Key factors influencing knowledge sharing practices and its relationship with organizational performance within the oil and gas industry

Arif Abdelwhab Ali, Dhanapal Durai Dominic Panneer selvam, Lori Paris and Angappa Gunasekaran

Abstract

Purpose – *This study aims to investigate the key elements that influence knowledge sharing practice, primarily the relationship between knowledge sharing practice and organizational performance within the oil and gas (OG) industry.*

Design/methodology/approach – *A sample of 203 responses was collected from the OG industry using an online questionnaire. Data were analyzed using applied structural equation modeling to validate the model and test the hypotheses.*

Findings – *The results indicate that significant relationships exist among the model constructs. These findings provide a better understanding of the factors that influence knowledge sharing practices within the OG industry. These findings prove that knowledge sharing practices positively impact organizational performance through cost reduction, organization growth and intangible benefits.*

Practical implications – *This study demonstrates that organizations in the OG industry may increase performance by adopting knowledge sharing practices. This study also provides practitioners with important information to enhance knowledge sharing practice within their organizations. For instance, managers should focus on Web 2.0 and other knowledge sharing systems to facilitate both tacit and explicit knowledge sharing. The findings provide empirical evidence that knowledge sharing practices allow organizations to transfer expert knowledge to younger generations of employees. As a result, organizations will be able to capture knowledge and alleviate the negative impact of high staff turnover within the OG industry.*

Originality/value – *The lack of knowledge sharing practices and the eminent loss of technical knowledge within the (OG) industry, because of retirements and turnover, create a difficult challenge for practitioners. Research on knowledge sharing within the OG industry is limited. Therefore, this study provides an in-depth analysis regarding the critical knowledge sharing practices and valuable information to researcher and practitioners' knowledge sharing practices within the OG industry.*

Keywords *Knowledge management*

Paper type *Research paper*

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1. Introduction

Knowledge management has received a great deal of attention during the past few decades, as both researchers and practitioners have recognized the importance of managing knowledge in a knowledge-based economy. Researchers have confirmed the vital role of knowledge in the modern economy and creative industry (Manfredi Latilla *et al.*, 2018). According to a study of Fortune 500 companies, the annual cost of lost knowledge is approximately $31.5bn, which is primarily because of the failure of managing knowledge

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(Wang and Noe, 2010). Thus, the process of sharing and maintaining such knowledge is of vital importance (Tubigi *et al.*, 2013), as knowledge is a resource that allows an organization to create and maintain a sustainable competitive advantage (Asrar-ul-Haq and Anwar, 2016; Wang *et al.*, 2014). Knowledge sharing is the process of transferring knowledge to other members of the organization in a suitable format (Xiaojun and Venkatesh, 2017; Okah *et al.*, 2011; Bartol and Srivastava (2002)). Knowledge sharing benefits an organization by turning individual knowledge into corporate knowledge (Wang and Wang, 2012).

The oil and gas (OG) industry greatly impacts the lives and livelihoods of people around the world. Currency (2016) describes the OG industry as a cyclical and advanced industry that shapes our modern economy. Although alternative energy resources exist, oil and natural gas are still the predominant and essential energy resources used around the world (Skouloudis *et al.*, 2012). Along with providing energy, the OG industry offers resources that are used in the manufacturing of products in other industries including, construction and paving materials, chemicals, and transportation. In fact, according to Balat and Balat (2009), the transportation sector constitutes 60 per cent of total global oil consumption. The global population of seven billion people requires 60 per cent of their everyday energy needs to be met by OG, while 40 per cent of those needs are met by alternative fuel sources (www.world-petroleum.org). Surprisingly, despite recent developments in alternative fuels and the growing concern surrounding fossil fuels, there appears to be no real decrease in OG consumption. Therefore, the OG industry will be the primary provider of energy and OG byproducts well into the future (Muzahmi, 2015).

Organizations in the OG industry operate in a highly complex and turbulent environment, because of globalization, outsourcing, government rules, and rapidly changing technology (Denicolai *et al.*, 2014). Unfortunately, because of frequent turnover and retirements, knowledge loss in this industry is highly problematic. According to Society of Petroleum Engineers, between 2013 and 2014, nearly 231,000 technical knowledge workers retired from the OG industry and these numbers continue to increase. (Muzahmi, 2015). The ability to survive the knowledge drain caused by high turnover rates, require organizations to capture knowledge by utilizing knowledge sharing practices. The OG industry has a huge impact on the global economy and knowledge within this industry must be managed properly given the vast amounts of data and information that need to be captured and used for decision-making. However, knowledge sharing has not been a priority in this industry.

Knowledge loss, because of high turnover and a lack of knowledge sharing practices in the OG industries as well as other industries, is because of a number of limiting factors. First, research has not definitively confirmed the effect of knowledge sharing practices on organizational performance Tubigi and Alshawi (2015). For instance, 200 knowledge sharing experts from around the world have confirmed that the knowledge management research lacks a clear understanding of the link between knowledge management and organization performance (Inkinen and Inkinen, 2016). Second, prior studies are inconsistent regarding the influence of organizational factors on knowledge sharing (Hau *et al.*, 2013). Finally, organizations have strictly limited their knowledge sharing practices to IT applications (Henttonen *et al.*, 2016). Given these factors, it is the purpose of this study to examine the key elements that influence knowledge sharing practice, including the relationship between knowledge sharing practices and organizational performance within the OG industry.

2. Literature review

2.1 Knowledge and knowledge sharing

Rapid changes and a knowledge-based economy have forced organizations to stay competitive by maximizing resources, especially those resources that are valuable, rare and inimitable (Barney, 2002), such as knowledge and expertise. Knowledge sharing is a

necessary organizational capability, which is needed to maintain a sustainable competitive advantage (Witherspoon *et al.* (2013). Knowledge sharing is a central process which links other knowledge management processes and practices together. Without knowledge sharing it is difficult for a firm to take full advantage of the investments it has made in its ability to capture and create knowledge (Carrillo *et al.*, 2010). Therefore, knowledge sharing has attracted the attention of many practitioners and researchers as it represents a solution for many of the serious challenges that organizations face in a knowledge-based environment.

Knowledge sharing is the process of transferring knowledge to other organizational members in a manner suitable for decision-making (Okah *et al.*, 2011). Knowledge sharing requires a culture of social interaction that incorporates the exchange of employee knowledge, experiences, and skills across departments and the organizations (Lin, 2007b). This type of environment motivates employees to cooperate and participate in the generation and storage of knowledge and experience (Martinez-Conesa *et al.*, 2017).

Knowledge is classified as either tacit or explicit (Nonaka, 1994; Kirsch *et al.*, 2015; Lam and Lambermont-Ford, 2010; Zahedi *et al.*, 2016). Explicit knowledge is relatively easy to access and to share among organizational members, however tacit knowledge is embedded in the human experience (ideas, insights, beliefs) and resides in the mind of the individual (Henttonen *et al.*, 2016; Liyanage *et al.*, 2009). Tacit knowledge must be explicted, before it can be documented and transferred to other organizational members (Spender, 1996). Unfortunately tacit knowledge, which is developed over the years, can be difficult to codify and often remains undocumented (Martins and Martins, 2011). Research has demonstrated that tacit knowledge sharing requires a shared social process and that face-to-face interaction is the only way to share tacit knowledge (Nonaka and Takeuchi, 1995). Thus, managers must "create space" to facilitate informal communication in order for knowledge sharing to transpire (Nonaka and Takeuchi, 1995; Filius *et al.*, 2000).

2.2 Knowledge sharing factors

Knowledge sharing is one of the most important and complex activities among all knowledge management processes and requires managers to focus on the following three key areas: individual, organizational, and technological (Edwards, 2011). The complexity of knowledge sharing occurs because these three dimensions can be difficult to manage and can interfere and/or influence the knowledge sharing process. Individual employees represent an important source of knowledge since they possess the explicit and tacit knowledge (ideas, experiences and beliefs) which need to be shared. Knowledge must be supported by organizational processes, such as policies and procedures, to support the act of knowledge sharing. Finally, the increasing role of information technology in the organization plays a vital role in the knowledge sharing process. Companies that have appropriate technological systems in place are better positioned to take advantage of their knowledge resources. These dimensions need to be understood separately and then be considered collectively to manage knowledge sharing to improve organizational performance.

2.2.1 Individual dimensions. Individual dimensions that influence knowledge sharing behaviors include, the intention to share knowledge, interpersonal trust, reciprocal relationship, and personal motivation (Seba *et al.*, 2012; Holste and Fields, 2010; Ajzen, 1991). The theory of planned behavior (Ajzen (1991) demonstrates the positive relationship between the above individual dimensions and knowledge sharing behavior.

The theory of planned behavior has been commonly used to study the intention of an individual to engage in knowledge sharing behaviors. Attitudes, subjective norms, and perceived behavior control all factor into an individual's intention to share knowledge. Lin (2007a) advises researchers to continue to consider and explore other factors that will allow

us to better understand the intention of individuals to share. In our current model, an additional factor has been added (enjoyment) to investigate the intention to share knowledge. Thus, enjoyment was considered as another factor which affects the intention to share knowledge.

Interpersonal trust among employees also positively influences knowledge sharing interactions (Hau *et al.*, 2013; Seba *et al.*, 2012; Holste and Fields, 2010). Trust increases knowledge sharing among employees (Panteli and Sockalingam, 2005) and represents the basis for employee relationships (Okyere-Kwakye *et al.*, 2012). Individuals are more interested in sharing knowledge with those that they trust.

