Four-dimensional model: A literature review in online organisational knowledge sharing

Abstract

Purpose – Online knowledge sharing is a popular activity worldwide and can be leveraged by organisations to innovate, create and sustain competitive advantage. Although there have been a number of studies examining knowledge sharing to encourage employees to convey their skills and experiences to others in an organisation, few attempts have been made to investigate the key motivators of online knowledge sharing in an organisation. Based on the theory of planned behaviour and technological acceptance model, this study reviews the literature to establish a conceptual framework examining motivators of online knowledge sharing in organisations.

Design/methodology/approach – Previous studies that investigated motivators of online knowledge sharing in organisations in the literature were reviewed to propose a conceptual framework.

Findings – Four-dimensional model, which includes four types of key motivators of online knowledge sharing: individual, social, organisational, and technological was established.

Originality/value – The model serves as a roadmap for future researchers and managers to consider their strategy to enhance online knowledge sharing in organisations.

Keywords – Four-dimensional model · ISTO model · Online knowledge sharing · Organisations · Conceptual framework · Literature review

Paper type Research paper

1 Introduction

In the modern economy, knowledge sharing as a core process of knowledge management has received considerable attention because of its benefits in increasing and sustaining the competitive advantage of an organisation. This may stem from avoiding ‘reinventing the wheel’, reducing redundancy and the cost of innovation and encouraging creativity. Encouraging employees to share knowledge is crucial for an organisation to create a healthy learning climate based on collaboration (Yang, 2007). To do this, providing support, resources,

and a clear mandate is very important (Black and Laflin, 2009). An organisation also needs to consider the major obstacle to knowledge management, which is the propensity of employees to hoard and or only partially share knowledge because of a fear of losing personal competitive advantage. This fear seems to be natural in some ways, especially since “knowledge is power”. Therefore, in order to encourage knowledge sharing among employees, determinants of knowledge sharing need to be identified to assist an organisation in the knowledge management process.

To facilitate knowledge sharing, many organisations, especially multinational corporations and large companies, use online platforms because of their flexibility in transferring knowledge with no restriction of time and space. In 2002, organisations across Fortune 500 firms spent USD\$2.7 billion on online platforms and knowledge management systems (Babcock, 2004). Despite the huge effort and investment in facilitating online knowledge sharing, employees are still reluctant to share knowledge online. Therefore, it is imperative for organisations to understand the key factors that motivate employees to participate in online knowledge sharing.

In the literature, a number of theories have been applied to understand and explain the online knowledge sharing process. The most common theory is the theory of planned behavior because they provide a solid theoretical framework that has been considered the foundational backbone to examine the factors driving knowledge sharing behaviour (Chen, 2011; Chen *et al.*, 2009; Chiu *et al.*, 2006; Hau *et al.*, 2013; Nguyen *et al.*, 2019a). According to the theory of planned behavior, attitude toward online knowledge is the most important determinant of online knowledge sharing intention. In turn, online knowledge sharing intention will determine knowledge sharing behaviour. Attitudes toward online knowledge sharing refer to positive feelings by employees about online knowledge sharing (Hutchings and Michailova, 2004), whereas online knowledge sharing intentions refer to employees’ intention to participate in online knowledge sharing in organisations (Hutchings and Michailova, 2004). Both are crucial determinants of knowledge sharing behaviour. However, in the literature, there is a shortage of research investigating determinants of key variables of the theory of planned behaviour to have a deeper understanding of the model in online knowledge sharing.

The advent of information technology has facilitated new electronic methods of knowledge sharing. These include online platforms such forum, asocial networking or social media platforms. In order to explain and predict the acceptance of information technology in online knowledge sharing by individuals, the technology acceptance model (TAM) should be applied (Makkonen and Siakas, 2019a; Makkonen and Siakas, 2019b). TAM was first introduced by

