

Knowledge Utilization and Decision Making in Construction Projects in Malaysia

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ABSTRACT

Knowledge utilization is the process to apply right and relevant knowledge at the right time and place for effective decision making. The purpose of this paper is twofold. First, to identify the characteristics of knowledge utilization in construction projects in Malaysia. Second, to test whether there is an influence of knowledge utilization on decision making. A questionnaire survey was used to collect data from 124 professionals in different types of construction projects. Processes, factors, and obstacles of knowledge utilization were identified and discussed in this paper. However, the results indicated that there is no significant relationship between knowledge utilization and effectiveness of decision making.

Keywords: knowledge conversion, knowledge sharing, decision making, Malaysia.

I INTRODUCTION

The construction industry is a knowledge-based industry. Construction projects are expensive, complex and large custom-built facilities, which strongly rely on knowledge input (Ly, Anumba, & Carrillo, 2005). Knowledge is an important asset to construction companies, which are project-based organization, and knowledge management has gain more attention in this industry (Owira & Ogollah, 2014). However, knowledge has no value unless it is being utilized. Knowledge utilization is an integral activity of knowledge management. All the activities of knowledge management are created to get benefits from the positive effect of knowledge on the organization's performance (Bloodgood, 2009).

Construction projects have become more complex due to change in clients demand such as more quality and value for money and environment regulations. In addition, fragmentation of the construction industry caused lower project efficiency leading to client dissatisfaction and low profitability (Charles, John, & Mike, 1999; Patricia, Chimay, & John, 2000). Besides, the construction industry is complex and large and many players do not share common education base (Asmi, Rasli,

Majid, & Rahman, 2009). Professionals tend to forget the knowledge and experience for specific projects once the project is completed and they usually repeat the same mistakes (Kanapeckiene, Kaklauskas, Zavadskas, & Seniut, 2010). This situation can be regarded as 'knowledge wastage'. Knowledge and lessons learned from previous projects need to reapply to generate new knowledge so that can improve projects performance and increase competitiveness (Vines et al., 2004). Construction projects are highly depending on knowledge capacities of stakeholders and not all these knowledge capacities are utilized because sometimes knowledge is not applied appropriately. Therefore, lack of utilization of knowledge can increase uncertainty in construction projects.

Similar to knowledge management, knowledge utilization has a positive impact on project output such as project performance (Alashwal, Abdul-Rahman, & Radzi, 2016). By definition, knowledge utilization involves the application of knowledge for effective decision making. Since there is a limited number of studies in this area, the purpose of this paper is identify the characteristics of knowledge utilization and determine its influence on decision making processes in construction projects.

Decision making is defined as a process to diminish uncertainty to a considerable level and determine alternatives to suit a purpose by selecting the best option (Ahmed & Omotunde, 2012). The process of decision making takes place in many stages in construction project (Castillo, Al-jibouri, & Halman, 2010). Alsendi (2015) affirmed that slow decision making can cause delay of construction projects. Delay can become the potential risks to cause time and cost overrun, arbitration, dispute, total abandonment and litigation in construction projects (Aibinu & Jagboro, 2002; Sambasivan & Soon, 2007). Hence, effective decision making is important to successfully completing construction projects as it will influence the performance of work.

The following section provides a review of available literature on knowledge utilization to identify its processes, factors, and obstacles. The

section also highlights the relationship between knowledge utilization and decision making. The section after that explains the method of collecting and analyzing the data to verify knowledge utilization characteristics and its influence on decision making.

II KNOWLEDGE UTILIZATION CHARACTERISTICS

A. Processes of Knowledge Utilization

There are seven processes of knowledge utilization proposed by (Alashwal, Abdul-Rahman, & Radzi, 2014; Alashwal et al., 2016) which are knowledge acquisition, knowledge conversion, knowledge sharing, knowledge generation, knowledge integration, knowledge competence, and knowledge utilization.

Fong and Choi (2009) highlighted that knowledge can be acquired internally and externally in construction projects. When knowledge is successfully acquired and shared among each other in a particular approaches only mean that the knowledge is being utilized (Liebowitz & Megbolugbe, 2003). Knowledge can be acquired using organization resources and then stored for usage when needed.

