# EMPOWERING AEC PROFESSIONALS TOWARDS HIGH PERFORMANCE AND EXCELLENCE VIA COMMUNITIES OF PRACTICE AND KNOWLEDGE NETWORKS: CASE STUDY OF THE PUBLIC WORKS DEPARTMENT OF MALAYSIA

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Abstract:

Given the ever-increasing complexity of the construction industry, as a sector that relies heavily on knowledge for its day-to-day operations, the accuracy, relevancy and timing of knowledge are deemed imperative among the key stakeholders involved in various infrastructure projects. Nonetheless, due to the fragmentation nature of the industry, knowledge-related issues such as knowledge silos and inconsistent best practices have imposed significant barriers to architecture, engineering and construction (AEC) professionals in better managing their technical knowledge. Furthermore, with the advances in technology, in particular, digital communication, which in particular has revolutionized the way humans interact with knowledge, it has inadvertently inundated the AEC professionals with overwhelming tasks in sieving through the ocean of knowledge. This paper describes the continuous efforts undertaken by the Public Works Department of Malaysia to empower their technical professionals towards achieving high performance through the practice of communities of practice (CoP) and knowledge networks. In realizing the department's vision in becoming a learning organization, five main CoP domains which include project management and technical & contract administration were introduced nationwide. This innovative knowledge management technique represents an ideal vehicle to facilitate the professionals to communicate and share their technical knowledge and experience with each other in a conducive environment.

Keywords: knowledge, knowledge management, communities of practice, knowledge networks, construction industry.

## Introduction

The survival of organisations, both public and private sectors, in today's complex environment is crucially dependent upon their abilities to swiftly adapt and anticipate future changes. Failure to respond coherently to the changes that are rapidly taking place will eventually run the risk of organisations becoming irrelevant and ineffective over time. Thus, the uncertainty of the current dynamic reality is forcing organisations worldwide to evolve and be more innovative to remain competitive. In accomplishing this goal, organisations must progressively acquire new knowledge and develop their capacities to learn in order to expand their existing knowledge base which subsequently would allow them to cope better with the new surroundings (Senge, 1994).

The knowledge-based theory of the firm contends that knowledge is the most critical organisational resource that leads to sustainable competitive advantage. Hence, organisations that are better in

managing their organisational knowledge will most likely find themselves to be ahead of the masses and in control of their own future (Chong, 2006). This is largely contributed to nature of knowledge itself, in particular, the tacit aspect of it that is often difficult to imitate and replicated by others. In recent years, scholars and practitioners alike have continuously highlighted the importance of tacit knowledge to organisations and suggest that greater efforts must be taken to leverage its value and potential (Beesley & Cooper, 2008; Coetzee, Beek, & Buys, 2012).

Against this background, this paper highlights a case study of a large multi-disciplinary construction-related public organisation, Public Works Department of Malaysia in their concerted efforts to empower their technical professionals towards achieving high performance through the use of Communities of Practice (CoP) and Knowledge Networks. The next section of the paper will discuss the aims and methodology of the research. The subsequent section describes the initiative taken by the case study organization in managing its organizational knowledge, in particular, tacit knowledge via CoP. This is then followed by discussions of the findings of a survey undertaken by the department to explore the role played by CoP as an innovative collaborative tool before the last section concludes the paper.

## AIMS AND OBJECTIVES

The aims of the paper is to analyse and discuss the approach adopted by the Public Works Department of Malaysia by using Communities of Practice (CoP) and knowledge networks to empower their employees achieving high performance and technical excellence.

In line with the aims, research questions developed for the study were:

- How can CoP and knowledge networks facilitate technical professionals to improve their performance and competency?
- What are the issues and challenges faced by organisations in implementing CoP and knowledge networks?
- What are the key critical factors required to sustain the longevity of CoP and knowledge networks?

## RESEARCH METHODOLOGY

This paper is part of a broader research project which investigates knowledge management in construction-related public project management organisations. A qualitative method was employed using document analysis and expert opinions.