Davis (1986) and Davis *et al.* (1989) to explain and predict the acceptance of information technology by users. TAM provides a basis for unveiling the influence of external determinants, beliefs, attitude and intentions concerning adoption decisions (Awa *et al.*, 2015; Nguyen *et al.*, 2013). In TAM, behavioural intention to use is the intermediate variable of actual use; therefore, factors influencing behavioural intention to use are also likely to impact on actual use. However, in the literature, there have been few studies examining TAM in online knowledge sharing which clarify the potential mechanisms through which technological factors can influence knowledge sharing. In addition, in the literature, there is a lack of the integration of theory of planned behaviour and TAM in a single study to provide a comprehensive picture of determinants of online knowledge sharing in organisations. Therefore, in response to the growing importance of online knowledge sharing in organisations and issues in this area, this study reviews the literature to ascertain the dominant determinants of online knowledge sharing in an organization based on the theory of planned behaviour and TAM. By doing so, the review establishes a conceptual framework that comprehensively demonstrates factors affecting online knowledge sharing in organisations.

2. Literature review

Knowledge is the most important factor driving innovation in any modern economy (Grant, 1996; Stewart, 1997; Yang and Chen, 2007). The term ‘knowledge sharing’ has become very popular worldwide, it can be seen as a modern management method to help organisations innovate, create and sustain competitive advantage. Recently, advances in information technology has paved the way for an increase in knowledge sharing among employees in organisations (Leonardi *et al.*, 2013). Information technologies enable social interaction among individuals, thus facilitating such online knowledge sharing in organisations. From the employee perspective, they have accessed social networking technologies to communicate or share information with their colleagues and other social contacts. From the organisational perspective, changes in how people interact and communicate enable the utilisation of information technologies when accommodating the needs of a new generation entering the workforce. However, encouraging employees to share knowledge is a challenging task as knowledge is considered power and online knowledge sharing is voluntary. Employees tend to not share knowledge due to a fear of losing personal competitive advantage (Akhavan *et al.*, 2005). Therefore, it is imperative for organisations to find the motivators that encourage employees to share knowledge online.

Online knowledge sharing behaviour is related to the transfer and dissemination of knowledge (De Vries *et al.*, 2006; Lin, 2007c; Van den Hooff *et al.*, 2012). Researchers often pay attention to knowledge sharing in organisations as it turns individual knowledge into organisational knowledge (Suppiah and Sandhu, 2011). Online knowledge sharing is a multi-dimensional activity. By definition, online knowledge sharing involves the supply of and demand for knowledge (Ardichvili *et al.*, 2003). Regarding the knowledge supply, employees often donate their knowledge transferring individual knowledge into organisational capital, leading to knowledge donating behaviour. Regarding the knowledge demand, two aspects need to be mentioned. First, employees consult colleagues to encourage them or ask them to share their intellectual capital (Van den Hooff and de Ridder, 2004), leading to knowledge collecting behaviour. Second, a number of employees just lurk in online knowledge sharing platforms without posting or asking for information, leading to lurking behaviour.

Lurking has been recognised as a common online behaviour (Edelmann 2013), and sometimes lurking is encouraged as a way for new users to get a feeling of belonging (van Uden-Kraan *et al.*, 2008). Therefore, knowledge sharing behaviour contains three distinctive dimensions of knowledge sharing: knowledge donating, knowledge collecting and lurking (Van den Hooff and de Ridder, 2004; De Vries *et al.*, 2006; Ali *et al.*, 2018). These three dimensions are different in nature and need to be examined separately and independently in the online knowledge sharing process in organisations (Van den Hooff and de Leeuw van Weenen, 2004). In the literature, while there have been a few studies examining knowledge donating and collecting such as that by Akhavan and Mahdi Hosseini (2016), Lin (2007c) and Foss *et al.* (2009) and Tan (2016), few studies have examined these three dimensions of online knowledge sharing behaviour in a single study context.

