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Preliminary Study on Collaborative Knowledge Management System Strategic Planning (CKMS^{2}P) Model

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Abstract: This study proposes a comprehensive Collaborative Knowledge Management System Strategic Planning (CKMS^{2}P) Model to assist the Knowledge Management System (KMS) developers and implementers in managing and executing the development and implementation of CKMS systematically and strategically in the organization. The model was developed based on Systematic Literature Review (SLR) and preliminary survey was done to gauge the perception of the proposed model to support the objective of this research. The data were analyzed using the Rasch Measurement Model. The results show that the CKMS^{2}P may assist the CKMS developers and implementers as a guideline to develop and implement CKMS in their organization comprehensively and strategically.

Key words: Knowledge management, knowledge management system, knowledge management system strategy, knowledge process strategy, implementation strategy, collaborative knowledge management system strategic planning

INTRODUCTION

The importance of managing knowledge in the organization becomes significant and creates a major impact in boosting the organization's growth since decades ago. In order to compete in the global environment, the organization must adopt a comprehensive strategy to manage their valuable knowledge to the optimum level (Beiryaei and Jamporazmay, 2010; Gourova and Toteva, 2014; Muntean and Tarnaveanu, 2009; Saad *et al*., 2012). The usage of KMS as a tool in managing knowledge is not a new occurrence to the organization but always reported as a failure to help them achieve their goals KMS (Chalmeta and Grangel, 2008; Floyde *et al*., 2013).

In previous studies, one of the problems highlighted is the lack of comprehensive strategic planning to develop and implement CKMS (Beiryaei and Jamporazmay, 2010; Chalmeta and Grangel, 2008; Dehghani and Ramsin, 2014; Lin and Lee, 2012; Smuts *et al*., 2009). This will lead to a major failure in terms of KMS usage. To address this problem, this research has proposed a comprehensive strategic planning model which will act as a guideline in developing and implementing KMS in the organization's collaborative environment.The model, namely CKMS^{2}P Model is believed not only can help in the decision making process but will assist the KMS developers and implementers to strategize and monitor the development and implementation of CKMS thoroughly and effectively. The CKMS^{2}P Model is constructed to fulfil the research objective which is to construct a comprehensive CKMS^{2}P Model in the perspective of knowledge processes strategy and implementation strategy to increase CKMS effectiveness and efficiency in the organization.

Literature review

Knowledge process, Knowledge Management System (KMS) and Collaborative Knowledge Management System (CKMS): Knowledge process is an activity to create, acquire, transfer, share, store and use the organizational valuable knowledge to enhance organization's competitiveness (Tubigi and Alshawi, 2015). In order to increase the effectiveness of the knowledge process management, many organizations have developed KMS. KMS can be defined as a system that performs and manages knowledge process activities via information technology to be utilized to achieve the organizational goals (Saad *et al*., 2012). KMS is believed could facilitate in increasing the organization's productivity and growth.

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In recent years, many organizations have started to apply KMS in the collaborative environment. Cha *et al.* (2014) in his study, defined CKMS as a KMS system that is applied in the collaborative platforms (forum, chatroom, email, media social, etc.) and environment which involves a group of people to create, share and use the knowledge to fulfil their needs. By implementing CKMS, the knowledge can be created, shared and used collectively and more effectively to assist in the decision making process in the organization.

Collaborative Knowledge Management Strategic Planning (CKMS^{2}P): Strategic planning is a higher level list of strategies that steers the organization towards achieving their goals. The organization must tie the strategic planning with KPI and timeline to monitor and control the implementation of strategy executed (Pearlson and Saunders, 2001). In the development and implementation of CKMS, strategic planning can help in managing and monitoring the execution of every action plans in a strategic way to ensure the system can be utilized optimally. By implementing CKMS^{2}P comprehensively, every tasks assigned to fulfil the organization's needs can be managed and controlled effectively and efficiently.

