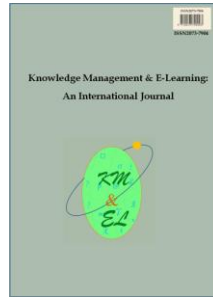


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Challenges of knowledge sharing in the petrochemical industry

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Abstract: Knowledge sharing is one of the important and also challenging parts in the success of KM implementation. The objective of this paper is to find out knowledge sharing barriers in the petrochemical companies in a Middle East country. Three main categories are found to have an impact on knowledge sharing in the companies. These categories are potential individual knowledge sharing barriers, potential organizational knowledge sharing barriers and potential technological knowledge sharing barriers. Data were collected by using a convenience sampling survey method. 500 questionnaires were distributed among employees and 302 questionnaires were returned. Trust, knowledge as power, communication, organizational hierarchy and knowledge sharing technological systems are found to have relationships with knowledge sharing. However, reward and recognition system have less significant relationship with knowledge sharing in the petrochemical companies.

Keywords: Knowledge sharing; Barriers; Challenges; Petrochemical companies

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1. Introduction

Knowledge management (KM) is “a systematic process for creating, acquiring, disseminating, leveraging and using knowledge to retain competitive advantage and to achieve organizational objectives” (Nicolas, 2004). If firms want to maintain its competitive advantages they should keep their knowledge in a good and effective way (Sandhu, Jain, & bte Ahmad, 2011). The knowledge which is externalized and captured by people who need it can increase the productivity and profitability of firms (Mtega, Dulle, & benard, 2013). With KM, organizations try to provide the required knowledge at the right time to the person who needs it in order to maximize the effectiveness of the firms and increase the organizational performance (King, 2006).

Knowledge sharing, as referred as individuals’ sharing of practices and knowledge (Lin, 2007) in terms of procedures and job practices (Barson, Foster, Struck, Pawar, Ratchew, Weber, & Wunram, 2000) is one the important and also challenging parts in the of success of KM implementation (Lee & Ahn, 2005). Knowledge sharing can be defined as a process in which different units, groups and individuals can share their experience with each other (Argote & Ingram, 2000). It happens if groups or individuals in firms want to cooperate with each other and share their experiences among themselves. Otherwise structured or technological interventions in knowledge sharing will not work (Goh, 2002). When useful knowledge sharing occurs, it helps create innovation and hence improve product development (Riege, 2005). Knowledge sharing needs interaction and involvement of people in a group and if individuals in group have common interest the interaction will increase (Mtega, Dulle, & benard, 2013). According to Gupta and Sharma (2004) knowledge sharing is very important because when knowledge is shared in the organization, it can be transferred to other individuals or groups within the company. In other words knowledge sharing links individual knowledge to group or firm knowledge.

However, knowledge sharing is also considered as one of the challenges commonly faced in the implementation of effective knowledge management systems (Alavi & Leinder, 2001; Szulanski, 1996; Nonaka & Takeuchi, 1995). The challenges and barriers are not only concerned with information technology but also relevant to how employees can be encouraged to share their knowledge and experience (Barachini, 2009). In fact, Al-Alawi, Al-Marzooqi and Mohammed (2007) argued that individuals and behaviours are the main barriers for knowledge sharing.

2. KM in Middle East oil and petrochemical companies

Benefiting from vast oil and gas reserves, the Middle East and North Africa (MENA) regions are experiencing a petrochemical rush, accelerating the industry’s development at an unprecedented rate. Petrochemical companies are facing tight competition with each other. Moreover, the employees’ rate of turnover in the petrochemical industry is high due to the humid weather and unattractive working environment. Hence, it is important for petrochemical companies to work on KM and motivate their employees to share and transfer their knowledge in order to keep their tacit knowledge within the company, and thus minimizing the negative impact of brain drain whenever employees leave the company. However, as reported by Pooremamverdy and Sheikhhbeglo (2008), there are several barriers that create a gap that make most of the companies not to start with KM implementation. These barriers are related to human resource, organizational hierarchy, motivation, flexibility, and transparency and communication system.