In the literature, a number of motivators of knowledge sharing have been empirically examined (Table 1). However, few studies have examined key factors affecting online knowledge sharing in organisations. Online knowledge sharing is the knowledge sharing process through online platforms; thus, technological factors, which are often omitted in the knowledge sharing literature, play a crucial role in the decision making of online knowledge sharing. Furthermore, in organisations, employees often bond with each other and collaborate to achieve organisational goals; therefore, organisational factors strongly affect online knowledge sharing. [This study is based on the knowledge sharing literature and the three theories in the development of the individual-social-technological-organisational \(ISTO\) model with four dimensions to demonstrate the four typical types of motivators in online knowledge sharing in organisations.](#)

Table 1

Studies examining key motivators of knowledge sharing in an organisation

Study			Sample					Individual factors	Social factors	Technological factors	Organisational factors				
No	Author (year)	Publisher	Country	Sample size	Male (%)	Female (%)	Sample description				Leadership	Shared goal	Commitment	Management support	Rewards
1	Akhavan and Mahdi Hosseini (2016)*	RO	Iran	230	65	35	employees in multiple companies in Iran		✓	✓	✓				✗
2	Akhavan <i>et al.</i> (2015) ^{2,4,5}	EM	Iran	257	66	34	employees from 22 high-tech companies (including companies in pharmaceutical, nano technological, biotechnological, aviation, and aerospace industries) in Iran.	✓	✓	✓					✗
3	Al-Alawi <i>et al.</i> (2007)	EM	Bahrain	231	58	42	individuals in organisations from the public and private sectors in the Kingdom of Bahrain		✓	✓			✓		
4	Alam <i>et al.</i> (2009)	OT	Malaysia	305	60	40	employees in the manufacturing companies from Melaka and Johor states		✗	✓			✓	✗	
5	Al-Busaidi <i>et al.</i> (2010)	OT	Oman	104	80	20	employees in a major private petroleum organisation in Oman			✗	✗		✓	✓	
6	Arpaci and Baloglu (2016) ¹	EL	Turkey	399	39	61	students majoring in information technology in Turkey			✓					
7	Aslam <i>et al.</i> (2013) ⁵	OT	Pakistan	105	58	32	students in university		✗	✗	✓				✓
8	Bakker <i>et al.</i> (2006)	EM	Netherland	91			members of 20 large new product development projects			✓					
9	Bartol <i>et al.</i> (2009)	BL	China	255	68.7	31.3	information technology professionals and their supervisors working in the information technology industry in China						✓		
10	Bock <i>et al.</i> (2005) ¹	OT	Korea	154	88.3	11.7	responses from 27 organisations		✓	✓			-		
11	Bock and Kim (2002) ^{1,2,4,6,7}	OT	Korea	467	92.6	7.4	employees from four large, public companies		✓				-		
12	Borges (2013)	EM	USA	143	76	22	Information technology professionals		✓				✓		
13	Casimir <i>et al.</i> (2012) ^{4,5}	EM	Australia	496	45	55	employees from 15 organisations across ten industries.			✓			✗		
14	Cavaliere and Lombardi (2015)*	EM	Italia	389	75	25	employees from six Italian subsidiaries						✓		
15	Chai <i>et al.</i> (2011) ^{5,8}	RO	USA	454	58	32	responses at two large universities in the midwest and northeastern parts of the United States. Surveys were distributed to students who were business majors,		✓	✓	✓				
16	Chen <i>et al.</i> (2009) ²	OT	Taiwan	396			full-time senior college students and master of business administration	✓	✓	✓					

[illegible]

100	Zhang <i>et al.</i> (2014) ⁴	EL	Global	113	80.5	19.5	postgraduate students in engineering and business in the innovative virtual class	✓	✓	✓	✓								✓				
101	Zhang <i>et al.</i> (2013) ⁴	EL	China	159			liaisons from different department of Xuan Cheng Division												✓				

(✓ : positive significantly; ✖: not significant; ○: indirect; -: negative significantly; BL: Blackwell; EL: Elsevier; EM: Emerald; RO: Routledge; SA: Sage; SP: Springer; TF: Taylor & Francis; WI: Wiley; OT: Others; *: examine both knowledge donating and knowledge collecting; ¹: Theory of Reasoned Action; ²: Theory of Planned Behaviour; ³: Technology Acceptance Model; ⁴: Social Exchange Theory; ⁵: Social Capital Theory; ⁶: Social Cognitive Theory; ⁷: Economic Exchange Theory; ⁸: Social Role Theory; ⁹: Rational Action Theory; ¹⁰: Motivation Theory; ¹¹: Innovation Diffusion Theory; ¹²: Fuzzy Set Theory; ¹³: Theory of Social Independence; ¹⁴: Expectancy Theory; ¹⁵: Self-determination Theory)