## KNOWLEDGE IN THE CONSTRUCTION INDUSTRY

As one of the major industries which operate in an information-rich environment, the construction industry relies heavily on knowledge as one of its strategic resources to ensure the tasks associated with the domain can be performed effectively and efficiently (Abdul-Rahman & Wang, 2010; Egbu & Robinson, 2005). Therefore, it is crucial that project knowledge must be deliberately managed in a systematic manner to enable construction-related organisations to achieve improved performance, avoiding repetition of costly mistakes and reducing the time taken in problem solving activities (Borousan, Mehrdadi, Sahafzadeh, Sabet, & Saleki, 2012; Kamara, Augenbroe, Anumba, & Carrillo, 2002; Lin & Lin, 2006; Tan, Carrillo, Anumba, & Asce, 2012).

Nonetheless, the process of managing knowledge in the construction industry is not an easy and straightforward task. Due to the inherent characteristics of the industry that is highly fragmented and transient in nature, this has caused significant challenges for the industry to move forward in its attempt to effectively capturing and managing project knowledge (Tan et al., 2010). Eventually, this predicament has led to a somewhat minimal and merely satisfying success rate of managing project knowledge (Eliufoo, 2008; Zhang & Ng, 2012). To make the situation even more difficult, the construction industry is infamously known for having poor records of managing project knowledge

and this has, in turn, caused a huge loss of opportunity for the industry to leverage the technical know-what, know-how and know-why (Abdul-Rahman & Wang, 2010; Borousan et al., 2012).

The distinctive complications in managing project knowledge is further compounded by the fact that most of the knowledge reside in people's heads, in the form of tacit knowledge (Tan et al., 2010). Most of the initiatives thus far in managing project knowledge have been focusing on capturing and managing explicit knowledge, the type of knowledge that can be easily articulated, transferred, shared and stored (Egbu, 2004). Explicit knowledge represents the most common type of knowledge found within organisations, usually exists in the form of databases, reports, patents, standard operating procedures and manuals.

However, as many may have observed, knowledge in the construction industry is mostly comprised of tacit knowledge, the type of knowledge that is highly personal and deeply rooted in values and beliefs (Polanyi, 1966). Hence, tacit knowledge is hard and almost impossible to be codified and formalized. Nevertheless, despite the difficulties involved in managing tacit knowledge, suitable solutions must be identified to capture and share this type of knowledge. Unless necessary actions are being taken promptly, valuable project knowledge stands a risk of being lost forever whenever a project team is disbanded at the end of a project and all the team members move on their separate ways to new projects (Anumba, Egbu, & Carrillo, 2005; Borousan et al., 2012). Along with the ongoing retirement of the baby boomers generation, it would be a tragic waste if all the knowledge that is accumulated in the mind of experienced surveyors, architects and engineers throughout their professionals life is not being transferred properly to the younger generations (Slagter, 2007).

Reflecting on the unique characteristics of tacit knowledge which is unwritten, unspoken and hidden, it cannot be extracted or shared through the normal process of learning and techniques commonly associated with explicit knowledge. The process of articulating tacit knowledge can only be achieved by means of social interaction between individuals (Nonaka & Takeuchi, 1995). The challenge, therefore, is to identify the right techniques and tools that are able to uncover the hidden knowledge and at the same time to facilitate the process of knowledge transfer to take place.

## MANAGING KNOWLEDGE IN PUBLIC WORKS DEPARTMENT OF MALAYSIA

As the largest technical public organisation in the nation, Public Works Department of Malaysia (PWD Malaysia) which have been in existence for more than 140 years, is responsible for overseeing public-projects development and maintenance of infrastructure assets nationwide. As demand for complex and sophisticated projects continues to be on the rise, PWD Malaysia is aggressively pursuing new and innovative ways in meeting their stakeholders' dynamic expectations. Notwithstanding, taken into consideration the current economic scenario, PWD Malaysia is faced with an uphill task of accomplishing their business objectives due to the increasing pressure exerted on the public organisations nationwide by the constraints of limited resources, in particular, financial resources. As such, in an effort to better optimizing their less than ideal resources, the department has decided to focus on harnessing its intellectual capital and knowledge resources that are ubiquitously embedded in organizational culture, process, products and employees (PWD Malaysia, 2012).