Knowledge conversion is the process to convert knowledge into organizational mean (Lee & Suh, 2003). The main process to convert knowledge is through applying and sharing knowledge that has been stored (Ping & Cheng, 2004). Knowledge can be generated as a result of knowledge conversion (Alashwal et al., 2014). In projects, team members can interact and communicate to generate new or emergent knowledge (Fong, 2003). Before utilizing knowledge, it is required to integrate knowledge through combining knowledge that was shared by socialization process (Radzi, 2012). During these processes, competence plays an important role especially in problem solving and decision making process (Charoenngam & Maqsood, 2001). According to Spencer, McClelland, and Spencer (2011), competence is the simultaneous integration of skills, attitudes and knowledge needed in performance of designated role.

The last process is knowledge utilization, which can be considered as one of the critical process in the creation of knowledge. Knowledge utilization can enhance the performance of project if the knowledge which is successfully converted is applied or utilized (Alashwal et al., 2014). For example, site managers may use tacit knowledge to improve site management by utilizing the lesson

learned from past experiences and solutions in construction projects (Fikri & Anumba, 2006).

B. Factors Influencing Knowledge Utilization

Koskinen (2003) divided the factors influencing the generation and utilization of tacit knowledge in project environment into internal and external factors. The internal factors are under control of an individual that can be categorised into three distinct groups, which are communication, memory and motivational systems. While external factors which also called the situational system include leadership style and culture of organization (Koskinen, 2003). While, Pathirage, Amaratunga, and Haigh (2008) grouped the obstacles into three different levels which are Individual level: Intra-personal drivers; Group level: Inter-personal drivers; and Organizational level: Situational drivers.

Other factors influence knowledge utilization, based on case study findings include competence of team members, pressure to complete the project on time, and teamwork (Alashwal et al., 2016; Radzi, 2012). These three factors influence the speed of knowledge utilization when managing time-related issue during construction phase.

C. Obstacles of Knowledge Utilization Process

In their study, Tervonen and Ojanen (2015) identified obstacles of knowledge utilization in six stages of knowledge utilization process as described by Verkasolo and Lappalainen (1998). Obstacles of sustainability of knowledge utilization can be categorizes into four levels. Firstly, the organizational factors, which influence the sustainability of knowledge utilization. Examples of organizational factors are attitudes, level of competence, and internal development. Secondly, sustainability of knowledge utilization needs methods and tools to collect and evaluate information to make effective practice of knowledge management. Thirdly, the need for assessment activity, which is related to measurement of sustainability of knowledge utilization. Lastly, the need to monitor environment of business, stakeholders, and change management.

D. Influence of Knowledge Utilization on Decision Making

Construction projects are characterized by high levels of uncertainty and complexity. Project managers in construction projects have to undertake timely and immediate response in decision making as construction projects in recent times have become more complicated and dynamic. Knowledge is a significant asset that influence

decision making in an organization (Carrillo, 2004; Teerajetgul & Charoenngam, 2006). According to Hertwig and Hoffrage (2012), “knowledge is crucial to an individual’s decision making performance.”

Effectiveness of decision making can be measured using four dimensions namely quality of decision making, speed of the decision, yield of decision where an organization makes decisions faster than competitors and translates decisions into actions and lastly appropriate amount of effort devote by decision makers (Blenko & Mankins, 2012).

Decision making in construction projects can be challenging and complicated as it is one of the knowledge intensive activity. Professionals in construction projects must understand how to apply, manage and utilize the valuable knowledge when making decision as every individuals owned different knowledge-based and they might have different experiences therefore can lead to different decision making (Teerajetgul & Charoenngam, 2006). In addition, it is important for professionals working in construction projects to fully utilize all available knowledge resources in decision making process. Thus, it can be assumed that knowledge utilization can positively influence decision making. This proposition will be tested empirically as shown in the following section.

III METHODOLOGY

A questionnaire survey was chosen as research method for this study to identify processes, factors and obstacles of knowledge utilization and the influence of knowledge utilization on effectiveness of decision making in construction projects in Malaysia. Respondents were required to rate the listed statements in the survey based on 5-point Likert scale representing processes, obstacles and factors of knowledge utilization and effectiveness of decision making in their projects.

