



Organizational factors and process capabilities in a KM strategy: Toward a unified theory

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Organizational factors and process capabilities in a KM strategy: Toward a unified theory

Abstract

Purpose- This study aims to examine the role of knowledge management (KM) enablers on KM activities in the context of Malaysian small and medium-sized enterprises (SMEs). The effects of organizational culture, transformational leadership, organizational structure, and technology utilization as infrastructural KM enablers are examined on KM activities as knowledge acquisition, knowledge conversion, application, and protection.

Design/methodology/approach- A total of 227 responses from SMEs' top management are used to assess the measurement and structural models applying partial least squares-structural equation modelling (PLS-SEM).

Findings- The results show that technology utilization and organizational structure are two main factors in KM activities (all structural relationships are supported). Surprisingly, organizational culture is only associated with knowledge conversion and protection and the findings indicate no relationships between organizational culture and knowledge acquisition and application. The results also indicate a positive relationship between transformational leadership and knowledge acquisition and the hypotheses on the association between transformational leadership and knowledge conversion, application, and protection are rejected.

Practical implications- The results of importance-performance map analysis (IPMA) imply that technology utilization has the highest importance on knowledge acquisition, conversion, and protection while organizational structure has the highest importance on knowledge application. The results of IPMA also show that organizational culture has the highest performance on all KM activities.

Originality/value- This study is amongst the few that examines the structural relationships between organizational factors and KM activities in a SME context.

Key words: Organizational culture, organizational structure, transformational leadership, technology utilization, and knowledge management activities.

1. Introduction

The field of KM, its processes and activities has attracted profound interest among scholars (Silver, 2000). “Knowledge cannot be managed, only enabled” (von Krogh, 2012, p. 154). In this turbulent market, knowledge-based activities are indispensable for developing sustainable competitive advantage (Tiwana, 2002) and companies need to care more about the management of their knowledge workers (Jafari *et al.*, 2013). A long lasting core competency is resorted to an affective KM that is facilitated by infrastructural capability (organizational factors) and process capability (KM activities) (Chan and Chao, 2008). Issues related to KM are multi-dimensional and need a holistic approach (Ale *et al.*, 2014). Therefore, a comprehensive and integrated KM model that addresses the role of organizational factors in KM activities is crucial. Few researches study KM in SMEs (Dwivedi *et al.*, 2011) and most KM studies in SMEs are case studies that have a brief summary of particular KM solutions (Dotsika and Keith, 2013). In this research, however, we argue that organizational factors namely, organizational culture, transformational leadership, organizational structure, and technology utilization have vital role in KM activities, and the main question addressed in this research is: 1) to what extent organizational factors impact on KM activities? 2) Which organizational factor/s has the highest importance on KM activities?

The management information system development agenda in most SMEs fail to pay proper attention to combine KM as part of the plan (Lee and Lan, 2011). This failure can be due to the budget limitations, lack of awareness among managers (Dotsika and Keith, 2013), lack of perception about processes engaged in KM, and lack of understanding the intricacy and several types of knowledge (Lee and Lan, 2011). Implementing KM initiatives in SMEs is critical, as the main resource in these companies is knowledge (Dotsika and Keith, 2013). KM success factors need to be appraised so that “decisions can be made on what to continue, what to improve, and what to discard” (Lee and Wong, 2015, p. 711). SMEs still fail to become fully aware of benefits of KM (Chan and Chao, 2008) and the associated organizational factors that bolster a KM intensive environment.

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KM in large organizations and SMEs is different (Janet and Alton, 2013) and it needs to be studied separately without applying the models in large organizations directly to SMEs. There are several conceptual and review studies about the critical success factors that may impact or hinder KM in organizations but few empirical researches were conducted. For instance, based on a review on KM in organizations, Wong (2005, p. 266) postulated 11 critical success factors in SMEs that may impact on KM, namely “management support, culture, information technology, strategy and purpose, measurement, resources, motivational aids, process and activities, organizational infrastructure, human resource management, and training and education”. Migdadi (2009) attempted to examine these 11 factors on KM performance outcomes such as employee development, good external relationship, systematic knowledge activities, customer satisfaction, and organizational success. Moreover, previous studies mainly focused on the performance of KM in SMEs through comparing the descriptive results between countries (for example, Chan and Chao, 2008, Lee and Lan, 2011) or developing KM performance models (Lee and Wong, 2015) and the literature is scarce in examining the structural relationships between organizational factors and KM activities in SMEs. Therefore, the main purpose of this study is to find out the extent to which the organizational factors impact on KM activities, if any.

In addition, according to Malaysia’s 10th plan (Economic Planning Unit, 2010), so-called “knowledge SMEs” have a substantial role to play in the innovation process among Malaysian companies. SMEs make a profound contribution to manufacturing, and in developing economies they comprise 90 to 95 percent of all industrial enterprises (Loecher, 2000). Malaysia is a developing country that considers SMEs as the drivers of innovations. Malaysia has ambitious plans regarding SMEs and the role of SMEs in economic growth is clearly stated in the 2020 plan. However, understanding the way they view and practice KM brings value to South-East Asia region.

This paper is structured as follows: section 2 provides the relevant literature on organizational factors and KM processes to develop the hypotheses. Section 3, as the research method, explains the steps in data collection and several priori statistical tests are applied ensuring that the data is ready for SEM analysis. Section 4 summarizes the results of measurement model, structural model, and IPMA. Discussion, implications, and future directions are addressed in sections 5 and 6.

