VIRTUAL COMMUNITIES OF PRACTICE: THE ROLE OF CONTENT QUALITY AND TECHNICAL FEATURES TO INCREASE HEALTH CARE PROFESSIONALS' SATISFACTION

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ABSTRACT

Knowledge management in health care sector poses a challenge for policy makers and international health organizations. Nowadays, virtual communities of practice (VCoPs) resolve many problems, which arise from geographical distance and expensive learning process in health care sector. It is used by health professionals and researchers, for improving health care services quality, by enhancing the knowledge of health practitioners. Whereby, satisfaction of using VCoPs is the nucleus its success, since, pleasant experience with VCoPs will lead to better "user satisfaction", which in turn leads to increase the number of users. This study aims to identify the determinants of member's satisfaction with VCoPs. We have also developed a VCoPs satisfaction model, based on the information systems (IS) success theories: the technology acceptance model (TAM) and DeLone and McLean IS success model. The proposed model can be used to evaluate and measure the satisfaction of VCoPs in health care sector.

Keywords: *Virtual Community Of Practice, Knowledge Management Initiatives, Knowledge Management System, Health Care Sector, User Satisfaction.*

1. INTRODUCTION

Quality of health services poses a challenge to bridge knowledge gap between research and practice in health care sector and then offer up-to-date knowledge for health care workers [1]. Health care policy makers should provide suitable environment for enhancing knowledge of professionals, based on updated health researches and professionals' evidence-based best practices. Consequently, the health care policy makers should implement satisfied knowledge management system, in order to make it accepted by health care practitioners.

There is a popular belief that, despite their rapid diffusion across organizations, knowledge management literature has mainly focused on general conceptual principles or case studies of knowledge management (KM) initiatives in major organizations [2, 3]. However, there are little causal models and frameworks, which are empirically tested, in order to evaluate virtual communities of practices (VCoPs) user satisfaction or otherwise knowledge management systems (KMS)

satisfaction in health care sector. Hence, there is a need to establish valid measurement model, for evaluating the VCoPs user' satisfaction, and suggest methods to improve its adoption in health care sector. This study has developed and validated a VCoPs satisfaction model based on the IS success theories, such as: the technology acceptance model (TAM) [4] in addition to DeLone & McLean information systems success model [5].

This study posits that, using factors from both IS success theories for measuring the user satisfaction of such KMS, will give the researchers and practitioners a clear picture about the role of knowledge characteristics and system specifications, in capturing the full meaning of users' satisfaction, within health VCoPs.

2. THEORETICAL BACKGROUND

Although KMS has been increasingly recognized to be a primary source of organizational survival and competitiveness [6], it is observed that, there is a lack of studies in terms of understanding KMS

users' adoption or usage satisfaction in VCoPs setting, especially in health care sector.

Due to limited research on VCoPs for health care sector, information about the factors that have influenced VCoPs user satisfaction is limited. This present study addresses this shortcoming. The uniqueness of this study lies in the amalgamation of two significant streams of IS success research: (a) the technology acceptance model (TAM) [4] and (b) DeLone and McLean information systems success model [5] in health care sector setting.

2.1 Technology Acceptance Model

The technology acceptance model (TAM) was developed by Davis, et al. [4], to predict and explain information technology acceptance and usage. This model of IS success relies on theory of reasoned action (TRA), which was developed by Fishbein and Ajzen [7], in order to specify the causal relationships between system design features, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), Behavioural Intentions (BI), and actual system use [4]. PU is defined as "the degree to which person believes that, using a particular system would enhance his or her job performance". While, PEOU is defined as "the degree to which a person believes that using a particular system would be free of effort " [8: p320]. Davis's model shows how the actual system use is determined by Behavioural Intentions to use the technology, which is predicted both PU and PEOU. Additionally, behavioural intention to use the technology is also affected by PU directly.

