


# Measuring knowledge sharing behaviour among software development teams

**Author:**Lucas T. Khoza<sup>1</sup> **Affiliation:**<sup>1</sup>Department of Applied Information Systems, University of Johannesburg, Johannesburg, South Africa**Corresponding author:**Lucas Khoza,  
lucask@uj.ac.za**Dates:**

Received: 25 Jan. 2019

Accepted: 07 June 2019

Published: 26 Sept. 2019

**How to cite this article:**Khoza, L.T., 2019, 'Measuring knowledge sharing behaviour among software development teams', *South African Journal of Information Management* 21(1), a1076. <https://doi.org/10.4102/sajim.v21i1.1076>**Copyright:**© 2019. The Authors.  
Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

**Background:** Knowledge is a crucial asset for organisations to gain sustainable competitive advantage. Software development organisations are trying their best to promote teamwork in projects to improve information technology (IT) project success. Team members working in the same projects interact more often to share the progress of their assigned tasks and to share their expertise and experiences for them to deliver the projects successfully within the triple constraints of time, scope and cost.

**Objectives:** This study was undertaken to explore the measuring of knowledge sharing behaviour among software development teams. The study is therefore aimed at measuring the intentions of software development teams in knowledge sharing and how that can affect the success of IT projects.

**Method:** Four software development organisations in South Africa participated successfully in this research study. This is a quantitative research study with a response rate of 53%. Expert sampling was used to get rich data from experts in the field of IT. Data were collected using an online questionnaire.

**Results:** Results have revealed that employee attitudes are the main drivers of knowledge sharing behaviour and employees are not willing to share their knowledge if they are not compensated to do so. It was revealed that knowledge capture is not significant at all and these findings were contradicting with the current literature and further research is required.

**Conclusion:** For organisations to be competitive, it is crucial for them to manage their knowledge effectively. Software development organisations are trying their best to promote teamwork in projects in order to improve IT project success. Project managers can focus on creating reward systems to motivate their project teams to share knowledge.

**Keywords:** Knowledge sharing behaviour; software development; expert sampling; knowledge management processes; intrinsically motivation.

## Introduction

Knowledge sharing (KS) helps employees and teams to improve information technology (IT) project success and create new ways of working, 'creation of new knowledge', and thus improves the success of software development projects (Khoza & Pretorius 2017:3; Yu et al. 2013:780). Knowledge can be shared internally among teams and externally among different organisational units or industries (Yu et al. 2013:782). Knowledge sharing leads to organisational learning; hence, where KS is not promoted, no organisational learning takes place and that organisation will suffer its position in the market (Mueller 2014:191). To safeguard incentive sharing relationships between organisations and employees within software development organisations, the management of knowledge is critical, of which KS is a part. Hence, it has become an important element in knowledge management (KM) and for sustaining organisation's competitive advantage – not only to sustain competitive advantage but also to leverage the organisation's valuable assets (Razak et al. 2016). It can be difficult to make use of the employee's capabilities, skills and expertise if knowledge is not shared among project team members and it will also be difficult to retain critical knowledge in the organisation during staff turnover (Razak et al. 2016; Zhang, De Pablos & Zhou 2013:307). This article is structured as follows: the problem statement will be discussed next, followed by the literature review, the research design and methodology, research results and, lastly, conclusions and future research.

## Problem investigated

According to the theory of reasoned action (TRA), an employee's intention to KS is determined by his or her attitudes and subjective norms (Razak et al. 2016). These two will lead to KS

**Read online:**

Scan this QR code with your smart phone or mobile device to read online.

behaviour. Information technology projects are not adding value to the organisational strategies because of their high failure rates (Marnewick & Langerman 2018). Literature has revealed that IT projects are failing as a result of employees' unwillingness to share their knowledge unless they are motivated and rewarded to do so (Khoza & Pretorius 2017:8). It is reasoned: why should they just share their brain critical knowledge to benefit software development organisations if they are not compensated to do so? (Khoza & Pretorius 2017:8; Mueller 2014:198). Some employees believe that they are hired to work and be productive as individuals and not to share knowledge as it is considered not to be part of their job responsibilities. While epistemological, technical and motivational factors influencing KS, cultures of KS and organisational dimensions of KS have received much attention in the scholarly literature, less is known about the KS behaviour of employees and how to measure such behaviour (Boer, Berends & Van Baalen 2011:86–87). This study will therefore focus on this gap that exists in the body of knowledge.