2. Literature review and hypothesis development

Role of organizational culture in KM

Zheng *et al.* (2010) included organizational culture as a factor participating to KM effectiveness. Even though Wong (2005) proposed that culture may be a critical success factor in KM, he did not indicate what aspects of KM are influenced by core beliefs, norms and values of SMEs. Gregory *et al.* (2009) found a positive relationship between group culture and employee satisfaction. Hogan and Coote (2014) studied layers of organizational culture in terms of values, artefacts, behaviour and norms and they attempted to link these substructures of culture to innovation and organizational performance. They found that values supporting information influence norms for innovation. According to Beijerse (2000), a motivating culture fits KM which is an informal culture and is characterized by an open attitude. Hogan and Coote (2014) concluded that organizational culture is positively associated with innovation and performance of firms. Lemon and Sahota (2004) regarded organizational culture as a primary determinant of innovative capabilities. Surveying 301 organizations, Zheng *et al.* (2010) found that culture is positively related to KM and organizational effectiveness. The findings of Lee and Choi (2003) show that culture is positively associated with socialization process. Finally, it is hypothesized that:

H1: There is a positive relationship between organizational culture and **H1a:** Knowledge acquisition; **H1b:** Knowledge conversion; **H1c:** Knowledge application; **H1d:** Knowledge protection.

Role of transformational leadership in KM

The role of leadership has moved from a traditional and command-based model to a freer and more open style of management (Nguyen and Mohamed, 2011). Transformational leaders are those that motivate and inspire their followers and empower them in the process of decision-making. Crawford and Strohkirch (2002) claim that transformational leadership promotes knowledge creation. In addition, Martín-de Castro *et al.* (2011) and Politis (2001) state that this

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3 type of leadership is more related to knowledge processes than transactional leadership style.
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5 Surprisingly, the results of the previous studies conducted by Nguyen and Mohamed (2011) and
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7 Analoui *et al.* (2012) imply that both transactional and transformational leadership styles are
8
9 positively associated with KM activities. Therefore, even though research shows the negative
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11 relationship of transactional leadership on knowledge acquisition attributes (Politis, 2002), the
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13 literature still is not consistent on which leadership style is conducive to KM activities and this
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15 signals for more research cross-culturally.

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17 Drawing on a sample of 1046 graduate students, Crawford (2005) finds a positive
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19 relationship between transformational leadership and KM behavior. Using a sample of 432
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21 Korean organizations, Hoon Song *et al.* (2012) finds that there is a positive relationship between
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23 transformational leadership and organizational knowledge creation. Surveying 157 Australian
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25 SMEs, Nguyen and Mohamed (2011) indicate that transformational leadership is positively
26
27 associated with knowledge exchange, socialization, and internalization. The results of study
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29 conducted by Podsakoff *et al.* (1990) indicate that there is no direct relationship between
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31 transformational leadership and organizational citizenship behavior. Further investigation is
32
33 required on the consequences of transformational leadership within organizations and the extent
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35 to which it may impact all KM activities. Therefore, following hypotheses are developed
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37 examining the positive role of transformational leadership on KM activities:

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39 **H2:** There is a positive relationship between transformational leadership and **H2a:** Knowledge
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41 acquisition; **H2b:** Knowledge conversion; **H2c:** Knowledge application; **H2d:** Knowledge
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43 protection.
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45 46 *Role of organizational structure in KM*

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49 According to Beijerse (2000, p. 168), a facilitating structure is critical for “the development, the
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51 acquisition, and the locking of the knowledge”. Willem and Buelens (2009) found that
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53 organizational structure dimensions such as coordination and specialization positively influence
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55 knowledge sharing within organizations. They also found unexpected relationships of
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57 centralization and formalization on knowledge sharing as well. Therefore, research on the
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59 consequences of organizational structure is still ambiguous and it should be studied cross
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3 culturally and with scrutiny. In addition, Chen *et al.* (2010) studied the interaction effects of
4 organizational structure and climate on the relationship between KM and innovativeness of
5 Taiwanese firms. They found that the effect of KM on firms' innovativeness is positively
6 moderated by less formalized, decentralized, and integrated organizational structure. The results
7 of the study by Chen *et al.* (2010) also indicated that a decentralized, integrated, and less
8 formalized organizational structure is positively associated with enhanced KM activities.
9 Surveying Chinese electronics manufacturing companies, Daugherty *et al.* (2011) found positive
10 relationships between formalization, decentralization, and firm's logistics service innovation
11 capability. Their findings also suggest that specialization is not conducive to logistics service
12 innovation capability. Wong (2005) also indicated that organizational infrastructure may have
13 positive impact on KM in SMEs. The results of study conducted by Lee and Choi (2003) showed
14 that a centralized organizational structure is negatively associated with knowledge creation.
15 Zheng *et al.* (2010) also found a negative relationship between organizational structure and KM
16 and organizational effectiveness. Therefore, few researches were conducted in examining the
17 structural relationship of lean organizational structure and KM activities. Accordingly, it is
18 hypothesized that:
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32 **H3:** There is a positive relationship between lean organizational structure and **H3a:** Knowledge
33 acquisition; **H3b:** Knowledge conversion; **H3c:** Knowledge application; **H3d:** Knowledge
34 protection.
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41 *Role of technology utilization in KM*