Reciprocity, the mutual exchange of knowledge (Tamjidyamcholo *et al.*, 2013), occurs when participants perceive that the knowledge to be exchanged has value (Chang and Chuang, 2011; Sedighi *et al.*, 2016). Reciprocity implies that knowledge sharing is expected in return (Burgess, 2005). Thus, employees are more likely to share knowledge with those who share knowledge in return. Sedighi *et al.* (2016) studied knowledge sharing in a network environment and found that reciprocal attitudes can be divided into two types; direct and generalized reciprocity. Direct reciprocity represents the expectation that knowledge sharing will be reciprocated by the original recipient who received the knowledge that was shared. Generalized reciprocity indicates that a members' expectation of reciprocity can come from any member of the community and not just the original recipient (Sedighi *et al.*, 2016). In contrast, Happ *et al.* (2016) claimed that the norm of reciprocity restricts one's options to choose with whom to share knowledge. Other studies have addressed different factors associated with individual attitudes such as the reciprocity (Hau *et al.*, 2013) and how the reciprocal relationship among employees affects their communication and thus knowledge sharing.

The motivation to share knowledge is another individual factor that drives knowledge sharing (Paulin and Suneson, 2012). However, a growing number of studies have recognized that employees are not usually motivated to share their knowledge with others (Barner-Rasmussen and Aarnio, 2011). Thus, it would be useful to understand what motivates employees to share their knowledge and how organizations can create an environment to promote knowledge sharing. Personal benefits, normative consideration and community-related consideration have a significant influence on knowledge sharing practice (Amayah (2013). Personal benefits include any type of personal gain that an employee might receive when sharing knowledge with others, including acknowledgment or recognition from colleagues. Social pressures also create an environment where individual are motivated or pressured to share knowledge. Finally, Ardichvili (2008) identified three community-related considerations that impact one's motivation to share knowledge including, creating ties with colleagues, building a stronger community and strengthening one's position in a community.

2.2.2 Organizational dimensions. Organizational dimension related to knowledge sharing include management support (Wang and Noe, 2010), rewards (Hau *et al.*, 2013; Amayah, 2013), organizational structure (Seba *et al.*, 2012; Sharratt and Usoro, 2003; Abili *et al.*, 2011) and organizational culture (Paulin and Suneson, 2012; Abili *et al.*, 2011). This study investigates four organizational dimensions that impact knowledge sharing practices, these include, management support, rewards, organization structure and organization culture.

Management support plays a critical role towards encouraging knowledge sharing behaviors (Wang and Noe, 2010; Chen and Cheng, 2012). Management support refers to the support that top and middle management provides to increase knowledge sharing behaviors and knowledge sharing processes throughout the organization. Management support is defined as the way in which managers inspire staff to share knowledge and support activities which encourage knowledge sharing (Lee *et al.*, 2016; Wang and Wang (2012). Perceived supervisor and coworkers support and the encouragement of knowledge sharing increases employees' knowledge exchange and their perceptions of the usefulness

of sharing knowledge (Kulkarni *et al.* (2006). According to the literature, perceived management support is an antecedent for knowledge sharing in different research contexts, as management support has the capacity to affect employee commitment which improves the quality and the level of knowledge sharing practice (Lee *et al.*, 2016; (Wang and Noe, 2010).

Organization structure influences how knowledge sharing behaviors get disseminated throughout the organization. Abili *et al.* (2011) evaluated different types of organizational structures including, complexity, officialism and centralization. A centralized structure is organized to emphasize vertical information flow because the communication channels follow the corporate hierarchy (Joseph *et al.*, 2016). This restricts knowledge sharing, as knowledge sharing must occur in both vertical and horizontal directions. Formality, complexity and centralization reduce, not increase, the amount of shared knowledge among an organizations' employees (Abili *et al.*, 2011). Knowledge sharing occurs when coworkers and superiors communicate. Therefore, a less centralized structure allows for more knowledge sharing to occur (Wang and Noe, 2010). Managers who wish to increase knowledge sharing must consider adopting a less centralized organizational structure (Aljuwaiber *et al.*, 2016), by creating open workspaces (Huang *et al.*, 2013), increasing communication flow throughout the organization, and encouraging more informal meetings (Wang and Noe, 2010).

Organizational culture also affects the knowledge the sharing process. Organizational culture is defined as "the combination of symbols, language, ideology, beliefs, rituals, and myths of an organization". Lee *et al.* (2016) argued that organizational culture influences employees' view of knowledge sharing and may encourage or impede knowledge-sharing activities. Several types of organizational cultures exist (Abili *et al.*, 2011); however, this study focuses on supportive organizational culture, as a supportive culture facilitates knowledge sharing and makes it a key element of the daily work processes (Han *et al.* (2016).

2.2.3 Technological dimension. Technology is a key element and one of the most researched areas related to knowledge sharing. Technology naturally enables organizations to develop business processes, by facilitating knowledge sharing within organizations. For instance, research has established that technology has often been associated with innovation (Chuang *et al.*, 2013; Yang *et al.*, 2009; Vukšić *et al.*, 2015; Kamhawi, 2012). Information and communication technology (ICT) tools play an important role in knowledge sharing implementation. ICT tools can nurture the practice of knowledge sharing within organizations (Schiuma *et al.*, 2012). To be shared, knowledge needs to be codified and technology assists with knowledge codification by quickly (Vukšić *et al.*, 2015) transforming tacit knowledge into explicit knowledge. In this study, two major technological tools are considered; Web 2.0 and knowledge sharing systems. Oyefolahan and Dominic (2013) asserted that knowledge sharing systems are enablers of knowledge sharing practices as they facilitate the maintenance of organizational lessons learned and staff expertise. Web 2.0 also provides opportunity for knowledge sharing as it is a new technology of community-driven web users including social networking and blogs (Paroutis and Al Saleh, 2009). Web 2.0 includes technology such as online/virtual communities of practice (CoPs) and the intranet. Although the literature indicates the importance of using Web 2.0, the adoption rate is low, because of the fact that implementation is difficult as it is a social platform and must grow organically versus being imposed on employees (Kosalge, 2015).

Recently, more and more organizations are beginning to recognize the significant role of weblogs to enable knowledge sharing to transpire (Lu and Hsiao, 2007). Tools such as weblogs support knowledge sharing, especially tacit knowledge, which is only shared through social interactions. In fact, weblogs provide a socialization platform that enables individuals to engage in friendly discussions (Chatti *et al.*, 2007; Gordeyeva, 2010). Furthermore, the user flexibility of weblogs encourages the sharing of knowledge, experiences, and thoughts (Lu and Hsiao, 2007). Du and Wagner (2006) also confirmed

that a weblog should attract and encourage users to engage in knowledge sharing, yet attraction to the weblog is dependent upon the weblogs content.

CoPs are "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger and Snyder, 2000). The findings of a recent study by Aljuwaiber *et al.* (2016) emphasized the importance of CoPs in nurturing knowledge sharing within organizations. CoPs are encounters that can be moved to a virtual space. Virtual/Online CoPs could provide useful and act as an alternative to face-to-face interactions, overcoming the problem of employees being in different locations. Virtual/Online CoPs increase trust among individuals which enriches communication and knowledge sharing within organizations (Panahi *et al.*, 2013). However, the value and knowledge of Virtual/Online CoPs will not have impact if members fail to regularly update these sites (Hidayanto *et al.*, 2015).

Organizational portals are another means of sharing knowledge. Employee Portals, Enterprise Intranet Portals, Corporate Portals and Business-to-Employee Portals are synonymous and can act as channels that connect employees within an organization to a knowledge domain which provides opportunities for interaction (Benbya *et al.* (2004). Portal technology provides the structure for storing and sharing knowledge (Fernandes *et al.*, 2005). Furthermore, portals may consist of various tools that can serve the same purpose for knowledge access and sharing. For instance, an organization's portal can offer forums, chat rooms, and a gateway to organizations' repositories and databases (Fernandes *et al.*, 2005). Likewise, portals serve as tools to support decision-making in organizations through knowledge sharing (Al-Debei *et al.*, 2013).

Employees often need to be able to find and communicate with specific field experts for technical advice. However, finding experts and communicating with them is often difficult and time consuming without the aid of information systems. Quick access to the appropriate experts reduces wait times and increases the opportunity for quality feedback, which results in better knowledge sharing (Aichholzer (2001). These systems go by a variety of names, but ultimately produce the same results of mapping and identifying experts according to expertise. For instance, expert profile systems or "expertise locator" systems identify experts and provide either online access on the organizations intranet or website.

Organizations use databases and repositories to capture and store knowledge (Desouza, 2003). However, knowledge repositories are insufficient, as employees must use such stored knowledge (Ghobadi and Mathiassen, 2015). Therefore, some organizations push their staff to exploit knowledge repositories as a part of the performance evaluation process (Liebowitz, 2003). Nevertheless, knowledge sharing systems should support communication among staff members rather than focusing solely on repository access (Desouza, 2003).

The most important technology in an organization is the computer network infrastructure/ intranet. Intranets are computer networks that function similar to the internet. Intranets however, are generally limited to employees in the organization (Lefika and Mearns, 2015). The OG industry has a strong technological base that supports different knowledge sharing tools. Infrastructure/intranet technology is necessary to facilitate the implementation of knowledge sharing tools, including weblogs, portals, and online CoPs. These technologies enhance the practice of knowledge sharing, as these tools act as facilitators to motivate employees to use platforms that are both familiar to them and offer opportunities to share knowledge.

2.3 Organizational performance

Organizational performance indicators are typically either financial/tangible outcomes or nonfinancial/intangible outcomes. In this study, the terms financial or tangible and nonfinancial or intangible will be used interchangeably.