3. Methodology

As the aim of this study is to develop a conceptual framework for understanding online knowledge sharing behaviour in organisations, the methodology in this study started with presenting the research problem and was then framed in the context of theory through the literature review. The review of the literature was based on the studies related to knowledge sharing in organisations. Studies were selected based on the procedure suggested by Tranfield et al. (2003). The method fits with the aim of this study, which is to create a comprehensive picture from a heterogeneous collection of interdisciplinary research conducted in different contexts with various research designs. Papers were initially identified by searching Google Scholar and electronic databases (ScienceDirect, Springerlink, and Web of Science). The keyword search terms were (“knowledge sharing” OR “knowledge share” OR “information sharing” OR “information share” OR “knowledge exchange” or “exchange of knowledge” OR “information exchange” or “exchange of information” OR “knowledge transfer” OR “transfer of knowledge” OR “information transfer” OR “transfer of information”) AND (“organi?ation*”) with no limit on articles. The symbols ‘*’ and ‘?’ was used after “organi?ation*” as wildcards to include possible plurals and American/British spelling versions of the related terms of organisations.

4. Proposal framework

4.1. ISTO model

The literature recognizes the existence of a variety of factors leading to online knowledge sharing behaviour in organisations. In general, all factors can be categorized into four groups: individual, social, technological, and organisational. Individual factors refer to the personal dimension, which strongly influences human behaviour. Each person has different

characteristics, preferences, and background that give rise to a different set of perceptions, attitudes and behaviour. Individual factors help to explain why different people behave differently in the same situation. In the literature, a growing body of research has shown that individual factors drive online knowledge sharing behaviour in organisations. For example, individuals with a high level of self-efficacy, which refers to confidence in their ability to share valuable knowledge, often increase online participation (Chyung, 2007).

Beside individual factors, social factors also determine online knowledge sharing behaviour. As individuals do not exist alone in an organisation, they are influenced by social factors which refer to relationships and interactions with other people in the organisation. For example, when employees post for the first time, if they receive positive feedback, they tend to continue to contribute. Positive feedback can encourage employees to share more knowledge with their colleagues. With regard to online knowledge sharing, technological factors should be considered. Employees' perceptions of ease of use and the usefulness of the online platforms will maintain their engagement with online knowledge sharing. In some circumstances, although employees are willing and have capability to post, they do not share knowledge because of technological issues such as design flaws (Amichai-Hamburger *et al.*, 2016).

A number of researchers hold the belief that when employees work together in an organisation, organisational factors significantly influence their decision to become posters. An employee with a high level of commitment often tends to share knowledge online. Management support also can facilitate the online knowledge sharing process. A reward policy may encourage employees to share knowledge online. [As there is no single factor to explain online knowledge sharing behaviour in organisations, we propose a four-dimensional model named ISTO model to comprehensively demonstrate four key types of motivators of online knowledge sharing in organisations.](#) Figure 1 shows the ISTO model and the following sections describe the ISTO model in detail.

Fig. 1: ISTO model

Individual factors

Individual factors including self-enjoyment, self-efficacy and reputation are deemed to have a significant impact on online knowledge sharing. Self-enjoyment refers to the extent that employees find online knowledge sharing enjoyable. Employees who enjoy sharing knowledge may have motivation derived from moral obligation, and thus the moral obligation will exceed the desire to maximize self-interest (Washo and Faraj, 2000). Employees who find online knowledge sharing enjoyable are likely to contribute knowledge. Knowledge donators who

experience enjoyment from helping others may be more inclined to share knowledge since they gain satisfaction and the feeling of being useful from sharing (Lin, 2007b).

Self-efficacy is another determinant of online knowledge sharing in an organisation. Self-efficacy is the confidence in one's ability to provide knowledge valuable to others (Kankanhalli *et al.*, 2005; Papadopoulos *et al.*, 2012). Employees with a high level of knowledge self-efficacy have powerful self-motivation, and as a result, they will be active in sharing knowledge online (Nguyen, 2019). Self-efficacy motivates employees to share knowledge with colleagues (Bock and Kim, 2002). In the theory of planned behaviour, in order to understand the knowledge sharing process, self-efficacy is sometimes referred to as perceived behavioural control.