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44 According to organizational knowledge creation theory (Nonaka *et al.*, 2006), technology is
45 another enabling factor that provides knowledge base and that taps on the explicit knowledge in
46 the company. Organizational knowledge creation theory proposes the positive relationship
47 between technology utilization and innovative capabilities. Valaei *et al.* (2013) hypothesize a
48 positive relationship between technology utilization and knowledge quality of firms. The results
49 of the study conducted by Valaei and Rezaei (2016) showed that Web 2.0 utilization is positively
50 associated with intrinsic knowledge quality and actionable knowledge quality. Koellinger (2008)
51 found a positive relationship between technology investment, adoption, and process,
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3 product/service innovation. Lee and Choi (2003) found a positive relationship between IT
4 support and knowledge creation. It is noteworthy to understand what KM activities are
5 influenced by technology utilization. Figure 1 schematically shows that theoretical model of the
6 study. Finally, it is hypothesized that:
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11 **H4:** There is a positive relationship between technology utilization and **H4a:** Knowledge
12 acquisition; **H4b:** Knowledge conversion; **H4c:** Knowledge application; **H4d:** Knowledge
13 protection.
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20 **Figure 1:** Theoretical framework (Insert here)
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24 **3. Methodology**

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27 Malaysian SMEs from both manufacturing and service sectors were surveyed and data were
28 collected from chief executive officers, managers and other executives of SMEs. The online
29 questionnaire were designed through Google Docs and it was emailed to a random list of SMEs
30 obtained from the governmental SMECORP website. The survey was emailed to 1677 SMEs.
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32 According to Sekaran and Bougie (2010), the response rate using online survey is low. For
33 instance, online response rate is 33.3% (Watt *et al.*, 2002) and the overall response rate for online
34 survey is 30% (Sekaran and Bougie, 2010). To maximize the response rate of online surveys, a
35 token financial incentive or telephone follow-up could be useful (Dillman *et al.*, 2014). This
36 study used telephone top-up credit to increase the response rate. After respondents filled up the
37 survey, they could provide the code, time, and date of submitting the online questionnaire form.
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39 After confirming that the questionnaire was filled, the researcher provided the prepaid telephone
40 top-up PIN code through email to the respondent. A number of 242 responses were received
41 (14.4% response rate) and 15 responses were discarded due to high missing values (more than
42 50%). Table 1 shows the demographic information of the participants. The items of the KM
43 activities, organizational structure, organizational culture, and technology utilization (shown in
44 Appendix A) were adopted from (Chan and Chao, 2008, Lee and Lan, 2011) and the items of
45 transformational leadership were adopted from (Avolio *et al.*, 1999).
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Table 1: Sample characteristics ($N=227$) (Insert here)

In addition, no matter what method is applied, refusing to acknowledge the primary rules of sampling theory produces meaningless results (Hair *et al.*, 2013b). According to Hair *et al.* (2013a), before applying SEM, the sample size criterion should be determined through power analysis. This study uses a-priori sample size calculator for SEM (Soper, 2015). This calculator requires input data such as the anticipated effect size, statistical power levels, the number of observed variables (all the measurement items/indicators) and latent variables (both endogenous and exogenous constructs) in the model, and the desired probability to detect the minimum sample size for SEM technique (Cohen, 2013, Westland, 2010). Inputting the required information such as 95% desired statistical power level, 8 constructs of this study, 38 indicators (observed variables), 0.05 probability level, as well as anticipated high effect size of 0.5, medium effect size of 0.35, and small effect size of 0.12, the required number of sample size is 91, 91, and 181 for each effect size respectively. Since the sample size of this study is 227, this requirement is met as well.

3.1. Partial least square (PLS) path modeling approach

PLS path modeling as a variance based structural equation modeling (VB-SEM) (Lohmöller, 1989, Wold, 1975) is well-known method in the second generation of multivariate data analysis (Ringle *et al.*, 2012). PLS approach is one of the proper approaches to examine SEM mode of analysis and it has an appropriate way of analyzing conceptual frameworks with more than one dependent variable (Hair *et al.*, 2013a, Hair *et al.*, 2011, Valaei *et al.*, 2016, Rezaei *et al.*, 2016). In addition, PLS-SEM is a well-established technique for estimating path coefficients in causal models (Birkinshaw *et al.*, 1995). Further, PLS is a rich method for research in management and strategy fields of study (Hair *et al.*, 2013b) and this technique is an appropriate approach for developing and testing the existing theories (Fernandes, 2012). PLS is a good technique for exploring the theoretical relation between variables (Chin and Newsted, 1999, Reinartz *et al.*, 2009, Henseler, 2010, Hair *et al.*, 2011, Goodheu, 2012, Fernandes, 2012, Valaei *et al.*, 2016)

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3 and since the theoretical model of this study has four dependent variables, the number of causal
4 relationships are high (16 paths) (Ringle *et al.*, 2012), the model is complex and latent variable
5 scores are needed for subsequent analysis (mainly importance-performance map analysis) (Hair
6 *et al.*, 2013a), PLS-SEM approach is preferred.
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11 Another purpose of using of PLS-SEM is its predictive advantages such as R^2 values and
12 Q^2 values of predictive relevancy (Hair *et al.*, 2013b, Ringle *et al.*, 2012). One of the objectives
13 of this study is to find out to what extent organizational factors predict KM activities. In addition,
14 this study adopted and adapted the measurement items from previous researches (shown in
15 Appendix A), which applied reflective mode of measurements. The measurement model of this
16 study is reflective because “the causal priority is from the constructs to the indicators, the
17 constructs are traits explaining the indicators, the indicators represent consequences, the items
18 are mutually interchangeable, and all items will change if the assessment of the trait changes”
19 (Hair *et al.*, 2013a, p. 64). Finally, SmartPLS version 3.2.4 is used to assess the measurement and
20 structural models of the study.
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32 **4. Results**