For this purpose, various initiatives have been rolled out in the past including the introduction of a series of long-term strategic framework plans which among others place greater emphasis on organisational learning and growth. As a result, in 2009, a formal knowledge management initiative was introduced to ensure the organisational knowledge is systematically managed (PWD Malaysia, 2010). Better known as Enterprise Content and Knowledge Management, the initiative comprises of two main strategies namely codification and personalisation. The former places explicit knowledge at the centre of the strategy, making full use of technology such as web portals to connect their employees with content such as project reports, technical guidelines and manual. On the other hand, personalisation strategy is more concerned with connecting and developing knowledge networks among employees, focusing on the tacit knowledge that resides in individuals.

The journey of undertaken by PWD Malaysia to become a learning organisation is not without its own unique challenges (PWD Malaysia, 2010). Based on a study undertaken at the initial phase of the initiative, it was revealed that there were a number of key challenges that may serves as major hurdles to the imitative such as:

i) **Knowledge silos**
Due to the hierarchical structure of public organisations that are hierarchical and divided into various divisions and units, this has often resulted in the occurrence of knowledge silos which are found scattered across the organisations. As such, critical knowledge remains hidden to others within the department.

ii) **Inaccessible Best Practices and Processes**
There was a lack of adequate support, process and technology-wise, that is required in sharing the best practices developed by various divisions and units. As a technical organization, PWD Malaysia strives for consistency in decision making. Unless best practices are readily made available to others, inconsistency and inefficiency will creep in.

iii) **Brain drain**
As a large group of baby boomers is beginning to leave the department due to mandatory retirement, they will bring together with them years of experience and extensive project knowledge. The loss of invaluable knowledge could seriously hamper the department's effort to become the center of technical excellence in the nation.

As a technical department which comprises of thousands technical professionals and staff, the department is aware that much of its organisational knowledge is embedded in its employees, in the form of tacit knowledge. It is therefore critical that this type of knowledge is addressed appropriately by making them more visible and accessible to all. Hence, the department sought to identify the most effective tools in better managing technical and project knowledge which mostly resides in their technical professionals. Taken into consideration their employees' diverse backgrounds and areas of expertise, the department decided to embark on cultivating CoP as a knowledge transfer technique in managing knowledge in particular to address the issues of knowledge silos and brain drain.

## COMMUNITIES OF PRACTICE (CoP) IN PWD MALAYSIA

By definition, Communities of Practice is a network of highly motivated and dedicated individuals with a common interest, beliefs and understandings of a particular topic that interact regularly for the purpose of sharing knowledge and fostering learning activities (Wenger & Snyder, 2000). This semi-formal and self-governing group is focused on joint collaboration and mutual sharing of knowledge and experience among members and is intended to complement existing structures in organisations (Hearn, 2009).

CoP is a unique entity as compared to a project team in the sense that it does not possess the formal structure of the latter and the membership is based on voluntary commitment rather than compulsory. A project team is formed to accomplish a specific task while on the contrary; CoP's main purpose is to develop members' capabilities by building and exchanging knowledge in an enabling environment. Moreover, unlike the finite lifespan of a project team which is usually disbanded once the project is completed, the CoP community will continue to exist and remain active as long as the members see the interest and value in the topic and benefitted from the inherent rewards of knowledge sharing (M. du Plessis, 2008). CoP's members are free to leave the community at any time if they so desire. Due to the dynamic and fluid objectives that exist in CoP, CoP helps to build relationships and instil the element of trust and mutual respect among members.