Related work: Since 2010, there were limited studies concerning the strategic planning in developing and implementing CKMS in the organization. From twelve selected previous studies, it is found that the approaches applied in the proposed CKMS strategic planning were varied depends on their research domain selected. Most of the study suggested to strategize on initiation, planning and analysis phase in developing and implementing CKMS. This includes organization's goal setting (Dehghani and Ramsin, 2014; Goepp *et al*., 2013; Gourova and Toteva, 2014; Qing-Song, 2013; Saad *et al*., 2012) analyzing the current business problem and opportunity (Amine and Ahmed, 2011; Beiryaei and Jamporazmay, 2010; Dehghani and Ramsin, 2014; Ebrahimi and Ibrahim, 2011; Goepp *et al*., 2013; Gourova and Toteva, 2014) and determination of knowledge needed to boost the organization productivity and profit (Beiryaei and Jamporazmay, 2010; Dehghani and Ramsin, 2014; Ebrahimi and Ibrahim, 2011; Gourova and Toteva, 2014; Qing-Song, 2013; Saad *et al*., 2012; Sarnikar and Deokar, 2010).

The CKMS development strategy in the perspective of knowledge process would fulfil the requirement to develop a comprehensive CKMS (Pearlson, 2001). The knowledge process strategy can be grouped into 5 major components which are to enhance the knowledge capturing process (Amine and Ahmed, 2011; Ebrahimi and Ibrahim, 2011; Gourova and Toteva, 2014; Lin *et al*., 2012; Muntean and Tarnaveanu, 2009; Qing-Song, 2013; Saad *et al*., 2012) to inculcate the collaborative knowledge sharing culture in the system (Amine and Ahmed, 2011; Goepp *et al*., 2013; Gourova and Toteva, 2014; Qing-Song, 2013; Ward, 2007) to increase the searching capabilities (Cha *et al*., 2014; Chalmeta and Grangel, 2008; Ebrahimi and Ibrahim, 2011; Goepp *et al*., 2013; Gourova and Toteva, 2014; Lin *et al*., 2012; Qing-Song, 2013; Saad *et al*., 2012; Sarnikar and Deokar, 2010; Smuts *et al*., 2009) to strengthen the storage infrastructure and security (Amine and Ahmed, 2011; Beiryaei and Jamporazmay, 2010; Capilla *et al*., 2015; Chalmeta and Grangel, 2008; Ebrahimi and Ibrahim, 2011; Gourova and Toteva, 2014; Liebowitz, 2009; Qing-Song, 2013; Saad *et al*., 2012; Sarnikar and Deokar, 2010; Smuts *et al*., 2009; Ward, 2007) and to enhance the usage capabilities in the system (Amine and Ahmed, 2011; Dehghani and Ramsin, 2014; Gourova and Toteva, 2014; Lin *et al*., 2012; Sarnikar and Deokar, 2010; Tubigi and Alshawi, 2015).

The CKMS development strategy must collaborate with the implementation strategy to ensure a comprehensive planning can be executed. The implementation elements of strategy proposed by selected studies can be categorized into six components, in which the first category is to establish initiation plan and analysis (Amine and Ahmed, 2011; Beiryaei and Jamporazmay, 2010; Chalmeta and Grangel, 2008; Dehghani and Ramsin, 2014; Ebrahimi and Ibrahim, 2011; Goepp *et al*., 2013; Gourova and Toteva, 2014; Lin *et al*., 2012; Saad *et al*., 2012; Sarnikar and Deokar, 2010; Smuts *et al*., 2009) to deploy awareness and practitioner's program (Chalmeta and Grangel, 2008; Dehghani and Ramsin, 2014; Ebrahimi and Ibrahim, 2011; Gourova and Toteva, 2014; Patel *et al*., 2012; Qing-Song, 2013) to deploy reward and recognition program (Gourova and Toteva, 2014; Patel *et al*., 2012; Qing-Song, 2013; Saad *et al*., 2012) to improve the sustainability and performance of the system (Allameh *et al*., 2011; Beiryaei and Jamporazmay, 2010; Dehghani and Ramsin, 2014; Saad *et al*., 2012; Smuts *et al*., 2009) to enhance knowledge reliability and relevancy (Chalmeta and Grangel, 2008; Dehghani and Ramsin, 2014; Goepp *et al*., 2013; Gourova and Toteva, 2014; Lin *et al*., 2012; Smuts *et al*., 2009) and to increase control in the management of the system (Dehghani and Ramsin, 2014; Ebrahimi and Ibrahim, 2011; Lin *et al*., 2012; Saad *et al*., 2012; Smuts *et al*., 2009; Anonymous, 2007).