33 **4.1. Construct validity and reliability**

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35 To test the reliability of measurement model, both composite reliability and Cronbach’s Alpha
36 values are examined. All values of factor loadings, composite reliability, Cronbach’s Alpha, are
37 shown in Table 2. Composite reliability and Cronbach’s Alpha values are acceptable (more than
38 0.7), which ensures the reliability. There is no multi-collinearity and all indicators have variance
39 inflation factor below 5.
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49 **Table 2:** Construct reliability and validity (Insert here)
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53 In addition, acceptable value of average variance extracted (AVE) shows that the
54 questionnaire is valid. Tables 3 and 4 show the discriminant validity criteria according to
55 Fornell-Larcker criterion and heterotrait-monotrait ratio. In Table 3, the off-diagonal values are
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3 the correlations between the latent constructs and diagonal are square values of AVEs showing
4 AVEs on its own construct are higher than all of its loadings with other constructs. Additionally,
5 the results of loadings and cross-loadings showed that an indicator's loading on its own construct
6 is higher than all of its cross loadings with other constructs. The critical value for heterotrait-
7 monotrait ratio is below 0.9 (Teo *et al.*, 2008). Shown in Table 4, all values are below the
8 threshold.
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17 **Table 3:** Discriminant validity – Fornell-Larcker criterion (Insert here)

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19 **Table 4:** Discriminant validity – Heterotrait-Monotrait Ratio (Insert here)

20 21 22 23 **4.2. Structural model**

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25 The R-Square values of knowledge acquisition, conversion, application, and protection (shown
26 in Appendix B) indicate that 46.4%, 60.8%, 71.6%, and 61.1% of changes in these constructs can
27 be predicted through organizational factors. Another assessment of predictive accuracy of a
28 model is its predictive relevance of Q^2 values (Geisser, 1974, Stone, 1974) and they are extracted
29 through blindfolding in PLS-SEM (Hair *et al.*, 2013a). According to Hair *et al.* (2013a), a Q^2
30 value of higher than 0 as a good indicator of a path model's predictive relevancy. The Q^2 results
31 of knowledge acquisition (0.34), conversion (0.42), application (0.54), and protection (0.48)
32 indicate that all exogenous constructs of this study have predictive relevancy with large effect
33 sizes. In addition to R-square values, the changes in R-square when exogenous construct/s are
34 excluded from the model (f^2 effect size) are important as well. Likewise to f^2 effect size, the
35 relative impact of predictive relevance (Q^2) can be assessed through q^2 effect size. The results of
36 blindfolding procedure showed that organizational structure and technology utilization have the
37 highest effect sizes for f^2 and q^2 effect sizes.
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50 The results of hypotheses testing are tabulated in Table 5. All hypotheses except H1a,
51 H1c, H2b, H2c, and H2d were supported. Hypothesis 1b proposes a positive relationship
52 between organizational culture and knowledge acquisition with path coefficient of 0.138,
53 standard error of 0.063 and t-value of 2.202 and Hypothesis 1d poses a positive relationship
54 between organizational culture and knowledge protection with path coefficient of 0.138, standard
55 error of 0.063 and t-value of 2.202.
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3 error of 0.081 and t-value of 1.709 were supported (with 10% probability). Surprisingly, the
4 relationship between organizational culture and knowledge acquisition (H1a) and knowledge
5 conversion (H1c) was rejected. Perhaps, low level of trust and unclear vision and objectives may
6 hinder acquiring and applying new knowledge and experience about stakeholders. In addition,
7 lack of support and training to increase employees' work efficiency may also create difficulties
8 for acquiring and exchanging the knowledge for solving new problems and improving work
9 effectiveness and fine-tuning strategic vision. Therefore, companies should consider more about
10 motivating (Beijerse, 2000) and knowledge friendly organizational culture (Valaei *et al.*, 2013)
11 that support KM activities.
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20 Hypothesis 2a was also supported and there is a positive relationship between
21 transformational leadership and knowledge acquisition (with 10% probability). Perhaps, top
22 management's support, inspiration, and enthusiastic way of conduct only provides freedom
23 (Nguyen and Mohamed, 2011) for acquiring the new knowledge and experience (Crawford and
24 Strohkirch, 2002) and this style of leadership seems irrelevant to the way employees convert,
25 apply and protect the organizational knowledge and it is likely that the other style of leadership
26 (transactional leadership) is relevant to SMEs (Analoui *et al.*, 2012). Furthermore, all hypotheses
27 on the relationship between organizational structure and knowledge acquisition (H3a with 10%
28 probability), knowledge conversion (H3b), knowledge application (H3c), and knowledge
29 protection (H3d) were supported. Finally, hypotheses on the relationship between technology
30 utilization and knowledge acquisition (H4a), knowledge conversion (H4b), knowledge
31 application (H4c), and knowledge protection (H4d) were also supported. This signals the
32 importance of organizational structure and technology utilization in KM activities.
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46 **4.3. Goodness of fit in PLS-SEM**