Tangible indicators are traditionally related to organizational productivity. Financial performance being the marker for overall organizational achievement (Marques and Simón,

2006; Tubigi *et al.*, 2013). Return on sales, return on equity and return on capital (Tubigi *et al.*, 2013) are among the tangible indicators that measure the performance and provide the organization with an ability to visualize performance trends. Productive organizations are able to demonstrate productivity by expanding operations and activities as a result of substantial growth in the market (Oyemomi *et al.*, 2016; Marques and Simón, 2006) Cost reduction, because of operational efficiencies, is also linked to performance, and most organizations focus on cost reduction to increase profit margins (Katsuro *et al.*, 2013; Huarng, 2011). Time to market also affects performance as reducing time to market decreases costs and increases performance (Katsuro *et al.*, 2013).

Nonfinancial factors, commonly referred to as intangible benefits, are strongly associated with organizational performance. These intangible benefits include innovation (Ngah and Ibrahim, 2010; Pai *et al.*, 2013; Victoria *et al.*, 2007; Tubigi *et al.*, 2013; Katsuro *et al.*, 2013), the dynamic capability of organizations (Sher and Lee, 2004; Ngah and Ibrahim, 2010), organizational learning and competitive advantage (Victoria *et al.*, 2007; Marques and Simón, 2006; Sher and Lee, 2004; Salazar *et al.*, 2003; Ngah and Ibrahim, 2010; Pai *et al.*, 2013; Wang *et al.*, 2014; Oyemomi *et al.*, 2016). Both competitive advantage and innovation have been heavily researched as they relate to organizational performance (Victoria *et al.*, 2007; Marques and Simón, 2006; Sher and Lee, 2004; Salazar *et al.*, 2003; Ngah and Ibrahim, 2010; Pai *et al.*, 2013; Wang *et al.*, 2014; Oyemomi *et al.*, 2016). Reduction of time spent on manufacturing, designing and delivering a product to market are also important nontangible benefits, but are not included in this study because of the fact that they are highly company and industry specific.

2.4 Related work and research gap

Knowledge management research in the OG industry has primary focused on the challenges of knowledge management and knowledge sharing. For instance, Muzahmi (2015) found that procedural and cultural challenges impede the implementation of knowledge management. A literature review by Ramanigopal (2013) explored the opportunities and challenges of knowledge management implementation in the OG industry. Grant (2013) studied the challenges of converting tacit knowledge into explicit knowledge and the importance of knowledge management initiatives in garnering support from employees and top management. Unlike the above studies that evaluate knowledge management challenges in the OG industry, our study specifically focuses on the knowledge sharing process, specifically, the factors that influence the knowledge sharing. We speculate that the limited research is because of the lack of mature knowledge sharing practices in the OG sector, as compared to other sectors (e.g. the academic and health sectors). Consequently, much work needs to be done to raise the awareness of some of the benefits of knowledge sharing practices within the OG industry.

3. Methodology

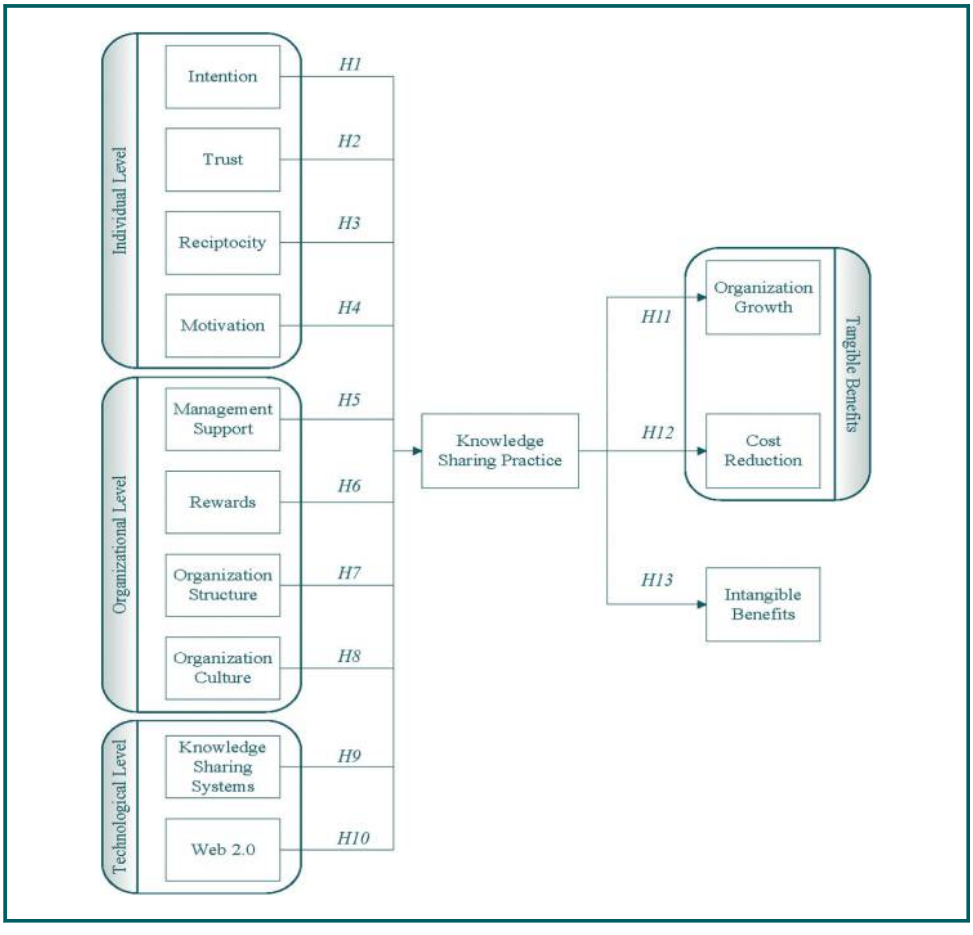
3.1 Knowledge-sharing framework

We have developed a framework built upon previous knowledge sharing research, to investigate the relationships that impact knowledge sharing practices in the OG industry. Primarily, we are interested in how people/individual, processes/organizational and technology influence knowledge sharing practice and in turn, how knowledge sharing practice affects both tangible and intangible benefits (Figure 1).

3.2 Hypotheses

The hypotheses were developed in line with earlier research. The study model considers three dimensions and each dimension incorporates several factors. The individual

Figure 1 The hypothesized knowledge sharing practice framework



dimension consists of four factors. Intention of an individual towards a certain action plays a major role in the conduction of that action. In our case, the action is sharing knowledge. Thus, *H1* addresses the relation between an individual's intention to share knowledge and the practice of knowledge sharing. Trust is another individual factor that influences the interaction and communication among the staff. It may help the cooperation and ease the communication and thus positively influence ideas and knowledge sharing. Accordingly, *H2* addresses the relation between interpersonal trust and knowledge sharing practice. In addition, mutual exchange of ideas and knowledge among the staff is referred to as reciprocity. It indicates that employees are more likely to share ideas with those who share in return. Thus, reciprocity is believed to have an impact on knowledge sharing practice among the staff which is reflected by *H3*. The last individual factor is motivation which indicates one's motivation to be involved in the act of knowledge sharing. There are different drives that motivate an employee to share knowledge with others. Regardless these drives, there is a relationship between individual motivation and knowledge sharing practice which is addressed by *H4*. *H1-H4* focus on the relationships between individual level variables, including an individual's intention to share knowledge, interpersonal trust, the reciprocal relationship among individuals, and the motivation to share knowledge on knowledge sharing practice (Table I).

Likewise, the organizational dimension contains four factors. These factors reflect the organizational behavior and how it may affect the practice of knowledge sharing. For instance, the support of the top and middle management encourages the act of knowledge

Table I Hypotheses related to individual dimension

No.	Hypothesis
H1	An individual's intention to share knowledge has a positive effect on knowledge sharing practice
H2	An interpersonal trust among individuals has a positive effect on knowledge sharing practice
H3	Reciprocal relationships among employees have a positive effect on knowledge sharing practice
H4	Personal motivation to share knowledge has a positive effect on knowledge sharing practice

sharing among the staff. Such assumption is addressed by *H5*. While organizational rewards can be another factor that might influence the knowledge sharing practice. As discussed earlier in the literature review section there is a link between rewards and knowledge sharing; however, it may vary across business environment. *H6* presents the relationship between organizational rewards and the knowledge sharing practice. Moreover, organizations with less centralized structure seem to have a better environment for sharing knowledge. Because, it enables vertical and horizontal communication flow unlike centralized structure which only enables vertical communication. *H7* is formulated to address the influence of a less centralized structure on knowledge sharing practice. A culture of an organization may encourage or impede knowledge-sharing activities. An organization with supportive culture for knowledge sharing can also play a positive role in enriching the practice of knowledge sharing. This factor and its relationship to knowledge sharing practice is reflected in *H8*. *H5-H8* measure the relationships between organizational dimensions and knowledge sharing practice. As mentioned previously, these organizational dimensions including management support, organizational rewards, decentralized structure and supportive culture are evaluated (Table II).

The third dimension focuses on technological factors and their association with the knowledge sharing practice. Computer systems nowadays are very essential to the modern business environment. In particular, knowledge sharing systems continues to provide a great help to organization in terms of facilitating the knowledge sharing process. Knowledge sharing systems such as repositories and databases, portals, and experts' profiles system facilitate the maintenance of organizational lessons learned and staff expertise. *H9* addresses the influence of knowledge sharing systems on knowledge sharing practice within the organization. The other technological factor is Web 2.0 which is a new technology of community-driven web users including social networking, CoPs, and blogs. *H9* and *H10* are related to the technological dimensions of knowledge sharing practices. We are primarily interested in how knowledge sharing systems and Web 2.0 technology effects knowledge sharing (Table III).

