

Factors Influencing Professional Virtual Communities Towards Public Service Efficiency

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Abstract: Communities of practice, which are often a central component of KM, are considered to be used to facilitate information sharing, resolve internal obstacles, and enhance mutual learning. The extensive use of ICT has enabled their transformation into a virtual environment – Professional Virtual Communities of Practice (VCoPs) – which is creating ideal conditions for collaborative information sharing and learning. This research examined factors predicting usage of the VCoP and how Malaysian public sector organisations, through their adoption, can influence their service efficiency. Based on the synthesis of the UTAUT2 and the DeLone & McLean Model of IS Success, a quantitative approach was adopted for this research. 313 valid respondent data was collected using a questionnaire from public sector organisations that had adopted a VCoP as a knowledge sharing tool. A logical sequence of methods, encompassing descriptive and inferential analysis, followed by using Structured Equation Modelling (SEM), and the SmartPLS software was conducted to determine relevant statistical tests. The findings suggest that the Malaysian Public Sector will benefit from improving their knowledge sharing environment with a VCoP system. Establishing appropriate facilitating conditions, quality knowledge and an enjoyable and up-to-date digital tool will ensure continuous usage.

Keywords: Public sector KM, Virtual communities of practice, UTAUT, DeLone & McLean

1. Introduction

Knowledge is widely regarded as crucial, particularly because it is the most valuable asset in any organisation. At all levels, new knowledge is created not just by individuals, but by teams and communities of people sharing their knowledge and experience throughout the enterprise. More recent interests have tended to introduce communities of practice as structures – tools to be deliberately created by policymakers and organisations for the instrumental purpose of targeted knowledge dissemination. Public organisations have begun to support professional virtual communities of practice (VCoPs), which have evolved into an effective knowledge sharing vehicle, where knowledge workers can voluntarily engage, share opinions, make informed decisions, and eventually enhance their performance. The aim of this research is to examine factors predicting usage of the VCoP and how Malaysian public sector organisations, through their adoption, can influence their service efficiency. The study is based on the integrated perspective of popular UTAUT2, and the DeLone & McLean Model IS Success models. Findings from the VCoP usage are highlighted and discussed, with the purpose to examine implications for research on KM in public services, and for the management of these social collaborative tools in Malaysian public organisations.

2. Literature Review and Hypotheses

2.1 Professional Virtual Communities (VCoP)

Alavi (2013), defines the VCoP as “social network of individuals, who interact through social media, potentially crossing geographical, political and psychological boundaries in order to pursue mutual interest or goals”. It has been observed that employees in a VCoP collectively learn to achieve their knowledge seeking objectives (Frank et al. 2017). More recent interest has tended to introduce the VCoP as structures – tools to be deliberately created by policymakers and organisations for the instrumental purpose of targeted knowledge dissemination (de Carvalho-Filho et al., 2020; Zamboni et al., 2020). A recent review concerning papers about CoPs published in major KM Journals, testified the growing interest of scholars: 25% of empirical papers were devoted to Communities of Practice in the public domain (Bolisani & Scarso, 2014).

However, empirical evidence in the public sector about KM in general, and VCoPs in particular, are still lacking, particularly when compared to the private sector (Scarso et al., 2016). The shortage of studies undertaken to predict the use in adopting the VCoP in public sector organisations, has propelled research to mitigate this gap.

Organisations like the Malaysian Public Works Department, Ministry of Trade, and the International Islamic University Malaysia have become pioneers in cultivating the VCoP amongst their professional staff. The question addressed in this article assesses factors that predict use of the VCoP system towards efficiency in public sector organisations.

2.2 Predicting Usage of the VCoP in Public Sector Organisations

Quigley et al. (2007) stressed that “no single theoretical viewpoint can provide clarification of the information sharing and transition process” from the perspective of knowledge sharing. Hence, to explain user acceptance on a particular technology, researchers apply theories and models with different variables, which have been proven successful in determining usage of a system (Venkatesh et al., 2012). There is an inclination of using a combination of theories as the UTAUT2 and DeLone & McLean IS Success models in predicting the usage of IS systems (Tarhini, A. et al., 2019). Consistent with the exponential growth of VCoPs during the last decade, this study combines these two models to predict VCoP usage for the Malaysian public sector organisations.