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49 Hair *et al.* (2014) introduce standardized root mean square residual (SRMR) as a goodness of fit
50 measure in PLS-SEM. According to them, SRMR transforms both the sample covariance matrix
51 and the predicted covariance matrix into the correlation matrix. SRMR is the difference between
52 the observed correlation and the prediction correlation. A value less than 0.1 (Hair *et al.*, 2014)
53 or 0.08, a more conservative view (Hu and Bentler, 1998), is a good fit for SRMR. Since the
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3 structural model of this study only has reflective constructs, the SRMR result for common factor
4 model is relevant (Hair *et al.*, 2014). Using the PLS-SEM as well as bootstrapping results, the
5 results indicate a significant value of SRMR, 0.054 (T-value = 8.780), which is less than 0.08.
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7 Therefore, the proposed model has a good fit.
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13 **Table 5:** Structural relationships and hypothesis testing (Insert here)
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18 **4.4 Importance-Performance Map Analysis (IPMA)**

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20 To address the second question, we apply IPMA to examine what organizational factor/s have
21 the highest importance and performance on KM activities. The PLS-SEM method is especially
22 beneficial when the research focus is on the analysis of a particular construct's key sources of
23 explanation (Ringle and Sarstedt, 2016) such as KM activities. IPMA can also help managers and
24 decision makers to prioritize their actions (Hair *et al.*, 2013a). For instance, taking the knowledge
25 acquisition as the endogenous target variable, IPMA calculates the total effects of structural
26 model (importance) with the average values of the latent variable scores (performance) to show
27 the important areas for the betterment of management activities. The results can show the
28 determinants with high importance (those constructs that have a strong total effect), but also have
29 a relatively low performance (low average latent variable scores) (Ringle and Sarstedt, 2016).
30 Table 6 shows the results of IPMA for four main target constructs of this study i.e., knowledge
31 acquisition, conversion, application, and protection. For example, according to Table 6,
32 technology utilization (0.422) and organizational structure (0.182) has the highest importance
33 and organizational culture has the highest performance on the knowledge acquisition construct
34 (see Appendix C). Focusing on the lower right area of the IPMA shown in Appendix C,
35 technology utilization has a high importance for the knowledge acquisition target construct, but
36 shows a low performance compared to the other constructs. Therefore, there is an especially high
37 potential to boost the performance of the technology utilization, which is relevant for managerial
38 actions. Such improvements could be providing the SMEs with IT platforms that support
39 knowledge sharing, providing communications channels across SMEs to facilitate knowledge
40 sharing between them, or investments in effective KM technologies to enable knowledge sharing
41 between employees.
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3 Taking knowledge conversion as the target construct, technology utilization (0.425) and
4 organizational structure (0.207) has the highest importance and organizational culture has the
5 highest performance on the knowledge conversion construct (see Appendix D). Therefore, there
6 is substantial room for improvement, making the aspects underlying technology utilization
7 construct extremely relevant for managerial actions.
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13 Considering knowledge application as the target construct, organizational structure
14 (0.674) and technology utilization (0.280) has the highest importance and organizational culture
15 has the highest performance on the knowledge application construct (see Appendix E).
16 Emphasizing on the lower right area of the IPMA shown in Appendix E, organizational structure
17 has a high importance for the knowledge application target construct, but shows a low
18 performance compared to the other constructs. Therefore, there is an especially high potential to
19 improve the performance of the organizational structure, which is relevant for managerial
20 actions. The improvements could be designing processes that facilitate knowledge exchange
21 across business functions, promoting collaborative rather than individualistic working behavior,
22 possessing a system that captures both failed and successful experiences, having a common
23 knowledge platform that provides employees with work-related assistance, and having high
24 “reuse rate” of important knowledge. Finally, knowledge protection as the target construct,
25 technology utilization (0.412) and organizational structure (0.409) has the highest importance
26 and organizational culture has the highest performance on the knowledge protection construct
27 (see Appendix F). However, as mentioned above, there is substantial room for improvement,
28 making the aspects underlying organizational structure construct particularly relevant for
29 managerial actions.
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46 **Table 6:** IPMA results (Insert here)
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51 **5. Discussion and conclusion**