TAM has been considered as valid model in predicting the individual's acceptance of information systems applications [9]. Most recently TAM has been applied to examine the use of mobile healthcare systems [10], and studied in acceptance of blog usage in USA [11]. Whereby, central to the success of IS, is the fact that, IS has to be installed, utilized, and accepted [12].

2.2 DeLone and McLean IS Success Model

Since its publication in 1992, the DeLone and McLean IS success model has been nearly used or referred in 300 articles. The main purpose of the model is to combine information system success into more consistent body of knowledge, and provide guidance to future researchers. This IS Success Model aims to create a comprehensive taxonomy model, which consists of interrelated dimensions, for evaluating IS success [13]. These interrelated dimensions of IS success and their

associations are: system quality and information quality, which affect use and user satisfaction. However, 'system quality' is defined as a measure of the information system processing itself [13]; whereas, 'information quality' is defined as "measures of the information system output" [13]; 'use' is defined as the utilization of an IT application by individuals, groups or organizations [14]; 'user satisfaction' is defined as "the net feeling of pleasure or displeasure that results from aggregating all the benefits that a person hopes to receive from interaction with the information system" [15].The use and user satisfaction have an influence on individual impact which in turn affects organizational impact.

A decade before, service quality dimension was added as an antecedent of use and user satisfaction [5]. The individual and organizational impacts were reconstructed as net benefits. Similarly, in the proposed Integrated VCoPs Success Model, service quality is added as an antecedent of use and user satisfaction, whereby, 'Service quality' refers to "the overall support delivered by the service provider"[5]; 'individual impact' refers to the effects of the outputs of IS systems, on individual users' behaviours; 'organizational impact' refers to the effects of the system's output, on the organization [13]. DeLone and McLean IS success model has been applied to examine various KMS [16,17]. Recently, Jin et al. [18] have adopted DeLone and McLean IS success model, to measure the willingness of individuals for continued use of bulletin board system.

3. THE INTEGRATED RESEARCH FRAMEWORK

In order to provide a solid theoretical basis for selecting influential driving factors of user satisfaction on VCoPs, this study first amalgamated two significant streams of IS success: (a) the technology acceptance model (TAM) [4, 8] and (b) DeLone and McLean IS success model [5], to explain the user satisfaction within VCoPs.

This study has adapted knowledge and system quality factors, in addition to the overall usefulness of VCoPs, as a prerequisite of user satisfaction within health VCoPs. The influential factors, adopted in the integrated model were selected from: 1) TAM model: Perceived Usefulness, and Perceived Ease of Use. 2) DeLone and McLean IS success model: Knowledge Quality, System

Quality, Service Quality and User Satisfaction. However, this study adopts knowledge quality construct instead of information quality from DeLone and McLean IS success model, since the VCoPs are all about managing the knowledge among their members.

The user satisfaction variable could be an important indicator for VCoPs acceptance by health care practitioners. Furthermore, it agrees with the efforts of most health care organizations, in identifying the factors that affect the transferring of knowledge from current medical researches into daily health practices [1]. Figure 1 depicts the details of the proposed model, showing the relationship between the various factors. The main hypotheses derived in this study are:

H1: knowledge quality positively affects participant's satisfaction with the VCoPs;
H2: System Quality positively affects participant's satisfaction with the VCoPs;
H3: Service Quality positively affects participant's satisfaction with the VCoPs;
H4: Perceived Usefulness positively affects participant's satisfaction with the VCoPs; and
H5: Perceived Ease of Use positively affects participant's satisfaction with the VCoPs.

4. METHODOLOGY

In this study, data were collected from health care professionals (e.g., Physician, Nursing, and Pharmacist), using a web-based survey. These professionals work for health care institutions and are members in these health forums.