Reputation is also very important in encouraging employees to share knowledge online in an organisation. Employees may share knowledge online to improve or establish a reputation or to achieve peer recognition (Carrillo, 2004). Reputation is shown to be a strong motivator of online knowledge sharing. Employees often share useful knowledge to gain peer respect and establish a position as an expert in an organisation. As a result, when employees feel that their reputation can be enhanced, they are likely to continue sharing (Ba *et al.*, 2001).

Social factors

Social factors refer to environmental determinants, which encourage an employee to share knowledge online in an organisation. Reciprocity and social interaction ties are two crucial determinants of online knowledge sharing. Employees who share their knowledge online expect mutual reciprocity for their time and efforts. Since knowledge receivers collect valuable knowledge from knowledge donators, they are indebted to transfer equivalent knowledge to knowledge donators (Schulz, 2001). This implies that knowledge donators often expect their knowledge to prove worthwhile via the mutual sharing of knowledge. Such reciprocity has been proven to be the major knowledge motivator of online knowledge sharing. In addition, previous studies (Chow and Chan, 2008; Kwahk and Park, 2016) have proven that if relationships among employees are close, online knowledge sharing will be significantly enhanced. Nahapiet and Ghoshal (1998) suggest that employees can gain more relational resources if they connect with more people. Social interaction ties were shown to be positively influential on knowledge sharing because employees increase the depth, breadth, and efficiency of knowledge sharing (Amayah, 2013).

Trust is another determinant of online knowledge sharing. Bakker *et al.* (2006) assert that if individuals have a trusting relationship, they will be more likely to share more of their useful knowledge online. When trust exists between parties, people are more inclined to listen and absorb each other's knowledge without worrying that they will be taken advantage of. In addition, trust is the anchor for increased approachability and communication due to a reduction in perceived uncertainty, the establishment of a constructive environment and the willingness of individuals to share tacit knowledge (Lin, 2007c). Trust is considered the most effective factor that can encourage employees to share knowledge online (Andrews and Delahaye, 2000).

Furthermore, social norms are the external stimuli that influence an individual's particular behaviour (Dong *et al.*, 2010). Social norms are a combination of perceived expectations from relevant individuals who have intentions to comply with these expectations (Ajzen and Fishbein, 1980). This means that an employee who perceives greater social pressure to share knowledge online will have a more positive attitude and intention as well as behaviour in online knowledge sharing. Compensation policies, performance appraisal and career advancement are used by managers to control employees. As a consequence, employees share knowledge online in accordance with management expectations (Wu and Zhu, 2012).

Technological factors

Technological factors refer to determinants involving information technology. System quality perceived ease of use and perceived usefulness are three major technological factors that affect online knowledge sharing. In order to encourage online knowledge sharing behaviour, a knowledge sharing system should have appropriate functions with excellent accessibility, user-friendliness for retrieval and input, search ability, and flexibility in meeting needs (Tan, 2016). Tan (2016) anticipates that the higher the quality of the knowledge sharing system, the more knowledge will be shared in an organisation by employees. Employees access the profusion of social networking technologies to communicate or share information with their colleagues and other social contacts.

Perceived ease of use refers to the clear understanding of employees in using information technology in knowledge sharing (Hsu and Lin, 2008; Yu *et al.*, 2010). According to TAM, all things being equal, improvements in ease of use will lead to improvements in performance (Davis *et al.*, 1989). Perceived ease of use has been shown to be a motivator in applying information technology in knowledge sharing behaviour (Lee *et al.*, 2007; Chang *et al.*, 2013).

This means that if individuals understand how to use all the functions in an online team, they are likely to interact more. In contrast, if employees do not know how to operate or post, they will not want to contribute knowledge. In the study of Nonnecke *et al.* (2006), around eight percent of respondents reported that the reason for their silence was the difficulty in posting online.

