International Journal of Engineering & Technology, 7 (2.29) (2018) 303-310

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Knowledge Quality Effect on Process Based Management Effectiveness

Ishamuddin Mustapha[1*], Khalil Md Nor [2], Mohd Ikbar Abd Wahab[3], Fairul Anwar Abu Bakar[4], Mohd Amran Mohd Daril[5], Mazlan Awang[6] , Latipah Nordin[7]

[1,3,4,5,6]universiti Kuala Lumpur, Quality Engineering Section, Bandar Seri Alam, Johor Bahru, Johor
[2]universiti Teknologi Malaysia, Faculty Of Management, Skudai, Johor Bahru, Johor
[7]universiti Kuala Lumpur, Student Development Section, Bandar Seri Alam, Johor Bahru, Johor
**Corresponding Author E-Mail: Ishamuddin@Unikl.Edu.My*

Abstract

The objective of this study is to examine the effect of knowledge quality (KQ) on process-based management effectiveness (PBME). The knowledge quality for effective process-based management is an increasingly important issue to the business community. The current review conducted on research work in Knowledge Management and Quality Management Systems field has shown that there are deficiencies in the current research domain which, investigation on knowledge quality and its effect on process-based management was not an interest of previous researchers. The deficiencies shed light for future research that explores in details the effect of KQ on PBME. This issue has initiated interest amongst academicians to empirically examine the effect of knowledge quality on the process-based management effectiveness especially on the ISO9001:2008 certified organization. This study has found that KQ has significant direct effect with PBME in the certified ISO9001:2008 organization. This is indicated by the path coefficients and t-statistics of the relationship between KQ and PBME using PLS-SEM. The results is in line with the opinion derived from semi-structured interview conducted and also accords with earlier research which showed that the quality of knowledge can improve the performance of the processes. The evidence from this result suggests that organization should emphasize on the quality of knowledge to increase the process-based management effectiveness.

Keywords: *Knowledge Quality; Process-based Management; Quality Management Systems; ISO 9001:2008; Knowledge Management; PLS-SEM*

1. Introduction

The important of managing the processes and its interaction within organization is being highlighted and stressed in the Quality management Systems (QMS) ISO9001:2008 standard Section 0.2 and ISO9004:2009 standard. The management of processes and its interaction is very important to the organization since it forces people to become aware of the link between the activities in the process. This is supported by Fraser (2004), who stated that the identification and management of processes in an organization are essential interpretation of the ISO9001 standard. Without proper management of the processes and its interaction, it will be difficult for organizations to comply with the technical requirements since the compliance of ISO9000 quality management systems standard requirements are complex and provides significant problem to the organization and their respective staff.

Ongoing control of individual processes within the overall quality systems required depth understanding of each process flow and important element of each work process, thus required quality knowledge to make correct decision and action. This is where in-depth knowledge of each process and its interaction is required by related personnel in the organization. This is the reason why organizations require quality of knowledge so it can support the process-based management effectiveness in QMS. However, one question that needs to be asked in this field, is whether the knowledge quality really provides significant effect on the effectiveness of process based management. All the research papers reviewed so far suffer from the fact that empirical studies has been made accordingly to understand the relationship of knowledge quality with PBM particularly in the certified ISO9001:2008 organization. Therefore, this research paper discusses and reveals the outcome of an empirical study that examines the effect of quality knowledge on the effectiveness of PBM towards knowledge contribution in this field. This is due to the fact that adding process based management effectiveness and quality knowledge elements will enhance the current QMS ISO9001:2008 maintenance (Mustapha, et. al).

2. Process-based Management (PBM)

Process-based management (PBM) is one of the pillars of TQM philosophy (Oakland, 1993) and few researches have been carried out on PBM such as by Koopman & Nicholas, (1997), Balzarova et al., (2004) and Carmignani (2008). Generally, PBM can be defined as a management of organization by emphasizing on maximizing the efficiency of processes and not maximizing the efficiency of departmental or functional units (Harmon, 2003). Carmignani (2008) noted in his article "Process-based management: A structured approach to provide the best answers to the ISO 9001 requirements" that "Process based approach means, first of all, identifying the process necessary to achieve a product or services, defining the interactions of such process among themselves and applying to their management (control)". According to Kohlbacher (2010), PBM is not only about designing, developing

and executing business processes, but also considering the interaction between these processes, managing, analyzing and optimizing them. PBM isn't a specific tool but rather a philosophy that focuses on changing the mindset of the organization toward that of enhancing product or service quality through understanding and improving how processes integrate with each other and the organization's strategy. Process-based organizations use this as a guiding philosophy and as a strategy to differentiate them self and outperform its competitors.

Previous researchers in this area found that, some of ISO9001:2008 requirements are difficult to comply without proper management of processes. For instance, Chin et al., (2000) found that, among the clauses (requirements) under the ISO9000 standard, 73.61 percent of the surveyed company ponder the "corrective and preventive actions" is the most critical issue in maintaining the ISO9000 requirements. Chin et al., (2000) also found that control of document and record, internal audits, quality management system general requirements, and management responsibility are amongst other clauses which difficult to maintain in complying the standards requirements. In Malaysia, Yahya and Goh (2001) conducted a study on Malaysian manufacturing companies and found that seven clauses that are the most difficult to satisfy are corrective and preventive actions, design and development, management responsibility, statistical techniques, process control, document and data control, and quality system.