The main objective of this research is to identify the factors that may affect the success of knowledge sharing in petrochemical companies in a Middle East country. The specific objectives are as follows:

- to examine the individual/personal barriers to knowledge sharing
- to examine the organizational barriers to knowledge sharing
- to examine the technological barriers to knowledge sharing

3. Knowledge sharing barriers

Numerous literatures have looked into the knowledge sharing barriers, in the context of universities (Chong, Teh, & Tan, 2014; Chong, Chong, Gan, & Yuen, 2012; Kim & Ju, 2008), communities of practice (Ardichvili, Page, & Wentling, 2003; Ling, Sandhu, & Jain, 2008), organization (Han & Anantatmula, 2007; Chong, Teh & Asmawi, 2012) and also across boundaries (Carlile, 2004). However, the process is much more complicated in knowledge sharing across boundaries due to the different types of boundaries involved (Carlile, 2004). According to Carlile (2004), there are three properties of knowledge at the boundaries: *difference*, *dependence* and *novelty*. He reported that increasing the difference in the amount and type of knowledge can increase the work to disseminate knowledge and by increasing the novelty, the effort needs for sharing the knowledge will also increase. However, sharing of knowledge may be harder if numbers of dependencies are increasing (Carlile, 2002, 2004).

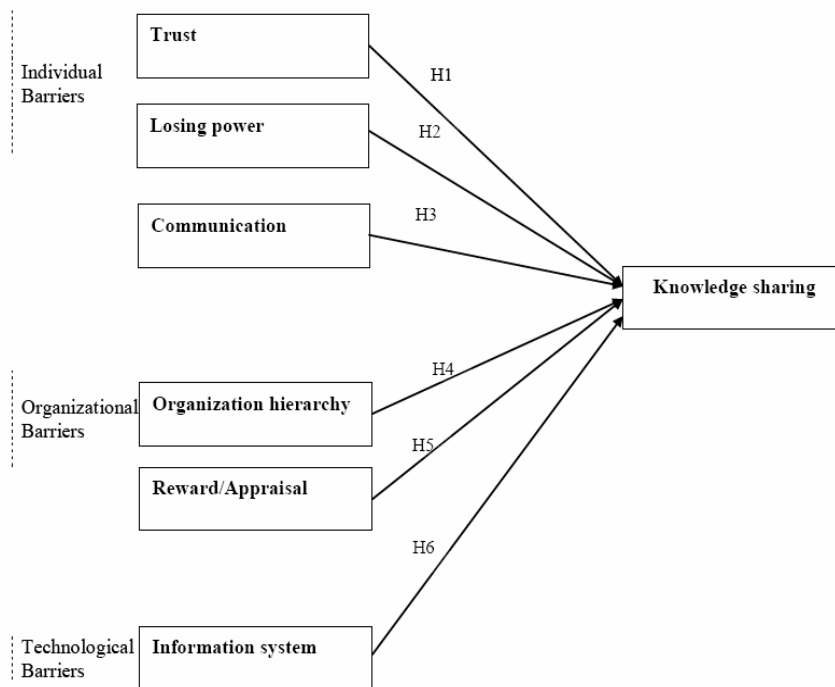


Fig. 1. Framework

In addition, to ensure continued existence while maintaining its competitive advantages and continuous innovation, a company must find ways so that knowledge can be shared within the company. Riege (2005) argued that the success and good outcome of a knowledge management strategy is mostly concerned to discovering the problems and obstacles of knowledge transferring. Better understanding of knowledge sharing and improving the efficiency of knowledge sharing, and its barriers will help manager to solve knowledge sharing barriers and increase the efficiency of the organization for example in one research which is done among doctoral students shows that language and cultural gap is the most important knowledge sharing barriers (Islam, Kunifuji, Hayama, & Miura, 2013). As shown in Fig. 1, these barriers can be generally grouped into three main categories, i.e. individual factors, organizational factors and technological factors.

3.1. Individual barriers

3.1.1. Lack of trust

Trust is one of the important factors that have a strong influence on the individual to share knowledge (Szulanski, 1996; King, 2006; Fathi, Eze, & Goh, 2011; Al-Alawi, Al-Marzooqi, & Mohammed, 2007). Mutual trust and social trust improve the interaction between employees and result in more knowledge sharing. Employees normally fear of sharing knowledge due to competition exists among them and this may result in losing power in the firm. However, when trust exists between individuals, it is not seen as a threat by individuals who want to share his knowledge with his colleague (Fathi, Eze, & Goh, 2011).

Goh (2002) noted that trust in a firm occur when information are accessible by employees and the organization has the rewards and recognition system for those who share their knowledge. In a climate of low trust, employees will not share their knowledge well (Goh, 2002).