MATERIALS AND METHODS

This research applied a quantitative research approach through survey distribution to gauge the respondent's view on the model proposed. The first step was by performing a Systematic Literature Review (SLR) to gather information pertaining the effective and comprehensive strategy to develop and implement CKMS (Hashim *et al*., 2015). The SLR method was based on (Kitchenham and Charters, 2007) which emphasized on rigorous and systematic approach to review previous related studies. From the SLR, the list of strategy elements were synthesized to construct the proposed CKMS^{2}P Model. This process involved the merging and deletion of similar and duplicate strategy. The list of strategy elements were then grouped into 2 main strategies which are knowledge process strategy and implementation strategy as depicted in Fig. 1.

Based on the model developed, a survey instrument was constructed. The objective of this survey is to confirm the theoretical strategy elements based on SLR and the synthesized strategy proposed in the research model. The questionnaire items were designed based on the proposed model which consists of 5 strategies for knowledge process (24 items) and 6 strategies for implementation of CKMS (38 items) and the evaluation criteria was based on the quality dimension proposed by (Owlia, 2010). The respondents were requested to give their perception on survey items based on 7 Likert scale ranging from 1-"strongly disagree" to 7-"strongly agree". The questionnaire items were then inspected and refined by experts in strategic planning, statistical and S engineering fields.

Next, a pilot study was conducted with a smaller sample of respondents to test whether they understood the purpose of the survey, all the instructions and questionnaire items in order to answer the survey. Upon a successful pilot study, a survey refinement was made (Kasunic, 2005) and the survey was distributed to the respondent in five local universities located in the klang valley to represent the local community of the university in Malaysia, namely Universiti Putra Malaysia (UPM) Universiti Malaya (UM) Universiti Kebangsaan Malaysia (UKM) Universiti Teknologi MARA (UiTM) and International Islamic University (UIA) as. A total of 233 respondents were selected purposively to participate in this preliminary survey which involves 10 CKMS Managers, 24 CKMS developers and implementers and 199 CKMS users. The survey was distributed via email and media social platforms, namely Face book and Whats App. The survey data collected was then analyzed using the Rasch Measurement Model via Winsteps S tool (Linacre, 1994).