On the other hand, there is another set of hypotheses that address the relationship between the knowledge sharing practice and the organizational performance dimension. This

Table II Hypotheses related to organizational dimension

No.	Hypothesis
H5	Organizational management support has a positive effect on knowledge sharing practice
H6	Organizational rewards have a positive effect on knowledge sharing practice
H7	Less centralized structure of an organization has a positive effect on knowledge sharing practice
H8	A Supportive culture for knowledge sharing of an organization has a positive effect on knowledge sharing practice

Table III	Hypotheses related to technological dimension
No.	*Hypothesis*
H9	Knowledge sharing systems have a positive effect on knowledge sharing practice
H10	Web 2.0 technology in organization has a positive effect on knowledge sharing practice

dimension incorporates tangible and intangible benefits. Knowledge sharing practice has influences the growth of an organization through either market share expansion, staff growth, reduction of staff turnover or increment of production capacity. *H11* depicts the relationship between knowledge sharing practice and organization growth. One of the typical goal of most organizations is to reduce the cost. In this regards, knowledge sharing practice can play a role in achieving such a goal through training cost reduction, avoiding previous mistakes and learning from them, reduction of time to find key information or to proficiency in general. *H12* addresses the hypothesized relationship between knowledge sharing practice and cost reduction. The intangible benefit factor refers to those nonfinancial benfits gained from having knowledge sharing practice. For instance, accelerating problem solving, developing of new business opportunities, and competitive advantages. This relationship is reflected in the last hypothesis *H13*. *H11-H13* (Table IV) evaluate the effects of knowledge sharing practices on tangible benefits (organizational growth and cost reduction) and intangible benefits (innovation, dynamic capability of organizations, organizational learning, and competitive advantage) (Table IV).

3.3 Measures

3.3.1 Pilot study, sample and procedures. Initial data for the pilot study were collected from 41 respondents in the OG industry in Malaysia using an online questionnaire. A brief introduction and questionnaire were sent through email to key organizational members. These members disseminated the questionnaire to individual departments and units. Respondents' feedback was automatically retrieved and stored in Excel format and then integrated into SPSS package version 20.0. The online questionnaire was designed in a way that made it mandatory for respondents to answer all questions to submit their feedback. The pilot study was primarily used to conduct reliability analysis to determine if each construct was both valid and reliable. An alpha test was calculate and compared to the recommended threshold value of 0.60 (Hair *et al.*, 2010; Sekaran and Bougie, 2010). Accordingly, items below the threshold of the alpha value of 0.60 were removed, and they were not considered for any further analysis. A total of 203 valid responses were collected and used in the study.

3.3.2 Scales. Variables were measured using a five-point Likert scale. The Likert scale ranged from 5 "strongly agree" to 1 "strongly disagree".

3.3.3 Measurements. Fourteen constructs were investigated and latent constructs were measured through observed variables (indicators). The measurement items used in the survey to measure these constructs were adapted from previous studies. These measures

Table IV	Hypotheses related to organization performance
No.	*Hypothesis*
H11	Knowledge sharing practice has a positive effect on organization growth
H12	Knowledge sharing practice has a positive effect on cost reduction
H13	Knowledge sharing practice has a positive effect on intangible benefit

were adapted to fit the current study. All constructs, their measures, and supporting references are shown in Appendix 1.

4. Results

4.1 Preliminary analysis

4.1.1 Demographic characteristics. The demographic characteristics help the researchers to understand the structure of the sample regarding their backgrounds and professions. The researchers were interested in including only the most relevant characteristics to the research topic. In details, demographic profile describes the respondents regarding their gender, age, job title, qualification, years of experience, and job function. The total number of the respondents is 203 collected from OG industry in Malaysia. More details are shown in Table V.

In studies that use survey method some types of bias may occur such as non-response bias. Non-response bias happens when there is a difference between those who responded to the survey and those who do not. Some of the reasons are because of inaccurate targeted group and incomplete answers. However, in our survey we exactly targeted the right population as knowledge sharing is not a selective process and all employees should be involve despite their profession. Therefore, the sample included both technical and non-technical staff. Besides, all the feedbacks were valid and no incomplete

Table V Demographic characteristics

Demographic characteristic	*Frequency*	*(%)*
Gender		
Female	38	18.7
Male	165	81.3
Age		
18-24	8	3.9
25-34	127	62.6
35-44	52	25.6
45-54	14	6.9
55-64	2	1.0
Job title		
Junior Staff	79	38.9
Senior Staff	114	56.2
Manager	9	4.4
Senior manager	1	0.5
Qualification		
Degree	130	64.0
Diploma	5	2.5
Post graduate	68	33.5
Years of experience		
1-3	42	20.7
4-6	38	18.7
7-10	66	32.5
11-15	40	19.7
16-20	13	6.4
Above 20	4	2.0
Job function		
Non-technical	46	22.7
Technical	157	77.3
Total	*203*	

answer because the online survey was developed in way that does not allow the submission of incomplete or missing answers. Therefore, there is no indication of non-response bias issues.

4.1.2 Normality analysis. The assessment of normality is carried out utilizing the test of Skewness and Kurtosis. The critical ratio value for Skewness and Kurtosis is ± 2.58 at the significant level of 0.01(Byrne, 2013). It is also asserted that if the critical value of Skewness is ≤ 2.58 as an absolute value, then data are normally distributed. Normality test was carried out for all items of all constructs, and they showed a normal distribution as reported in Appendix 2.

4.1.3 Multicollinearity. Multicollinearity tests were conducted using the Tolerance and Variance Inflation Factor (VIF). The recommended tolerance range for VIF is ≤ 0.19 and VIF ≥ 5 (Hair *et al.*, 2010). Our findings indicate a lower tolerance level of 0.301 and the higher tolerance value at 3.321 and our within range. There are no indications that multicollinearity exists among the variables in our study.

4.1.4 Reliability and factor analysis. A reliability analysis was conducted using Cronbach's alpha, to test the inter-correlation among the individual items pertaining to a specific construct. De Vaus (2013) strongly recommends conducting a reliabilty analysis when Likert scales are used for data collection. Our findings indicate that alpha values, on the variables in question, range from 0.607 to 0.895 (Table VI). Based on the threshold value of 0.60 (Sekaran, 2006; Hair *et al.*, 2010), it is determined that the reliability of all constructs fall within acceptable levels.

Factor analysis was conducted and each observed variable significantly loaded on one component, with factor loadings ranging from 0.732 to 0.927. Furthermore, the rotated component matrix was examined and no complex structure was found. Thus, no reduction was necessary and all items were retained. The results also demonstrated that there were no cross loading among factors and all factors either highly loaded (>0.7) or low loaded (<0.4) on the different components. It is important to note however, that during the pilot study some items were removed because of their lack of reliability. Hence, the retained items which were used in the factor analysis produced better results and proved that all items were up to the required internal consistency level and assured sample adequacy.

4.1.5 Construct validity. The measurement items were validated to test the extent to which they can measure their respective construct. Construct validity was used for that purpose and it was done through conducting both convergent and discriminant validity. The convergent validity was evaluated by examining the factor loading for each measurement

Table VI Constructs, measurements, reliability and EFA results

Latent construct	*No. of items*	*Cronbach's alpha*	*Factor loadings*
Intention	3	0.0721	0.769-0.846
Reciprocity	2	0.836	0.927-0.927
Trust	2	0.607	0.845-0.845
Motivation	3	0.620	0.675-0.846
Management support	4	0.895	0.828-0.906
Rewards	4	0.881	0.732-0.901
Organization structure	4	0.812	0.788-0.824
Organization culture	3	0.874	0.886-0.901
Knowledge sharing systems	3	0.773	0.782-0.858
Web2.0	3	0.798	0.825-0.873
Knowledge sharing practice	3	0.773	0.791-0.874
Organization growth	3	0.840	0.857-0.885
Cost reduction	4	0.881	0.778-0.920
Intangible benefits	3	0.869	0.838-0.926

item on its underlying construct (Lomax and Schumacker, 2012). The factor loading should at least score 0.5 and preferably exceed 0.7 as asserted in Hair *et al.* (2010). Factor loadings found to be higher than 0.7, ranging from 0.732 to 0.927. The cross-loadings were examined as well to ensure that no complex structure exists (Appendix 2).

The discriminant validity was assessed using the average variance extracted (AVE), composite reliability, factor loadings and the squared multiple correlations. The AVE value has to exceed 0.50 to ensure the adequacy of the construct validity (Lomax and Schumacker, 2012). Henseler *et al.* (2016) Indicated that the AVE should be greater than R^2 to establish the discriminant validity. The results indicated that all values of AVE exceeded the threshold of 0.50 and AVE for each construct was greater than the corresponding R^2 at the same time (Appendix 2). Hence, the discriminant validity is established.

4.1.6 Common method bias. Previous studies have mostly used either Harman single factor test or marker variable technique to detect the presence of common method variance issue (Sharma *et al.*, 2009). In this study, the authors applied Harman single factor to check for common method bias existence. To conduct Harman single factor test, loading of all measurements are calculated using exploratory factor analysis technique. The existence of common method variance issue is discovered when a single factor explains the majority which means 50 per cent or more of the variance among the measurements (Sharma *et al.*, 2009). In this study, findings asserted that the total of the variance which can be explained by a single/general factor is only 39.5 per cent (Appendix 2). Therefore, no presence of common method bias issue in the dataset.

4.2 Measurement model assessment

The measurement scales used to evaluate the strength of the measurement between the latent variables and their corresponding indicators were validated. Hair *et al.* (2010) found that structural analyses are untrustworthy if a measurement model has low reliability. A goodness-of-fit test was conducted using a group of model fit indices, including Chi-Square (χ2/df), CFI, NFI, GFI, IFI, RMR, and RMSEA. The measurement model depicted in Figure 2 results in a χ^2/df = 1.903, CFI= 0.883, NFI= 0.787, IFI = 0.885, GFI =0.764, RMSEA= 0.067, RMR = 0.044. Fit indices indicate that the measurement model achieved a good overall fit (Table VII).