Perceived usefulness refers to employee perception of their performance when using information technology in knowledge sharing (Hsu and Lin, 2008; Yu *et al.*, 2010). It provides diagnostic lenses into how actual use and intention to use are affected. Perceived usefulness is identified as a determinant of online knowledge sharing (Venkatesh and Davis, 2000). Ajzen and Fishbein (1980) explain that an employee will have a positive feeling when they believe that sharing their knowledge online will most likely lead to better outcomes. Perceived usefulness is believed to be a motivator in the technology acceptance model (Davis, 1989; Chang *et al.*, 2013) driven by near-term and long-term expected results (Triandis, 1979).

Organisational factors

Organisational factors refer to determinants within an organisational context. It is unrealistic to assume that employees automatically share knowledge without strong rewarding incentives, management support, commitment, shared goals or leadership. It is suggested that organisations should link the contribution of knowledge donators by comparing their contributions and the use of knowledge management systems (Carrillo, 2004). Changes in reward systems and performance appraisal systems can lead to changes in online knowledge sharing behaviour of employees. Organisational rewards have been proven to be effective in encouraging employees to share knowledge to gain extrinsic benefits (Hung *et al.*, 2011a).

In order to support online knowledge sharing, Chee (2009) summarized all responsibilities of managers including setting goals and objectives, allocating resources, preparing budgets, providing training courses, creating knowledge roles, designing organisational and technical infrastructure, measuring performance, and considering needs as well as priorities. Management support will create the organisational culture in which sharing knowledge among employees is encouraged (Koch, 2003). As a result of providing structure, facilitation, and support which comes from senior managers and company knowledge managers, a knowledge sharing culture can be cultivated and maintained. Management support is particularly important in large organisations or multinational companies where it is impossible to determine which employees have specific knowledge. Therefore, if management can support this by bridging

the gap between donators and receivers, online knowledge sharing will be implemented effectively.

Commitment is also another important organisational determinant which refers to an individual's emotional attachment to and involvement in a group and it provides a motivation to an individual to do more than what is formally required over a sustained period (Choi, 2006). Commitment is the strength of an individual's identification with a particular group or organisation (Mowday *et al.*, 1979). According to Hislop (2002), employees with high levels of commitment are less likely to leave the organisation and are more likely to be highly motivated to provide additional discretionary effort. Thus, if employees strongly commit with the organisations, they tend to contribute their knowledge to build up the relationship with other colleagues and contribute to the organisation.

Since knowledge is a source of power, individuals tend not to naturally share knowledge with others; however, with common goals, mutual understanding and exchange of ideas will be promoted. In addition, common goals can improve trust among individuals in an organisation and reduce the fear of self-interest by other members. As a result, individuals tend to contribute their knowledge to help achieve their mutual goals. Within an organisation, shared goals can be gained by cooperation and knowledge sharing which creates a bond among individuals and encourages them to share what they know (Wagner, 1995).

Leadership is also identified as an important determinant of online knowledge sharing (Cong *et al.*, 2007). Employees consider their leader as a role model who will guide and direct all processes of online knowledge sharing. Employees will be inspired and motivated in online knowledge sharing if their superiors recognize the employees' contribution and empower them (Eze *et al.*, 2013). Therefore, empowering leadership is proposed as a key determinant of online knowledge sharing in an organisation (Raquib *et al.*, 2009).

4.2 Moderators

In examining determinants of online knowledge sharing, it is necessary to consider some moderators which may moderate the strength of effects from determinants to attitudes toward online knowledge sharing, online knowledge sharing intentions and online knowledge sharing behaviour. Type of knowledge is one moderator which needs more attention. There is general agreement that knowledge can be divided into two dimensions: explicit and tacit knowledge (Smith, 2001). Explicit knowledge is "written down in a knowledge base or captured in a formal document" including grammatical statements, mathematical expressions,

specifications, and manuals (Buckman, 1998). Tacit knowledge, on the other hand, is abstract and implicit knowledge in nature or “know-how” it resides in the human brain and is embedded in individual experience and action, and therefore it cannot be easily conveyed (Hislop, 2003). It is estimated that eighty percent of useful knowledge is tacit (Sheehan *et al.*, 2005) which is unlikely to be adequately recorded (Rooke and Clark, 2005).