PWD Malaysia recognises CoP as an useful vehicle for knowledge exchange and transfer which in turn helps to support their technical professionals in developing a shared meaning and building professional relationships. By adopting a strategic definition of CoP as "peer networks of practitioners

within PWD Malaysia who help each other to perform better by sharing knowledge and experience where through this collaborative environment, new knowledge is created and will help spark innovation", the department envisages that CoP would help to break down the knowledge silos that exist in the department. This subsequently would enhance the interactions between their employees via its informal and welcoming social environment.

Based on two value propositions that the PWD's CoP offer including a) in-depth relevant knowledge and experience and b) reliable knowledge support, in 2012, the department organised its first CoP awareness program to introduce CoP to its employees and explore its advantages of cultivating knowledge sharing initiatives. Following this, a dedicated CoP roadmap comprising of five key phases was developed to get the program under way (Figure 1). The roadmap was based on a knowledge management implementation framework model known as QUEST (Qualifying Elements for Strategic Transformation in Organisations) and the processes involved the following elements (PWD Malaysia, 2015, p. 4):

i) **Explore**
Study the 'as is' and envision the 'to be' scenarios to identify the elements in cultivating a knowledge sharing and learning environment;

ii) **Strategise**
Lay out the CoP implementation program using the community feedbacks, strategic plans, tactics and activities were drawn out to;

iii) **Enable**
Identify the domains, champions and task force to kick start the program;

iv) **Cultivate**
Building the CoP portal for online interaction, and

v) **Evaluate**
Explore and identify critical success factors to develop the CoP Sustenance Program