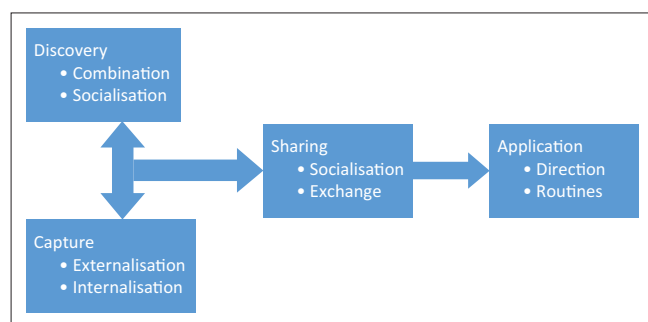
## Literature review

Knowledge management is the capability of controlling information and resources to get the best out of the knowledge resources (Becerra-Fernandez & Sabherwal 2014). Organisational competitiveness is embedded in the agility of knowledge that is realised through knowledge sharing and transfer (Yu et al. 2013:780). Hence, KS is of utmost importance for gaining competitive advantage. It is the building block of sustaining knowledge within the organisations. In order for knowledge to be sustained in organisations, it must go through all KM processes (Becerra-Fernandez & Sabherwal 2014). Figure 1 illustrates four KM processes that are critical in software development organisations to sustain competitive advantage.

### Description of knowledge management processes

Description of knowledge management processes as described by Becerra-Fernandez and Sabherwal (2014):

- **Knowledge discovery:** The production of knowledge from past experiences and skills to produce new knowledge (tacit or explicit).



Source: Becerra-Fernandez, I. & Sabherwal, R., 2014, *Knowledge management: Systems and processes*, Routledge, New York

FIGURE 1: Knowledge management processes.

- **Knowledge sharing:** The new knowledge created or discovered is now communicated among employees for different purposes such as to retaining knowledge during staff turnover.
- **Knowledge capture:** This has to do with the capturing, the storing of the knowledge within individuals as well as artefacts that are collected into the organisation's systems.
- **Knowledge application:** Directly related to the performance of the organisation as it depends on the availability of knowledge and the discovering, capturing and sharing processes.

The rise of KM as an important component for long-term survival of software development organisations has created the need to manage and control the KM efforts in software development organisations. Knowledge management involves choosing organisational structures (Pemsel & Müller 2012:865) and KS mechanisms (Khoza & Pretorius 2017:3–4). These organisational structures and mechanisms can influence the entire KM processes, which include discovering, capturing, sharing and the application of knowledge (Becerra-Fernandez & Sabherwal 2014). Software development organisations are trying their best to promote teamwork in projects to improve IT project success (Khoza & Pretorius 2017:2–3, 7). Teamworks in projects are initiatives to foster organisational learning through KS. Work activities in organisations are organised around projects, and therefore, teamwork promotes organisation wide learning and enables organisations to understand the value within employees (Estrada, Faems & De Faria 2016:61; Khoza & Pretorius 2016). There are several factors affecting the effectiveness of KS among teams such as time, organisational structure, resistance to change, output orientation and reward systems. For organisations to be successful in today's competitive environment, it becomes very critical to address the factors affecting KS (Estrada et al. 2016:63; Khoza & Pretorius 2016; Khoza & Pretorius 2017:5).

### Organisational culture as the basis for knowledge sharing

Team members working in the same projects interact more often to share the progress of their given work tasks and to share their expertise and experiences for them to deliver projects successfully within the triple constraints of time, scope and cost (Mueller 2014:191). Organisational culture plays a major role in the effective KS and organisational learning. These organisational cultures that can enable or affect effective KS are shared leadership, structure of the organisation, time to share the knowledge, employee orientation, output orientation, team orientation, growth and size orientation, learning orientation and willingness to share (Becerra-Fernandez & Sabherwal 2014; Mueller 2014:191). Knowledge sharing is considered to be the basis of organisational learning, innovation, advancement in new knowledge, skills and capabilities, and increase in productivity and above all it enables organisations to be sustained in competitive advantage. Knowledge sharing can

be among different organisational units, departments, groups and also project teams (Khoza & Pretorius 2017:3). Software development organisations can also learn from the experiences of project team members and lessons learnt on projects. Organisational culture determines the success or the failure of the organisations and their projects (Mueller 2014:190,193).

