KNOWLEDGE SHARING FRAMEWORK FOR RESEARCH SUPERVISION

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Abstract

Universities face new challenges and opportunities and must be innovative in order to develop their competitive advantage. One of the most important objectives of universities is to promote students as professional knowledge workers. Knowledge sharing between students and supervisors is therefore vital for universities. In this paper, the knowledge management model for research supervision and theory of technology are used as the basis for the proposal of a knowledge sharing framework designed to improve quality in research supervision. This framework shows that there are three factors which influence knowledge sharing in the supervision process, namely: individual, organizational, and technological factors. Knowledge sharing facilitates the research process by developing knowledge management skills, improving the quality of the learning experience, promoting the reliability and validity of the research, enhancing the students’ completion rate, optimizing the use of knowledge resources and promoting critical thinking.

Keywords: Knowledge management, knowledge sharing, research supervision

1. INTRODUCTION

We live in a competitive environment where knowledge plays an important role as a competitive advantage. In the knowledge-based economy, knowledge is a vital element for individual and organizational success (Alavi and Leidner, 2001). Therefore, managing knowledge (through creation, sharing, and application) has become the central issue in the new economy. When knowledge is created, it is necessary to transfer and share it quickly to use the advantage of this new knowledge and apply it in the organization. Knowledge is a necessary asset for an organization to achieve competitive power. The dilemma of knowledge sharing can lead to failure of an organization in the competitive economy.

Knowledge sharing can be defined as information that is provided to help others work together to solve certain problems, develop new ideas and initiatives or implement policies or procedures (Cummings, 2004).

Alavi and Leidner (2001) equate knowledge sharing to knowledge transfer and identify it as the process of distributing knowledge throughout the organization. Knowledge is distributed through different types of communication channels between individuals, groups or organizations.

Välimaa and Hoffman (2008) stated that the increasing importance of knowledge, innovation and research are changing the social role of universities in the globalized world. Knowledge management (KM) techniques were first used in profit-oriented companies. Knowledge management, including knowledge sharing, has been investigated in the following organizations (Välimaa and Hoffman, 2008):

- British Petroleum
- Toyota
- Chevron, Ford, Xerox, Raytheon, IBM
- Shell
Siemens.

Recently, the investigation of knowledge sharing has also extended to universities. Universities provide an environment to help academics develop their insights and ideas (Martin and Marion, 2005).

Storing knowledge is not new in universities but sharing knowledge and using it among academics and students is new (Keramati and Azadeh, 2007). For academic institutions like business organizations, knowledge management can produce a competitive advantage. Studies investigating universities in Asia have showed that knowledge sharing has similar barriers in the academic environment as in the business environment. For example, in some universities, the culture of sharing is lacking, most activities are individualistic, and communication and collaboration between students in group is weak (Basu and Sengupta, 2007). The research conducted in an education institution by Yue Wah et al. (2007) in Singapore showed that the cost-benefit concerns of knowledge hoarding and rewards, open-mindedness of the sharer, and incentives impact on knowledge sharing strongly in comparison to organizational care or pro-social motives. In research done by Abdullah et al. (2009) in several main universities in Malaysia, the results showed that rewards and suitable incentives have important factors for using knowledge management system to improve knowledge sharing and motivate academics. Zhao (2003) argued that using the knowledge sharing approach in research supervision enhances the quality of the research supervision process and leads to improve scholars’ research skills. Zhao looked at the retention rate in educational programs such as the student progress rate and completion rates and found that knowledge sharing improves them. A quantitative study was done by Rhodes et al. (2008) and showed that knowledge sharing in an organization can enhance innovation and organizational performance. Knowledge sharing is considered to be an important factor in knowledge management. The literature identifies different factors which influence knowledge sharing in organizations (Alavi et al., 2006). In spite of the availability of superior systems and a great amount of information in institutions, it is the organizational and behavioral and technological factors in sharing knowledge that is vital in concluding the success or failure of KM technologies (Dyer and McDonough, 2001). The factors that encourage or discourage knowledge sharing in the supervision process are weakly understood (Zhao, 2003). Wang and Noe (2010) stated that current studies consider factors that influence knowledge sharing from the organization level to the individual level. The present study examines the effects of the same on knowledge sharing. There is not any knowledge sharing framework that identifies the important aspects of knowledge sharing in research supervision which can facilitate knowledge sharing in the research supervision process and guide managers of universities and supervisors to support knowledge sharing in universities. Knowledge sharing in the research supervision process is therefore an important research area that needs more focus.