The formatted electronic version of the questionnaire, including introduction page and invitation letter, with a link to the survey, was sent to health care forums, located in Middle East [19]. The questionnaire was developed from previous validated studies; the knowledge Quality (KQ) construct was measured by a seven-point Likert scale, adapted from Chang and Chuang [20] and Kankanhalli, et al. [21]; the System Quality (SyQ) construct was measured by a seven- point Likert scale based on Choi, et al. [22] and Lin, et al. [23], the Service Quality (SeQ) construct was measured with a five-point Likert scale, based on Urbach, et al. [24]; the Perceived Usefulness (PU) a seven-point Likert scale, adopted and refined from

Kulkarni, et al. [16]; the Perceived Ease of Use (PEU) construct was measured by a five- point Likert scale, adapted from Casaló, et al. [25]; and User Satisfaction (SAT) was measured by a seven-point Likert scale, adopted from Lin [26] and Lin and Lee [27]. The items were marginally customized to suit the context of healthcare forums. However, in order to test the associations among variables of interest, the data were analysed using Statistical Package for Social Science (SPSS) for descriptive analysis, in addition to partial least squares (PLS) to test the measurement and structural models. The sample size of 100 cases has fulfilled the minimal requirement for PLS analysis [28].

The online survey has produced 112 usable questionnaires; of which, 58.2% of respondents were males, 41.8% were females. The distribution of ages of respondents shows that, the majority of respondents (64.5%) are between 25-30 years old, all respondents are educated with bachelor degree, which accounted 56.5% of the sample.

This study has covered a wide range of health care professionals including Psychologists, Medical Laboratory Technicians, Administrators, Radiographers, and Dieticians, in addition to 40.2%, 32.7%, and 19.6% of the respondents were Nurses, Physicians, and Pharmacists respectively. Moreover, 83.7% of respondents had over two years of experience in using health forums. We had utilized the advantage of Internet while sampling; hence we were able to collect a large number of health forums' participants from several countries, including Egypt, Malaysia, Saudi Arabia, Kuwait, and United Arab Emirates, whereas 92.5% of respondents are from Jordan.

5. RESULTS AND DISCUSSION

The research model and the five hypotheses were evaluated using SmartPLS 2.0.M3 for structural equation modelling (SEM) in order to examine the causal model including measurement and structural models. The measurement model is estimated by confirmatory factor analysis (CFA) to check whether the constructs possess adequate validation and reliability. The structural model is utilized to examine the strength and direction of the associations between the theoretical constructs.
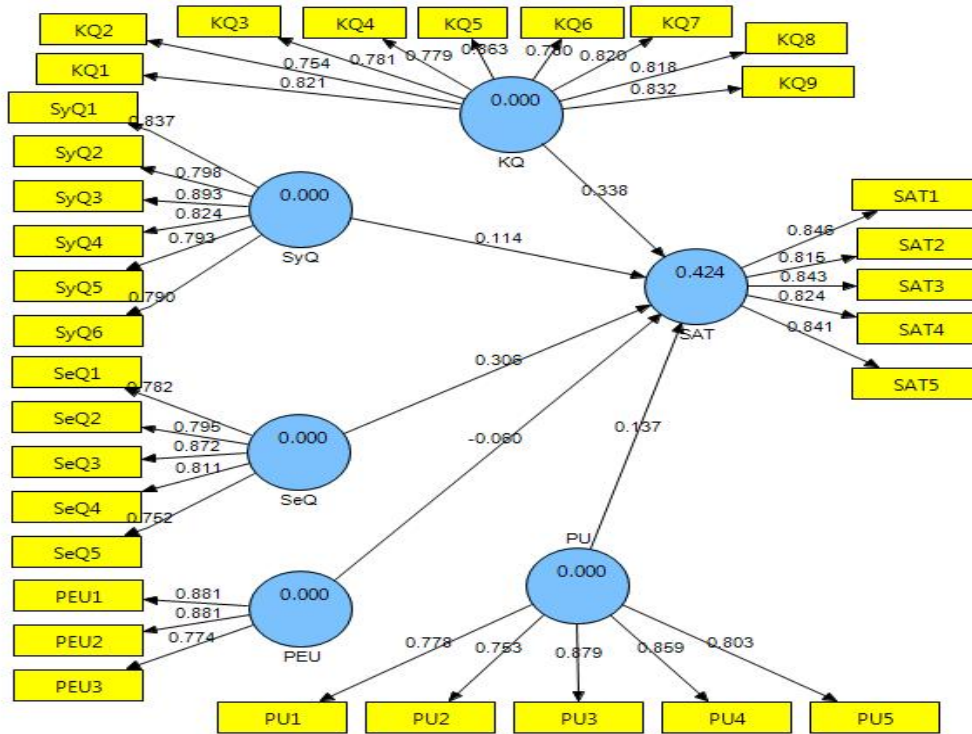
Figure 1: Measurement Model