### Formal knowledge protection mechanisms

Employees in software development organisations often argue that KS activities are not part of the job description and therefore because of work overload, resources are not allocated for KS (Lin, Wu & Lu 2012:751–752; Zhang et al. 2013:307). However, KS requires time to find resources to retrieve the necessary knowledge (Becerra-Fernandez & Sabherwal 2014) and integrate the new knowledge into the project team's knowledge base (Mueller 2014:192). Self-developed items contributing or facilitating easier KS are shared leadership time, structure of the team, growth orientation, learning orientation, employee orientation, openness and output orientation (Mueller 2014:198). There is high interest in software development organisations towards embedded knowledge, but the big question is why employees are so reluctant to share what they know as they do not lose anything in the process of KS (Lin et al. 2012:751).

Software development organisations should focus on controlling and managing scarce skills through KS processes in order to sustain competitive advantage. Critical knowledge must be protected and boundaries must be created to define what knowledge can be shared and what knowledge cannot be shared. When both internal KS mechanisms and formal knowledge protection mechanisms are present, competitor collaboration positively impacts organisation's innovation performance (Estrada et al. 2016:57; Razak et al. 2016). The critical issue in KM is how to encourage employees to share knowledge as it is believed that it is not part of their duties; hence, they need to be encouraged to do so through some reward systems. Project team members find it difficult to share their knowledge if not motivated to do so (Khoza & Pretorius 2017:8; Zhang et al. 2013:307).

In order for software development organisations to achieve competitive advantage, goals and objectives in the market place and growth in business, it is vital for KS to be encouraged and proper reward systems to be put in place (Mueller 2014:198). The more employees share their knowledge, the more synergistic value will be created. Project team members treat owned skills, capabilities and expertise as valuable and significant resources of self-competitiveness not organisational competitiveness (Lin et al. 2012:751; Pee & Lee 2015:4–5). Khoza and Pretorius (2017:3–4) have argued that some project team members in software development organisations are reluctant to share their knowledge because of trust, and they find it difficult to share what they know with people they do not trust.

### Intrinsically motivation of employees to knowledge sharing

Intrinsic motivation is critical to promote employees to share knowledge in a consistent and effective way. The sharing of knowledge in software development organisations creates opportunities for organisational learning. It allows employees to create new useful knowledge beneficial to the organisation in reducing costs of productions and increasing the performance of organisations (Lin et al. 2012:754; Pee & Lee 2015:679). Because of the fact that most employees spend more time on the Internet, online KS facilitates efficient flow and distribution of knowledge among project team members. Online KS has its own challenges, such as cost of codifying knowledge, lack of personal benefits, lack of trust and fear of losing own knowledge (Pee & Lee 2015:679). Intrinsic motivation is within an individual, it is self-motivated and it emphasises inherent enjoyment and stimulated when performing activities and easily engaging in KS. There are certain factors such as job design contributing to intrinsic motivation (Pee & Lee 2015:680).

Knowledge sharing is a key process in creating new products and services, in leveraging organisational knowledge assets and in achieving collective goals and objectives. However, research on KS also revealed its complex nature and a multitude of factors hindering KS among project team members (Khoza & Pretorius 2017:5). Because of the fact that people own their knowledge, they have therefore developed a tendency of 'I share with you and you must share with me your knowledge'. All tacit knowledge is difficult to be shared among software development teams as it is perceived to be owned by a person not an organisation. It is therefore of utmost importance to ensure that all key knowledge is converted to explicit knowledge so that organisations can gain competitive advantage (Becerra-Fernandez & Sabherwal 2014). The more knowledge is perceived to belong to the organisation, the more employees will be willing to share their knowledge with others (Boer et al. 2011:86; Becerra-Fernandez & Sabherwal 2014).

New knowledge is integrated and shared with the right people and using right mechanisms enables knowledge to be reused in future as once the knowledge is created, it is captured in organisational systems for future usage (Becerra-Fernandez & Sabherwal 2014). Both formal and informal KS mechanisms contribute to KS behaviour (Pemsel & Müller 2012:865; Razak et al. 2016). Formal KS mechanisms include chat rooms, team networking, wikis, emails, video conferencing, deployment of information systems, reward systems, decision rights, etc., while informal mechanisms are comprised of organisational culture, networking, organisational structure and communities of practice (Khoza & Pretorius 2016; Pemsel & Müller 2012:865).