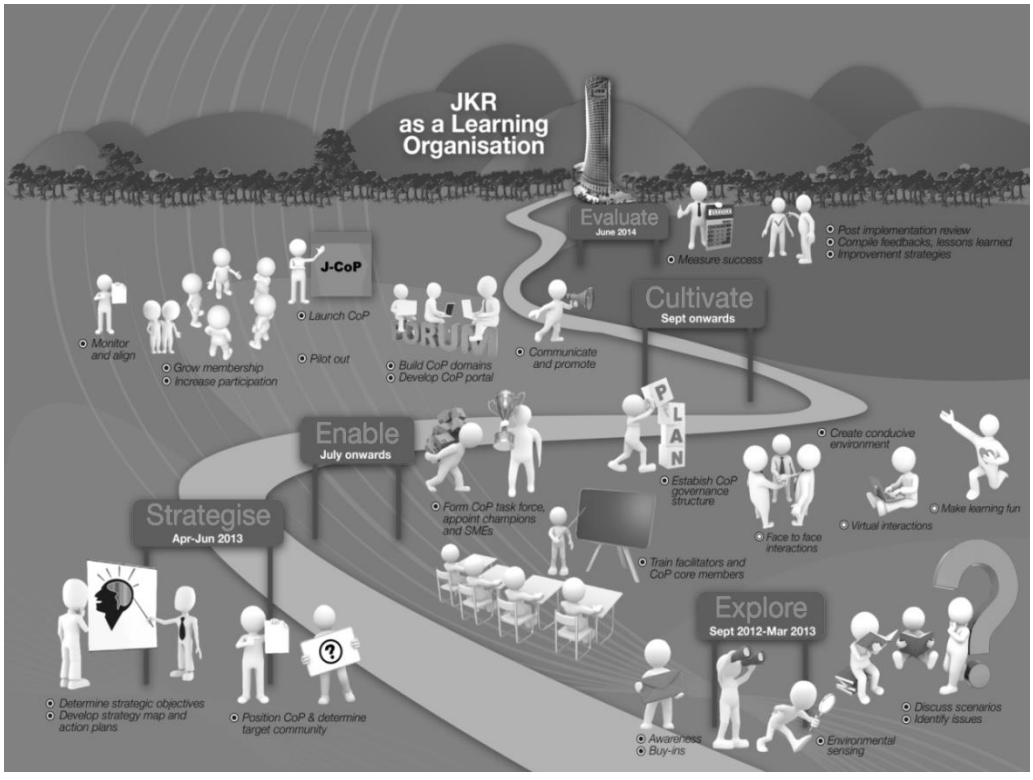


**Figure 1:** PWD Malaysia's Communities of Practice Roadmap (PWD, 2013)

For a successful CoP implementation to achieve sustainability and lasting growth, the department realise that the initiative must be closely aligned to the organisation corporate goal and priorities. The CoP program cannot be run as an end in itself, but must be firmly linked to the strategic mission of PWD Malaysia. In the department's Strategic Framework 2012 – 2015, CoP was aptly placed under Theme 5, (Innovative Organisation); item 5.4: Develop Innovative-centric Workforce. In line with the five strategic themes as outlined in the strategic framework, five CoP domains were introduced including Project Management, Asset and Facilities Management, Human Resource Management, Stakeholder Management and Technical and Contract Administration (Figure 2). Among the roles identified for each domain include to share collective knowledge, to facilitate networking among employees from various backgrounds, to create innovative strategies and to provide learning opportunities for competencies development (PWD, 2015, p. 9).

On the operational aspect of the initiative, a dedicated task force was set up to oversee and implement the overall action CoP plan while concurrently a number of experienced individuals and subject matter experts were roped in to spearhead the CoP as community leaders, coordinators and facilitators. To complement the physical face to face CoP, a virtual CoP known as JCoP was introduced to enable the technical professionals who are involved in CoP to meet and interact with each others in an online forum, independent of time and space. The portal was designed to capture individuals' experiences and opinions on various topics in relation to each of the domain. JCoP provides the users with an interactive platform for them to ask and discuss matters pertinent to their works. Meanwhile, in an effort to entice new users to join the CoP and JCoP portal and to keep the technical professionals aware of the initiatives, JCoP newsletter are published on quarterly basis and disseminated via email.