Segars and Grover [29] have recommended that, first the measurement model needs to be evaluated, and later has to be respecified to generate the best model fit. The primary evaluation of the model has exposed that, a few items have to be removed. Based on the respecifying of the instruments, 33 items were retained, as shown in Figure 1. The reliability of indicators was measured by item loading greater than 0.70. For all items, the reliability has ranged from 0.80 to 0.93, and this is in line with the acceptable value of 0.70 as suggested by Hair, et al. [30]. The internal consistency of the measurement model was measured by calculating the composite reliability. However, all composite reliabilities were above 0.70, as recommended by Bagozzi and Yi [31]. The average variance extracted for all constructs were higher than 0.50, as recommended by Fornell and Larcker [32].

Table 1: Measurement Model: Convergent And Discriminant Validity

Construct	AVE[a]	CR[b]	Cronb-achs α	KQ	PEU	PU	SAT	SeQ	SyQ
Knowledge Quality (KQ)	0.650	0.943	0.932	**0.81**					
Perceived Ease of Use (PEU)	0.718	0.884	0.806	0.13	**0.85**				
Perceived Usefulness (PU)	0.665	0.908	0.873	0.06	0.07	**0.82**			
Satisfaction (SAT)	0.696	0.920	0.891	0.30	0.07	0.11	**0.83**		
Service Quality (SeQ)	0.646	0.901	0.862	0.22	0.15	0.12	0.28	**0.80**	
System Quality (SyQ)	0.678	0.926	0.905	0.27	0.16	0.03	0.16	0.15	**0.82**

Note: [a]**AVE** =Average Variance Extracted; [b]**CR** = Composite Reliability; Diagonals represent the square root of the AVE and the other entries represent the squared correlations

Due to the fact that, the values of reliability were exceeding the acceptable thresholds, the scales for measuring the constructs were considered to expose convergence reliability. As shown in Table 1, the square root of the variances, extracted from the constructs were higher than any squared correlation of other constructs, which indicates sufficient discriminant validity. Precisely, the assessment of measurement model, including convergent and discriminant validity measures, was satisfactory.

Table 2: Communality And Redundancy

Construct	Communality	H^2	Redundancy	F^2
KQ	0.65	0.65		
PEU	0.72	0.72		
PU	0.67	0.66		
SAT	0.70	0.72	0.18	0.30
SeQ	0.65	0.65		
SyQ	0.68	0.68		

Table 3: Structural Model: Path Coefficients And Hypothesis Testing

	Hypothesis	Beta	Std error	t-value	Supported
KQ -> SAT	H1	0.34	0.139	2.43***	Yes
SyQ -> SAT	H2	0.11	0.151	0.75	No
SeQ -> SAT	H3	0.31	0.137	2.23**	Yes
PU -> SAT	H4	0.14	0.097	1.42*	Yes
PEU ->SAT	H5	-0.06	0.091	0.66	No