This paper is organized as follows. First, some important challenges to universities are identified, and then three well-known research supervision models are discussed. Next, based on the literature, a knowledge sharing framework on research supervision is proposed and we describe the major influence factors on knowledge sharing in this framework. Finally, the conclusions and contributions are summarized.

2. IMPORTANT CHALLENGES TO UNIVERSITIES

Universities face new challenges and opportunities, because of globalization and the development of new technology such as the Internet and e-learning. Students’ and lecturers’ demands have changed and they expect to use new technology for research supervision. Universities should compete in an international environment and absorb international students and fulfill new needs. They should compete in knowledge-based economy and society. The main output of the universities is research results and new knowledge that should be managed by using knowledge management techniques. Knowledge sharing and transfer in universities between students and supervisors is vital for universities. It decreases the budget and is an affordable way for doing research in universities. The important objective of universities is to improve students’ skills and educate them to become expert knowledge workers. Some challenges
that change the traditional method of research education and supervision include:

- A more diverse population of research students with different interests and backgrounds.
- Increased demand for flexible research supervision and training which uses new ICT technology to satisfy new needs.
- Different job goals of research students in response to the changing market.
- Changing nature of supervision that allows students freedom to choose research awards (by coursework, by project, by research), mode of study and institute and supervisor.
- Expectation for students to complete their postgraduate degree in the regulated time.
- Meetings between supervisors and students are a crucial part of the research supervision process; yet, frequently, meetings are weakly set and the agenda not clearly defined.
- In research supervision the relationship between supervisor and students is very important for the research progress. In traditional supervision, the communication between supervisor and student is face-to-face and in this way, it is assumed that the student is full-time and on-campus. With the growth of ICT, supervisors and students are more mobile than before; there are more international students and part-time students than in the past, and these students need to be supervised in more flexible way. The demand for flexible research supervision and training is therefore increased.
- De Beer and Mason (2009) state that the number of research students per supervisor has increased. In their study, some supervisors had more than 14 postgraduate students. A new way to manage and supervise large numbers of students is needed. Using knowledge sharing can lead to improved performance and efficiency and effectiveness in the supervision process.

3. **Research Supervision Models**

In this study, some existing supervision models were reviewed and used to propose the improved supervision model. Soliman (1999) stated that, during the supervision process, the supervisor evaluates the work of the student and provides appropriate feedback for enhancement. The student frequently meets the supervisor to discuss the progress of his/her work. Different modes of communication and collaboration are employed during that time. A number of guidelines and suggestions exist regarding the way meetings should be conducted, the responsibilities of students and supervisors, and the resolution of problems and conflict that may arise during the process. Figure 1 depicts the elements in the postgraduate supervision process. Zainal Abiddin (2007) upholds that good supervision goes through a consensus between supervisors and students. She further elaborates that not all students require the same attention in terms of their supervision needs, and that supervisors should adopt the right mix of supervisory skills to help the students' progress.
4. THE SUPERVISORY MANAGEMENT STYLES MODEL

Much of the literature is concerned with the relationship between supervisors and students. Gatfield and Alpert (2002) propose a four quadrant supervisory style management grid which emphasizes the understanding of supervisory styles and its changes during the supervisory period. The authors argue that supervisors tend to assume that they know which elements of the supervisory process and management styles are more appropriate for success. A modified reproduction of their conceptual model is shown in Figure 2.

Figure 1. The research supervision process (Soliman, 1999)

Figure 2. Supervisory management grid (Gatfield and Alpert, 2002)
5. **The Supervisory Blended Model**

De Beer and Mason (2009) stated that blended learning is offered through three modes: the classroom, the virtual classroom, and online. They argue that postgraduate supervision is very similar to blended learning in these delivery methods with the exception that there is rarely classroom instruction but rather face-to-face interaction between students and supervisors. In blended postgraduate supervision, the role of supervisors is to represent the key sources of information to be accessed by students in face-to-face consultations and via the Internet and libraries, and then evaluating what the student has gained from it. The use of technology facilitates creativity and communication which improve motivation (Kearsley and Shneiderman, 1998).