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53 This study developed a unified model of organizational factors and KM activities in SME
54 context and it also provided evidence on the structural relationships between organizational
55 factors i.e., organizational culture, transformational leadership, organizational structure, and
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3 technology utilization and KM activities i.e., knowledge acquisition, conversion, application, and
4 protection. Addressing the first research question, our study found that all organizational factors
5 are partially (organizational culture and transformational leadership) and totally (organizational
6 structure and technology utilization) relevant to KM activities. The results showed that 46.4% of
7 changes in knowledge acquisition, 60.8% of changes in knowledge conversion, 71.6% of
8 changes in knowledge application, and 61.1% of changes in knowledge protection could be
9 predicted through organizational factors. The findings suggest that in SME setting, the most
10 significant organizational factors to KM activities are organizational structure and technology
11 utilization. Therefore, it can be concluded that the more SMEs ponder on their lean and
12 decentralized organizational structure as well as applying various technologies, the higher they
13 will experience KM activities.
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24 This study offers several theoretical implications. Given the sparseness of research on the
25 role of KM in SMEs (Dwivedi *et al.*, 2011), this research contributes to the literature by
26 investigating organizational factors that enable KM activities in SMEs. Previous research on the
27 KM critical success factors in SMEs (Migdadi, 2009, Wong, 2005) failed to indicate what are the
28 effects of their proposed factors on each KM activity. Even though Migdadi (2009) tried to
29 examine the role of KM critical success factors on systematic knowledge activities, the flaws of
30 his study were 1) considering systematic knowledge activities as a single obscure construct, and
31 2) not indicating which aspects of KM activities were influenced. But, this study had a rigorous
32 examination to the concepts of KM activities.
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40 Similar to previous studies (Zheng *et al.*, 2010, Lee and Choi, 2003) and showing the
41 importance of culture in KM, the findings indicate that organizational culture is conducive to
42 knowledge conversion and protection. In line with (Hoon Song *et al.*, 2012, Martín-de Castro *et*
43 *al.*, 2011, Politis, 2001, Nguyen and Mohamed, 2011), the results also highlighted the
44 significance of transformational leadership in KM. Transformational leadership was found as a
45 significant factor to merely the knowledge acquisition and interestingly it was not relevant to
46 other KM activities. Perhaps, this is due to lack of timely communications and knowledge
47 sharing between top management and employees or chances are that transactional leadership
48 style is relevant to KM activities as stated by Analoui *et al.* (2012). In contrast with Zheng *et al.*
49 (2010) who found a negative relationship between organizational structure and KM, our results
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3 imply a positive relationship between organizational structure and all KM activities, which is in
4 agreement with (Daugherty *et al.*, 2011, Chen *et al.*, 2010). Similar with Lee and Choi (2003),
5 Nonaka *et al.* (2006), Valaei *et al.* (2013) and Valaei and Rezaei (2016), this study found that
6 technology utilization is the most significant factor which is imperative to KM activities.
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10 11 12 13 14 **6. Managerial implications and future direction**

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16 From a practical point of view, due to the existence of Malay, Chinese, and Indian ethnic groups
17 in Malaysia, the results of this study can also be applied to SMEs in other South-Asian countries.
18 Our study suggests that managers should be aware of the organizational factors that play a
19 significant role in KM activities. SMEs' managers and owners can prioritize their managerial
20 actions based on the results of IPMA. IPMA addresses the important areas for the improvement
21 of management activities. Technology utilization and organizational structure has the highest
22 importance on the knowledge acquisition, conversion, application, and protection constructs. In
23 other words, managers should note that one point increase in the performance of technology
24 utilization and organizational structure is expected to increase the performance of knowledge
25 acquisition, conversion, application, and protection by the value of total effect. Organizational
26 culture has the highest performance on KM activities' constructs.
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37 Since KM in large organizations and SMEs is different (Janet and Alton, 2013) and it
38 needs to be studied separately, further investigation is required to examine other organizational
39 factors. Empirical studies on organizational factors and KM activities in SME context are scarce
40 and factors influencing them need to be studied with scrutiny. Future research should investigate
41 the impact of other organizational factors such as strategy (Lee and Wong, 2015), functional
42 diversity, and organizational memory on KM activities.
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48 **Appendix A: Measurement items**

49 **Appendix B: PLS results**

50 **Appendix C: IPMA for knowledge acquisition**

51 **Appendix D: IPMA for knowledge conversion**

52 **Appendix E: IPMA for knowledge application**
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Appendix F: IPMA for knowledge protection