Riege (2005) believed that people will not share their knowledge unless they are sure that their knowledge will not be misused or that they are sure about the validity of the source of knowledge. Riege (2005) also mentioned that trust will have an effect on communication process and finally the amount that the knowledge will be shared.

Levin, Cross, Abrams, and Lesser (2002) mentioned that when level of trust is constant knowledge sharing happens more in weak ties because people want to learn more and connect more to people with different ideas, but in case of strong ties individuals may have similar knowledge. It is also mentioned that when the knowledge is mostly tacit and mostly gained by experience, competence trust is more important, so it was said that the nature of knowledge has an effect on the importance of trust (Levin, Cross, Abrams, & Lesser, 2002).

H1. There is a positive relationship among trust and knowledge sharing in the company

3.1.2. Fear of losing power and job security

Another important knowledge sharing barrier is those individuals think that if they share their knowledge, then they will lose their power/influence in the organization. Losing ownership, a position of privilege and superiority are important factors that may influence knowledge sharing in the organization (Szulanski, 1996). Individuals who think

“knowledge is power” do not have the tendency to share their knowledge and in fact they want to keep their knowledge (King, 2006). If an individual thinks his valuable knowledge makes him powerful in the firm, he may be reluctant to share his knowledge.

H2. There is a positive link between not losing power and knowledge sharing in the company

3.1.3. Lack of communication

Riege (2005) noted that the communication skills of employees play an important role on knowledge sharing behaviour. Communication means share or exchange information by the use of body language and let other know what knowledge that you have (Al-Alawi, Al-Marzooqi, & Mohammed, 2007). It was argued that in the workplace if interactions among employees are high it may result in increasing the knowledge sharing among them (Al-Alawi, Al-Marzooqi, & Mohammed, 2007). Lindsey (2006) listed potential knowledge sharing barriers based on the communication model, some of which are listed below:

- Motivational disposition of source or willingness to share (Gupta & Govindarajan, 2000)
- Know-it-all attitude (Golen & Boissoneau, 1987)
- Appropriateness and effectiveness of a channel (Westmyer, Dicioccio, & Rubin, 1998)
- Unsuitable feedback (Golen & Boissoneau, 1987)
- Dislike to listen (Golen, Burns, & Gentry, 1984)
- Receiver evaluation tendency (Rogers & Roethlisberger, 1991)
- Distance among employees of an organization (Blagdon & Spataro, 1973)

H3. There is a positive relationship between communication and knowledge sharing in the company

3.2. Organizational barriers

3.2.1. Organizational hierarchy

Organization hierarchy has a negative impact on knowledge sharing in an organization and it is said that if an organization has an open culture and low hierarchy, knowledge sharing may happen more between teams (Huotari & Iivonen, 2005). Suppiah and Sandhu (2011) noted about the hierarchy culture in organizations and believed that it has a negative influence on tacit knowledge sharing. It was mentioned that in hierarchy organization, procedures and rules govern the individual’s action (Suppiah & Sandhu, 2011). Structure and power relationship are two important knowledge sharing barriers in an organization with hierarchy culture (Suppiah & Sandhu, 2011). When there is lack of formal distance, employees are able to interact more easily and can transfer their knowledge (Rivera-Vazquez, Ortiz-Fournier, & Flores, 2009). Hence, managers should provide a bureaucratic space in which the information flow easily (Al-Alawi, Al-Marzooqi, & Mohammed, 2007).

H4. There is a positive relationship between low hierarchical structure and knowledge sharing in the company

3.2.2. Lack of rewards

McDermott and O'Dell (2001) mentioned that reward and recognition system were not seen as the best practice in motivating and making it clear for the people to share knowledge but can be used to show and enhance the importance of knowledge sharing. It is better for people to feel and see that the time and energy spent for knowledge sharing will show itself in their performance (McDermott & O'Dell, 2001). Fathi, Eze, and Goh (2011) argued that incentives can increase knowledge sharing among employees because employees are motivated to share their knowledge when they see the higher incentives. It is also mentioned by Sandhu, Jain, and bte Ahmad (2011) that there is a linkage of knowledge sharing with reward and recognition system in a research done in one of the American Multinational companies in Malaysia. It is mentioned that rewards system must be designed to fit employees' need otherwise it will not motivate the employees in the organization to share knowledge. (Al-Alawi, Al-Marzooqi, & Mohammed, 2007)