3. Knowledge Quality (Kq)

The effective use of knowledge will depend, to a large extent, on its quality (Rao and Osei-Bryson, 2007; Yu et al., 2007). In this study, knowledge quality is defined as the fitness of operational knowledge being created and shared amongst organizational members to fulfill user requirements and expectation, relevant and valuable to the context of quality management systems. Knowledge and its quality are critical to organizations' survival and prosperous since organization operates in a highly competitive environment (Nonaka and Teece, 2001; Alavi and Leidner, 2001). High levels of knowledge quality helps organization and its member do work better, develop novel and useful products or services, reduce costs, and increase sales. It escalates problem-solving capability, raise process efficiency, and improve performance (Yoo et al., 2011).

With the advancement of knowledge transfer and shared mechanism and technology available nowadays, the questions of whether the knowledge created and shared having a quality characteristic that suit to organization needs is still yet to be investigated. Within organization, knowledge is acquired from inside as well as outside through various methods and being used to expedite routine task as well as making decision. The quality of knowledge is important and should have some good " quality – in – use" factors (Marwick, 2001). High quality knowledge might not only be reflected in the performance of a planned, executable, and measurable task but also in people's ability to spontaneously design tasks, improve them, and discard old solutions and improvise new approaches. Knowledge also should have the characteristics of quality that bear on its ability to satisfy stated or implied needs of the user and free of deficiencies (as defined by American Society of Quality).

Generally, since knowledge has become the key resource for competitive advantage (Soo et al., 2004), the quality of knowledge obtained and used is very crucial for most of the industry nowadays. For instance, the quality of knowledge is very important in the hospital where doctors make decisions on their patient, in the aviation and aerospace industry, in the military activities and even in the education sectors. The quality of knowledge gained from several knowledge acquisition activities such as knowledge creation and knowledge sharing activities will be used in the processes and activities throughout the organization. That quality knowledge will also require to be used in maintenance of QMS through the effective knowledge application in daily activities of managing quality within the organization.

Quality of knowledge also provides significant contribution in each PBM implementation steps as has been discussed above. Furthermore, in maintaining QMS and implementing effective PBM, the ability to create new and high quality intellectual property and knowledge as well as capitalizing the intellectual resources is very important for the organization. This is in-line with the Organizational Knowledge Creation (OKC) theory by Nonaka & Takeuchi (1995) and further study by Nonaka, Toyama & Byosiere (2001) and Von Krogh et al., (2000). Other scholars, Jablokow and Booth (2006) noted that, the competitive advantage of a company can be linked to two key factors; the ability to generate new intellectual property that offers superior value to customers and the ability to capitalize on it quickly.

4. PBM process

On of the key area that important to be explored in details for this study was to understand each steps involved in implementing the process-based management. By having through understanding on each steps of PBM implementation process, the contribution of knowledge quality can be clearly observed. According to Carmignani (2008), the PBM implementation process may consist of few steps as tabulated in Table 1. Figure 1 below illustrates how the KQ contributes in each step of PBM implementation for effective PBME.

Table 1: Steps in implementing PBM adopted from Camignani (2008)

No	Steps in PBM	Details
1	Identifying macro-processes, their mutual relations, inputs, outputs, constraints and necessary resources.	Identifying the macro-processes of the organization can be done by dividing the process based on priority and identify a possible range of performance indicators for each processes.
2	Specifying progressively the single macro-processes to activity level.	Describe the logical flow of the single activities in details, trace all the inputs and the resources, the constraints and the outputs and calculate the suitable indicator.
3	Building complete flow charts for all activities.	Describe the activities that constitute the process in the forms of flow chart, tables, matrixes, graph, etc.
4	Defining the gaps between the activities, the fixed targets and the norm and, if necessary, rethinking (re-engineering) the activity.	Making an evaluation of the processes and re-plan any activity in order to overcome inefficiencies.
5	Checking the effectiveness of the activity, and the process that subsumes them.	Evaluate, assessed and verified the effectiveness against the fixed control elements and the attainment of performance objectives.
6	If necessary, drafting a document that describes the activity (instruction) or the process (procedure).	Develop document such as instruction, procedure or manual for activities which may have tendency not to be consistent during the application of the processes.
7	Repeat steps 3 through 6 for all the processes	N/A
8	Documenting the necessary items in Quality Manual for all processes and activities and shows the interaction and linkages of the process map, policies, activities, manual, procedure, instructions, indicators, plan, etc. with each other.	N/A

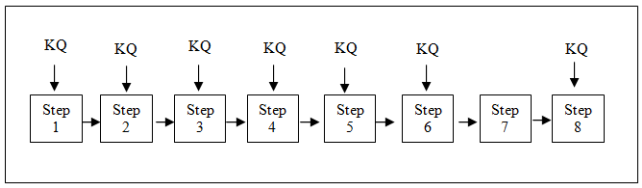

Fig. 1: KQ contribution on each PBM steps

5. Elements Of Effective Pbm

In this study, the effectiveness of PBM is measured by analyzing the level of effectiveness of each PBM's strategic elements proposed by Jeston and Nelis (2008) which are the process governance, process leadership, strategy alignment, people capability, process performance, technology and project execution. These elements are selected since they aligned with high performance organization characteristics suggested by Waal (2010) which also an objective of maintaining the QMS from bigger perspective. In addition, the elements selected also align with the management systems model developed by Kaplan and Norton (2008). Table 5.1 explains further the elements proposed by Jeston and Nelis (2008). The elements of PBM's element will be used as a reference during the development of questionnaire in this study. In order to have a clearer understanding, Figure 2 shows the relationship between PBM elements and the PBM effectiveness

