 1.2.3: Rank from 1 up to 3 the environmental challenges to KT using SM in terms of: (c) effectiveness and efficiency: environmental factors, e.g. IT, economic, social, cultural, political advancement.

For SQ 1.2.3, participants' responses ranking challenges of KT using SM in terms of the (c) effectiveness and efficiency of environmental factors, indicate the following: 1 = pose the most extreme impact and need urgent attention, a frequency of 9; 2 = pose a very high impact and need attention, a frequency of 13; and 3 = pose an average impact and need less attention, a frequency of 7.

Statistical analysis represent that participants strongly agree environmental challenges have a significant impact, requiring attention (mean = 10, median = 10, SD = 4.24, range 13.1 and 7). In relation to KT using SM, challenges posing a very high impact and needing the most urgent attention stem firstly from the environment, followed by organisational factors, and lastly from people.

Discussions and conclusion

The use of socio-technical theory in business research

This research delved into the multifaceted realm of KT using SM, unravelling the intricate interplay of people, processes, tasks and the broader organisational-social-technical-cultural and environmental factors. From an interdisciplinary perspective, this study drew upon the STT, amalgamating elements from psychology, organisational behaviour, and technology studies to comprehend the complexities of KT dynamics.

People and tasks in business

Socio-technical theory underscores the pivotal roles of individuals and tasks in business operations. Traditionally, tasks were narrowly defined, mirroring an older paradigm where humans were considered mere extensions of machines. However, the new paradigm recognises humans as valuable resources (Bostrome & Heinen 1977; Zijlstra, Alblas & Langerak 2024), emphasising self-regulation, diversified skill sets and internal control mechanisms. Within organisations, the involvement of people, especially system designers, is crucial. Their role extends beyond mere information processing; they actively influence social-technical processes, shaping the KT landscape (Timiyo & Foli 2023).

Technology in knowledge transfer

Technology acts as a linchpin in contemporary KT efforts. Information systems, a quintessential example, embody the integration of hardware, software and human elements. For instance, cross-generational KT is facilitated by interlinks, similarity, and knowledge codification, similar to downward knowledge transfer. Technology in the form of media richness also influences KT (Daft & Lengel 1986). Additionally, accumulated experiences generate new knowledge that enhances the performance of older generations (Zijlstra et al. 2024). Social media, as a subset of technology, facilitates knowledge creation, acquisition, sharing and application. Without technology, the intricate processes of knowledge dissemination, sharing and innovation become cumbersome, hindering organisational growth and adaptability.

Social systems and collaboration

Social systems within organisations emphasise relationships, communication and collaborative endeavours. Socially interactive processes, trust among employees, and reciprocal relationships form the bedrock of effective KT. Collaborative platforms, exemplified by SM tools such as Facebook, foster cooperative learning, interactive content promotion and shared knowledge creation. These social interactions are integral components of modern KT methodologies, bridging the gap between technological advancements and human interactions. Individual motivation, management support and technology also influence knowledge sharing practices within organisations (Liwang 2024). Knowledge transfer issues, such as board members' actions impacting stock prices and information leakage, influence KT willingness. Predicting message diffusion in social networks risks knowledge leakage and cyber-attacks, necessitating effective KM strategies to mitigate the risks (Timiyo & Foli 2023).

Organisational structures and agents

In reference to organisational structure and agents (Li et al. 2023), a firm's size is a significant factor in determining organisational behaviour, and business size generally has a favourable impact on organisational activity. Organisational structures, depicted through roles, groups and interconnections, illustrate the complex network within which KT unfolds. This multilevel structure, realised through agents fulfilling roles, influences the flow of knowledge. Clear roles and effective group dynamics facilitate seamless knowledge dissemination. Modern organisational charts, informed by interdisciplinary insights, reflect not only hierarchical structures but also the intricate web of relationships and information flow. Knowledge management processes enhance and support innovation in organisations (Areed, Salloum & Shaalan 2020).

Moreover, decentralised structures play an important role in facilitating collaboration and knowledge sharing, which, in turn, improves organisational performance and innovation (Liwang 2024; Singh et al. 2024).

In conclusion, the amalgamation of social, technical and organisational aspects, guided by the STT framework and interdisciplinary perspectives, provides a holistic understanding of KT through SM. People, organisational efficiency, social connections and technical advancements collectively shape the challenges and opportunities in KT.

Limitations and future research

The data analysis conducted using the Delphi technique represents the perspectives of the participants involved, providing valuable insights. However, it is important to note that these insights may not cover the entire spectrum of expertise across all domains. In the context of Southern African states, embracing and leveraging the Fourth Industrial Revolution is crucial. This technological revolution can serve as a catalyst, driving productivity and improving societal well-being.

Future research endeavours should prioritise the adoption, adaptation, implementation and evaluation of SM and KT strategies. However, it is equally vital to acknowledge and address the challenges associated with these implementations. To tackle these challenges effectively, established theories such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) can be instrumental. Technology Acceptance Model also elucidates that the actual usage of technology is contingent upon the intention to use it.

This intention, in turn, is influenced by one's attitude towards technology, determined by the Perceived Ease of Use of Technology and the Perceived Usefulness of Technology. These factors interconnect, shaping the users' approach toward technology utilisation. On the other hand, UTAUT provides a comprehensive framework to understand users' acceptance and usage behaviour concerning technology. It encompasses key factors such as performance expectancy, reflecting how users perceive technology's ability to enhance performance and productivity, effort expectancy, social influence and facilitating conditions.

By applying these theories in the context of SM and KT, challenges can be systematically addressed, paving the way for effective implementation and utilisation of technology, fostering progress and innovation.

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Competing interests

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Authors' contributions

F.N.: Conceptualisation, methodology, data analysis, writing – original draft. M.T-D.: Writing – review and editing. A.D.H.: Supervision, validation.

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Data availability

The data that support the findings of this study are available from the corresponding author, F.N., upon reasonable request.

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