Smith (2001) calculated that ninety percent of the knowledge in any organisation is embedded and synthesized in people’s heads. Although the majority of knowledge is tacit, the transfer of tacit knowledge is far more difficult than explicit knowledge because tacit knowledge essentially resides in the minds of the knower, so it is almost impossible to share tacit knowledge without the active participation and cooperation of the knower (Nonaka and Takeuchi, 1995). Transferring explicit knowledge does not lead to the loss of privileged status in an organisation, but transferring tacit knowledge may do. Therefore, employees seem to be more willing to share explicit knowledge. Humphreys *et al.* (2008) stated that in the interaction with determinants, explicit knowledge is positively associated with online knowledge sharing, whereas tacit knowledge is found to be negatively related to online knowledge sharing. Lu *et al.* (2006) posit that there is less willingness to share tacit knowledge than to share explicit knowledge in an organisation. Therefore, knowledge type influences the strength of the impact of determinant on online knowledge sharing. In reality, previous research on knowledge management has ignored tacit knowledge as there are difficulties in capturing and communicating it. Therefore, the moderator role of knowledge type still needs to be further explored.

The type of organisation is another potential moderator because it has a different impact on knowledge sharing behaviour. For example, Kumari and Takahashi (2014) conducted a meta-analysis study to examine the moderator role of type of organisation in the theory of planned behaviour. In this study, the relationships between attitude and knowledge sharing intention were stronger in private organisations than in public ones, whereas the relationship between social norms and knowledge sharing intention was significantly weaker in private organisations than in public counterparts. Although there have been discrepancies as regards findings in previous studies, the moderation of organisation type still needs to be further explored.

Researchers also need to consider culture as a moderator since the cultural dimensions, individualism and collectivism, affect online knowledge sharing in different ways and this has been empirically proven in some studies in different countries (Al-Alawi *et al.*, 2007; Georgiadou *et al.*, 2011; López *et al.*, 2004; Siakas *et al.*, 2018). Individualism refers to the

tendency of people to put personal goals over organisational goals whereas collectivism describes the tendency of people to put organisational goals before personal goals (Ardichvili *et al.* 2006). Ways of processing information and sharing knowledge are different between people in individualistic cultures (e.g. USA) and collectivistic cultures (e.g. China, Brazil and Russia). For example, Zhang *et al.* (2014) investigated national culture effects on knowledge sharing in computer-based education systems in three groups from China, Hong Kong and the Netherlands. The qualitative and quantitative results show that cultural dimensions have direct impacts on knowledge sharing. Nguyen *et al.* (2019b) conducted a meta-analysis to compare the nations with higher and lower level of collectivism. They found that in nations with higher level of collectivism, the perception of behaviour control, which often links with self-efficacy, has stronger effect on intention to share knowledge.

The influence of gender on online knowledge sharing in an organisation has not yet gained much attention from academics. However, Connelly and Kelloway (2003) point out that women seem to be more sensitive to social interaction, as being frequently less advantaged, they may be hesitant to share with colleagues due to the fear of losing knowledge power. Lin (2006) argues that the influence of instrumental ties, co-worker congruence on expressive ties, and outcome interdependence on instrumental ties are stronger for females than for males, while the influence of expressive ties, and perceived organisational support on instrumental ties are stronger for males than for females. In particular, the gender behaviour in knowledge management system usage is different. Men are likely to use all components of a knowledge management system more frequently than women because women may prefer to utilize interpersonal and socialisation strategies to acquire or share knowledge (Taylor, 2004).

5. Implications

The growing interest in online knowledge sharing in organisations leads to a need to have a conceptual framework which highlights key motivators. The study aims to develop a conceptual framework based on the theory of planned behaviour and TAM to demonstrate the key factors affecting online knowledge sharing in organisations. The ISTO model consists of four dimensions: individual, social, technological, and organisational as a useful guide for both researchers and managers.