Table 2: PBM elements and the explanation (Jeston and Nelis, 2008)

No	PBM Element	Explanation
1	Process leadership (PL)	The leadership of the organization to manage the process from business process view point
2	Process governance (PG)	The establishment of governance structure based around business process
3	Process performance (PP)	The measurement of business process performance
4	Strategic process alignment (PA)	Ensuring business process are aligned with strategy and objectives of the organization
5	People capability (PC)	The capability of organization member which a process-based organization is created and sustained
6	Project execution (PE)	The capability of the organization to manipulate all the processes to ensure all project is being executed accordingly as planned
7	Technology (Tech)	The existence of technology as an enabler towards effective PBM

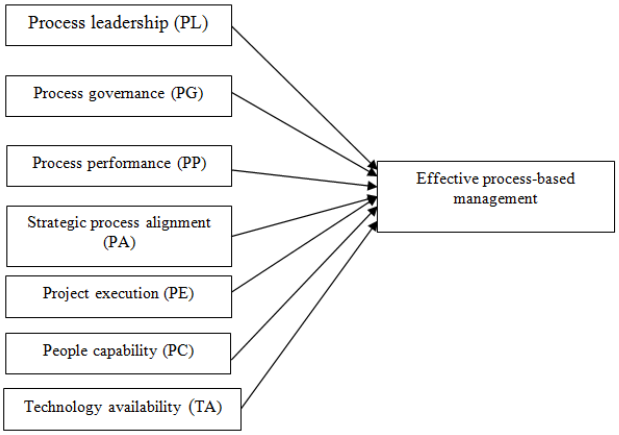

Fig. 2: Relationship between PBM element and PBM effectiveness based on Jeston and Nelis (2008)

6. Elements of KQ

Knowledge quality has been explored in several studies previously where most of the researchers focused on the quality of knowledge gained through knowledge sharing or knowledge acquisition for online activities or virtual community. Some researchers also have relates the quality of data and information as a part of knowledge quality since data and information are the main ingredient before they are transformed to knowledge. The most recent study related to quality knowledge and much related to this study was conducted by Yoo et al., (2011). Their study addressed the nature of knowledge quality in a team environment, describe its dimensions, and create valid and reliable instruments to measure it. They developed valid and reliable measures of three dimensions of knowledge quality, and provides evidence that knowledge quality forms a second-order factor model. They also aimed to examine important antecedents to and outcomes of knowledge quality. The detail dimensions of quality knowledge and its characteristic suggested by Yoo et al., (2011) is shown in Table 3.

Table 3: Summary of knowledge quality dimensions and its criteria proposed by Yoo et al., (2011)

No	Dimension of knowledge quality (Dong Kyoon, Yoo; Mark A, Vonderembse;T.S., 2011)	Description
1	Intrinsic knowledge quality	The extent to which knowledge has quality in its own right.
2	Contextual knowledge quality	Refers to the extent to which knowledge is considered within the context of the task.
3	Actionable knowledge quality	Refers to the extent to which knowledge is expandable, adaptable, or easily applied to tasks.

Based on above discussion and detail explanations of quality knowledge dimension, the construct of quality knowledge are shown in Figure 3.

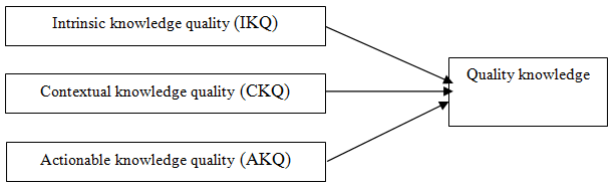

Fig 3: Construct for quality knowledge based on Yoo et al,. (2011)

7. The Research Process

In order to achieve the proposed contributions, a research process was conducted through several phases. In the first phase, an assessment and understanding on relevance theories and issue on quality knowledge creation, process-based management, the current state of the art of QMS ISO9001 practices were reviewed. In the second phase, the expert opinion was solicited through the qualitative survey (semi-structured interview) which has led to further understanding of the actual problems as well as to refinement of the process to develop research hypotheses.

In the third phase, the researcher designed a suitable research methodology for this study as a bridge leading to answer the research questions in meeting the objectives of this study. The suitable sampling method, development of the questionnaire, administration of the survey (data collection), validity and reliability analysis, data analysis techniques and respondents related issues have been part of important research activities being emphasized by the researcher. The researcher has also identified type of research tools to be applied in the data collection process related to each research question and identified the method that raw data should be analyzed. In this study, the Quality Assurance personnel (QMR or QA manager) whom having depth and richness of knowledge in the area of the study from pre-identified organization have been selected as the target respondent for quantitative survey. The survey instruments have undergone expert validation and the necessary pilot test. The final sets of survey instruments were sent to the target respondents according to the sampling size suggested by Krejcie and Morgan's (1970) and Hair, et al., (2010). All data collected were then being preserved for analysis.