In addition, McDermott and O'Dell (2001) also reported that employees in AMS company would not get promoted if they do not share their knowledge and management track what employees share in the knowledge base for promotion. On the other hand, Lee and Ahn (2005) argued that employees may see knowledge sharing as a process which needs time and will decrease their job security. Hence, it is important to build a rewards system in the company in order to compensate employees for sharing their experience and knowledge. They also reported that rewards and recognition systems should be in line with the quantity and also the quality of the knowledge sharing. Al-Alawi, Al-Marzooqi, and Mohammed (2007) also reported that the reward system should fit with the personnel needs. Hence, designing a good reward system can be effective in motivating employees to share knowledge.

H5. There is a positive link and relation between rewarding system and recognition in the and knowledge sharing in the company

3.3. Technological barriers

Technology is said to be one of the knowledge management infrastructure along with people and processes (Cepeda-Carrión, 2006). Han, Zhou, and Yang (2011) believe that it is necessary to find technical ways in order to find, disseminate and utilizing the knowledge. Information technology is usually said to be a good way for intra-organizational knowledge sharing, especially for companies that are dispersed but want an environment which motivates people to share information, knowledge and best practice. For example British petroleum built a virtual network to overcome the distance between their business units and by this virtual network they share their knowledge and decentralize their operations (Goh, 2002). IT can create a connection between the knowledge seeker and individuals who may have it without the needs of a formal communication line (Alavi & Leidner, 2001). It is also important to note that KM software needs to be integrated into the organizational culture, human resource as well as IT infrastructure (de Carvalho & Ferreira, 2006). Another important point is that companies should choose a technology for implementation which fits more with their employees and the organization (Riege, 2005). The research made by Han, Zhou, and Yang (2011) shows that IT infrastructure is one of the important factor which should be considered in implementing knowledge management system.

Some potential technological barriers that were mostly recognized by Riege (2005, P.29) are as follows:

- Lack of integration of information technology, systems and actions.
- Refuse and unwillingness to use information technology's systems because of insufficient experience or unfamiliarity.
- Lack of IT training to enable employees to be familiar with the new IT technology.
- Lack of knowledge about the features and advantages of new system over old one due to lack of communication about it.
- Employees' expectation and integrated information technology systems are not coupled.
- Existence of the problem of compatibility among varied information technology systems.
- Unrealistic and unpractical expectation from technology.

H6. There is a positive link between the existence of IT systems and knowledge transferring in the company

4. Methodology

A structured closed end questionnaire with Likert five point scales was used for data collection. 5-point Likert scale was used to measure the level of agreement or disagreement: 1 = completely disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = completely agree with the question. Likert scale provides the opportunity to measure the respondents' ideas and convert them for statistical analysis.

The questionnaire was divided in two parts. In the first part the respondents were asked about their personal information such as gender, age, educational level, the units they work, their positions and their work experiences in the company. In the second part, the respondents were asked about the barriers towards knowledge sharing. This part covered of 27 questions and will be used to measure and analyse the overall attitude of the employees. The following dimensions were adopted from various previous literature and were used to measure the different categories of barriers (refer to Appendix 1 for questionnaire; Al-Alawi, Al-Marzooqi, & Mohammed, 2007; Bennett & Gabriele, 1999; Fong & Choi, 2009; Jain, Sandu, & Sidu, 2006; Joia & Lemos, 2010; Moolan, 2004; Smith, 2006).

- *Trust*: sharing feeling, sharing personal information, previous experience with trust
- *Communication*: high level of face to face interaction, common language, teamwork discussion and collaboration
- *Information system*: existence of knowledge sharing technologies, effectiveness of knowledge sharing tools, comfort while using knowledge sharing technology
- *Reward system*: existence of reward for knowledge sharing, effectiveness of rewards system, team based rewards
- *Power*: influence in the company, knowledge as power
- *Hierarchy*: participative in decision making, ease of information flow, not fear of senior

- *Knowledge sharing*: personal interaction, mentoring, willingness to share knowledge freely

Approximately 500 employees from Oil companies in the Middle East country were asked to answer the questionnaire based on convenience sampling method. Convenience sampling was used because the employees are working in different shifts and in different days and it is difficult to include every individual. Those employees who answered the questionnaires were from different hierarchy levels of the company. 302 questionnaires were collected and this indicated a 60.4% response rate. A pilot study was done for checking the Cronbach's alpha of questionnaire and also for the clarity checking of the questions. The result for Cronbach's alpha was .888 which shows that questions are reliable.