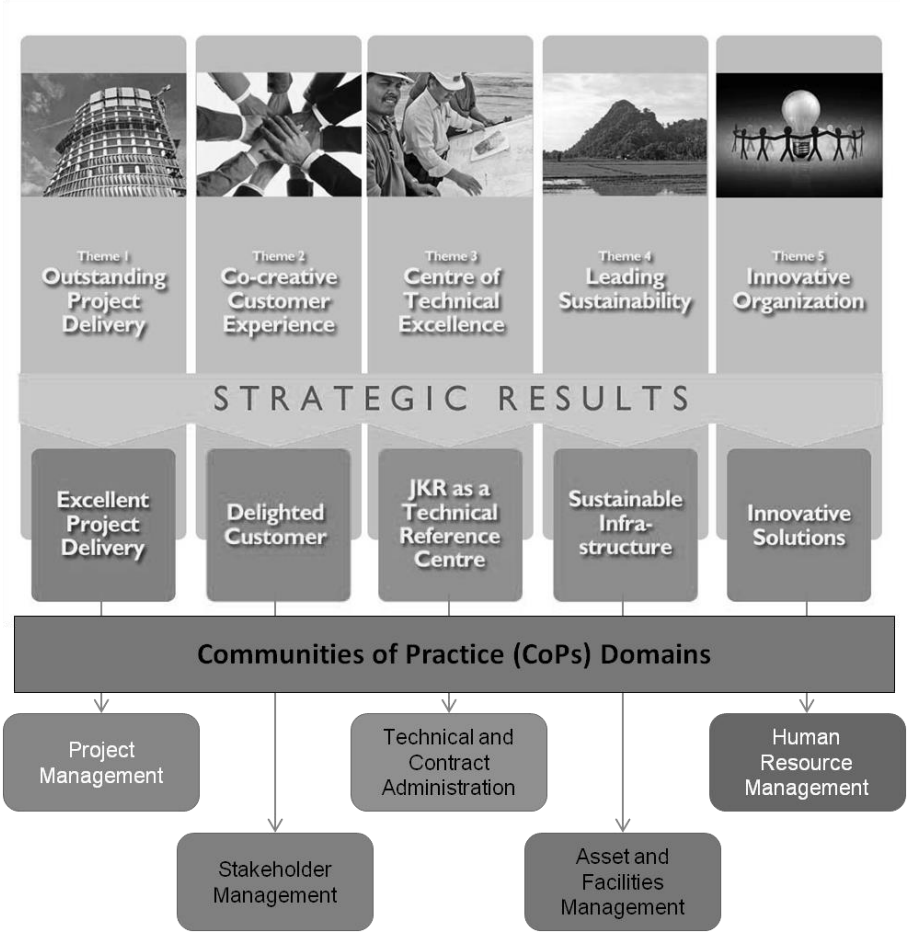


**Figure 2:** PWD Malaysia's Communities of Practice

## LESSONS LEARNED FROM CoP IMPLEMENTATION IN PWD MALAYSIA

### What went well

On the onset, the active involvement of technical professionals and support staff from various background and positions demonstrates a promising future for CoP and JCoP within PWD Malaysia. Based on a study conducted on the virtual CoP users, JCoP portal, between October until December 2014 - a year and a half after the inception, an encouraging 84% of the respondents surveyed cited that JCoP are capable of building knowledge sharing and learning in work culture while 78% agreed that JCoP are useful in gathering best practices (Othman, Albert & Kwong, 2015). In addition, 75% suggested that JCoP would provide them with the much needed assistance in identifying the subject matter experts and referrals (Figure 3). Seminars and conferences such as PWD Project Management Seminar 2015 which was co-organised by the Project Management CoP and well attended by the department's surveyors, architects and engineers, provide the employees with engaging avenues to acquire new knowledge whilst concurrently build up the professional networks with others. Due to success of CoP in the department, plans are being developed to create three new CoP domains to complement the initial five, in line with the current trends in the construction industry including Green Technology CoP, Building Information Modelling CoP and Contract Administration CoP.