Based on the “Construction Quarterly Statistical Bulletin” published by the Construction Industry Development Board on September 2015, a sample size of about 187 construction projects was calculated based on the population of projects under construction. The total number of construction projects was 3910. Thus, 190 sets of questionnaires were prepared and distributed. Whereas 100 questionnaire forms were distributed randomly through face-to-face manner, other 90 questionnaire forms were sent online to target respondents randomly via email. The target respondents were professionals that have experience in construction projects and are working in construction companies

in Klang Valley and Selangor States. The 100 set of questionnaires, which was distributed face-to-face, was fully answered. However, only 24 sets of questionnaire were answered through the email. The total response was 124, making 65.26% response rate, which is in general good. The result of Cronbach’s Alpha showed that this questionnaire is reliable ($\alpha = 0.79$).

IV FINDINGS AND DISCUSSION

A. Processes of Knowledge Utilization Developed by Local Construction Professionals

Table 1 shows the ranking of knowledge utilization processes. The following paragraphs discuss the top-five ranked processes.

Table 1. Ranking of Knowledge Utilization Processes

Statement	Mean	SD	Ranking
We apply and reuse knowledge, lesson learned, best practices and expertise at the right time to solve problems in construction projects	4.64	0.50	1
We keep acquired information in database or documents for future reference	4.44	0.64	2
We validate the acquired information before using it	4.23	0.63	3
We share relevant data, information and knowledge from lesson learned with others within our organization	4.22	0.68	4
We acquire relevant data and information from internal and external resources	4.21	0.60	5
We create and use new knowledge to resolve issues or problems in construction projects	4.15	0.71	6
We create new knowledge through interaction and communication with other team members	4.09	0.66	7
We convert relevant information (internal or external) to suit our project or company	4.06	0.63	8
We use external knowledge to resolve problems or making decision in construction projects	4.05	0.64	9

The respondents who agreed to the statement “we apply and reuse knowledge, lesson learned, best practices and expertise at the right time to solve problems in construction projects” are exposed to the process of **knowledge utilization** in construction projects. Majority of the respondents agreed that utilization of knowledge is the most important process which allows them to reuse the knowledge accumulated from the past practices and experiences. Past knowledge is directly applied for

useful project output such as solving problems related to current projects.

The statement “*we keep acquired information in database or documents for future reference*” indicated that professionals in local construction industry have practiced **knowledge storage and retrieval** as their current practice in construction projects. It seems that many companies have their own database to keep the useful data and information for future usage.

In addition, the statement “*we validate the acquired information before using it*” that agreed by majority revealed that **knowledge validation** is one of the process of knowledge utilization practiced in local projects. Practitioners need to check the information first before applying and utilizing the information in construction projects to ensure accuracy and suitability of the information.

Moreover, the statement “*we share relevant data, information and knowledge from lesson learned with others within our organization*” indicated that **knowledge sharing** is one of the important processes of knowledge utilization. This indicates that professionals in construction industry are willing to help each other within a company by sharing relevant knowledge and utilize the relevant knowledge in construction projects.

Lastly, the statement “*we acquire relevant data and information from internal and external resources*” represents **knowledge acquisition** as one of the vital processes of knowledge utilization. According to Ping and Cheng (2004), knowledge acquisition is the process of collecting data, information and knowledge that is vital and useful for the projects and organizations which from internal sources and external sources. Respondents need to acquire relevant information from different sources in order to fully utilize relevant data and information that are useful to problem solving in construction projects.

B. Factors Affecting Knowledge Utilization

The top five factors that influence knowledge utilization as rated by the respondents are “*experience of individuals in construction projects*”, “*competence of professionals*”, “*interactions between team members (face-to-face meeting)*”, “*teamwork*”, and “*leadership*”.

Based on the data analysis, experience of individuals in construction projects is a significant factor that affects the knowledge utilization in construction projects. This result is supported by Chaminda, Dilanthi, and Richard (2007), who

affirmed that construction industry is more centered on experience of construction workers and professionals. Knowledge utilization can be achieved by interaction between team members to share their knowledge and experience.

Based on the research findings of Radzi (2012), competence and teamwork are interrelated with each other as the factors to affect the knowledge utilization and competence is depends on level of teamwork. The result of this study is in line with these findings. The capability and skills of construction project professionals are very significant in affecting knowledge utilization in order to solve problems or make decisions. Furthermore, co-operation between project members is important in which competent employees will share their experience or knowledge they learnt before with others.

Lastly, many respondents chosen leadership as factor of knowledge utilization as they might think that leadership can be positive encouragement and influence from upper level of management thus can create an open environment for team members to generate and utilize knowledge. This finding is also similar to the finding of Radzi (2012).