4.3 Structural model and hypotheses testing

The structural model depicts the relations among the latent variables (constructs) which is specified by the model including indirect relationships. Given that the structural model in this study mainly focuses on the hypotheses, the structural model can only be viewed as a description of each construct through either direct or indirect links. Testing the study hypotheses are based on the results obtained applying SEM approach using the AMOS 20.0 software package. Standardized regression coefficients and its level of significance are explained in Table VIII.

Table VIII provides a summary of the hypotheses under study. All p values were less than 0.001 except *H3* and *H7* p values <0.05 these values were 0.011 and 0.04 respectively). Out of the 13 proposed hypotheses, 11 are significant at the $p < 0.001$ level. *H3* and *H7* are significant at the level of $p < 0.05$.

Squared multiple correlation R^2 values were calculated for the dependent (endogenous) variables including knowledge sharing practice, organization growth, cost reduction and intangible benefits. The findings show that the calculated R^2 for the knowledge sharing practice construct is 0.81. Thus 81 per cent of the variation in the knowledge sharing practice variable can be explained. Likewise, the R^2 for organization growth, cost reduction and intangible benefits were 0.76, 0.67 and 0.86, respectively. These findings indicate that

Figure 2 Measurement model

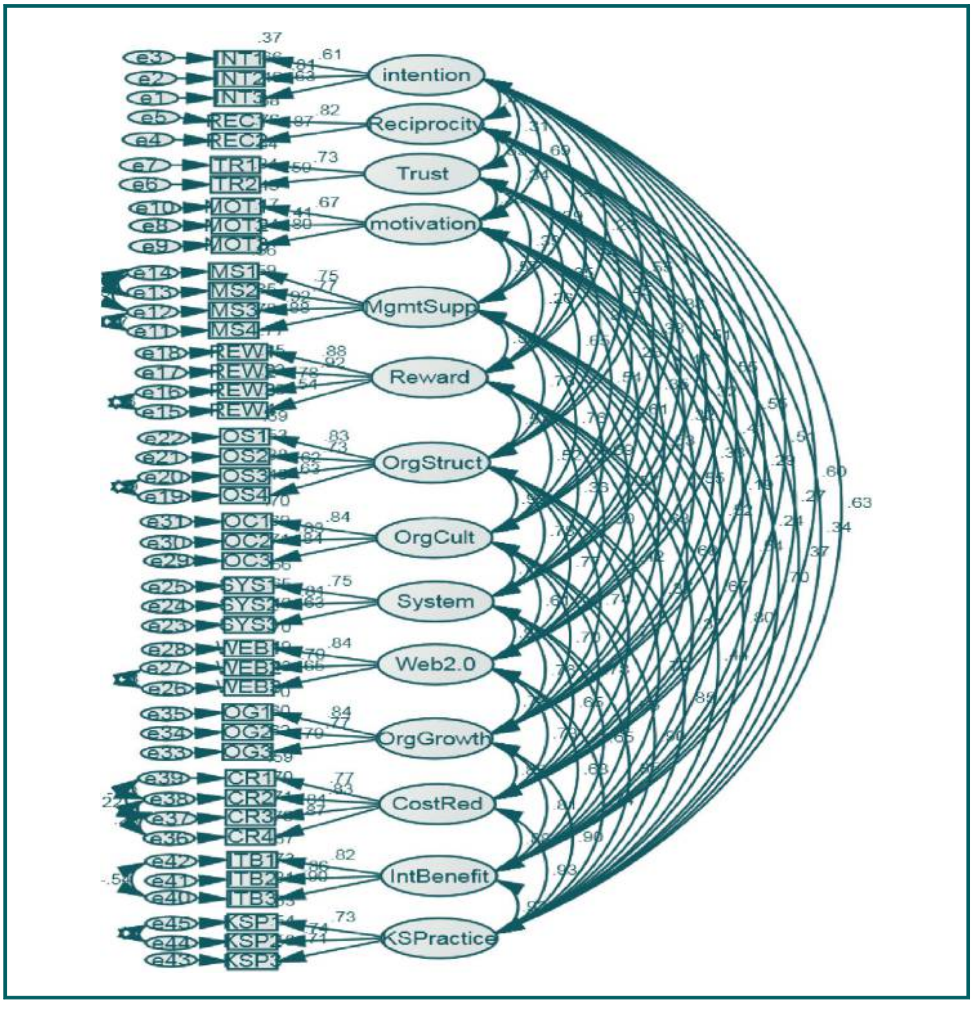


Table VII Goodness of fit indices threshold

Fit index	*Recommended range*	*Measurement model*
$\chi 2$/df	<3; <5	1.903
CFI	≥0.90; ≥0.80	0.883
NFI	≥0.90; ≥0.80	0.787
IFI	≥0.90	0.885
GFI	≥0.90; ≥0.80	0.764
RMSEA	0.060 to 0.08	0.067
RMR	<0.10	0.044

Source: Kline (2015), Swanson and Holton (2005), Hair *et al.* (2010), Doll *et al.* (1995)

the knowledge sharing practice is able to explain 76 per cent of the variation in organization growth, 67 per cent of the variation in cost reduction, and 86 per cent of the variation in the intangible benefits. The R^2 statistics have confirmed the hypotheses testing results and emphasized the important role that knowledge sharing practice has on organizational performance. In general, the R^2 reflects that the structural model and provides significant explanation for the independent (endogenous) variables especially knowledge sharing practice and intangible benefits. A path diagram summarizing the results of testing the

Table VIII Hypotheses testing results

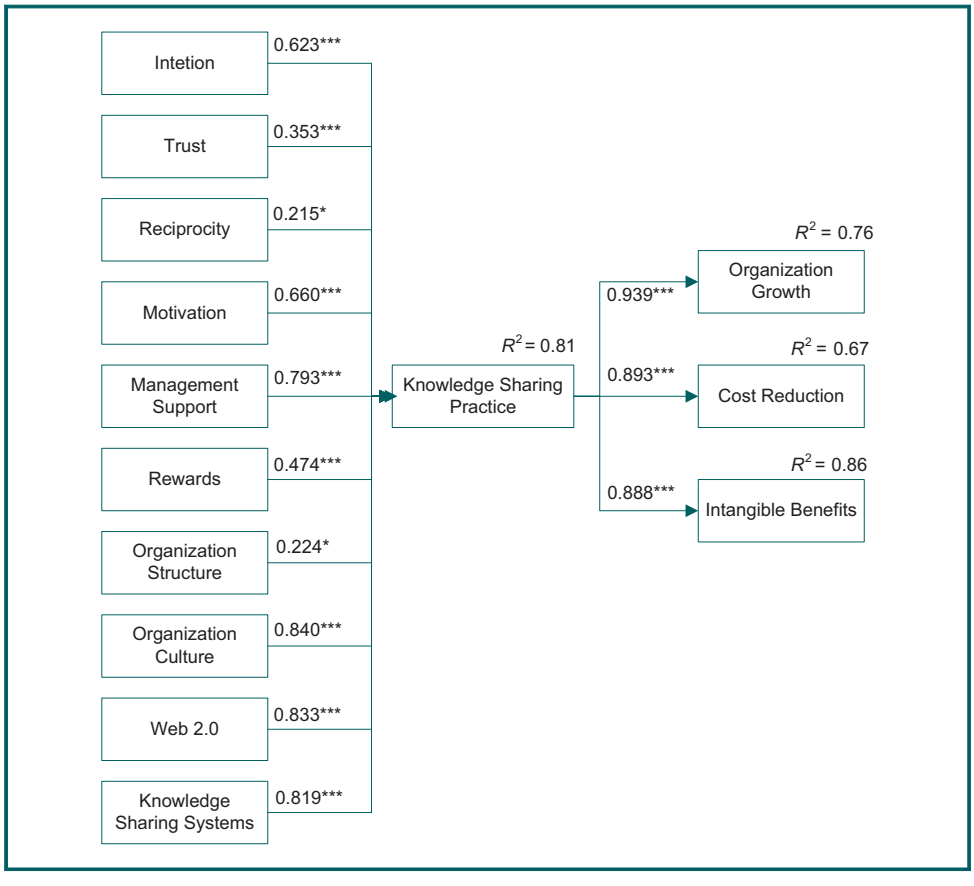
No.	Hypothesized path	Standardized path coefficient	t-value (C.R)	Remarks
H1	Individual's intention for knowledge sharing → knowledge sharing practice	0.623	6.316***	Supported
H2	Interpersonal trust → knowledge sharing practice	0.353	3.440***	Supported
H3	Reciprocal relationships → knowledge sharing practice	0.215	2.537*	Supported
H4	Motivation to share knowledge → knowledge sharing practice	0.660	7.793***	Supported
H5	Management support → knowledge sharing practice	0.793	11.253***	Supported
H6	Organizational rewards → knowledge sharing practice	0.474	5.221***	Supported
H7	Less centralized structure → knowledge sharing practice	0.224	2.013*	Supported
H8	Supportive organizational culture → knowledge sharing practice	0.840	10.631***	Supported
H9	knowledge sharing systems → knowledge sharing practice	0.833	8.917***	Supported
H10	Web2.0 → knowledge sharing practice	0.819	8.321***	Supported
H11	Knowledge Sharing Practice → organizations' growth	0.888	11.560***	Supported
H12	Knowledge Sharing Practice → cost reduction	0.893	7.780***	Supported
H13	Knowledge Sharing Practice → intangible benefit	0.939	11.630***	Supported

Notes: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

hypothesized relationships among the model constructs (standardized coefficient), their level of significance (p-value), and R^2 values can be found in Figure 3.

The initial hypotheses examined the relationships between the individual dimensions and knowledge sharing practice. The path coefficients for intention to share knowledge (*H1*),

Figure 3 Study path model



trust among the staff (*H2*), reciprocal relationships (*H3*) and the motivation to share the knowledge (*H4*) to knowledge sharing practice were as hypothesized.