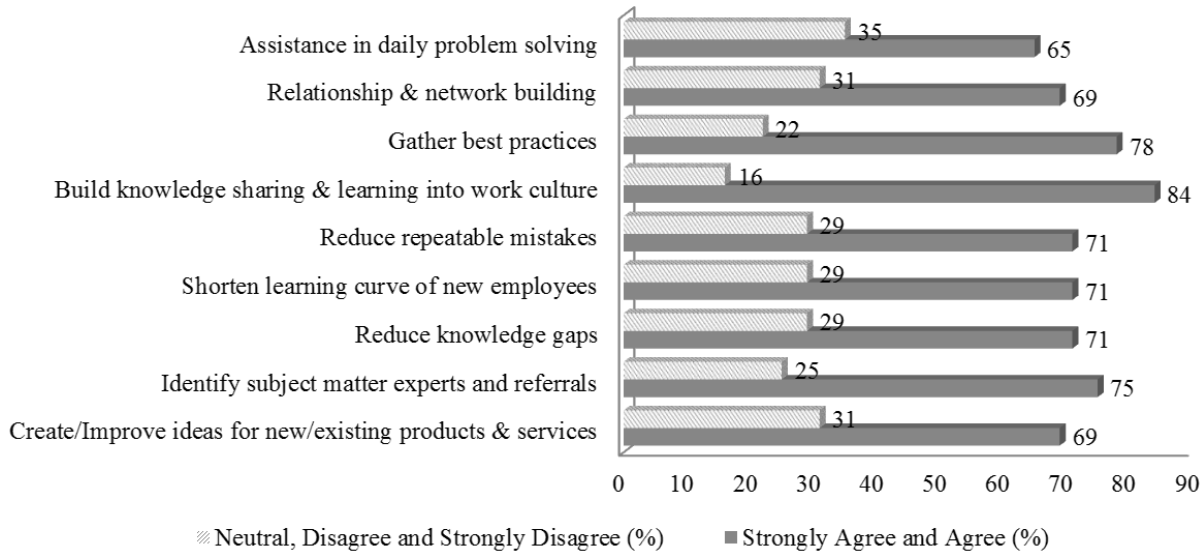


**Figure 3:** CoP & JCoP Benefits (adopted from Othman et al., 2015)

Moreover, due to the increased promotional and marketing exercises that are conducted on a regular basis, the number of technical professionals within the department joining the initiative, in particular, JCoP continues to rise. Programs such as one day road show, CoP and JCoP day and workshops were initiated to provide the awareness on the initiative including the benefits offered. During these events, the participants are encouraged to be part of the CoP and register themselves with the online JCoP portal. It was observed that these interactive programs significantly help to generate the euphoria and enthusiasm among the employees on CoP and JCoP. This is evident by the number of visits and online interactions in JCoP Portal which would increase dramatically after each event ended.

### What have not gone well

Despite the encouraging interest received from the employees during the early phase of the initiative, as time passes by, there appears to be a lack to face to face meetings and activities organised by the CoP's core teams. Much of this predicament is attributed to the nature of works that the professionals are involved in on daily basis as there is a great likelihood that they would often spend their times out of the office, attending meetings and project site visits. As such, limited time is available for them to

plan and initiate their CoP domains' activities. This resulted in a lack of programs being organised which led to a less than ideal engagement interactions to take place between the CoP's members. In order to ensure the sustenance of a CoP, continuous communication serves as a critical prerequisite. Traditional face to face activities must be conducted on a regular basis to facilitate the members to receive "first-hand" knowledge from the experts and build up professional relationships among colleagues.

In relation to the CoP champions, leaders and subject matter experts, as the majority of them are experienced professionals, there is a high tendency of them being transferred from one office to another within a short period of time and sometimes to different geographic locations. When this occurs, most of the time they will not be able to be part of the CoP and have to relinquish their roles in the CoP. In the process of filling up the void left by the experts, the task force is facing persistent challenges to identify the new CoP champions and experts who are willingly to lead the CoP on voluntary basis. Taken into consideration the responsibilities required of them such as to envision the services of CoP over time and energise the sharing process and provide continuous nourishment to the society, the tasks involved in appointing the CoP champions may be arduous and lengthy at times (PWD, 2013).

A closer observation on users' participation reveals that the online JCoP portal is performing far better than the physical CoP when membership's aspect is considered. Reasons for this may be explained by the advantage offered by JCoP in term of accessibility where members can log in into the portal at any time of the day. Moreover, with the advent of technologies and digital telecommunications, members can communicate with others who shared the same interest and passion using their smartphones and tablet without much difficulty. The element of gamification embedded in the online forum helps to create an engagement process, which allows users to obtain points for every online transaction made for example 20 points for asking questions, 40 points for posting an answer and 300 points if the answer provided by the member is chosen as the best answer. Nevertheless, there were some concerns raised up by the members and concurrently observed by the task force that some JCoP moderators or subject matter experts of certain CoP domains are not active either in answering the questions or participating with the online conversation. This is largely perhaps due their pressing workloads. Notwithstanding, it would adversely affect the performance of the CoP domains and subsequently causing members to lose interest.

## DISCUSSION

Based on the case study of CoP in PWD Malaysia, there are a number of key critical factors that can be identified that can be considered when an organisation plans to introduce their own CoP. First and foremost, a visible support and commitment from the top management of the department is crucial. Senior managers and top management must be directly involved in any of the knowledge-related activities organised by the CoP domains to demonstrate the importance and the benefits that the initiative bring to the department. For instance, during the official launching of the CoP initiative in 2013, the event was attended by the department's Director General (DG) and accompanied by all the senior directors and directors from various offices. Moreover, in the subsequent CoP Seminar for PWD Malaysia's Top Management organised in 2015, the-then DG even took on the podium to facilitate the questions and answers sessions. Such impromptu action as this helps to send a powerful message to all employees that CoP as a collaborative knowledge transfer initiative is central to the department's growth and development.