For researchers, firstly, the model serves as the framework for future studies to have an understanding of online knowledge sharing behaviour in organisations. In the literature, the theory of planned behaviour and TAM are appropriate tools for understanding online

knowledge sharing behaviour, but they have often been examined separately. Furthermore, few studies have investigated TAM to understand the acceptance of information technology in online knowledge sharing. Therefore, this study draws on two schools of thought of TAM and TPB in examining the adoption of information technology in online knowledge sharing in organizations. Through integrating the theory of planned behaviour and TAM, the ISTO model is believed to bring more insights and fill the gap in the online knowledge sharing literature. In this way, this study paves the way for future studies in the field.

Secondly, the ISTO model provides a comprehensive framework of key motivators of online knowledge sharing in organisations in four categories: individual, social, technological, and organizational. Four types of motivators of online knowledge sharing should be paid more attention and empirically examined in a single study to provide the better understanding of the determinants of online knowledge sharing in organisations. Future researchers may consider examining and validating the ISTO model in an empirical study using survey or interview or mixed methods in various contexts.

Thirdly, this study is one of the first to propose three dimensions of online knowledge sharing behaviour: knowledge donating, knowledge collecting and lurking. In the literature, most researchers examined online knowledge sharing behaviour online knowledge as a holistic activity when considering sharing of knowledge as a one-directional process from the provider to the recipient. Very few researchers viewed online sharing from a bidirectional perspective, which involves both donating and collecting knowledge. And according to our literature review, no researcher has examined the lurking dimension in viewing online knowledge sharing behaviour. The inclusion of all three dimensions of online knowledge sharing behaviour will help future researchers gain more insights into different types of online knowledge sharing behaviour.

Fourthly, this study also extends the knowledge sharing literature and serves as a guideline for future researchers to consider moderators when investigating online knowledge sharing. Nguyen et al. (2019a) and Nguyen et al. (2019b) argued that the variation in the results of empirical studies in the literature stems from the presence of moderators. Following the argument, this study proposes four potential moderators in the ISTO model. The proposal of these moderators serves as a guideline for future studies when validating the ISTO model and making comparison across type of knowledge, type of organisation, country culture and gender.

For managers, the model helps organisational managers to understand the key factors to motivate employees to share knowledge online. As knowledge sharing and especially online knowledge sharing plays a crucial role in organisations, the lack of effective online knowledge

sharing can be a bottleneck to improve organisational performance. The present study consolidates the understanding of online knowledge sharing by proposing four categories of key determinants of online knowledge sharing. Managers should frame the policies for successful implementation of online knowledge sharing. Regarding individual factors, managers should consider training or workshops to improve employees' self-efficacy as well as to make employees feel that online knowledge sharing is enjoyable and helps to achieve a positive reputation. Regarding social factors, managers should create a favourable environment to foster the targeted reciprocal relationships, trust and interpersonal interactions of employees. Social norms could be applied by emphasizing that sharing knowledge is a form of contribution to the organisation.

Regarding technological factors, online platforms for online knowledge sharing should be designed with a user-friendly interface. This could make employees perceive online platforms as easier to use in the early stage and consequently they may use online platforms more to share knowledge. Some guidance, tutorial videos and frequently asked questions should be proposed. In addition, organisations should maintain system quality to facilitate online knowledge sharing. The benefits of online platform usage for online knowledge sharing such as no limit of time and space should be introduced to employees, the usefulness of knowledge shared also needs to be emphasised. Regarding organisational factors, managers should provide more support and incentives such as rewards or leadership as well as enhance commitment and shared goal to encourage employees to share knowledge online. By placing more focus on all four types of factors in the ISTO model, more participation and effective online knowledge sharing could be improved.

6. Conclusion

The development of information technology has led to changes in the organisational knowledge sharing process. This study develops the ISTO model based on the theory of planned behaviour and TAM to demonstrate the key motivators of online knowledge sharing in organisations in four categories. The ISTO model serves as a guideline for future researchers who wish to examine online knowledge sharing in organisations. From the model, a comprehensive picture is provided from which managers can draw to enhance the online knowledge sharing process. As a result, online knowledge sharing can not only enhance work quality but also improve decision-making skills, problem-solving efficiency and competency.

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