2.3 The DeLone & McLean Model

The DeLone & McLean Information System (IS) Success Model has been acknowledged as one of most widely used technology assessment frameworks and had contributed towards an improved understanding of IS management (Stefanovic et al. 2016). After a comprehensive review of the literature in 180 empirical studies, the researchers DeLone & Mclean (1992) grouped the IS success dimensions into six main categories of which are multidimensional and closely related: 1.system quality, 2.information quality, 3.use, 4. user satisfaction, 5.individual impact, 6. organisational impact. DeLone & McLean revised the IS performance model ten years later, adding service quality as a new dimension of assessing IS success and combining organisational and individual impacts into a single impact measure called "net value" (Stefanovic et al., 2016). The emphasis of the DeLone & McLean, (2003) updated model is on the importance of measuring the success of information systems.

2.4 The Unified Theory on the Acceptance and Use of Technology (UTAUT2)

Numerous empirical studies provide support for UTAUT2 being a robust and parsimonious model that can be adopted to explain users’ acceptance of new information technology as a tool, for performing an activity (Venkatesh et al., 2012). UTAUT2 with seven constructs that affect behavioural intention and use behavior include facilitating condition, performance expectancy, effort expectancy, social influence, hedonic motivation, price value, and habit, has been applied to explain the acceptance in various industries such as Internet Banking (Arenas et al., 2013), Mobile Applications (Wong et al., 2014) and Social Media applications (Baptisa et al., 2015). As price value is not significant in organisational contexts, studies in this research setting can exclude it (Venkatesh et al., 2012).

Having examined the existing VCoP studies, the researchers construed the VCoP will require factors from both models to better predict VCoP usage. With similarity of variables, the service dimension of the DeLone & McLean model has been merged with UTAUT’s facilitating conditions. Existing VCoP studies (presented in Table 1) below, examine factors that influence its usage.

Table 1: Existing VCoP Studies That Examines Factors Predicting its use

No	Research Studies that affect VCoP usage	Variables: DeLone & McLean model		Variables: UTAUT2 Model	
		Knowledge Quality	System Quality	Behavioural variables	Facilitating Conditions
1	Andrew et al. (2008) The research focussed on the VCoP, with its potential application in nursing.	Access to reified and tested best practice statements.	Simple to use online systems	Ease of use, Social influence amongst practitioners and academics	A vibrant learning environment.

No	Research Studies that affect VCoP usage	Variables: DeLone & McLean model		Variables: UTAUT2 Model	
		Knowledge Quality	System Quality	Behavioural variables	Facilitating Conditions
2	Meeuwesen, B. & Berends, H. (2007) Research of four CoPs within Rolls-Royce.	Knowledge quality	Social networking system with easy-to-use functions	Performance expectancy	A knowledge sharing environment
3	Yamklin, S. & Igel, B. (2012) Research based on in-depth interviews with staff in 3 CoP field sites in Thailand.	Access to new ideas and best practices	24x7 system access	Service efficacy and problem solving Ease of use	Governance – Formally integrating CoPs into the organisational structures
4	Scarso et.al (2016) Research on VCoP development and usage in corporate and public sector organisations.	Technical but shared reviews amongst experts and line professionals	Social Networking Platform with a 24x7 access to the content	Peer influence with performance expectancy	Dedicated team at every level, with top management support. Governance to manage the CoPs.
5	Haas et al. (2020) Research on VCoP Engagement	Access to best practices	Adequate technology to support and sustain the VCoP	Performance expectancy	CoP governance to develop best practices. Regular communication programs to promote benefits.
6	Wolf P., Spath, S., & Haeffliger, S. (2011). An automotive case study to explore what incentivizes employees to share knowledge in intra-firm CoPs.		Infrastructure to share experiences with ease.	Performance expectancy Social influence	Support from Management
7	Othman, R., Albert, G., and Kwong, G.S. (2015). An Engineering case study to determine VCoP usage.	Problem solving forums and link to subject-matter experts.	Wikis with cloud tags for easy search terms. Online chats linking to lessons learned.	Peer influence, 'fun' environment with allocation of points for top views, queries, and feedbacks. Cultivating a habit of using the VCoP	Dedicated team with on-going awareness programs, publishing reified knowledge for easier viewing.
8	Lai and Chen (2014). Research to investigate the knowledge-sharing behaviour.	Quality knowledge		Enjoyment in helping others, Knowledge self-efficacy	Offline activities, Effective CoP Task Force and Moderators
9	Hung, Lai & Chou (2015). Study on Use intention in VCoP		Technology adoption, Resource availability	Reciprocity and enjoyability	Interpersonal trust