In the next phase, the data analysis was conducted accordingly starting with the analysis of the response rate that shows 16% responses from 966 questionnaires distributed. Subsequently, the data screening process was performed (as suggested by Coakes et al., 2006, Field, 2009) on the returned survey questionnaires to ensure that data in the questionnaires are all in place and accounted for. For this purpose, wrong input, missing data and outliers screening were conducted. The next stage of data analysis involved the examination of non-response bias and common response bias as to ensure the data obtained is accurate without any bias effect. As the structural model in this study is a reflective-formative second-order hierarchical model, the analysis was made based on the order of the model (i.e. first-order followed by second-order). The analysis of structural model which comprises of collinearity, significance, and relevance assessment, predictive accuracy, effect size and predictive relevance of the model were conducted using SPSS version 19.0 as well as SmartPLS version 2.0 Software.

The analysis was then followed by the exploration of the mediating effect on the structural model using the mediator analysis procedure in PLS-SEM suggested by Hair et al., (2014). Finally, in this phase, the researcher has found the exploratory models of the relationship between KQ and PBME that accentuate the understanding of the importance of KQ on PBME effectiveness. The final phase of the research process was based on the analysis results. In this phase, the researcher managed to summarize the findings and subsequently addressed the research the hypotheses.

8. Research Tools

In this study there were a total of five (3) parts of questionnaire to solicit respondents' evaluation of the variables and to collect relevant data. The overview of each of the survey questionnaire are :

1) Part A of the questionnaire attempts to collect the demographic information of the respondent. Part A was intended as a foundation for descriptive information.

2) Part B of the questionnaire covers the respondents' evaluation of KQ. In this study, knowledge quality was assessed with items adopted from Yoo et al., (2011). It consists of three constructs and 16 measurements items. The maximum score for this part are 112 points.
3) Part C consists of 31 measurement items that formed seven constructs of process-based management effectiveness. This part keen to collect respondent's opinion on the relationship of PBME with other variables. The maximum scores for this part are 217 points.

For part B and C, respondents were asked to rate the level of agreement they placed on each attribute based on the seven point scale of (1) `Strongly disagree' to (7) `Strongly agree'. Cohen et al., (2000) reveal that application of seven point scale rating promotes more responsive and sensitive field work.

In this study, a Cronbach Alpha reliability value for KQ is 0.851 and PBME is 0.864 suggests the reliability of the instruments in measuring a factor (Nunally, 1994; Tavakol & Dennick, 2011). Finding from pilot test also suggested that the selected research instruments are appropriate to address all research questions.

The questionnaires were channeled to targeted respondents via two methods:

Method 1: Hardcopy of survey questionnaire was sent to the respondents by hand or post (complete with response envelope).

Method 2: Electronic survey form which was delivered to targeted respondents through email (complete with automatic link to Google Form and soft copy of the questionnaire).

Method 1 was given out to 719 individuals, 39 of them had responded. Whereas 247 sets of electronic questionnaires were distributed via method 2, with 116 responses. This gave a survey response rate of 5.4% for method 1 and 47.0% for method 2 with the total response of 155 (16%). Having dropped 15 responses during data screening, the total useable responses are 140 questionnaires. The analysis still can be conducted using PLS-SEM software and still fulfils the minimum samples size requirements of 10 times rules (Barclay et al., 1995) which indicates the minimum sample size should be equal to the larger of 10 times the largest number of structural paths directed at a particular construct in the structural model. As the maximum number of arrowheads pointing at a latent variable in this study is 10, the minimum sample size should be 100 samples (10 x 10). This is also in-line with Hoyle (1999) who suggested that the minimum sample size for PLS-SEM is 30 samples.

9. The Research Hypotheses

Based on the understanding of the importance to investigate the effect of KQ on PBME, the researcher has developed a research hypothesis as below :

H_1 - KQ has significant and direct effect on effective PBM implementation

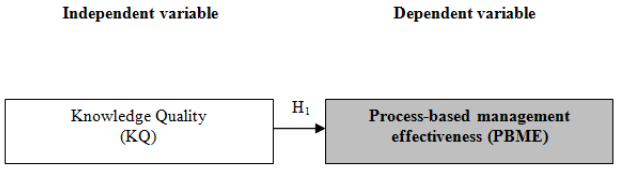

Fig. 4: The relationship between KQ and PBME

H_1 are developed based on the facts that, each QMS processes are related and interacted. These QMS processes are being managed through PBM by creating and understanding the networks of processes, their sequence and interactions which requires quality knowledge. Ongoing control of individual processes within the overall quality systems required depth understanding of each process flow and important element of each work process. This is where in-depth knowledge of each process and its interaction is required by related personnel in the organization. The quality knowledge which consist of intrinsic, contextual and actionable knowledge are also very importance to make correct decision and action in each process management.

In addition, organization's QMS shall also be always dynamic and responsive to adapt changes in meeting the needs, requirements and expectation of customers (Marín & Ruiz-Olalla, 2011). Therefore, the researcher believes that the quality of knowledge created and shared amongst organizational members will provides significant effect to establish dynamic and responsive QMS by providing sufficient knowledge upon the amendment or changes of procedures, manuals, work flow and other control systems within the organization. This is in-line with Ra et al., (2012) findings that knowledge has a significant effect to the organization performance that frequently facing dynamic challenge. The grater the quality of knowledge created, shared and applied within the organization, the more effective implementation of PBM will be. This is supported by Senge (1990), that it is important for the whole organization to emphasized the relationships between the processes and understand these processes supported by sufficient knowledge resource. In addition to that, the effective use of knowledge will much depend on its quality (Rao and Osei-Bryson, 2007; Yu et al., 2007) which support to the significant of quality knowledge for effective PBM and QMS maintenance.