5. Findings

As shown in Table 1, majority of the respondents are male (91.4%) and are in the range of 30-39 years old. 55% of them have bachelor degree and most of them are engineers/ specialist and technician / operator. 52.6% have 6-10 years of working experience.

Table 1
Profile of respondents

	Frequency	Percentage (%)
Gender		
Male	276	91.4
Female	26	8.6
Age		
20-25	13	4.3
26-29	87	28.8
30-39	183	60.6
Above 40	19	6.3
Education level		
Diploma	47	15.6
Higher Diploma	52	17.2
Bachelor	166	55
Master	37	12.3
Position		
Senior Manager	6	2
Middle Manager	52	17.2
Specialist / Engineer	116	38.4
Technician / Operator	107	35.4
Others	21	7.0
Working Experience		
1 year or below	8	2.6
2-5 years	102	33.8
6-10 years	159	52.6
Above 10 years	33	10.9

Table 2 shows the mean and standard deviation for the barriers of knowledge sharing. Communication was indicated as the main barrier for knowledge sharing as it scored the highest mean (3.66), followed by trust (3.5), knowledge as power (3.49), information system (3.33), hierarchy (3.16) and lastly reward (2.78).

Table 2
Mean and standard deviation

Variables	Mean	Std. Deviation	N
Trust	3.5	.98	302
Knowledge as Power	3.49	1.1	302
Communication	3.66	1.03	302
Hierarchy	3.16	.968	302
Reward	2.78	1.021	302
Information system	3.33	.969	302

As shown in Table 3, all the barriers have positive relationship with knowledge sharing with p-value = 0.000 < .05.

Table 3
Pearson correlations

	Trust	Power	Communication	Reward	Hierarchy	Technology
Sharing	.829**	.775**	.781**	.664**	.817**	.804**

**Significant at the 0.01 level (2-tailed)

Table 4 shows the result of multiple regression. Below is the regression equation.

$$\text{Knowledge Sharing} = 0.013 + 0.29(\text{Trust}) + 0.154(\text{Power}) + 0.126(\text{Communication}) + 0.183(\text{Hierarchy}) + 0.044(\text{Reward}) + 0.233(\text{Technology})$$

Table 4
Coefficients

Model	Unstandardized coefficients		Standardized coefficients		Sig.	Collinearity statistics	
	B	std.error	Beta	t		Tolerance	VIF
Constant=1	0.013	0.099		0.127	0.899		
Trust	0.290	0.047	0.282	6.145	0.000	0.286	3.492
Power	0.154	0.037	0.170	4.186	0.000	0.366	2.733
Communication	0.126	0.042	0.130	2.965	0.003	0.315	3.174
Hierarchy	0.183	0.052	0.177	3.509	0.001	0.239	4.190
Reward	0.044	0.038	0.045	1.166	0.245	0.409	2.446
Technology	0.233	0.047	0.226	5.009	0.000	0.297	3.367

This means that for every unit increase in trust, knowledge sharing will go up by 0.29 units, provided other variables, technology, reward, communication, power, hierarchy remain unchanged. However, p-values for reward is more than 0.05 and this indicates it may not be significant predictors of knowledge sharing in the petrochemical companies. Overall, since VIF values are not more than 5, it does not have problem of multicollinearity among the predictor variables.

Regression by stepwise method was performed due to the insignificance of reward. In this method it shows that all other are significant predictors. As shown in Table 5, this model presents the best model as it explains 82.2% of the variation in knowledge sharing. The regression equation (Model 5 – the Final Model):

$$\text{Knowledge Sharing} = 0.018 + 0.289(\text{Trust}) + 0.154(\text{Power}) + 0.122(\text{Communication}) + 0.208(\text{Hierarchy}) + 0.25(\text{technology})$$

Table 5
Coefficients

Model	Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
	B	std.error	Beta	t	Sig.	Tolerance	VIF
Constant=1	0.018						
Trust	0.289	0.047	0.282	6.127	0.000	0.286	3.491
Power	0.154	0.037	0.170	4.176	0.000	0.366	2.733
Communication	0.122	0.042	0.126	2.879	0.004	0.317	3.154
Hierarchy	0.208	0.048	0.201	4.371	0.000	0.287	3.483
Technology	0.250	0.044	0.242	5.649	0.000	0.329	3.041

Note: $R^2 = .822$

6. Discussion

The findings show that all the proposed barriers have influence on knowledge sharing and reward has the least impact on knowledge sharing. Pearson correlation also shows that all the barriers have a significant impact on knowledge sharing. Hence, all the hypotheses are accepted.