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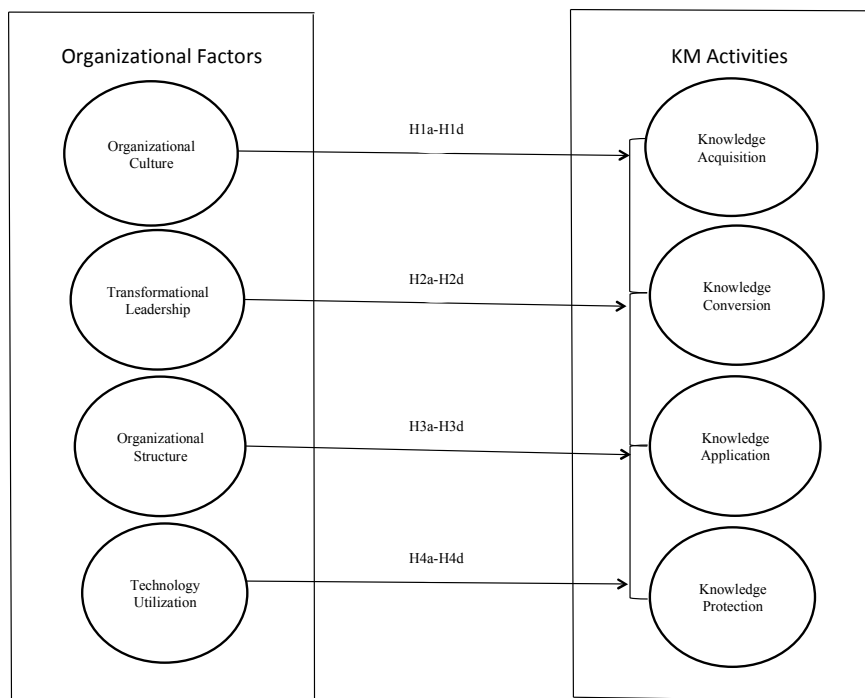
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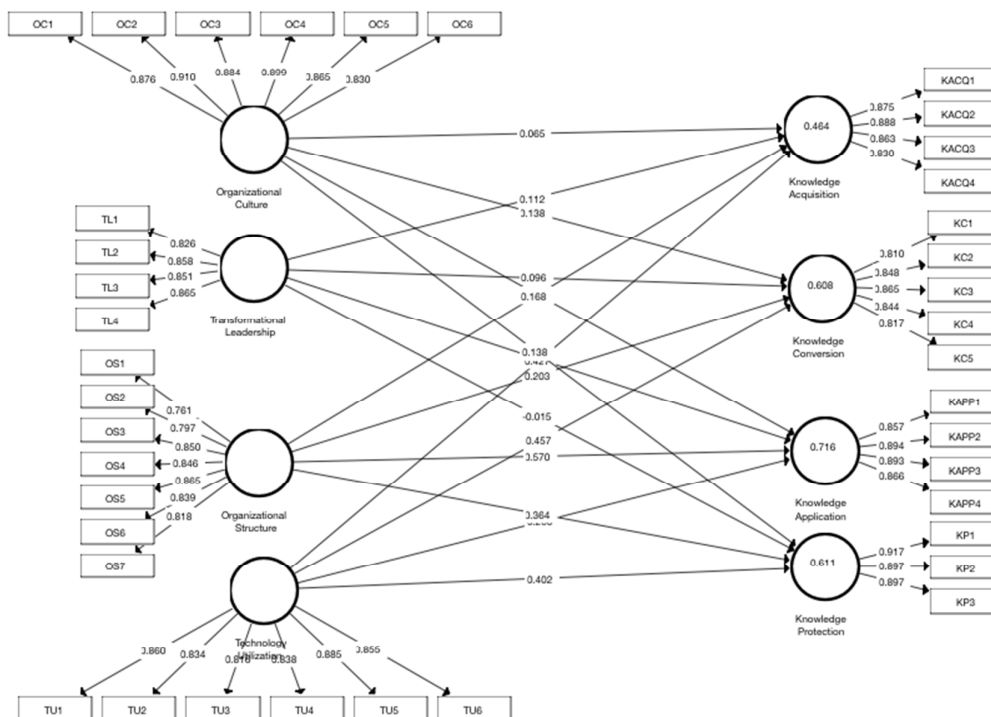
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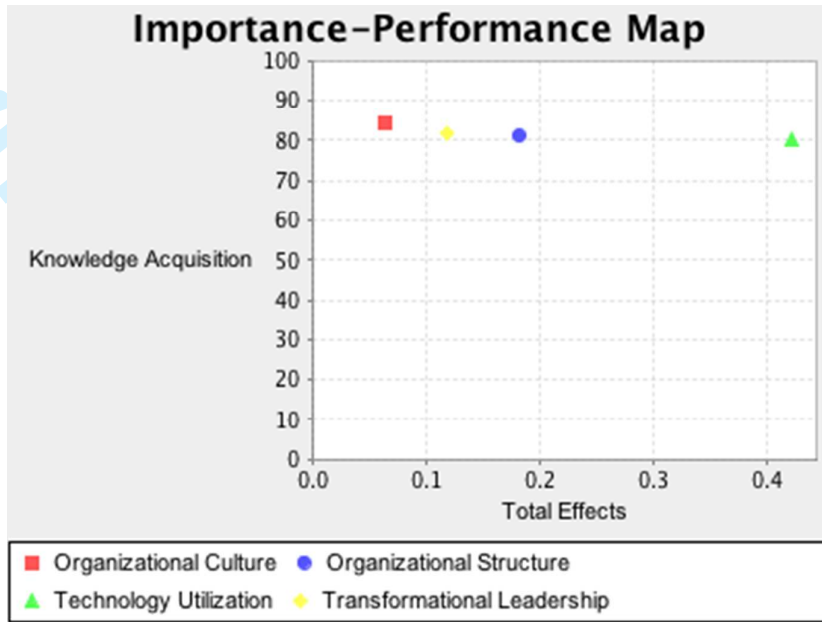
Figure 1: Theoretical framework