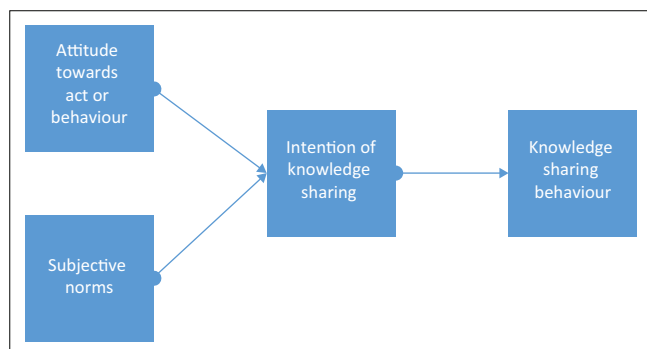
Encouraging continuous KS can help software development organisations to have a greater probability of retaining employees who are willing to contribute their knowledge (Hashim & Tan 2015:145). Knowledge sharing helps software

development organisations to maintain competitive advantage (Khoza & Pretorius 2017:1). It is crucial to examine the mediating role of trust and commitment to help extend the current understanding of continuous KS determinants beyond the influence of satisfaction. Trust plays a vital role in the KS process as some employees believe that it is difficult to share their knowledge with people they do not trust. Inspiring and motivating employees to participate in KS at organisations and to find ways of motivating employees to KS behaviour needs attention among researchers (Hashim & Tan 2015:146). Knowledge sharing is very important in retaining knowledge among project team members and rewards are drivers that enable employees to share their knowledge (Razak et al. 2016).

### The drivers behind knowledge sharing behaviour: Elements of theory of reasoned action

Employees' attitudes and behaviours determine their KS and the willingness to share knowledge (Razak et al. 2016). Knowledge sharing as part of the KM process, as depicted in Figure 1, is the ultimate goal of the theory of reasoning action. The success of KS process is determined by an employee's attitudes. Motivation in terms of rewards leads to proper KS behaviour. Tacit knowledge is the kind of knowledge that is shared or understood by people or groups who are either unwilling or unable to express it explicitly without a proper motivation (Khoza & Pretorius 2017:2; Zhang et al. 2013:356). The TRA is a social psychology model, which discusses the relationships between attitudes and behaviours within human action. This theory can be used to determine the intention of employees' behaviour in a software development organisation in order to determine the intentions of employees not willing to share critical knowledge that can help the entire team deliver projects successfully. The intention of an individual to perform a behaviour influenced by positive attitude and social norms is the degree to which an individual perceives how others approve the individual's participation in a specific behaviour (Razak et al. 2016). Figure 2 represents the dimension of the TRA.

Knowledge sharing is a way of managing knowledge within an organisation, with the aim of providing knowledge where



Source: Razak, N.A., Pangil, F., Zin, M.L.M., Yunus, N.A.M. & Asnawi, N.H., 2016, 'Theories of knowledge sharing behavior in business strategy', *Procedia Economics and Finance* 37, 545–553. [https://doi.org/10.1016/S2212-5671\(16\)30163-0](https://doi.org/10.1016/S2212-5671(16)30163-0)

FIGURE 2: Theory of reasoning action.

it is needed in delivering projects successfully, thus contributing towards the achievement of sustainable competitive advantage. Knowledge sharing plays an important role in creating new ideas and is considered one of the most important KM processes (Becerra-Fernandez & Sabherwal 2014). The sharing of both tacit and explicit knowledge contributes in various degrees to increase the capacity of software development organisations. Software development organisations often organise their employees into teams as a way of allowing them to work together and share their knowledge (Oliveira et al. 2015:133).

## Research design and methodology

This research study seeks to discover currently existing KS behaviour and to uncover new findings. As the study is purposed to measure the intentions of software development teams in KS and how that can affect the success of IT projects, a quantitative approach is more suitable and positivism paradigm was followed. Descriptive research strategy is quantitative in nature and uses questionnaires, interviews and observation (Maxine & Peter 2010). The population in this research study is composed of targeted employees from selected software development organisations. In this study, expert sampling as a subcategory of purposive sampling was used, as the researcher seeks information, views and opinions from specialists in the field of IT, especially employees involved in IT projects. With this kind of sampling method, relevant data from specialists or experienced participants were gathered quickly and easily, because only targeted participants with the information required participated in the study. The researcher is of the opinion that this sampling method is more appropriate to get the targeted IT experts in software development projects. The other reason for using this sampling method is the availability of organisations willing to assist in providing information needed for the success of this research study. The organisations selected to partake in providing data have been nominated based on their readiness to participate and the knowledge they have when it comes to software development. These organisations are also listed on the Johannesburg Stock Exchange (JSE). The online questionnaires were distributed to 270 employees from four software development organisations. Out of 270 employees who received the online questionnaires, only 218 (80.7%) employees had the potential to participate in the questionnaires, having more than 1 year of experience. The remaining 52 (19.3%) were not eligible to participate. About 117 (53%) of the employees participated successfully in this study. Data were collected using online questionnaires. After data collection, the data were scrutinised using the IBM Statistical Package for Social Science (SPSS) version 20.