6.1. Individual barriers

- **Trust:** The findings show a remarkable level of trust existing within employees in the petrochemical industry as most of the respondents are sharing their feeling and perceptions with their co-workers. It is good to mention that sharing feelings and believing in being trust among co-workers are indicators of trust between employees and the result of this hypothesis is resemble to the work of previous research which were done in public and private sector of Bahrain (Al-Alawi, Al-Marzooqi, & Mohammed, 2007) and with the discussion made by Riege (2005).
- **Power:** The second hypothesis is accepted, which shows that if knowledge is the source of power then knowledge sharing will decrease. This result is also similar to what other researchers mentioned before (Riege, 2005; Szulanski, 1996).

- **Communication:** Third Hypothesis talks about communication and its link with knowledge sharing. The finding shows that as much as communication among employees increase the knowledge sharing will increase too. Companies should care about informal networks of their employees since these informal networks will increase the amount of communication among people and the level of knowledge sharing between them (Riege, 2005; Al-Alawi, Al-Marzooqi, & Mohammed, 2007).

6.2. Organizational barriers

The fourth and fifth hypotheses examine the relationship among two organizational barriers and knowledge sharing in the company.

- **Reward:** The result shows a positive relationship between reward and recognition system and knowledge sharing. The result of this research is consistent with previous researchers on knowledge sharing (Riege, 2005; Al-Alawi, Al-Marzooqi, & Mohammed, 2007; Lee & Ahn, 2005).
- **Organizational Hierarchy:** The result shows that the majority of the respondents are agree with the questions related the organizational hierarchy in the questionnaire and the Fifth hypothesis is accepted. The result of this research is consistent with previous researches that restriction of information or knowledge flow can decrease knowledge sharing (Suppiah & Sandhu, 2011).

6.3. Technological barriers

The sixth hypothesis is about technological barriers. It is found that knowledge management information system has a positive link with knowledge sharing in the organization, and the result of this research is consistent with Al-Alawi, Al-Marzooqi, and Mohammed (2007). Most of the employees believe that they are comfortable and feel good using IT technology for knowledge sharing and it is effective for the knowledge to be transferred.

7. Conclusion

In conclusion, all the proposed variables, i.e. trust, knowledge as power, communication, hierarchy of organization, compensation and recognition system and knowledge sharing technological system were found to have an impact on knowledge sharing. Therefore, organizational managers should consider the effects of these factors if they want their employees to share their experience with others and to maintain their competitive advantages.

The result of this research is consistent with Al-Alawi, Al-Marzooqi, and Mohammed (2007), in which they proposed that social event, outdoor, formal and informal discussions can help employees make a better friendship and increase trust among them. To increase communication among employees, managers can pay attention to office design which can help employees to interact more and the communication may increase among employees.

Rewards and recognition system is also found important. It is important to build a reward system to reward employees based on the amount of knowledge and experience they with others. Managers may develop a policy to make knowledge sharing as an important necessity for job promotion. This finding is also consistent with McDermott

and O'Dell (2001) in which they believe that knowledge sharing can be clearly seen if a company uses a rewards and recognition system for sharing experience. Managers should also consider the costs of reward because employees may not share their tacit knowledge if such sharing practice is not rewarded sufficiently (Lee & Ahn, 2005).

The result also shows that employees should be included in organizational decision making and this is consistent with the finding from the previous research (Al-Alawi, Al-Marzooqi, & Mohammed, 2007). The research shows that if the flow of information from top management to the bottom is easy, then knowledge sharing will occur more. Hence, flat structure is good for knowledge sharing in the organization. As such, organizational structure should be in a way that motivates personnel horizontal communication and managers should decrease hierarchical barriers to the flow of information.

Knowledge sharing information system or technological systems is also found very important in the process of knowledge sharing. Information technology will remove the time and physical distance in accessing information and knowledge base of the company (Hendriks, 1999). The result of this research also shows that if IT Managers build internal company's networks like Portal or Intranet, the flow of information and knowledge sharing among employees will increase.