10. Research Model Analysis

In modeling the relationship between KQ and PBME, the researcher used a reflective-formative second-order hierarchical model since the research model theoretically operationalized at higher levels of abstraction establishing higher-order models. In this study, the assessment of the Partial Least Square - Structural Equation Modeling (PLS-SEM) output is based on Wong (2013) and Hair et al., (2014) who have outlined the elements that should be covered in research model analysis. Therefore, the research model analysis using PLS-SEM is divided into two stages:

1. Measurement model – involves the validity and reliability assessment of the indicators (items) and constructs
2. Structural model – involves the evaluation of the relationship between latent constructs and other latent constructs which is also where the hypotheses are tested

10.1. Analysis of The Measurement Model (First-Order)

In this study, the analysis of the measurement model includes indicator reliability, internal consistency reliability as well as convergent and discriminant validity which aim to assess the reliability and validity of the constructs. The first step of analyzing the measurement model is to examine the convergent validity of the measurement model. To establish convergent validity, the researcher examined the outer loadings of the indicators as well as the average variance extracted (AVE). Items that did not comply with the required minimum value were removed for further analysis. According to Hair et al., (2014), the outer loadings should be 0.708 or higher. Hair et al., (2014) also noted that the AVE value shall be a minimum of 0.50.

The result shows that all items or indicators exceeded the minimum requirements where the outer loading is more than 0.708 and indicator reliability is more than 0.4 (Hulland, 1999). In addition, the first order construct has apparently fulfilled the convergent validity test with all AVE values are more than 0.50. In addition, the composite reliability for the (first-order) latent constructs indicated that all constructs complied with the minimum value of 0.6 based on a suggestion by Bagozzi and Yi (1988). All in all, these results suggest that all indicators and first-order latent constructs have passed the internal consistency reliability test. To examine the discriminant validity of the measurement model, Fornell and Larcker (1981) criterion analysis for checking discriminant validity was used. It is expected that the values of the square root of AVE of each construct (i.e. in the bold caption) should be larger than the correspondence row (the correlation value between construct).

In summary, the analysis ran using PLS-SEM had established valid measurement model that suitable to be used for structural model evaluation using the higher order or second order construct. The model has undergone and proven to comply with validity and reliability assessment of the indicators (items) and constructs. In the next stage, the structural model analysis that involves the evaluation of the relationship between latent constructs and other latent constructs are shown. Subsequently, these structural model evaluations will also be a stage where the research hypotheses are tested.

10.2. Analysis of The Structural Model (Second-Order)

The researcher uses a two-stage approach in the estimation of the second-order constructs to suit the formative type of the higher-order constructs. Therefore, a new higher-order model that uses the latent variable scores as indicators of the constructs were developed. Based on Hair et al. (2014), structural model assessment involves examining the model's predictive capabilities and the relationships between constructs. This evaluation includes collinearity test, significance and relevance tests, determine the level of determination (R2), effect size (f2) and predictive relevance (Q2).

As suggested by Hair et al., (2014), to begin the assessment of the model's predictive capabilities, the researcher used the repeated indicator approach to obtained the latent variables scores for the lower-order constructs. The latent variable scores then serve as manifest variables namely KQ and PBME for the higher-order construct structural model. Therefore, a new higher-order model that uses the latent variable scores as indicators of the constructs was developed. Next, the researcher checks the second-order formative measurement models for collinearity of indicators. The collinearity test is very crucial to assess if there are strong correlations between the variables that may cause serious problems in multivariate analysis. This is according to the measurement models assessment procedure that outlined by Hair et al., (2014). As the SmartPLS software does not provide the tolerance and the VIF values for collinearity test, the SPSS software had been used accordingly for this analysis. Multiple regression analysis had been run using SPSS with specific formative construct as independent variables. The results of the collinearity test shows the variables are free from collinearity issue as VIF for PBME is 3.953 and for KQ is 2.925. The researcher concluded that collinearity does not reach critical levels in any of the formative constructs and is not an issue for the estimation of the structural model using PLS-SEM.

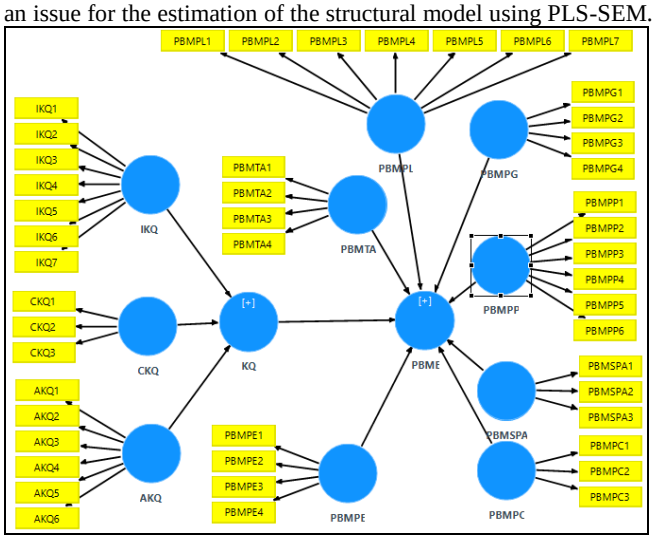

Fig. 5: The structural model of the relationships between KQ and PBME

On the subsequent analysis, assessment of the significance and relevance of the structural model is based on the estimates that were obtained after applying the PLS-SEM algorithm on the structural model. The estimates obtained from running the PLS-SEM algorithm represent the path coefficients (the structural model relationships) which also represent the hypothesized relationships among the construct. According to Hair et al., (2014), the path coefficients have standardized values between -1 and +1 which values of +1 represent strong positive relationships whiles -1 represent strong negative relationships. In the next steps, the researcher analyze the outer weight of each path of the construct for their significant and relevance by means of bootstrapping. For doing this analysis, 5000 bootstrap subsamples were used as suggested by Hair et al., (2014). This is due to the fact that PLS-SEM relies on a nonparametric bootstrap procedure (Davidson & Hinkley, 1997; Efron & Tibshirani, 1993) to test coefficients for their significance.. The results of the bootstrapping analysis are provided in Table 4.