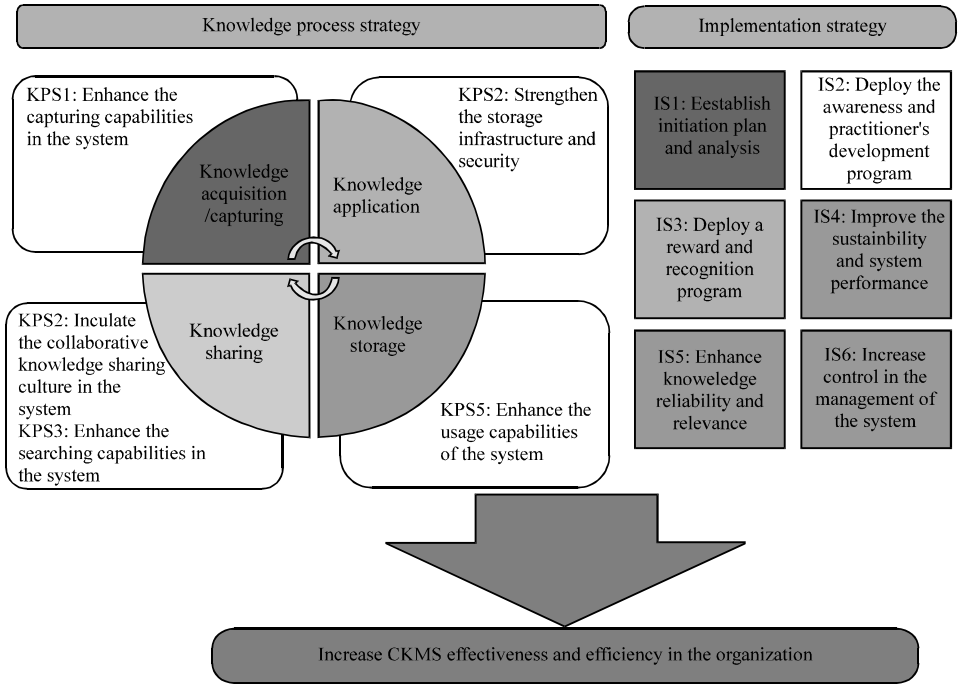

Fig. 1: The CKMS^{2}P Model

RESULTS AND DISCUSSION

Rasch analysis is practical to be used in this study to determine the data reliability and the fitness of persons and items data to support every synthesized strategy proposed in the CKMS²P Model. Table 1 shows the summary statistic of the 233 respondents which stated the reliability of 0.98 for persons and items respectably. With the cronbach alpha reading at 0.99, it indicates high reliability of data and all items were sufficient to support the research model proposed. The survey instrument for measuring content validity was reliable and the results were reproducible to be used in further analysis. The mean for persons measured at 1.20 which is between 1-2 logit was fair according to (Fisher, 2007). It indicates that most persons likely to agree with the strategy suggested in the CKMS²P Model. The fitness of items must comply with several conditions; Point Mean Correlation (PTMEA) should in the range of 0.4<PTMEA<0.85, Mean Square (MNSQ) should be in the range of 0.5<MNSQ<1.5 and Z-Standard (ZSTD) should be in the range of -2<ZSTD<2. From the summary statistic, MNSQ and ZSTD for items and persons reading in the acceptable range which satisfactory fit for the model.

Table 2 which depicted "The Standardized Residual Variance", disclosed the variance explained by measures as 73% which is very good. The variance in 1st and remaining contrast were all in the acceptable range as implied in the Fisher's rating scale instrument quality criteria (<15%) which confirmed the unidimensionality of the questionnaire to support the structural aspect of construct validity and valid to be used for further analysis.

The variable map as shown in Fig. 2 shows the distribution of items in the right side of the map and persons on the left side of the map on the same logit scale. The side by side illustration will give better perception on the overall distribution of the survey data. The mean of the persons, 1.20 which is higher than mean for items 0.00, indicates that most of the respondents agreed with the proposed strategy in the survey. The most agreeable item is KPS1-1: Provide a collaborative platform for knowledge capturing, (e.g., via email, forum, electronic bulletin, social media and mobile apps) while IS4-6: Reconfigure the system based on updated goal is the less agreeable item. Person 063 is identified as the most agreeable person which indicates high approval on every strategy proposed in the CKMS²P Model while person 228 is the less agreeable person.

Table 1: Summary statistic

	Raw				Infit		Outfit	
Statistics	Score	Count	Measure	Model error	MNSQ	ZSTD	MNSQ	ZSTD
Summary of 233 measured persons								
Mean	439.8	70	1.2	0.27	0.99	-0.3	1.05	-0.1
SD	35.2	0	2.23	0.03	0.34	1.9	0.46	2.6
Max	478	70	3.87	0.44	2.43	6.7	3.15	6.6
Min	356	70	4.74	0.24	0.47	-4.5	0.45	-4.4
Summary of 70 measured items								
Mean	1464	233	0	0.15	0.98	-0.2	1.05	0.2
SD	49.7	0	1.01	0.01	0.15	1.7	0.36	2.4
Max	1541	233	1.54	0.17	1.58	6.8	2.85	9.5
Min	1386	233	-1.69	0.14	0.71	-3.7	0.65	-2.9

Real RMSE: 0.28; Adj. SD: 2.21; Separation; 7.83: Person reliability: 0.98; Model RMSE: 0.27; Adj. SD: 2.21; Separation: 8.18; Person reliabilty: 0.99; SE of person mean = 0.15; Person raw score-to-measure correlation = 1.00; Cronbach alpha (KR-20) person raw score reliability = 0.99; Real RMSE: 0.15; Adj. SD: 0.99; Separation; 6.68: Item reliability: 0.98; Model RMSE: 0.15; Adj. SD: 0.99; Separation: 6.81; Item reliabilty: 0.99; SE of person mean = 0.12; U mean = 0.000; U scale = 1.000; Item raw score-to-measure correlation = -1.00; 16310 data points; Appreximate log-likelihood χ^2: 19553.02