The standard path coefficient for intention to share knowledge is 0.623. The estimation revealed a significant *t*-value of 6.316 associated with $p = 0.000$. The intention to share knowledge increases the chance of the actual act of knowledge sharing. Therefore, *H1* the intention of an employee to share knowledge is supported. *H2* evaluates the relationship between trust among staff and knowledge sharing practice. The standardized path coefficient is 0.353 with *t*-value of 3.440 which is significant at the $p < 0.001$ level. Trust among staff as is an important factor for knowledge sharing practice. *H2* is supported. Reciprocal relationships also prove to be important to knowledge sharing practice. The standardized path coefficient for reciprocal relationships is 0.215 with a *t*-value of 2.537 at the $p < 0.05$ level. *H3* is supported. An individual's motivation to share knowledge positively impacts the practice of knowledge sharing within organizations. The estimated path coefficient between motivation and knowledge sharing practice was 0.660 with a *t*-value of 7.793 which is significant at the $p < 0.001$ level. Based upon these findings, *H4* is supported.

The second set of *H5-H9* examines the relationships between the organizational variables (management support, organizational rewards, organizational structure and supportive organizational culture) and their relationships with knowledge sharing practice. The relationship between management support and knowledge sharing practice produced a standardized path coefficient of 0.793, with a *t*-value of 11.253. The estimated path coefficient was significant at the level of $p < 0.001$; hence, *H5* is supported. *H6* examines the influence of organizational rewards on knowledge sharing. The estimated path coefficient was 0.474 and the *t*-value of 5.221 was found significant at the $p < 0.001$ level. *H6* is supported and demonstrates the positive influence of organizational rewards on the practice of knowledge sharing within the organization. *H7* measured the relationship between organizational structure and knowledge sharing practice. The estimated path coefficient for this hypothesis is 0.224 and the *t*-value of 2.013 was found to be significant at the $p < 0.05$ level. Therefore, *H7* is supported and demonstrates that a less centralized structure helps an organization increase the practice of knowledge sharing. The estimated path coefficient for *H8* was (0.840) which indicated a large amount of influence. This standardized path coefficient was associated with a highly significant *t*-value of (10.631) at the level of $p < 0.001$. Supportive organizational culture (*H8*) is supported as having a positive effect on knowledge sharing.

H9 and *H10* measure the technological relationships (knowlwedge sharing systems and Web 2.0) on knowledge sharing practice. *H9* captures the relationship between knowledge sharing systems and knowledge sharing practice. The path coefficient is 0.833 indicating a large effect. The *t*-value 8.917 is significant at the level of $p < 0.001$. *H9* is supported. *H10* examined the relationshio between Web2.0 and knowledge sharing practice. A path coefficient of 0.819 with a significant *t*-value of (8.321) at the $p < 0.001$ level demonstrates a strong positive influence of Web2.0 on knowledge sharing practice. *H10* is supported.

H11-H13 exam the relationship between knowledge sharing practice and organizational outcomes (organizational growth, cost reduction, and intangible benefits). The relationship between knowledge sharing practice and organizational growth (*H11*) was significant with the highest path coefficient estimation in the study of 0.939. The associated is *t*-value of 11.630, which is significant at the level of ($p < 0.001$). *H11* is supported. *H12* assumes that the practice of sharing knowledge helps the organization to reduce the cost. The results showed the standardized path coefficient was 0.893 and the *t*-value for this path was 7.780. This *t*-value was significant at the level of ($p < 0.001$). Hence *H12* is supported. These results prove that there is a positive effect of the knowledge sharing on the cost reduction. Finally, *H13* measures the influence of knowledge sharing practice on an organization's

intangible benefits. The path coefficient is 0.888 with a *t*-value of 11.560 at the ($p < 0.001$). *H13* is supported. Knowledge sharing practice has the capacity to bring the organization intangible benefits, such as faster problem solving, developing new business opportunities and creating a competitive advantage.

5. Discussion

Organizations in the OG industry operate in a turbulent and complex and environment. The complexity is primarily because of globalization, outsourcing, government rules, and rapidly changing technology. Companies in this industry are struggling with frequent turnover and retirements, which is causing a loss of knowledge in both OG organizations and ultimately the industry. It is the impetus of this study to find the means to increase and capture knowledge through knowledge sharing processes. The results of this study indicate that individual, organizational and technological factors exist that have an effect on knowledge sharing practices. Knowledge sharing practices in turn effect organizational growth, cost reduction and intangible benefits.

This study demonstrates that individuals are more apt to share knowledge with coworkers, when the individual feels confident about their capability to perform the act of knowledge sharing. The findings also indicate that an employee's intent to share knowledge comes from the simple enjoyment of sharing knowledge with others. Furthermore, the subjective norms of a community may interfere with an individual's intention is share. For instance, employees tend to share knowledge with others when they feel that there is a norm or expectation of knowledge sharing. Our findings, similar to findings by Hau *et al.* (2013), find that knowledge sharing behavior is increased through subjective norms, sense of enjoyment and an individual's confidence in their ability to engage in knowledge sharing activities.

Trust among employees positively impacts knowledge sharing. Our findings indicate that employees tend to trust coworkers, who appear competent and reliable. Individuals also prefer to share their knowledge with colleagues whom they favor. These findings provide empirical support that interpersonal trust has a positive influence on knowledge sharing among the staff of the organization. A recent study by Amayah (2013) also found that trust among employees increases the knowledge sharing practice.

Our findings further demonstrate that reciprocal relationships create a high expectation that individuals will share knowledge. The existence of a reciprocal relationship between two or more coworkers increases the chance that communication and an exchange of knowledge will occur. The mutual relationship of giving and receiving appears to encourage the act of knowledge sharing among individual and enrich the knowledge sharing practice within the organization. Our results are similar to Hau *et al.* (2013), who established that reciprocity plays a significant role in knowledge sharing among an organizations' employees.

Individual employees can also be motivated to share knowledge, when they feel they will benefit intellectually. For instance, being part of group discussions and problem-solving provide opportunities to gain knowledge and learn new skills. Individuals who share vital knowledge in an organization improve their reputation with coworkers. Though many employees may only share knowledge for personal gain, the findings prove that individual motivation increases the practice of knowledge sharing in organizations. This finding is supported by Amayah (2013) who stated that individual motivations including personal benefits are considered as enablers for knowledge sharing practice. Therefore, motivation is a powerful factor that increases personal enthusiasm for knowledge sharing.

From an organizational standpoint, top and middle management support of knowledge sharing plays an integral role in encouraging and increasing the practice of knowledge sharing throughout the organization. Managers, section leads, supervisors and team leaders need to emphasize sharing ideas, providing professional guidance and even

technical advice based on experience. Managers can encourage employees to make sharing a part of their daily routine. In addition, top management should support activities that help increase communication and an exchange of ideas and experiences. Furthermore, top management must respect and respond to employees' ideas and concerns. Management support allows employees to share experiences and develop new skills. Our findings were similarly supported by a previous study conducted by Chen and Cheng (2012) in which they assert that management support plays a vital role in enriching knowledge sharing practices.

Intrinsic and extrinsic organization rewards were both considered in the scope of this study. Extrinsic rewards including salary raises and bonuses that were provided by to employees based upon knowledge sharing. Intrinsic rewards including acknowledgement and recognition play a positive role towards motivating employees to share knowledge. Research by Hau *et al.* (2013) claimed that rewards can only increase explicit knowledge sharing and not tacit knowledge sharing. However, other studies have confirmed that rewards have a positive influence on knowledge sharing practices in general (Amayah (2013) Burgess (2005).

Managers can increase knowledge sharing by creating a less centralized structure that supports communication among employees. Knowledge sharing can increase when it is embedded in the daily work routines and shared in informal meetings in open workspaces. Employees prefer to exchange their insights and discuss technical problems in more informal and settings. Findings indicate that open workspace environments increase communication among staff members. Furthermore, job rotation allows for employees to learn new skills, while making new connections, as they encounter coworkers from different departments. Our findings support an earlier study by Wang and Noe (2010) that found that knowledge sharing increased in a less centralized structure, as it provides a friendly environment which increases the chance for the staff interactions and more knowledge sharing practice.

To further facilitate knowledge sharing, managers can nurtures a culture that supports knowledge sharing activities and encourages learning. A supportive culture emphasizes learning, creativity, teamwork, and collaboration. Managers can encourage staff to be creative while being accepting of mistakes that may occur as a result of trying new methods and techniques. These findings are in agreement with earlier results published by Amayah (2013), which asserts that a supportive organizational culture positively affects the practice of knowledge sharing within organizations. Such a culture turns an organization into a learning organization that promotes knowledge sharing.

Accordingly, employees should have access to the organization's databases. The repositories should be easy to access all documented knowledge. Since knowledge can be classified as either tacit or explicit. The explicit knowledge simply refers to the documented sort of knowledge. Providing access to databases and repositories helps the staff to explore and share explicit knowledge. Expert profiles/locators systems also provide information to employees regarding organizational experts. Expert locator systems contain experts personal profile information, field of expertise, contact details, and other relative information. It helps employees easily identify whom to contact in case of challenging situation, need for technical advice, guidance and recommend suggestions. Archer-Brown and Kietzmann (2018) stated that expert profile enables employees to access their collective knowledge of colleagues. Knowledge sharing systems also include the organization portal systems which can incorporate databases and also provide experts profile. In fact, portals work as a gateway to the organization databases and provide a communication platform at the same time. Knowledge sharing systems combine all three types of systems which provide a tool for sharing knowledge especially explicit knowledge. The previous studies such as Kosalge (2015) and

Oyefolahan and Dominic (2013) have supported these findings and emphasized on the great role of knowledge sharing systems as enablers for the practice of knowledge sharing. Organizations in OG industry already have the information technology in place; only they need to focus on maximizing the usage of such technology.