## Ethical consideration

The author declares that this work has been ethically evaluated and people who participated in this research have the right to privacy, confidentiality and anonymity.

## Research results

### Knowledge sharing processes as drivers shaping knowledge sharing behaviour

Descriptive statistics were generated to summarise the data, that is, frequencies and proportions (%) are reported for all categorical data. A *p*-value helps in determining the significance of the research result. The *p*-value is a number between 0 and 1 and the cut-off is 0.05. A *p*-value above the cut-off point (0.05) is considered not to be significantly associated (Frost 2014). Pearson's chi-squared test was used to test for association between any pair of categorical variables. Interpretation was performed at a 0.05 error rate. Coefficients marked with an asterisk (\*) indicate significant results at the 0.05 level. The four KM processes also shape the KS behaviour. Table 1 illustrates the KM processes, the *p*-value and their significance. Knowledge discovery is found to be more significant, while knowledge capture is not significant at all. The results do not confirm the study of Becerra-Fernandez and Sabherwal (2014) as they argue that all KS processes are significant in shaping KS behaviour. The KM processes are all important for organisations to sustain their competitive advantage.

**TABLE 1:** Test for association: How much significance does each process contribute towards knowledge sharing behaviour?

Variable	Knowledge sharing processes	<i>p</i> -value	Significance
V1	Knowledge discovery	0.003	***
V2	Knowledge capture	0.001	n.s.
V3	Knowledge sharing	0.008	**
V4	Knowledge application	0.002	*

Note: Significance of knowledge sharing processes towards knowledge sharing behaviour. V, variable; n.s., not significant.

\*, Less significant; \*\*, significant; \*\*\*, more significant.

### Factors shaping knowledge sharing behaviour

Many factors within software development organisations shape the willingness and unwillingness of project team members to share knowledge. The top five factors that shape the KS behaviour are openness (53%), structure of the team (52%), trust among team members (43%), team orientation (40%) and time (29%). The way a team is structured, the time given to employees to share knowledge and other factors shaping knowledge behaviour are all influenced by the structure and the culture of the organisation. These findings and conclusions are confirmed by Becerra-Fernandez and Sabherwal (2014), Mueller (2014:192) and Pemsel and Müller (2012:865), where they argue that organisational culture and structure shape individuals' KS behaviour. Figure 3 illustrates the factors shaping KS behaviour.

### Mechanisms for knowledge sharing

Different mechanisms can be used to share knowledge in software development organisations. These mechanisms enable knowledge to be shared from one individual to another. It is clear that most organisations very frequently