Table 4: Path analysis results summary for PLS-SEM Algorithm and Bootstrapping

Hypothesis	Path	Path Coefficients	T-Statistics
H1	KQ→ PBME	0.626	8.310

The results is also in line with the opinion derived from semi-structured interview conducted, which support that the quality of knowledge is one of the important factors to ensure the process management within the certified organization is effective. This also accords with earlier research works by Dooley et al., (2000) which showed that the quality of knowledge can improve the performance of the processes.

The evidence from this result suggests that organization should emphasize on the quality of knowledge to increase the process-based management effectiveness. The current findings add substantially to the understanding that the quality of knowledge will provide significant influence on the PDCA (Plan-Do-Check-Action) principles which require quality knowledge. In addition, the quality knowledge is important to accelerate the transition progress from functional to process-based management for certified organization. This is due to the fact that despite the importance of process-based management, the transition of the organization of a functional approach to an approach focused on

processes still happens slowly as suggested by Neubauer (2009), Paim et al. (2008) and McCormack et al. (2009).

Taken together, this result suggests that organization shall put necessary strategy and effort to ensure that the quality knowledge is used for all processes and its interactions. Organizations may improve the quality of knowledge by effectively deploying the knowledge creation process (the SECI model) proposed by Nonaka and Takeuchi (1995) and use information systems available in the organization to codify and review knowledge before internalized for usage (Maurer et al., 2015). According to Maurer et al., (2015), to ensure the quality of knowledge, the organization should identify important knowledge that are required for each processes and acquire or create the knowledge from reliable and selective sources. Subsequently, the knowledge shall be transformed from tacit to explicit forms of knowledge, preserve it using available information technology within the organization and provides relevance code for each of knowledge created or shared. Next, the organization should review the knowledge using the specific characteristics sets by the organization. The organizations shall then publish the quality knowledge for employees' usage and sharing.

The quality of knowledge to be used for effective process-based management can also be enhanced by getting authentic information on the actual requirements and expectations of stakeholders i.e. customers, suppliers, employees, environment etc. (Badreddine et al., 2009). By obtaining accurate information on the needs of the stakeholders, organizations can set the necessary processes that best suits to their needs during the planning stage of process based-management.

11. Theoretical Implication

The findings from this study make several contributions to the current literature and provide implications for knowledge enhancement in the knowledge management and quality management system area. First, this study has extended the research related to knowledge from a broader context. This study has proposed knowledge quality that have been given considerably less attention in previous works as new variables for process-based management effectiveness. In this study, the knowledge quality was tested and proven valid to be part of the construct through the structural analysis. These variables have never been tested in any empirical studies of previous research works concerning QMS ISO9001:2008 certification in Malaysia.

Apart from that, the exploration of the relationship between knowledge quality in the tested model provides new context of study for organization knowledge creation theory. Previously, organizational knowledge creation theory has been used to explain phenomena in many fields, including those of organization theory (e.g. Osterloh and Frey 2000), organization behaviour (e.g. Peterson 2002), human resource management and leadership (e.g. Ranft and Lord 2000), innovation and technology management (e.g. Nonaka et al. 1996), strategic management (e.g. Choo and Bontis 2002), public administration (e.g. Larsen and Pedersen 2001) and management information systems (Scott 1998). In this study, the findings had contributed to more comprehensive understanding on the organizational knowledge creation phenomena in ISO9001 certified organization specifically on the creation of quality knowledge as for effective management of processes.

So far, from the context of organizational knowledge, little is known about the factors that potentially impact the effectiveness of process-based management (Nonaka et al., 2006). In this study, the theoretical elaborations have been done on the interrelationships between process-based management and the creation of quality knowledge by employees specifically for the quality management system in ISO9001 certified organization. The analysis conducted in this study demonstrates that knowledge quality are significantly affect the effectiveness of process-based management which synthesizes insights from different epistemologies and theoretical perspectives, thus enrich academic and practical knowledge of process management.

The findings are consistent with findings of past study by Gotzamani (2005), which indicate that the effort to maintain QMS within the organization shall not too focus on the technical requirements of the standard (such as updating documentation) but instead, shall encompass the principles and values that embedded within the organization (such as employee knowledge sharing self-efficacy and quality knowledge created and shared by the employee). The evolution of the theory verifies an important point that organization shall ensure employees have high knowledge sharing self-efficacy and encourage employees to create and share quality knowledge to ensure effective process-based management.

In addition, it was understood previously that the important enabler to the successful implementation of process-based management were top management and key stakeholders' support, high communication and awareness, effective process mapping, effective process measurement, low resistance to change, high teamwork and the effective practical training (Balzarova et al., 2004). However, it is interesting to note that, the results of this study also suggested that knowledge quality are predicted to be additional enabler that support the critical success factors for PBM effectiveness.