It is crucial to ensure that the CoP initiative is well aligned with the organization's vision and mission in order to add value to the organization (Coetzee et al., 2012). The strategic plan developed for CoP must be underpinned by the contextual needs of each individual organization (Conley & Wei, 2009). PWD Malaysia's CoP roadmap was initiated with the department's corporate goals in mind. This is evidently observed in the inclusion of CoP as part of the initiatives consisted in the department's Strategic Framework 2012 – 2015. Furthermore, all of the five CoP domains were identified based on

the five strategic themes outlined in the framework. This provides reciprocal links between the department's corporate goals and the CoP domains.

Subject matter experts (SMEs) participation in CoP and virtual CoP must be constantly encouraged to provide support and guidance to the members. It is only through greater SMEs continuous interactions, that CoP and virtual CoP are able to function effectively. In addition, it is also important that the issues or matters being discussed in the domains are of high relevance and strategically links to the core business of the department. Community members will find the time they spend in the domains worthwhile if the topics being discussed are related to their job scope and help them to perform their tasks better.

Meanwhile, concerted efforts must be undertaken on a continuous basis to ensure all employees, including those from headquarters, states and districts are aware of the existence of CoP and JCoP. It would be such a waste if such useful initiative remains unknown to the majority of the employees. CoP thrives on collective community wisdom. The more members participate in the domains, it would help to create a knowledge enabling environment and strengthen the knowledge networks. Promotional and marketing exercises such as road shows, seminars and workshops must be organised from time to time to create awareness and develop interest among as many employees as possible. Use of technology and digital channels, in particular social media, must be optimised to help the CoP's task force and SMEs to engage actively with community members.

Rewards and recognition program must also be established to encourage continuous participation. In 2015, the top management recognised three of the JCoP members as the most active users in JCoP and they were awarded with certificates and souvenirs (books). For the future plan, as part of the CoP's sustenance program, the task force is currently exploring possible ways to empirically monitor and assess the health of each CoP. By performing a health check on the individual community and the overall initiative as a whole, it would provide a good indicator of the status of each CoP and subsequently, how and when to exercise corrective measures when a CoP shows display signs to falter.

As highlighted in the JCoP survey, despite the positive feedback received by the respondents on the capabilities offered by initiative, many of the respondents singled out time limitation as one of the main reasons that prevent them from being actively involved (Othman et al., 2015). As technical professionals who are involved in various infrastructure projects nationwide, their daily workloads can at times be overwhelming. Thus, it would difficult for them to attend any face to face sessions organised by their respective CoP domains due to conflicting schedules and logistical constraints. It would be beneficial, therefore, if CoP activities which have been planned earlier to be advertised and promoted to all members months before the programs are going to take place. Furthermore, members must be encouraged to take advantage of the JCoP portal by posting questions that are of interest to them or answering other members' questions.

## SUMMARY

The importance of managing knowledge in a systematic manner in the era of globalization where only the fittest thrive cannot be taken lightly by any organisations regardless of their organizational type or size. This paper describes the continuous efforts undertaken by the Public Works Department of Malaysia to empower their technical professionals towards achieving high performance through the practice of communities of practice and knowledge networks. As part of concerted efforts to realise the department's vision in becoming a learning organisation, PWD Malaysia have introduced CoP as an innovative knowledge sharing technique to enable their employees to get together in a conducive environment to discuss pertinent matters related to their works. Findings reveal that this collaborative knowledge transfer technique represents an ideal vehicle for individuals from various backgrounds to communicate and share their technical knowledge and experience with each other. By continuously interacting with each other in an informal environment, members help to create a knowledge friendly culture while the learning process takes place.

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