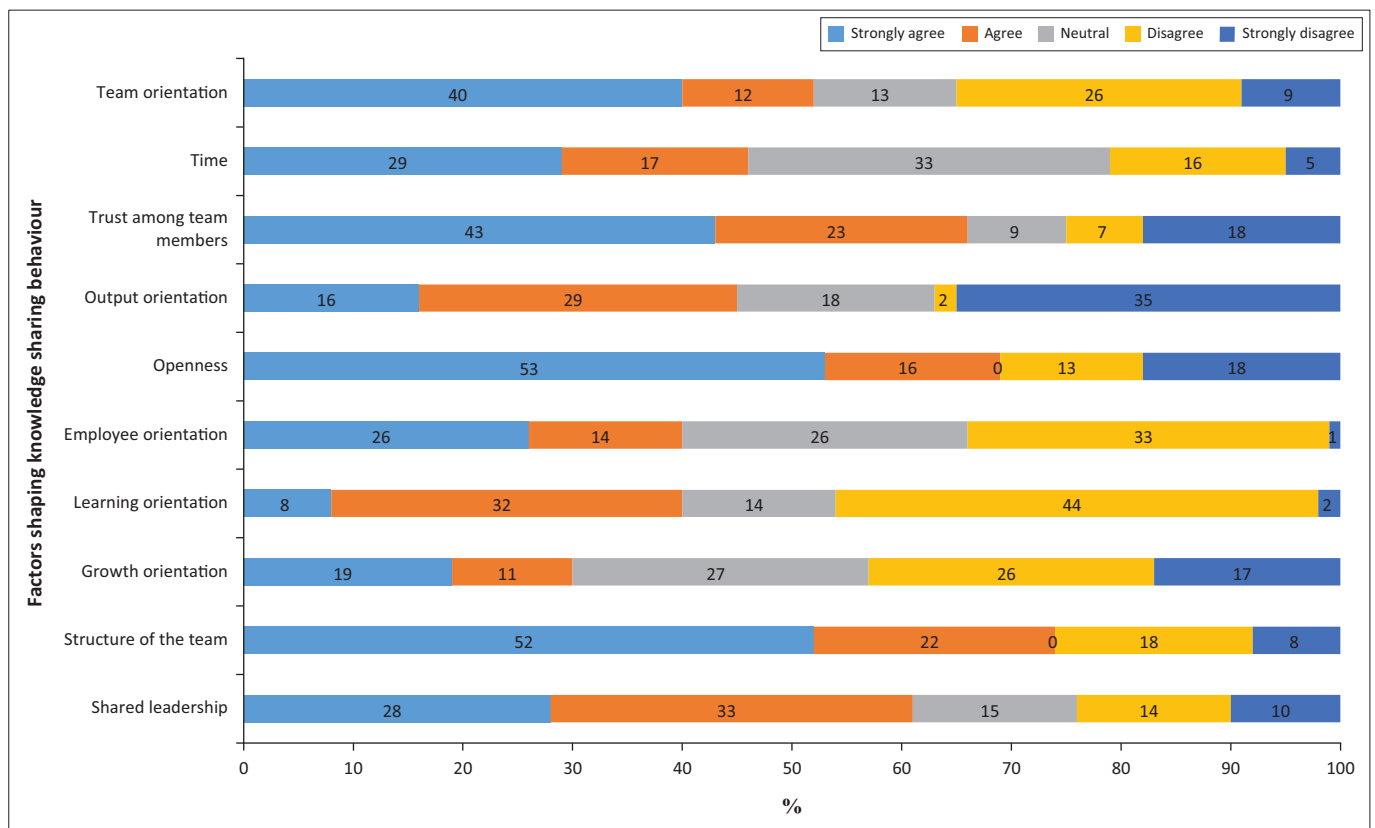
**TABLE 2:** Test for association: How much significance is each factor contributing towards knowledge sharing behaviour?

Variable	Elements	<i>p</i> -value	Significance
V1	Attitude	0.000	***
V2	Subjective norm	0.001	*
V3	Intention to knowledge sharing	0.008	*

Note: Significations of dimensions of theory reasoning action.

V, variable.

\*, Less significant; \*\*, significant; \*\*\*, more significant.



**FIGURE 3:** Factors shaping knowledge sharing behaviour.

use emails (54%) as a mechanism to share knowledge between team members and across different teams and organisational units. Emails (54%), wikis (39%), chat rooms (7%), team networking (30%) and organisational structure (21%) are the top mechanisms most frequently used in software organisations to share knowledge. Figure 4 illustrates the mechanisms for KS.

### The drivers behind knowledge sharing behaviour: Elements of theory of reasoned action

These are very interesting results on the elements of theory of reasoning action. A  $p$ -value (less than 0.05) of the three elements tested shows strong evidence that these elements determine the KS behaviour of employees. All the elements show that they are significantly associated with the KS behaviour of employees in software development organisations. These results are confirmed by Razak et al. (2016), who opines that attitude ( $p = 0.000$ ) is more significant than other factors. This simply means that attitude is the ultimate driver for employees' behaviour to share knowledge.

### Conclusions and future research study

Knowledge is a crucial asset for organisations to gain sustainable competitive advantage. Software development organisations are trying their best to promote teamwork in

projects in order to improve IT project success. Project managers can focus on creating reward systems to motivate their teams to share knowledge. As employees spend more time on the Internet, it is therefore advisable for managers to encourage online KS mechanisms. It has been revealed that emails are the most frequently used mechanism for KS. Research results have revealed that the way the team is structured, the time given to employees to share knowledge and other factors shaping knowledge behaviour are all influenced by the structure and the culture of the organisation. The organisational culture shapes the attitudes of employees in shaping them in KS behaviour. Top management support is also shaped by the organisational culture as they are the ones who need to introduce rewards systems to motivate employees to share knowledge. The KM processes are all important for organisations to sustain their competitive advantage (Becerra-Fernandez & Sabherwal 2014). Future research studies can focus on getting more understanding and clarity on the link and significance between the four KM processes as the results were not confirmed from the current literature. Knowledge capture was found not to be significant and this was not in line with the findings by Becerra-Fernandez and Sabherwal (2014). Further research should also focus on the contradicting findings. This research was only focused on South African software organisations and only four organisations participated in the study. The results could be biased, and therefore, future research should focus on a variety of organisations across the world and interviews can be facilitated to obtain rich data.