Note: $p < 0.10$, **$p < 0.05$, and ***$p < 0.01$

Basically, the goodness-of-fit (GoF) in PLS included the predictive relevance, explaining power, and the overall model validity. To calculate the predictive relevance of the model, we have followed the recommendations of Fornell and Cha [33]. Blindfolding procedure in SmartPLS estimates the Q-squares: cross-validated communality (H^2_j) plus cross-validated redundancy (F^2_j) statistics. The Q-squares determine the predictive relevance of the model, by reproducing the values observed by the model itself, and the estimates of its parameter. As shown in Table 2, both statistics were greater than 0, which means that, the explanatory variables provide predictive relevance [33]. R^2 value for user satisfaction is considered substantial, as recommended by Cohen [34]. However, the R^2 value of satisfaction was 0.424, which suggests that, 42.4% of the variance in member satisfaction can be explained by the

independent variables (KQ, SyQ, SeQ, PU, and PEU).

Based on the recommendations of Tenenhaus, et al. [35], we have estimated the GoF values, to judge the overall fit of the model, as presented in Eq. 1, which may serve as cut-off values for global validation of PLS models. Based on the values presented in Table 2, this study has obtained a GoF value of 0.535 for the absolute model, which is higher than the cut-off value of 0.36, for large effect sizes of R^2 (GoF$_{small}$=0.1, GoF$_{medium}$=0.25, GoF$_{large}$=0.36). As such, the result shows that, the model has very acceptable explaining power, and represents adequate support to globally validate the PLS model [30, 35].

Next we have proceeded with the path analysis to test the five hypotheses generated. Table 3, presents the structural equation model results. The results show that, knowledge and service quality, and perceived usefulness had significant effects on the satisfaction with health VCoPs (β = 0.338, p< 0.01; β = 0.306, p< 0.05; β = 0.137, p< 0.10), which supports the hypotheses 1,3, and 4 respectively. In this study, we have identified that, knowledge and service qualities were the most significant predictors of the members' satisfaction, followed by perceived usefulness of VCoPs. Perceived ease of use and system quality, have not confirmed any significant association with members' satisfaction. Previous researches have recommended, perceived ease of use, as a motivator for individuals to adopt KMS [25]. Nevertheless, the respondents in this research have adequate IT skills and experience, which supports them to effortlessly use VCoPs. For VCoPs' users, the perceived ease of use and system quality are probably not an important challenge, especially for educated users (56.5% of respondents have BSc education level and above). Besides, 83.7% of respondents had over two years experience in using health VCoPs. As a matter of fact, the respondents in this research may be capable of effortlessly contributing and searching knowledge in health VCoPs.

$$\text{GoF} = \sqrt{\text{communality x } \overline{R^2}} = \sqrt{0.675 \text{ x } 0.424} = 0.535 \qquad (1)$$

The incorporation of acceptance of the VCoPs through members' satisfaction must describe the dependency of user satisfaction on service quality,

knowledge quality, and the overall usefulness of the VCoPs. These findings also agree with those of Vavasseur and MacGregor [36], which suggest that,

successful professional development should be emphasized on contents, instead of software, to support and facilitate members' participation in VCoPs.

6. CONCLUSION

This research had aimed to shed light on the factors influencing the VCoPs acceptance in order to get adequate understanding and knowledge of factors, which affect the high level of inactive users or otherwise withdrawing users from VCoPs after they have registered. We had attained a finding that, members were satisfied with health VCoPs, because of the quality of shared knowledge and services provided by leaders and supervisors of VCoPs, in addition to the perceived usefulness of the overall VCoPs for health care practitioners. On the other hand, perceived ease of use and system quality have no significant influence on users' satisfaction. In case of healthcare forums, technical features including chat rooms, messages, discussion board are very simple to use, and also available everywhere through the widespread web 2.0 technologies, especially in social media (i.e. Facebook and Skype).

In fact, the majority of healthcare practitioners in this study have at least two years of experience in using health VCoPs, which reflects that, they are familiar with its operations. These results indicate that, extended experience of users make them content oriented, rather than features of the system. At this end, this research recommends VCoPs leaders to be focused more on content, rather than technical features which are available in diverse forms.

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