6. **The Supervisory Knowledge Management Model**

During the postgraduate supervision process, students and supervisors come together in fostering and nurturing research ideas and hence spend time in discussions communicating and collaborating with each other. It can be argued that this entails knowledge creation, transfer and sharing, Zhao (2003) points out that to graduate students successfully, the supervisory process is vital. It is responsible, complex and subtle. Then, a systematic knowledge sharing approach is needed to assist both supervisors and students to obtain, share and apply knowledge. A knowledge sharing approach means the supervisor focuses on assisting students to enhance the knowledge sharing ability in research supervision (Raisinghani, 2000). This knowledge sharing ability refers to not only the skills of using superior technological resources to manage information but also the ability to make decisions about selecting information and using it (Uit Beijerse, 2000). A knowledge management model for research supervision is shown in Figure 3.

![Figure 3. Knowledge management model for research supervision (Zhao, 2003)](image-url)
7. The Supervisory Knowledge Sharing Framework

Soliman’s model (Soliman, 1999) shows important processes in research supervision that we use them to propose our model. The supervisory management styles model shows that students and supervisors have different personalities and their interaction with each other is subject to their ability to adjust to each other through the supervisory process. Therefore, their ability to communicate, collaborate and share knowledge is influenced by the demands of students’ needs during the supervisory process. This model helps us to see that individual factors and the ability to communicate and share knowledge are the fundamental factors in research supervision which are emphasized in our model. The supervisory blended model mixes two aspects of interaction between supervisors and students (face-to-face and via the Internet) which are embedded in our model. Supervisors and students can share knowledge and communicate by using technology or via face-to-face communications. The knowledge management model for research supervision shows the flow of knowledge creation and sharing and embedding in the research supervision process. This model is our base model that we extend by focusing on knowledge sharing in the research supervision process.

Orlikowski (1992) proposed a theatrical model of technology to consider the impact and reciprocal interaction between organizations, people and technology. Her model consists of these three entities. Orlikowski defines four different influences between organization, people and technology (Figure 4).

Orlikowski (1992) explained that people shape technology, then it shapes people through the use of technology in special ways. The social system is independent of us, but is created every day through our thinking and through our actions. Orlikowski (1992) stated that using email in one company is a simple way to share information but people respond to this event with different approaches based on their individual preferences and different task contingencies and their roles related to the organization, so these three main factors (people, organization, technology) and their interaction are important when we want to consider knowledge sharing. Therefore, we analyze them to define which attributes of these entities can help us to identify the conditions that facilitate knowledge sharing. In this research, we use the knowledge management model for research supervision (Zhao, 2003) and the theory of technology (Orlikowski, 1992) and other existing models for research supervision to propose a knowledge sharing framework to improve quality in research supervision (see Figure 5). This framework shows that there are three factors which influence knowledge sharing in the supervision process, namely: individual, organizational and technological factors. The knowledge sharing facilitates the research process by developing knowledge management skills, improving the quality of the learning experience and promoting

![Figure 4. Theory of technology (Orlikowski, 1992)](image-url)
the reliability and validity of the research, enhancing the students’ completion rate, optimizing the use of knowledge resources and promoting critical thinking.

It has been acknowledged that one of the biggest challenges in the universities is the ability of managers to encourage students and supervisors to exchange their knowledge, experience and ideas among themselves (Zhao, 2001). Knowledge now is considered to be an asset in an organization, yet many researchers has opined that most employees within an organization are reluctant to share their knowledge (Nonaka and Takeuchi, 1995). In universities also the situation is the same, so it is worthwhile to propose a knowledge sharing framework that offers the solutions to facilitate knowledge sharing in the research supervision process.