Web 2.0 technology is an effective platform that has the capacity to provide a solid foundation for a variety of knowledge sharing initiatives and activities and provides a platform for socialization to take place in an organization. Web 2.0 is especially important given that tacit knowledge can only be shared through socialization, which was demonstrated by Nonaka and Takeuchi in their SECI model (Nonaka *et al.*, 2005). The process of socializing does not necessarily need to take place through face-to-face interactions, as technology has evolved to the point where socializing allows employees to communicate and have more relaxed interactions through the use of technology. Web 2.0 (online/virtual CoPs, weblogs) and intranet allow for this type of communication to occur. Most firms in the OG industry are already well equipped with sophisticated technology. Therefore, managers should begin with their current set of technological tools to increase the sharing of tacit and explicit knowledge. The findings provide managers with evidence that the adoption of socialization through Web2.0 will results in increased knowledge sharing practices. Our findings are in line with earlier studies that support the role of web 2.0 technology in increasing knowledge sharing practice (Aljuwaiber *et al.*, 2016; Hidayanto *et al.*, 2015; Panahi *et al.*, 2013).

An exciting finding for organizational leaders, is that knowledge sharing is positively associated with organizational performance, especially growth in sales (Wang and Noe, 2010). Knowledge sharing practices create a learning environment. For instance, when an organization provides opportunities for employees to learn and accumulate new experiences, they continue to develop their skills. Learning and development motivate employees to remain with an organization, instead of looking for opportunities elsewhere. As a result, staff turnover rates decrease and knowledge remains in house, eventually resulting in better overall performance. Accordingly, knowledge sharing practice has a positive influence on the overall organization growth.

Managers are often looking for ways to cut costs, but many times do not recognize the exorbitant costs associated with voluntary and involuntary turnover. Training and development need to occur for improved performance. However, training staff is costly (Al-Omari *et al.*, 2016). Knowledge sharing practices and tools provide an opportunity for learning to take place in a more cost effect manner. In addition, with systems in place, employees can share achievements and mistakes with others. Furthermore, knowledge sharing creates a culture through which it is easier for the staff to access key knowledge in less time. An earlier study supports our further supports our findings that practicing knowledge sharing results in cost reduction and enables the creation of new knowledge to occur (Abili *et al.*, 2011). Knowledge sharing also facilitates time to proficiency for employees. Therefore, knowledge sharing practice enables the organizations to reduce overall costs.

In this study, we considered faster problem solving, developing new business opportunities, and competitive advantage to represent the intangible benefits that an organization will realize through engaging in knowledge sharing practice. For instance, staff involvement in knowledge sharing activities, strengthens the relationship as confirmed by Archer-Brown and Kietzmann (2018), and builds interpersonal trust among employees. Furthermore, employees engagement in knowledge sharing activities builds a bridge between colleagues and creates a collaborative environment. Such collaboration among employees helps them to overcome technical challenges, and that leads to faster problem-solving. Lin (2007b) also found that knowledge sharing enhances quick response to both providing and accelerating knowledge dissemination resulting in increased problem-solving. In addition, organizations that practice knowledge sharing allow for knowledge to

remain and be housed within organizations, thus increasing their capability to gain a competitive advantage. Wang and Noe (2010) also assert that knowledge sharing is the door through which employees can participate in providing the organization with a long-term competitive advantage, including increased innovation and creativity. According to Lin (2007b), innovation and creativity can be developed through enabling knowledge and new ideas to be shared. Thus, knowledge sharing practice provides employees with accessible knowledge and aids the organization through faster problem-solving, creativity, development of new business opportunities and the platform for to gain an increase in competitive advantage.

6. Conclusion

The OG industry has struggled to combat voluntary and involuntary turnover and the resulting loss of knowledge. It has been the purpose of this study to evaluate the key elements that influence knowledge sharing practice with the intention of helping managers decrease costs, improve growth and ultimately create and maintain a sustainable competitive advantage. The findings highlight the importance of creating an environment for knowledge sharing practice to occur based upon individual, organizational and technological resources.

Individual factors that impact knowledge sharing include an individual's intention to share, reciprocal relationships, trust among individuals and the motivation to share knowledge. The empirical tests, proven these relationships to be significant. These four factors have a strong positive impact on the practice of knowledge sharing among employees. Furthermore, our results indicate that four organizational factors also play an important role in enhancing knowledge sharing in the OG industry. These organizational factors, management support, rewards, decentralized organizational structure and a supportive organizational culture, positively impact the practice of knowledge sharing within organizations in the OG industry. Moreover, our findings indicate that knowledge sharing systems and Web2.0 technology have a strong positive influence on the practice of knowledge sharing in organizations. Most knowledge sharing systems help to disseminate explicit knowledge, whereas Web 2.0 facilitates tacit knowledge sharing through a platform that encourages socialization. Knowledge sharing practices also have a strong positive impact on tangible and intangible benefits by reducing costs and contributing to organizational growth in the OG industry. Therefore, we have provided clear outcomes for the positive role of knowledge sharing practices in enhancing the overall organizational performance.

This study focused on the multinational OG industry. Given the industry choice, respondents came from a variety of backgrounds and cultures. Cultural was not a focus in this research, as it had the potential to interfere the feedback received from the respondents. This is a potential limitation to our study. In addition, the authors built the conceptual framework around factors that enable or facilitate knowledge sharing practice in the organizations. Clearly, there are other factors that inhibit knowledge sharing practices. These factors that were not considered in our study and could potentially serve as a potential limitation.

Limitations however open the door for further research. For instance, one avenue for future research may include cultural differences and examine knowledge sharing practice from individual and organizational perspectives grounded in culture. Cultural factors many potentially mediate and/or moderate the various relationships under investigation. Another promising research direction would be to study cases in which organizations failed to implement knowledge sharing in OG sector. Such unsuccessful attempts can provide beneficial information as to what factors might hinder knowledge sharing adoption.

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Appendix 1

Table AI Construction from previous authors

No.	Item	Construct	Source
1	I intend to share my knowledge with others because people important to me think I should share my knowledge	Intention (INT)	Goh and Sandhu (2013), Wang and Wang (2012), Aliakbar *et al.* (2012), Jeon *et al.* (2011), Ryu *et al.* (2003)
2	I intend to share my knowledge with others because I enjoy sharing my knowledge		
3	I intend to share my knowledge with others when I am confident about my ability to perform knowledge sharing		
4	I intend to share my knowledge with others based on my negative or positive feeling towards engaging in knowledge sharing		
5	I would rather share my knowledge with those who share their knowledge and experience in return	Reciprocity (REC)	Hau *et al.* (2013), Okyere Kwakye and Nor (2011), Hsu *et al.* (2007)
6	I would rather share my knowledge whenever I feel confident about my ability to do it		
7	I would rather share my knowledge with competent and reliable people	Trust (TR)	Goh and Sandhu (2013), Holste and Fields (2010), Renzl (2008)
8	I would rather share my knowledge with those people whom I have care and concern for		
9	I share my knowledge and experience with colleagues because I want to benefit others	Motivation (MOT)	Amayah (2013), Okyere-Kwakye and Nor (2011), Hsu and Lin (2008)
10	I share my knowledge and experience with colleagues because I want to gain a personal reputation in the organization		
11	I share my knowledge and experience with colleagues because I want to gain intellectual benefit		
12	I believe knowledge sharing practice will be increased if top management and immediate supervisors encourage employees to share knowledge	Management support (MS)	Chen and Cheng (2012), Wang and Noe (2010), Yang (2007)
13	I believe knowledge sharing practice will be increased managers support the knowledge sharing activities		
14	I believe knowledge sharing practice will be increased top management respect and response to employees' viewpoints		
15	I believe knowledge sharing practice will be increased if top management promotes knowledge and experience sharing		
16	I believe knowledge sharing practice will be increased if salary rises awarded to employees who contribute to knowledge sharing	Rewards (REW)	Tung and Chang (2011), Ismail and Yusof (2010), Pearlasamy *et al.* (2008), Lin (2007a), Lee and Ahn (2007)
17	I believe knowledge sharing practice will be increased if bonuses are given to employees based on their contribution to knowledge sharing		
18	I believe knowledge sharing practice will be increased if promotions of employees are based on their participation in knowledge sharing		
19	I believe knowledge sharing practice will be increased if the organization acknowledges/recognizes an employee based on his/her effort to share knowledge		
20	I believe knowledge sharing practice will be increased if managers provide employees with feedbacks to develop their abilities for knowledge sharing		
21	I believe knowledge sharing practice will be increased if the organization empowers employees and supervisors who have the most influence on knowledge sharing activities		
22	I believe knowledge sharing practice will be increased if the organization supports informal meetings	Organization structure (OS)	Wang an Noe (2010)
23	I believe knowledge sharing practice will be increased if open space offices environment is adopted		
24	I believe knowledge sharing practice will be increased if job rotation is applied		
25	I believe knowledge sharing practice will be increased if the organization considers knowledge sharing as part of the job description		

(*continued*)