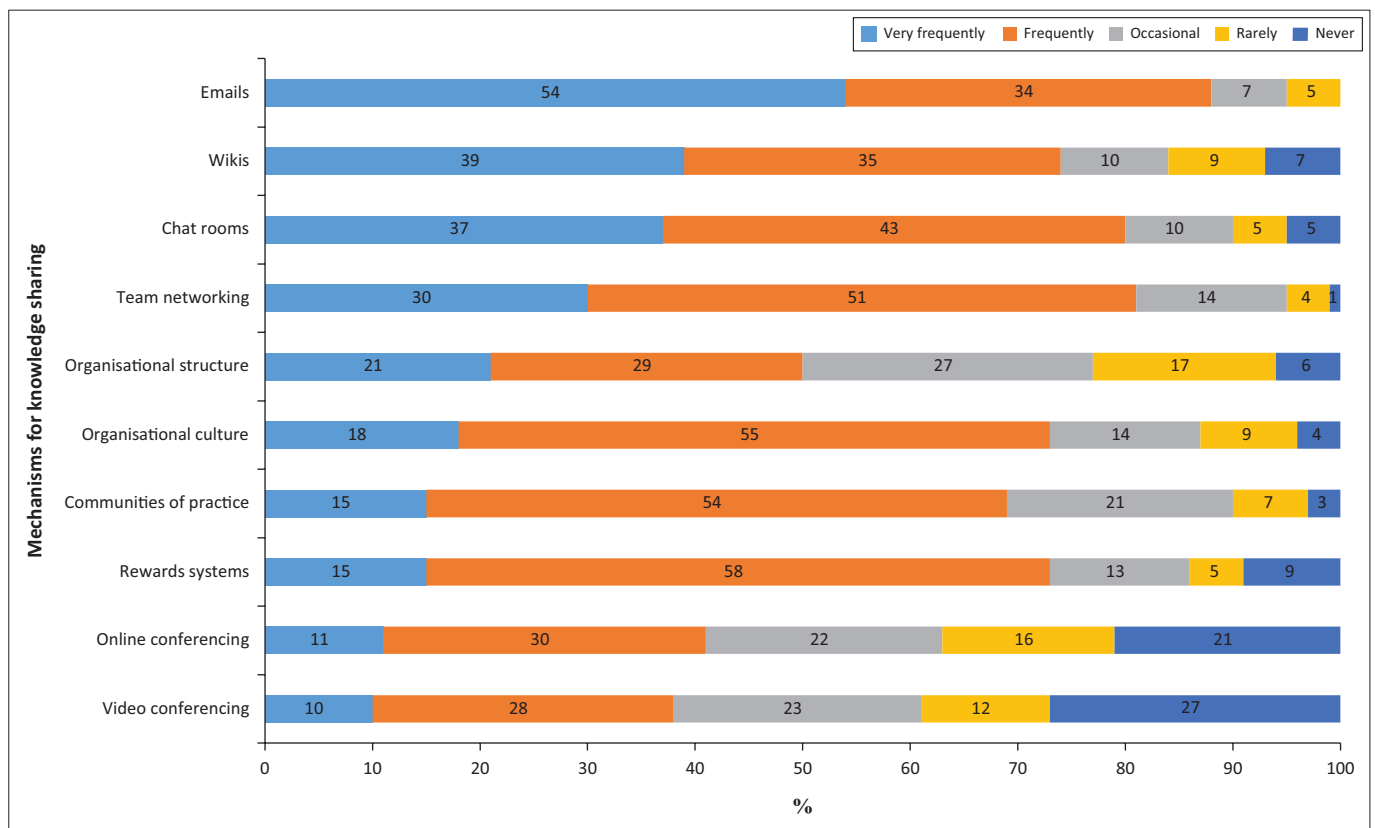


FIGURE 4: Mechanisms for knowledge sharing.

## Acknowledgements

### Competing interests

The author declares that he has no financial or personal relationships that may have inappropriately influenced him in writing this article.

### Author's contributions

I declare that I am the sole author of this research article.