Finally, another theoretical implication of this study is that it contributes further understanding on the PDCA (Plan-Do-Check-Action) model (the fundamental principle in process-based management) which requires quality knowledge (KQ) for its input and output of each phase of PDCA strategy. Logically, the progress of each PDCA phase depends on the completeness and effectiveness of each strategy (Jeston and Nelis, 2008), which each complete and effective strategy depends highly on the quality of knowledge available within the organization that being shared by the employee with high knowledge sharing self-efficacy. Theoretically, this finding adding another value to the importance of quality knowledge creation that beyond knowledge management lens.

12. Managerial Implication

This study makes several noteworthy contributions to ensure organizations strengthen their process management. To maintain QMS effectively and to go beyond maintenance, the process-based management must be given the same priority as to the compliance of the standard, continual improvement and the emergence of QMS principles. Practically, process-based management necessitates managers to evaluate existing processes and take steps to adjust the structure and function of the organization whenever necessary, so that maximum efficiency can be thus derived. The importance of process-based management also been highlighted by the interviewees during the interview conducted. For example, Mrs. C noted that the effective management of processes will ensure all effort towards continual improvement can be easily executed while, Mrs. B pointed out that the effective management of processes will avoid organizations' from facing high risk of customer dissatisfaction and not meeting the quality objective.

To ensure effective process-based management, organization shall make sure that employee not working in isolation but work as a team by providing some thought to employees on how departments work together for the benefit of the customers and the organization. Organization shall also make sure that employees recognize their part in the process and take ownership of it for optimal results. This can be done through the training or awareness session specifically conducted to improve employee's understanding on process-based management.

In addition to that, organization may design the implementation steps of process-based management by referring to the basic steps used to setup effective process management as suggested by Sinclair and Zairi (1995) :

i. Identify the customer and the suppliers in the process, customer demands, key activities, point of measurement and feedback loops
ii. Define process performance measurement on the basis of customer requirements

iii. Define process performance targets
iv. Assign responsibilities to achieve targets
v. Deploy measures, target, plans, and allocate responsibility to all the sub-process
vi. Operate processes
vii. Measure performance and compare them with targets
viii. Use information on performance to identify areas of improvement, carried out continuous improvement activities, update plans of action, and adjust performance targets and re-engineered processes.

13. Limitations of The Study

This study is not without limitations. During the research process some limitations were identified that provide worthwhile opportunity for further study. First, the study suffers from limitations that the data collection is limited to short period of time and it does not cover longitudinal studies based on long-term observation that may affect the accuracy in interpreting the results presented and conclusion drawn from this study. The respondents may answer the questionnaire based on their perception on current situation and not throughout the QMS maintenance phase. However, it would be difficult to carry out the longitudinal study since it will take longer time and more resources (i.e. finance logistic, technical). Despite of that, the results of the study might not be applicable or less applicable to other countries due to the difference in culture since the sources of data were collected in a single nationwide sample, which is Malaysia only. Generalizing the research results to international contexts and other settings may also not be applicable.

14. Summary

This study has achieved its key objectives to examine the effect of KQ on PBME. In conclusion, the rigorous theoretical, methodological, and analytical contents of this empirical study have contributed in the existing literature on Knowledge Management (KM) and process-based management area. This study has filled the knowledge gap and provided a solid foundation and new opportunities for future study. The analysis results has shown interesting findings.

References

[1]. Alavi, M. and Leidner, D. (2001). Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, Vol. 25 No. 1, pp. 107-36

[2]. Badreddine, A., Romdhane, T. Ben, & Amor, N. Ben. (2009). A New Process-Based Approach for Implementing an Integrated Management System : Quality , Security, Environment. *Proceedings of the International MultiConference of Engineers and Computer Scientists*. II, 18–20.

[3]. Bagozzi, R.P. and Yi, Y. (1988). On the evaluation of structural equation model. *Journal of Academy of Marketing Science.* Vol. 16 No. 1, pp. 74-94

[4]. Balzarova, M. A., Christopher J, B., John M, Sharp & Sharon, M. (2004). Key success factors in implementation of process-based management : A UK housing association ex. *Business Process Management Journal*, *10*(4), 387.

[5]. Barclay, D., Higgins, C. and Thompson, R. (1995). The partial least squares (PLS) approach to causal modelling: personal computer adoption and use as an illustration. *Technology Studies*, Vol. 2 No. 2, pp. 285-309.

[6]. Carmignani, G. (2008). Process-based management: A structured approach to provide the best answers to the ISO 9001 requirements. *Business Process Management Journal*, *14*(6), 803–812. doi:10.1108/14637150810915982

[7]. Choo, Chun W., and Nick Bontis (2002). *The strategic management of intellectual capital and organizational knowledge*. New York: Oxford University Press.

[8]. Coakes, S.J., Steed, L., & Ong, C. (2009). *SPSS: analysis without anguish: Version 16.0 for Windows*. John Wiley and Sons.

[9]. Davison, A. C., & Hinkley, D. V. (1987). *Bootstrap Methods and Their Application. Cambridge University Press* (Vol. 42). Cambridge University Press, 28 Oct 1997. doi:10.2307/1271471

[10]. Dong Kyoon Yoo, Mark A. Vonderembse and T.S. Ragu-Nathan (2011). Knowledge quality: antecedents and consequence in project teams. *Journal of Knowledge Management*, Vol. 15 No. 2 2011, pp. 329-343. doi: 10.1108/13673271111119727

[11]. Efron, B., & Tibshirani, R. (1993). *An introduction to the bootstrap*. New York, NY: Chapman & Hall.