2.5 The Research Model and Hypotheses

The research model posits that if the VCoP members have significant use intention, then this will result in increased VCoP System use and greater efficiency in public sector service delivery. The two notable models, UTAUT2 and DeLone & McLean IS Success model, was incorporated for the purpose of predicting use related to VCoP technology, based on theoretical evidence provided in the previous two sections and existing literature. The integrated research model presented in Figure 1 aimed to combine quality dimensions from the IS Success model with constructs of the UTAUT2 model, as independent variables, to predict VCoP usage. The research hypotheses and measures/items used to develop the constructs have been suggested below:

#	Research Hypotheses
H1	A higher level of a VCoP's system quality will produce a higher level of user satisfaction
H2	A higher level of a VCoP's knowledge quality will produce a higher level of user satisfaction
H3	Social influence will positively influence the use intention in the VCoP
H4	Effort expectancy will positively influence the use intention in the VCoP
H5	Performance expectancy will positively influence the use intention in the VCoP
H6	Hedonic motivation will positively influence the use intention in the VCoP
H7a	Habit will positively influence the use intention in the VCoP
H7b	Habit will positively influence the use behaviour in the VCoP
H8a	Facilities conditions will positively influence the use intention in the VCoP
H8b	Facilities conditions will positively influence the use behaviour in the VCoP
H9	User satisfaction will positively influence the use intention in the VCoP
H10	Use intention will positively influence the use behaviour in the VCoP
H11	Use behaviour will positively influence the efficiency in public service delivery

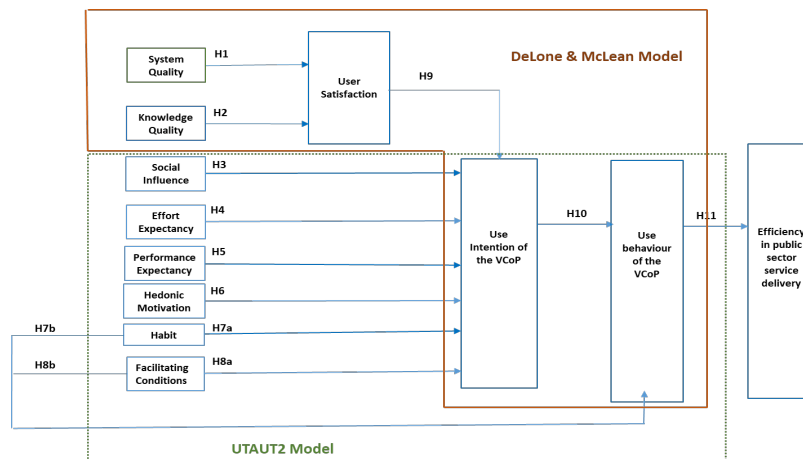


Figure 1: The Research Model

3. The Research Methodology

3.1 Design and Procedure

This study utilised a cross-sectional, questionnaire-based design. Using convenience sampling technique, 313 samples were analysed from employees adopting the VCoP in public organisations in the Klang Valley area of Malaysia in 2020. The results of power analysis following Cohen et al. (2013) and Hair et al. (2017) approach using G.Power 3.1, indicated that the sample size is big enough to achieve an alpha less than or equal to 0.05 (two-tailed) and a power greater than or equal to 80%. A link to the study's questionnaire was sent to employees to fill up. The questionnaire consisted of two sections including respondents' socio-demographic

attributes such as gender, age, academic qualification, frequency of VCoP usage, and job position, as well as the items prepared to measure the variables in the research model. Furthermore, the quantitative stand of this study, utilised the survey items originally derived by Venkatesh et al. (2003; 2012) from the UTAUT2 and the DeLone & McLean IS measurement models (2003); which supported these same items.

3.2 Participants

The sample consisted of 161 males (51.4%) and 152 females (48.6%). 74.2% of the respondents were young adults with an age range between 25-40 years of age. Majority of the participants (94%) were degree holders with 72.8% being officers. 86.3% of the respondents indicated that they have been accessing the VCoP for more than a year (34.5 % between 1-2 years, 28.8% between 2-3 years and 23% more than 3 years). Based on these responses, it is appropriate to assume that these respondents are experienced in using the VCoP and will be knowledgeable enough to provide their opinions on key success factors they feel will ensure sustenance of the VCoP.