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

### Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

## References

- Becerra-Fernandez, I. & Sabherwal, R., 2014, *Knowledge management: Systems and processes*, Routledge, New York.
- Boer, N.I., Berends, H. & Van Baalen, P., 2011, 'Relational models for knowledge sharing behaviour', *European Management Journal* 29(2), 85–97. <https://doi.org/10.1016/j.emj.2010.10.009>
- Estrada, I., Faems, D. & De Faria, P., 2016, 'Coopetition and product innovation performance: The role of internal knowledge sharing mechanisms and formal knowledge protection mechanisms', *Industrial Marketing Management* 53, 56–65. <https://doi.org/10.1016/j.indmarman.2015.11.013>
- Frost, J., 2014, *How to correctly interpret P values*, viewed 02 December 2015, from <http://blog.minitab.com/blog/adventures-in-statistics/how-to-correctly-interpret-p-values>.
- Hashim, K.F. & Tan, F.B., 2015, 'The mediating role of trust and commitment on members' continuous knowledge sharing intention: A commitment-trust theory perspective', *International Journal of Information Management* 35(2), 145–151. <https://doi.org/10.1016/j.ijinfomgt.2014.11.001>
- Khoza, L.T. & Pretorius, A.B., 2016, 'Knowledge sharing in software development projects', in *International conference on intellectual capital and knowledge management and organisational learning*, p. 143, Academic Conferences International Limited, viewed 22 March 2018, from <https://search.proquest.com/openview/9bbd2937c532941ac029d7ba84bde8e2/1?pq-origsite=gscholar&cbl=1796420>.
- Khoza, L.T. & Pretorius, A.B., 2017, 'Factors negatively influencing knowledge sharing in software development', *South African Journal of Information Management* 19(1), 1–9. <https://doi.org/10.4102/sajim.v19i1.776>
- Lin, T.C., Wu, S. & Lu, C.T., 2012, 'Exploring the affect factors of knowledge sharing behavior: The relations model theory perspective', *Expert Systems with Applications* 39(1), 751–764. <https://doi.org/10.1016/j.eswa.2011.07.068>
- Marnewick, C. & Langerman, J., 2018, 'Agile maturity: The first step to information technology project success', in *Developing organizational maturity for effective project management*, pp. 233–252, IGI Global, viewed 03 November 2018, from <https://www.igi-global.com/chapter/agile-maturity/200210>.
- Maxine, O. & Peter, V., 2010, *Development a healthcare research proposal: An interactive student guide*, New York, Wiley.
- Mueller, J., 2014, 'A specific knowledge culture: Cultural antecedents for knowledge sharing between project teams', *European Management Journal* 32(2), 190–202. <https://doi.org/10.1016/j.emj.2013.05.006>
- Oliveira, M., Curado, C.M., Maçada, A.C. & Nodari, F., 2015, 'Using alternative scales to measure knowledge sharing behavior: Are there any differences?', *Computers in Human Behavior* 44, 132–140. <https://doi.org/10.1016/j.chb.2014.11.042>
- Pee, L.G. & Lee, J., 2015, 'Intrinsically motivating employees' online knowledge sharing: understanding the effects of job design', *International Journal of Information Management* 35(6), 679–690. <https://doi.org/10.1016/j.ijinfomgt.2015.08.002>
- Pemsel, S. & Müller, R., 2012, 'The governance of knowledge in project-based organizations', *International Journal of Project Management* 30(8), 865–876. <https://doi.org/10.1016/j.ijproman.2012.02.002>
- Razak, N.A., Pangil, F., Zin, M.L.M., Yunus, N.A.M. & Asnawi, N.H., 2016, 'Theories of knowledge sharing behavior in business strategy', *Procedia Economics and Finance* 37, 545–553. [https://doi.org/10.1016/S2212-5671\(16\)30163-0](https://doi.org/10.1016/S2212-5671(16)30163-0)
- Yu, Y., Hao, J.X., Dong, X.Y. & Khalifa, M., 2013, 'A multilevel model for effects of social capital and knowledge sharing in knowledge-intensive work teams', *International Journal of Information Management* 33(5), 780–790. <https://doi.org/10.1016/j.ijinfomgt.2013.05.005>
- Zhang, X., De Pablos, P.O. & Zhou, Z., 2013, 'Effect of knowledge sharing visibility on incentive-based relationship in Electronic Knowledge Management Systems: An empirical investigation', *Computers in Human Behavior* 29(2), 307–313. <https://doi.org/10.1016/j.chb.2012.01.029>