Table AI

No.	Item	Construct	Source
26	I believe knowledge sharing practice will be increased if organizations emphasize on learning culture	Organization culture (OC)	Chen and Cheng (2012), Wang and Noe (2010), Yang (2008), Yang (2007)
27	I believe knowledge sharing practice will be increased if organizations willing to accept employees' mistakes while being creative		
28	I believe knowledge sharing practice will be increased if organizations emphasize on team working and collaboration		
29	I believe knowledge sharing practice can be facilitated through databases and repositories	Knowledge sharing systems (KSS)	Choi *et al.* (2010), Lee *et al.* (2009), Fernandes *et al.* (2005), Van Baalen *et al.* (2005)
30	I believe knowledge sharing practice can be facilitated through organization's knowledge portal		
31	I believe knowledge sharing practice can be facilitated through experts' profiles		
32	I believe knowledge sharing practice can be facilitated through Weblogs	Web 2.0 (web)	Paroutis and Al Saleh (2009), Pearlasamy *et al.* (2008), Koh and Kim (2004)
33	I believe knowledge sharing practice can be facilitated through computer network infrastructure (intranet)		
34	I believe knowledge sharing practice can be facilitated through virtual/ online communities		
35	I frequently share my knowledge with my colleagues	Knowledge sharing practice (KSP)	Hsu and Chang (2014)
36	I frequently involve myself in discussions of various topics with my colleagues		
37	I frequently spend some time discussing complex problems with my colleagues		
38	I believe, knowledge sharing practice enables the organization to achieve employment growth	Organization growth (OG)	Hana and Lucie (2011), Popova and Sharpanskykh (2010), Daunfeldt *et al.* (2010), Marr *et al.* (2004)
39	I believe, knowledge sharing practice enables the organization to expand the market share		
40	I believe, knowledge sharing practice enables the organization to increase production capacity		
41	I believe, knowledge sharing practice enables the organization to reduce the staff turnover		
42	I believe, knowledge sharing Practice enables the organization to reduce the cost of training	Cost reduction (CR)	Ishak (2011), Robertson (2007)
43	I believe, knowledge sharing Practice enables the organization to avoid previous mistakes and learn from them		
44	I believe, knowledge sharing Practice enables the organization to reduce the time to proficiency		
45	I believe, knowledge sharing Practice enables the organization to reduce the time to find a key information		
46	I believe, adopting knowledge sharing practice enables the organization to accelerate problem-solving	Intangible benefit (IB)	Pai et al. (2013) Lin (2007b) McKeen *et al.* (2006)
47	I believe, adopting knowledge sharing practice enables the organization to develop new business opportunities		
48	I believe, adopting knowledge sharing practice enables the organization to get an advantage over its competitors		

Appendix 2

Table AII Normality test results

Construct name	Item name	N Statistic	Skewness Statistic	Skewness Std. Error	Kurtosis Statistic	Kurtosis Std. Error
Intention	INT1	203	−0.331	0.171	−0.434	0.340
	INT2	203	−0.425	0.171	−0.439	0.340
	INT3	203	−0.298	0.171	−1.263	0.340
Reciprocity	REC1	203	−0.214	0.171	−0.967	0.340
	REC2	203	−0.781	0.171	0.471	0.340
Trust	TR1	203	−0.043	0.171	−1.005	0.340
	TR2	203	−0.253	0.171	−1.037	0.340
Motivation	MOT1	203	−0.309	0.171	−1.094	0.340
	MOT2	203	−0.252	0.171	−0.709	0.340
	MOT3	203	−0.452	0.171	−0.463	0.340
Management support	MS1	203	−0.458	0.171	−0.937	0.340
	MS2	203	−0.587	0.171	−0.764	0.340
	MS3	203	−0.358	0.171	−1.091	0.340
	MS4	203	−1.333	0.171	2.334	0.340
Rewards	REW1	203	−0.193	0.171	−0.886	0.340
	REW2	203	0.031	0.171	−1.193	0.340
	REW3	203	−0.517	0.171	−0.523	0.340
	REW4	203	−0.396	0.171	−0.453	0.340
Organization structure	OS1	203	−0.388	0.171	−0.629	0.340
	OS2	203	−0.392	0.171	−0.356	0.340
	OS3	203	−0.209	0.171	−0.861	0.340
	OS4	203	−0.282	0.171	−0.909	0.340
Organization culture	OC1	203	−0.495	0.171	−0.333	0.340
	OC2	203	−0.347	0.171	−0.741	0.340
	OC3	203	−0.323	0.171	−1.297	0.340
Knowledge sharing systems	SYS1	203	−0.167	0.171	−1.068	0.340
	SYS2	203	−0.063	0.171	−0.977	0.340
	SYS3	203	−0.131	0.171	−1.106	0.340
Web 2.0	WEB1	203	0.061	0.171	−0.822	0.340
	WEB2	203	1.096	0.171	−0.807	0.340
	WEB3	203	−0.101	0.171	−0.465	0.340
Organization growth	OG1	203	−0.559	0.171	−0.753	0.340
	OG2	203	−0.093	0.171	−1.008	0.340
	OG3	203	−0.316	0.171	−0.712	0.340
Cost reduction	CR1	203	−0.364	0.171	−0.842	0.340
	CR2	203	−0.399	0.171	−1.003	0.340
	CR3	203	−0.191	0.171	−1.070	0.340
	CR4	203	−0.323	0.171	−1.024	0.340
Intangible benefit	ITB1	203	−0.387	0.171	−0.900	0.340
	ITB2	203	−0.174	0.171	−1.135	0.340
	ITB3	203	−0.221	0.171	−1.103	0.340
Knowledge sharing practice	KSP3	203	−0.471	0.171	−0.691	0.340
	KSP2	203	−0.368	0.171	−0.968	0.340
	KSP1	203	−0.467	0.171	−0.714	0.340

Table AIII Convergent validity results

Factor	*Item name*	*Factor loadings*	*Loading average*
Intention	INT1	0.769	0.8
	INT2	0.846	
	INT3	0.788	
Reciprocity	REC1	0.927	0.9
	REC2	0.927	
Trust	TR1	0.845	0.8
	TR2	0.845	
Motivation	MOT1	0.782	0.8
	MOT2	0.675	
	MOT3	0.846	
Management support	MS1	0.897	0.9
	MS2	0.906	
	MS3	0.885	
	MS4	0.828	
Rewards	REW1	0.877	0.9
	REW2	0.901	
	REW3	0.890	
	REW4	0.732	
Organization structure	OS1	0.824	0.8
	OS2	0.796	
	OS3	0.793	
	OS4	0.788	
Organization culture	OC1	0.886	0.9
	OC1	0.901	
	OC3	0.896	
Knowledge sharing systems	SYS1	0.843	0.8
	SYS2	0.858	
	SYS3	0.782	
Web2.0	WEB1	0.825	0.9
	WEB2	0.873	
	WEB3	0.871	
Knowledge sharing practice	KSP1	0.863	0.8
	KSP2	0.874	
	KSP3	0.791	
Organization growth	OG1	0.885	0.9
	OG2	0.857	
	OG3	0.871	
Cost reduction	CR1	0.778	0.9
	CR2	0.875	
	CR3	0.907	
	CR 4	0.920	
Intangible benefits	ITB1	0.838	0.9
	ITB2	0.926	
	ITB3	0.903	

Table AIV Discriminant validity results

Latent construct	*No. of items*	*Indicator loadings*	R^2	*Composite reliability*	*AVE > 0.5*
Intention	3	0.769-0.846	0.388	0.843	0.643
Reciprocity	2	0.927-0.927	0.352	0.924	0.859
Trust	2	0.845-0.845	0.125	0.833	0.714
Motivation	3	0.675-0.846	0.436	0.813	0.594
Management support	4	0.828-0.906	0.628	0.932	0.774
Rewards	4	0.732-0.901	0.224	0.914	0.727
Organization structure	4	0.788-0.824	0.596	0.877	0.641
Organization culture	3	0.886-0.901	0.705	0.923	0.800
Knowledge sharing systems	3	0.782-0.858	0.659	0.868	0.686
Web2.0	3	0.825-0.873	0.671	0.892	0.734
Knowledge sharing practice	3	0.791-0.874	0.602	0.881	0.711
Organization growth	3	0.857-0.885	0.708	0.904	0.759
Cost reduction	4	0.778-0.920	0.707	0.927	0.760
Intangible benefits	3	0.838-0.926	0.681	0.919	0.792

Table AV Common method bias results

	Total variance explained					
	Initial eigenvalues			Extraction sums of squared loadings		
Component	*Total*	*% of variance*	*Cumulative (%)*	*Total*	*% of variance*	*Cumulative (%)*
1	17.391	39.524	39.524	17.391	39.524	39.524
2	2.732	6.210	45.734			
3	2.249	5.111	50.844			
4	1.745	3.966	54.810			
5	1.650	3.751	58.561			
6	1.478	3.358	61.919			
7	1.389	3.157	65.076			
8	1.131	2.571	67.647			
9	1.065	2.420	70.067			
10	0.945	2.147	72.214			
11	0.843	1.915	74.130			
12	0.809	1.839	75.969			
13	0.743	1.689	77.657			
14	0.689	1.565	79.222			
15	0.660	1.499	80.722			
16	0.605	1.375	82.097			
17	0.577	1.312	83.409			
18	0.533	1.211	84.619			
19	0.529	1.202	85.822			
20	0.492	1.118	86.940			
21	0.471	1.071	88.011			
22	0.430	0.977	88.988			
23	0.411	0.933	89.921			
24	0.386	0.877	90.798			
25	0.345	0.784	91.583			
26	0.337	0.767	92.350			
27	0.315	0.715	93.065			
28	0.297	0.674	93.739			
29	0.291	0.661	94.400			
30	0.270	0.613	95.014			
31	0.250	0.567	95.581			
32	0.231	0.525	96.106			
33	0.211	0.479	96.584			
34	0.206	0.469	97.054			
35	0.193	0.439	97.492			
36	0.172	0.390	97.883			
37	0.158	0.360	98.243			
38	0.143	0.326	98.569			
39	0.134	0.305	98.874			
40	0.131	0.297	99.171			
41	0.112	0.254	99.425			
42	0.093	0.211	99.635			
43	0.084	0.191	99.827			
44	0.076	0.173	100.000			

Extraction Method: Principal Component Analysis

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