3.3 Measures

User satisfaction was measured using two items adapted from DeLone & McLean (2003) (e.g., "The functionality and performance of VCoP website has met my expectations"). Behavioural intention was measured using three items adapted from Davis (1989) (e.g., "I intend to continue using the VCoP in the future"). To measure VCoP usage, respondents were asked to indicate if they use the seek problem solutions at work, learn about new knowledge or exchange of knowledge with other members. Systems quality was measured using four items adapted from DeLone & McLean (2003) (e.g., "It is easy to navigate within VCoP system"). To measure knowledge quality, respondents were asked to indicate if the information stored in the VCoP is relevant for their job, easy to understand, accurate, complete, and reliable (DeLone & McLean, 2003).

The items used to measure social influence (five items, e.g., "people who are important to me think that I should use VCoP") were adapted from Venkatesh et al. (2012). Also, the items to measure effort expectancy (four items, e.g., "Learning how to use the VCoP is easy for me") drawn from Venkatesh et. al (2003). Items to measure Performance Expectancy (four items, e.g., "Using the VCoP helps me accomplish things more quickly"). Hedonic motivation was measure using three items adapted from Venkatesh et al. (2012) (e.g., "I find using the VCoP to be enjoyable") and habit (four items, e.g., "The use of VCoP has become a habit for me"). To measure facilitating conditions, respondents were asked to indicate if they have the resources, knowledge, and adequate training to use the VCoP (Venkatesh et al. (2012)). All items were measured on a 5-point likert scale.

3.4 Data Analysis

Categorical variables were presented as frequency and percentages. The measurement model and structural models were assessed using partial least squares structural equation modelling (PL-SEM) and SmartPLS 2.0 software. Data analysis revealed all missing values were addressed. Using SmartPLS, the data was analysed in several separate, but sequentially related steps. The implementation of these parameters in a systematic manner is a two-step method (presented in Figure 2). The first criterion was to evaluate the outer model (measurement model), which will include the reflective constructs' reliability and validity, followed by the Inner model (structured model).

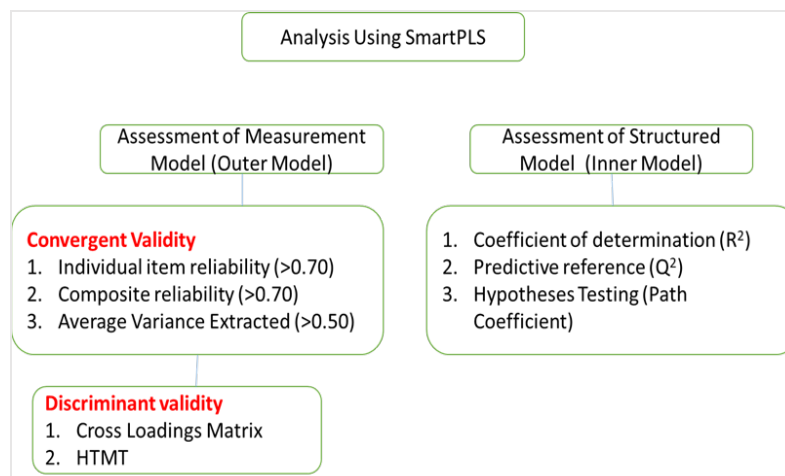


Figure 2: Model Validation Process

4. Results

The results supported construct reliability as well as convergent validity of all constructs. Cronbach's alpha (ranged from 0.754 to 0.929) indicated good internal consistency of the items of the constructs and composite reliability of the constructs (ranged from 0.754 to 0.912) support the construct validity. Convergent validity assessed average variance extracted of the constructs (ranged from 0.670 to 0.851), achieving discriminant validity. Factor loadings ranged from 0.730 to 0.929 and were significant at 0.001. As advised by Hair et al.(2017), Heterotrait-monotrait (HTMT) ratio was assessed and the value was less than 0.9, also fulfilling the requirements of discriminant validity.

4.1 Structural model assessment

While there were significant positive associations between habit (H7b), facilitating conditions (H8) and use intention (H10) towards use behaviour, this study could not support H3, H5 and H7a on the relationships between social influence, performance expectancy and habit towards use intention. There were significant positive associations between the two (2) factors of DeLone and McLean model, including systems quality and knowledge quality towards user satisfaction, supporting H1 and H2 respectively.