Zhao (2003) stated that we lived in a knowledge society where the basic economic resource is not capital because the real capital has changed to knowledge. This change leads to re-thinking about traditional practices and theories in research supervision. This new knowledge society needs knowledge managers and transformers, who can create new knowledge and share knowledge and adapt this knowledge to new environmental demands. Universities are responsible for training these knowledge managers. Therefore, in the research supervision process, the knowledge sharing approach is vital. This process should develop research students as competent knowledge workers (Down et al., 2000). The research supervision process needs innovation-oriented students and suitable research environments (research universities) that provide knowledge infrastructure such as IT systems and networks of experts (supervisors and lecturers). The output of this process is qualified researchers who complete their research degrees and have enough ability to manage knowledge, create new knowledge and add value to the knowledge-based society. The supervisors must therefore focus on guiding students to improving these knowledge management skills.

Figure 5: Knowledge sharing framework in the supervision process
Knowledge management ability helps students to improve their skills to manage advanced IT resources and also enhances their decision-making ability to select the right information (Raisinghani, 2000). This approach improves critical thinking in students which is an important ability for a research dissertation.

Knowledge management is an academic advantage and economic resource that promotes the quality of a university and manages the research supervision as a knowledge acquisition process to add value to the university. It is also an indicator for governments to judge the quality of a university.

Flexible structures and development culture are the key prerequisites of knowledge management to motivate students to create and share new knowledge. The process of learning happens when individuals share their knowledge because knowledge is embedded in the minds of people. The knowledge sharing approach can therefore enhance the process of learning in universities. This approach can help students with different interests and backgrounds to control the progress of their thesis. Empirical studies show that this approach is more efficient than traditional research. These studies also show that by using a collaboration framework and knowledge management model, the completion rates and the quality of dissertations were improved (Burnett, 1999).

To improve the quality of the learning experience and enhance student outcomes, knowledge management distinguishes between explicit and tacit knowledge. By using the knowledge sharing approach, the usage of knowledge resources by students becomes optimized and students’ access to resources is facilitated. Hence, the validity and reliability of their research is improved. In the knowledge exchange process, students explicitly and systematically add their tacit knowledge to the existing explicit knowledge by using technology infrastructure, partner students and their supervisors.

Preparing research students to become proficient researchers is the focus of research supervision. A main purpose of the knowledge sharing approach to research supervision is to improve the quality of the research process, which leads to the enhancement of students’ research experience. The literature identifies different factors which influence knowledge sharing in organizations (Rhodes et al., 2008). In spite of the availability of superior systems and great amount of information in institutions, it is the organizational and individual and technological factors in sharing knowledge that are vital in concluding the success or failure of knowledge sharing in the research supervision process (Agarwal et al., 2012; Boden et al., 2012; Chen et al., 2012; Chen and Cheng, 2012). The success of knowledge sharing in the research process in universities depends on collaboration and knowledge sharing among research group members, students and supervisors (Agarwal et al., 2012; Chen and Chen, 2009; Cheng et al., 2009; Sohail and Daud, 2009; Teh et al., 2011; Wabweci, 2011; Wangpipatwong, 2009).

Cheng et al. (2009) stated that knowledge sharing factors can be grouped into three subgroups: technical factors, individual factors and organizational factors. Organizational factors refer to the factors that are not developed from the individual personality; they are related to the environment of the organization and the relationship between persons in the organization, and they are organized as external factors. Individual factors are extracted from the individual personality such as beliefs, attitudes and feelings. They are internal factors. Technological factors are related to information technology including software and hardware for knowledge management systems used in sharing activities. Riege (2005) discussed the potential knowledge sharing barriers and divided them into three main groups: individual, organizational and technological barriers. A study was done by Wangpipatwong (2009) to consider the impact factors that influence knowledge sharing among students. He categorized these factors into three domains: the classroom, individual and technological domains. Wahlroos (2010) in his thesis also categorized these factors into three aspects: the individual, organizational and technological aspects.

8. KNOWLEDGE SHARING INDIVIDUAL FACTORS

When we review knowledge sharing literature, one of the greatest challenges in knowledge sharing
can be seen to be in the area of the distribution of knowledge from one person to another in the right way and at the right time (Riege, 2005). Hence, thinking about individual behavior and attitude as an important part of the knowledge sharing process is essential. Orlikowski (1992) states that people are at the heart of any change in the organization, so to consider the impact factors of knowledge sharing in research supervision, the individual factors of knowledge sharing are vital. This is especially the case in the present research where students and supervisors are the target community as we want to consider what factors are effective to improve knowledge sharing in the supervision process among students and their supervisors. Effective knowledge sharing needs a fundamental change in the way most supervisors and students carry out their duties.