C. Obstacles of Knowledge Utilization

Majority of the respondents agreed on these obstacles of knowledge utilization “*understand the information, compare and link the information from various databases*”, “*level of understanding of knowledge utilization among team members*”, “*attitudes of team members*”, “*availability of time to acquire, validate, convert, share, and apply knowledge*” and “*determine the knowledge in process of acquiring knowledge*”. These five obstacles are the top rated factors of knowledge utilization in Malaysian construction projects.

The statement “*understand the information, compare and link the information from various databases*” was highly rated by respondents. This may due to it is time consuming to understand, compare, and relate all relevant information that needed in carrying out tasks in construction projects from different databases. Thus, respondents feel that it is the significant challenges in knowledge utilization. The “*level of understanding of knowledge utilization among team members*” is the second highest ranking obstacle as the understanding of knowledge utilization is a challenging process.

Tervonen and Ojanen (2015) highlighted that attitudes, availability of time, and determining knowledge in the process of knowledge acquisition

are obstacles of sustainability of utilizing knowledge. The results of this paper indicated some of these obstacles. Construction professional regarded the availability of time and attitudes of project members on knowledge utilizing as important considerations. Professionals were always rushing to complete the tasks and achieve project goals or objectives within limited time. As knowledge utilization requires different processes including knowledge acquisition, validation, conversion, sharing, and applying, thus, the availability of time to undertake these processes is vital.

D. Influence of Knowledge Utilization Processes on Decision Making

Majority of respondents agreed on this two statements “*we perform quality decision making that enables achieving project goals and objectives*” and “*we make sure the outcomes of decisions are precise and consistent to attain project’s objectives*”. These two statements obtained high mean values may be because of they focus on achieving project goals and objectives instead of focusing on speed and time of doing decision. Construction projects are complex and involve many uncertainties, thus professionals might spend more time on planning before doing decision in order to achieve project goals or objectives. Then, they might more focus and concentrate on the project goals and objectives instead of speed, time, and effort of doing decision. In addition, regarding to Flueler (2007), the decision making can be considered as good if the decision is purposeful and meet the goals set in advance in the process of decision making.

In addition to this result, correlation test was conducted to determine if there is an association between knowledge utilization and decision making. Knowledge utilization (KU) represents the computed mean of knowledge utilization processes that comprised of nine variables as shown in Table 1. Effectiveness of decision making (DM) was also computed using the mean of four variables, namely “*we perform quality decision making that enables achieving project goals and objectives*”, “*we perform quality decision making that require less effort and time*”, “*we focus on speed of doing decision in limited time*”, and “*we make sure the outcomes of decisions are precise and consistent to attain project’s objectives*”.

Table 2. Result of Correlation between Knowledge Utilization (KU) and Decision Making (DM)

		KU	DM
KU	Pearson Correlation	1	0.11
	Sig. (2-tailed)		0.22
DM	Pearson Correlation	0.11	1
	Sig. (2-tailed)	0.22	

Referring to the results shown in Table 2, the correlation between KU and DM is only 0.11 with a p-value of 0.22. This indicates that the processes of knowledge utilization do not correlate with effectiveness of decision making in construction projects. This is perhaps related to the limitation of knowledge utilization practice in construction projects. Professionals in construction projects may have inconsistent practice of knowledge utilization in decision making. Furthermore, some of the companies might not implement decision support or knowledge management systems with completed sets of tools and technologies to support knowledge utilization in decision making.

Knowledge management provides the decision makers with useful tool while let them understand and apply the available knowledge at their own advantage in organization (Moss, 1999). The availability and appropriate usage of technologies and tools in managing knowledge would help decision makers in improving the efficiency of knowledge utilization. In addition, decision making is not established on the capability to manage knowledge (Janis & Mann, 1977; MacCrimmon, 1968; Simon, 1960). The skills and capabilities of professionals that involved in construction projects in facilitating and utilizing knowledge might affect the effectiveness of decision making.

V CONCLUSION

This paper highlights the important elements in knowledge utilization and the relationship between knowledge utilization and effectiveness of decision making in construction projects. The results of this research can be used as a guideline and reference for Malaysian practitioners in local construction industry to fully utilize their knowledge and experiences on construction projects. It might can raise and increase awareness of practitioners towards the important of knowledge utilization by understanding the whole framework of knowledge utilization and its influence on effectiveness of decision making in construction projects. It is recommended that future research can be conducted to determine other factors that influence the

effectiveness of decision making other than knowledge utilization.

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