Also, the results supported H9 that positively associated user satisfaction to use intention. Finally, the results displayed a strong relationship between use behaviour (H11) and efficiency in public service delivery (presented in Figure 3).

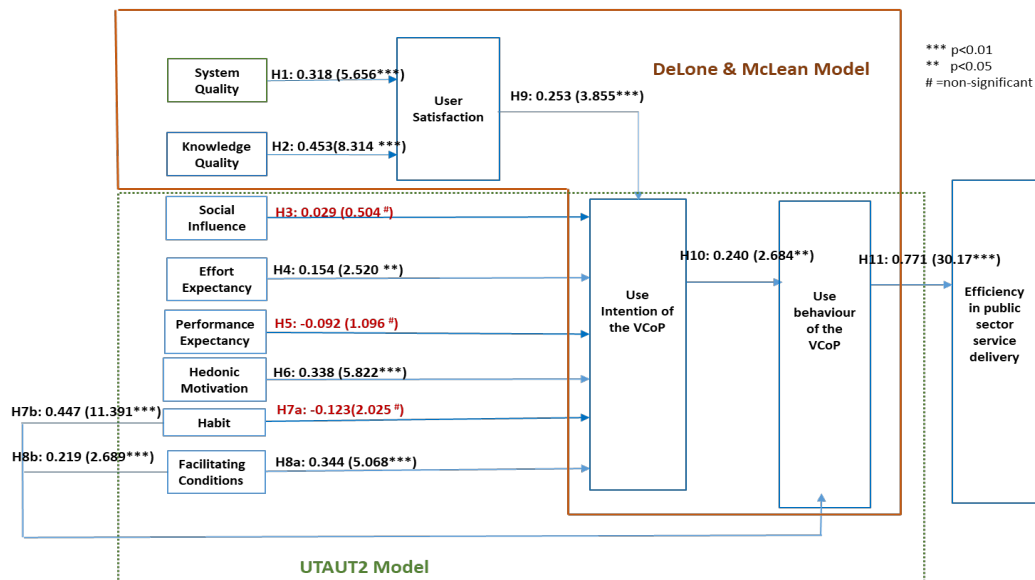


Figure 3: Research Model Assessment

4.2 Hypotheses Testing

Standard regression weights or path coefficients between constructs relevant to the proposed hypotheses were calculated to test the hypotheses. The statistical significance test was used to assess the intensity and existence of the relationships (which was either positive or negative). A t-test was used to determine the significance of the path coefficients, and hypotheses with t-statistics greater than 1.96 were found to be supported, as shown in table 3.

Table 3: Summary of Hypotheses Testing of the Research Model

#	Beta	T-stat value	Findings	#	Beta	T-stat value	Findings
H1	0.318***	5.656	Supported	H7a	-0.123#	2.025	Not supported
H2	0.481***	8.314	Supported	H7b	0.447***	11.391	Supported
H3	0.029#	0.505	Not supported	H8a	0.344***	5.068	Supported
H4	0.154**	2.520	Supported	H8b	0.219***	2.689	Supported

#	Beta	T-stat value	Findings	#	Beta	T-stat value	Findings
H5	-0.092 [#]	1.096	Not supported	H9	0.253***	3.855	Supported
H6	0.338***	5.822	Supported	H10	0.240**	2.684	Supported
				H11	0.771***	30.170	Supported

(#p< .1, * p<.05, **p<.01, *** p < .001, two-tailed test, # - not supported)

5. Discussion

This research contained 13 hypotheses in all, with 10 of them being supported. This study proved that that people seek the VCoP knowledge base to solve work related problems or seek for expertise (Wolf, P., 2011; Scarso, et al. 2016). Based on the integrated framework, this research clarified factors that can predict engagement in VCoPs for public sector organisations. As a result, this research adds to the theory on communities of practice and laid out options for the VCoP Administrators to strategise and put in place policies and procedures, to boost member participation in the virtual communities of practice. In particular, this research will be able to highlight individual user satisfaction and technological factors that are critical to motivate the VCoP members in adopting the VCoP for their knowledge sharing and learning initiatives.