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Appendix

Questionnaire

Barriers toward knowledge sharing

Please answer following questions by ticking in the appropriate box.

Personal questions

1- What is your gender?

Male Female

2- How old are you?

20-25 26-29 30-39 Above 40

3- What is your educational qualification?

Diploma degree College (2 years) B.S degree M.S
degree PhD degree

4-What is your current position?

Senior manager middle manager engineer/specialist
technician operator

Other

5- How many years of work experience do you have?

1year between 2 to 5 years 6 to 10 years more
than 10 years

6- Which department do you work in?

Process maintenance Technical services
 administrati IT
financial R&D other

Barriers toward knowledge sharing	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1-most of my colleagues are people whom I know well and thus are considered trustworthy. (Al-Alawi et al., 2007)	5	4	3	2	1
2-A considerable level of trust exists between co-workers in the organization. (Al-Alawi et al., 2007)	5	4	3	2	1
3-I have not been previously harmed as a result of sharing my knowledge with my co-workers. (Al-Alawi et al., 2007)	5	4	3	2	1
4-I do not hesitate to share my feelings and perceptions with my fellow colleagues. (Al-Alawi et al., 2007)	5	4	3	2	1
5-Knowledge is not the source of power in my company. (Joia & Lemos, 2010)	5	4	3	2	1
6- Sharing knowledge with others may not decrease my influence within the company. (Bennett & Gabriel, 1999)	5	4	3	2	1
7-Language is not a problem when communicating with other staff. (Al-Alawi et al., 2007)	5	4	3	2	1
8-There is a high level of face-to-face interaction among colleagues in the workplace. (Al-Alawi et al., 2007)	5	4	3	2	1
9-Teamwork discussion and collaboration enhance communication between colleagues. (Al-Alawi et al., 2007)	5	4	3	2	1
10-The hierarchy in our organization is not a barrier to the flow of ideas and information.(Moolan, 2004)	5	4	3	2	1
11-Information flow easily throughout the organization regardless of employee roles or other boundaries. (Al-Alawi et al., 2007)	5	4	3	2	1
12-Staff seek knowledge also from their seniors without the fear status. (Jain, Sandhu, & Sidhu, 2007)	5	4	3	2	1
13-I have access to people who have the knowledge I require, irrespective of their hierarchical level. (Joia & Lemos, 2010)	5	4	3	2	1
14-Workers actively participate in the process of knowledge					

sharing. (Al-Alawi et al., 2007)					
15-Employees are rewarded for sharing their knowledge and experience with their colleagues. (Al-Alawi et al., 2007)	5	4	3	2	1
16-The knowledge sharing rewards available are effective in motivating me to spread my knowledge. (Al-Alawi et al., 2007)	5	4	3	2	1
17-Knowledge-sharing behavior built into the performance appraisal system .(Fong & Choi, 2009)	5	4	3	2	1
18-The appraisal and/or reward system encourage employees to interact, work together in different sections and share the knowledge passed by various section. (Bennett & Gabriel, 1999)	5	4	3	2	1
19-Employees are more likely rewarded on teamwork and collaboration rather than merely on individual performance. (Al-Alawi et al., 2007)	5	4	3	2	1
20- The organization provides various tools and technologies to facilitate knowledge sharing and exchange (e.g. email, intranet, groupware). (Al-Alawi et al., 2007)	5	4	3	2	1
21- The technological tools available at the organization for sharing knowledge are effective. (Al-Alawi et al., 2007)	5	4	3	2	1
22-I feel comfortable using the knowledge sharing technologies available. (Al-Alawi et al., 2007)	5	4	3	2	1
23-employees use IT technology to share their knowledge inside the company. (Smith, 2006)	5	4	3	2	1
24-I share my experience with others in my organization so that they may not repeat the mistakes that I have made.(Suppiah & Sandhu, 2011)	5	4	3	2	1
25-My co-workers commonly share their knowledge and experiences while working.(Suppiah & Sandhu, 2011)	5	4	3	2	1
26-I can freely express my ideas and thoughts in organizational meeting.(Suppiah & Sandhu, 2011)	5	4	3	2	1
27-I share my knowledge with new employees and mentor them.(Suppiah & Sandhu, 2011)	5	4	3	2	1