Matzler and Mueller (2011) emphasized the influence of personal factors like conscientiousness, the need for learning, competitiveness and openness on knowledge sharing with two different approaches (learning orientation and performance orientation). Their study showed that learning orientation factors positively affect knowledge sharing, while performance orientation is a negative influence factor. These personal factors were empirically examined on a sample of 124 engineers in an operating engineering company.

Ismail and Yusof (2010) examined the impact of individual factors on knowledge sharing behavior in an organization. The purpose of the research was to examine the impact of individual factors such as personality, awareness and trust on the quality of knowledge sharing. The study showed that personality was the most important factor to improve quality of knowledge sharing.

9. KNOWLEDGE SHARING ORGANIZATIONAL FACTORS

To investigate the effective knowledge sharing factors in the research supervision process, organizational factors refer to the significant factors in the university environment that impact on knowledge sharing among students and supervisors.

Tsai et al. (2012) examined the organizational culture factor and anticipated reciprocal relationships as a major antecedent of knowledge sharing intention. Chen et al. (2012) developed a research model to examine different organizational factors on intention to share knowledge in Taiwanese enterprises.

Agarwal et al. (2012) examined some organizational factors (leadership, culture, structure, rules and responsibilities) on knowledge sharing in institutions of higher technical education in India. The results of the study reflected that organizational culture was an important success factor for KM. It was proposed that the important strategies necessary for knowledge sharing in the academic environment were:

- knowledge sharing committees
- knowledge sharing seminars
- written documentation
- articles
- Using the portal system.

Hassandoust et al. (2011) argued that organizational culture indirectly has an impact on individual’s intention to share knowledge virtually. A study to examine organizational knowledge sharing factors such as incentive system, management system, and organizational culture among academics in a knowledge-based institution was conducted by Cheng et al. (2009); the result showed that academics were motivated to share if the reward and incentive mechanisms supported a helpful knowledge sharing environment.

Wahlroos (2010) investigated the role of social media as a form of organizational knowledge sharing. The study considered the organizational factors such as managers’ and colleagues’ activeness and organizational guidelines for using social media, influencing employees’ use of social media in their working environment.

Yue Wah et al. (2007) proposed a research model to determine the social and organizational factors that influence knowledge sharing in an educational institution in Singapore. The result showed that open-mindedness, rewards and incentives and cost-benefit concerns of knowledge hoarding were the
strongest predictors of knowledge sharing rather than organizational care or pro social motivation.

10. Knowledge Sharing Technological Factors

Knowledge sharing not only involves people and organizational issues but also involves technology challenges. The term “hybrid solutions” refers to interactions between people and technology to facilitate knowledge sharing. Technology has the capability to provide access to large amounts of data and information and to enable long distance collaboration between business functions and teams. Without any doubt we can say that technology can perform as a facilitator to support and encourage knowledge sharing processes by making knowledge sharing more effective and easier. However, the key issue is to choose an appropriate technology that supports a close fit between people and organizations. Technology that operates effectively in some organizations may fail in others (Rhodes et al., 2008).

Riege (2005) listed the potential technology barriers to knowledge sharing. Some of these problems are: lack of integration of IT systems and processes, lack of technical support, employees’ unrealistic expectations of technology, lack of familiarity and experience with IT systems, and lack of training for employees to become familiar with new IT systems. Van den Hooff et al. (2003) examined the factors which influenced the use of ICT to share knowledge such as task interdependence, computer comfort, a positive attitude towards computer-based information, and an open and organic information culture within a community. The results showed that ICT can make a positive contribution to knowledge sharing.

The use of ICT by members of a community directly facilitates easier knowledge sharing (independent of place and time) between them, and it helps develop community and connectivity which promote knowledge sharing. ICT use also plays a role in an organization because it impacts identification and trust between community members. It also promotes an open and organic information culture in an organization. A study was done by Agarwal et al. (2012) to investigate the impact of technological factors (web-based technologies and user-based technologies) on knowledge sharing. The result showed that users preferred web-based technologies such as the Intranet and Internet to other knowledge sharing technologies.