Table 2: Standardized residual variance scree plot, table of standardized residual variance (eigenvalue units)

	Empirical		Modeled	
Variables	Value	Value (%)	Value (%)	Value (%)
Total variance in observations	259.3	100.0	-	100
Variance explained by measures	189.3	73.0	-	74.8
Unexplained variance (total)	070.0	27.0	100	25.2
Unexplained variance in 1st contract	011.1	4.3	15.8	-
Unexplained variance in 2nd contract	004.6	1.8	6.6	-
Unexplained variance in 3rd contract	003.8	1.5	5.4	-
Unexplained variance in 4th contract	003.7	1.4	5.3	-
Unexplained variance in 5th contract	003.3	1.3	4.8	-

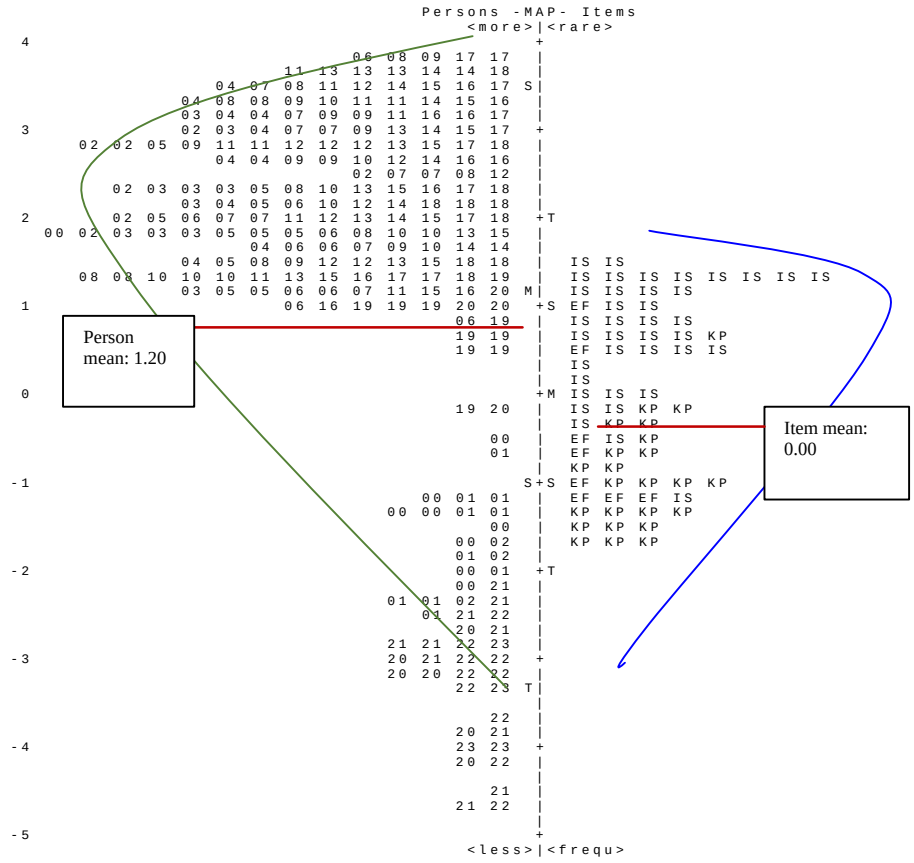

Fig. 2: The variable map

CONCLUSION

As a conclusion, rasch analysis confirmed that the content and construct validity of the questionnaire items were valid and could be used for further analysis. The summary fit statistic shows a satisfactory fit to the model. The respondents showed positive responses to the strategy listed in the CKMS2P Model proposed, thus the research objective to validate the model statistically is achieved. For the future work, a prototype system will be developed to incorporate with the model proposed. The effectiveness of the model will be verified by distributing post-survey to the managerial level user as they are the person who manage and monitor the development and implementation of CKMS strategically.

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