As the VCoP is a source of knowledge for information seekers, there is a belief that the quality of the technology, being an integral component in the VCoP, was posited as a potential influence in impacting user satisfaction. The H1 hypothesis was supported by these findings, which indicated that the System Quality in a VCoP had a substantial positive direct impact on user satisfaction ($\beta=0.318$, t-statistic =5.656). Similarly, the results of the study revealed that Knowledge Quality had a positive direct impact on VCoP System User Satisfaction ($\beta = 0.453$, t-statistic = 8.314).

These findings were not unexpected, as they corroborated with previous De Lone and McLean studies (Chen (2007); Gauzdal (2008); Hew (2009) and Borzillo (2017)). As a result, H2: A higher level of VCoP Knowledge Quality leads to higher levels of user satisfaction, was proven to be significant. The factor, Effort Expectancy (EE) had also a positive influence ($\beta = 0.154$, t-statistics = 2.520) on use intention of the VCoP, which is consistent with UTAUT findings (Venkatesh et al., 2003) and several previous studies (Al-Shafi et al. 2009; Gupta et al., 2008). Hence H4 – Effort Expectancy has a significant positive effect on use intention of the VCoP. Consistent with findings from several studies (Venkatesh et al., 2012; Moorthy et al., 2019), there is strong indication, that fun and enjoyment can predict technology adoption. Hedonic Motivation (HM) was found to have a significant positive direct effect on use intention ($\beta = 0.338$, t-statistic = 5.822). This indicates that the more users think of answering questions in the VCoP forums (Lai & Chen, 2015), as a pleasant and competitive environment, the more likely they are to use the virtual knowledge sharing platform. Limayem et al. (2007), with their findings had stated that “an operationalization of habit was seen have direct effect on technology use over and above the effect of intention” which can be a reason as why findings from this research followed a similar path. Hypothesis (H7a) was not significant ($\beta = - 0.123$, t-statistics = 2.025) in predicting users’ intention, whilst H7b posits that Habit is positively associated with the use of the VCoP ($\beta = 0.447$, t-statistics = 11.391). Facilitating Conditions in Hypothesis H8a had a significant positive direct effect ($\beta = 0.344$, t-statistic = 5.068) on use intention. Similarly, hypothesis H8b analysed the influence of facilitating conditions on use of the VCoP, and findings indicate a positive relationship ($\beta = 0.219$, t-statistic =2.689). This was in line with previous research results (e.g., Neufeld et al., 2007; Im et al, (2011)). A deeper discussion on the non-significant relationships between Performance Efficiency and Social Influence with intention to use the VCoP, indicated that these results aligned with previous research findings (Al-Shafi, 2009; Cimperman et al., 2016; Ladan et al., 2018).

Theoretical contributions of this research are threefold, one being combining two models (UTAUT 2 and DeLone & McLean) to better predict VCoP usage for public sector organisations. Second, predicting the factors that will be required to adopt VCoP usage has been studied and the findings of the research can be used to develop a VCoP framework and adopted for KM in public sector organisations. Finally, this research is explored further by determining the impact or net benefits in adopting the VCoP in organisations. By implementing the VCoP successfully, the model can determine if the VCoP users enhance employees’ decision-making skills, improve their work processes or service efficacy by acquiring new knowledge “captured” in the VCoP.

The findings of this research discovered several main factors that can influence users' adoption of a web based VCoP system and can improve service effectiveness in the Malaysian public sector. The quality of knowledge,

the stability and functionality of the system, cultivating a 'fun' environment and developing a habit of using the VCoP will be key constructs to consider in ensuring the success of VCoP adoption. Investing in quality infrastructure and initiating regular change management programs throughout the organisation via regular brainstorming sessions should be advocated to develop the VCoP facilitating infrastructure. The role of the VCoP policy makers entails developing a structured implementation approach, determining functional requirements of the VCoP Knowledge Portal and content reification processes in developing quality knowledge.

Several limitations of the present study include using self-report questionnaire that may induce several response biases (Podsakoff et al., 2012). Moreover, this study collected samples only at one point. It is proposed for further studies to examine adoption of VCoP systems from pre-implementation to later stage of implementation via a longitudinal study. A robust phased-based VCoP implementation strategy is proposed, hinged on significant factors in predicting usage, paving the way in constructing a VCoP maturity framework (Albert, G., et al., 2019), in assessing gaps and building strategies in enhancing its usage.

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