Cheng et al. (2009) examined technology factors (IT application) on knowledge sharing among academics in knowledge-based universities. The findings suggested that to improve knowledge sharing in universities, it is necessary to make an environment which is people-oriented, instead of technological-oriented. Although technology plays a vital role in minimizing the barriers and enhances the tendency to share knowledge, knowledge sharing is a people-process.

Wahlroos (2010) considered the impact of technological factors (Web 2.0) on knowledge sharing. He found that Web 2.0 is effective for knowledge sharing but users always complain about problems with the user-friendliness of the tools.

Many researchers have suggested that IT systems are an important mechanism in knowledge management (Agarwal et al., 2012; Wahlroos, 2010). Davenport and Prusak (1998) found that IT systems had a positive relationship with knowledge sharing. They concluded that IT improves an organization’s performance and increases the rate of knowledge sharing within the organization.

The grouping of IT systems into several business areas such as e-learning, customer relationship management tools, blogs and portals, could increase the knowledge sharing capability (Rhodes et al., 2008). However, it must be stated that IT systems are only tools and not solutions: individuals are still responsible for sharing information and knowledge (Wong and Aspinwall, 2005). A key aspect of an organization’s resources is its intellectual capital and knowledge base. This includes the skills and experience of its employees, its policies, processes and information repositories. Riege (2005) stated that the relationship between organizational knowledge and its competitiveness is dependent on its ability to integrate, share and apply knowledge. Nonaka and Takeuchi (1995)
stated that knowledge management requires the organization to create new knowledge, transfer it and incorporate it into its products, services and systems. It is becoming more and more important for an organization to adapt to change based on its ability to embed knowledge in databases and support systems (Rhodes et al., 2008). Embedding knowledge in these areas allows the organization to transfer it to new employees (Bharadwaj, 2000). Bharadwaj (2000) concludes that IT systems therefore enable the formalization of knowledge and the consolidation of previous knowledge that has been accrued, as well as their leveraging across the organization.

11. CURRENT RESEARCH DIRECTIONS

The model proposed in the present study is based on quantitative research-in-progress and focuses on investigating the effect of individual, organizational and technological factors on knowledge sharing in a research supervision process. The investigation concentrates on the supervision process of postgraduate students at the University of Technology, Malaysia. The respondents in this research were postgraduate students and supervisors at the University of Technology, Malaysia. This study employs a quantitative approach and survey questionnaire to collect data. The data collected is then analyzed by using Smart PLS (Partial Least Squares). To test and validate the proposed model, a structural equation modeling approach is used. The research has some limitations. Only a single university will be used; therefore, the findings may not be statistically relevant for other universities. Non-response bias or poor understanding of the questions may occur. In addition, the identified effective knowledge sharing factors in the research supervision process may change over time due to the rapid pace of change in the university environment.

12. RESEARCH CONTRIBUTIONS & CONCLUSION

This study helps university managers and academic supervisors to understand the most important aspects of knowledge sharing in the research supervision process and also the result of knowledge sharing in the supervision process, in order to improve the performance and quality of the supervision process. Studies have shown that effective knowledge sharing leads to improved overall performance; thus, efficiency and effectiveness in the supervision process can be improved and innovation in universities can be enhanced. A primary goal of a knowledge-sharing approach to research supervision is to enhance the quality of research education, by which students’ learning and research experience is transformed. Knowledge sharing decreases an organization’s budget and is an affordable technique for conducting research in universities and helps students to complete their postgraduate degree within the regulated time. It is hoped that the results of this study would prompt university managers to provide structures that would motivate students and supervisors to share their knowledge. This motivation can be in the form of rewards, recognitions, status and reputations.

This study would contribute to the body of knowledge by identifying the relationship between individual, organizational and technological factors and knowledge sharing in the research supervision process. In this study, we propose a framework explaining the relationship between individual, organizational and technological factors and knowledge sharing, and the result of using knowledge sharing in the research supervision process.

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