[12]. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobserved variables and measurement error. *Journal ofMarketing Research.* 18, 39–50.

[13]. Fraser, P. (2004).*The Holyrood Inquiry: Scottish Parliamentary Corporate Body*. [online] Available at http://www.scottish.parliament.uk/SPICeResources/Holyrood Inquiry.pdf [Accessed June 2015].

[14]. Hair, J.F. (2010). *Multivariate Data Analysis*. New York: Pearson Prentice Hall.

[15]. Harmon, P. 2003. *Business Process Change: A Manager's Guide to Improving*. Redesigning, and Automating Processes. Morgan Kaufmann: Amsterdam

[16]. Ishamuddin Mustapha, Ahmad Jusoh, Khalil Md Nor (2015). *Review on Quality Management Systems Maintenance Frameworkbased on Process Based Management, Knowledge Quality and Knowledge Self-efficacy*. Jurnal Teknologi. 72:4 (2015) 7–12

[17]. Jablokow, K.W. and Booth, D.E. (2006). The impact and management of cognitive gap in high performance product development organizations. *Journal of Engineering and Technology Management. Vol. 23 No. 4, pp. 332.*

[18]. Jeston, J. and Nelis, J. (2006). *Business Process Management: Practical Guidelines to Successful Implementations.* Elsevier: Oxford.

[19]. Kaplan, R.S. & Norton, D.P. (2008). Mastering the management system. *Harvard Business Review*, January, pp. 63-77.

[20]. Kohlbacher, M., Gruenwald, S., & Kreuzer, E. (2010, September). Corporate culture in line with business process orientation and its impact on organizational performance. *6th international workshop on business process design.* Hoboken, NJ.

[21]. Koopman, C. A., & Nicholas, S. J. (2011). Quality Systems Management - A Process Control Model. *Society of Automotive Engineers Inc*. 1-3

[22]. Krejcie, R. and Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*. 30, 607-610.

[23]. Larsen, Michael H., and Mogens K. Pedersen (2001). Distributed knowledge management in health-care administratio. *Proceedings of the 34th Hawaii International Conference on System Sciences*. Vol. 155.

[24]. Marín, L. M., & Ruiz-Olalla, M. C. (2011). ISO 9000:2000 certification and business results. *International Journal of Quality & Reliability Management*, *28*(6), 649–661. doi:10.1108/02656711111141201

[25]. McCormack, K., Willems, J., Van den Bergh, J., Deschoolmeester, D., Willaert, P., Indihar , Stemberger, M., et al. (2009). A global investigation of key turning points in business process maturity. *Business Process Management Journal*. 15(5), 792–815

[26]. Neubauer, T. (2009). An empirical study about the status of business process management. *Business Process Management Journal.* 15(2), 166–183

[27]. Nonaka, I. and Teece, D.J. (2001), Managing Industrial Knowledge: Creating, Transfer, and Utilization, Sage, London.

[28]. Nonaka, I., Toyama, R, and Byosière, P. (2001). *A theory of organizational knowledge creation: Understanding the dynamic process of creating knowledge. In M. Dierkes, A. Berthoin Antal, J. Child, & I. Nonaka (Eds.).* Handbook of organizational learning and knowledge (pp. 491-516). New York: Oxford University Press

[29]. Nonaka, I., Toyama, R. and Konno, N. (2000). SECI, ba and leadership: a unified model of dynamic knowledge creation. *Long Range Planning*. Vol. 33 No. 14, pp. 5-34.

[30]. Oakland, J.S. (1993). *Total Quality Management*, 2nd edition. Heinemann–Butterworth : Oxford press.

[31]. Osterloh, M., & Frey, B. (2000). Motivation, knowledge transfer, and organizational forms. *Organizational Science*. 11(5), 538

[32]. Paim, R.C.S., Caulliraux, H. and Cardoso, R. (2008). Process management tasks: a conceptual and practical views. *Business Process Management Journal*. Vol. 14 No. 5, pp. 694-723

[33]. Peterson, Mark F. (2002). Embedded organizational events: The units of process in organization science. *Organization Science*. 9/1: 16–33

[34]. Rao, L. and Osei-Bryson, K. (2007). Towards defining dimensions of knowledge systems quality. *Expert Systems with Applications*. Vol. 33 No. 2, pp. 368-78.

[35]. Senge, P. (1990). *The fifth discipline: The art and practice of the learning organization*. Toronto, Ontario: Doubleday.

[36]. Soo, C.W., Devinney, T.M. and Midgley, D.F. (2004). *The role of knowledge quality in firmperformance'', in Tsoukas, H. and Mylonopoulus, N. (Eds), Organizations as Knowledge Systems, Knowledge, Learning and Dynamic Capabilities* . pp. 252-75. London : Palgrave Macmillan.

[37]. Von Krogh, G., Ishijo, K., & Nonaka, I. (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation.* New York: Oxford University Press

[38]. Waal, A. (2010). *The characteristics of a High Performance Organisation.* Hilversum: Center for Organizational Performance BV.

[39]. Wong, K. K. (2013). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS*. Marketing Bulletin, 24, Technical Note 1, 1-32.

[40]. Yu, S., Kim, Y. and Kim, M. (2007). Do we know what really drives KM performance?. *Journal of Knowledge Management*. Vol. 11 No. 6, pp. 39-53.