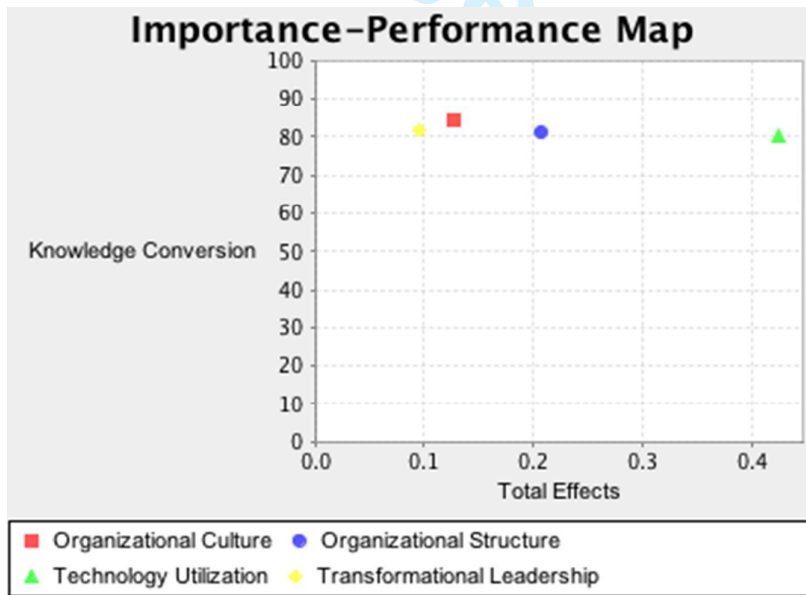
Appendix B: PLS results



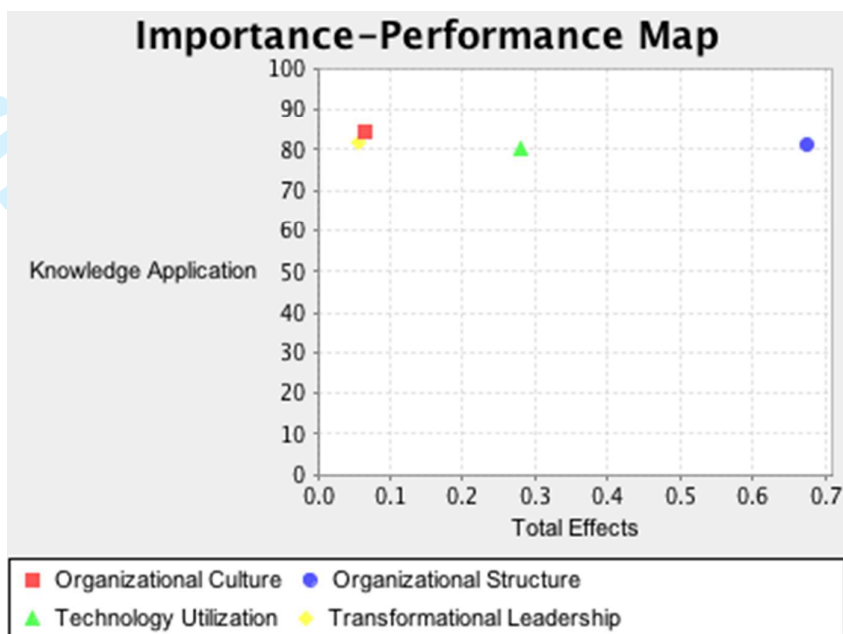
Appendix C: IPMA for Knowledge Acquisition



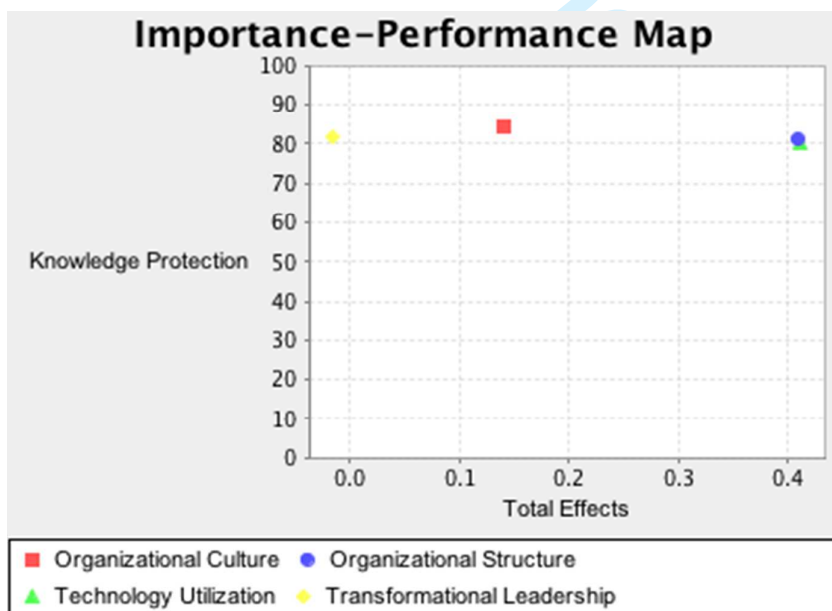
Appendix D: IPMA for Knowledge Conversion



Appendix E: IPMA for Knowledge Application



Appendix F: IPMA for Knowledge Protection



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Table 1: Sample characteristics (*N*=227)

	Characteristic	Frequency	Percent
Gender	Male	180	79.3
	Female	47	20.7
Age	Between 20 and 30	71	31.3
	Between 31 and 40	74	32.6
	Between 41 and 50	64	28.2
	Between 51 and 60	18	7.9
Position	CEO	112	49.3
	CFO	11	4.8
	COO	10	4.4
	CIO	13	5.7
	CMO	19	8.4
	Manager	62	27.3
Number of Employees	Between 10 and 30	83	36.6
	Between 31 and 50	68	30
	Between 51 and 70	50	22
	Between 71 and 100	26	11.5

Table 2: Construct reliability and validity

Construct	Item	Item loading	VIF ^a	AVE ^b	Composite Reliability ^c	Cronbach's Alpha
Knowledge Acquisition	KACQ1	0.875	2.617	0.747	0.922	0.887
	KACQ2	0.888	2.687			
	KACQ3	0.863	2.399			
	KACQ4	0.830	2.065			
Knowledge Conversion	KC1	0.810	2.523	0.700	0.921	0.893
	KC2	0.848	2.893			
	KC3	0.865	2.548			
	KC4	0.844	2.760			
	KC5	0.817	2.534			
Knowledge Application	KAPP1	0.857	2.372	0.770	0.931	0.900
	KAPP2	0.894	2.853			
	KAPP3	0.893	2.866			
	KAPP4	0.866	2.594			
Knowledge Protection	KP1	0.917	2.838	0.817	0.930	0.888
	KP2	0.897	2.456			
	KP3	0.897	2.478			
Organizational Culture	OC1	0.876	3.583	0.770	0.953	0.940
	OC2	0.910	4.930			
	OC3	0.884	3.989			
	OC4	0.899	4.439			
	OC5	0.865	3.370			
	OC6	0.830	2.764			
Organizational Structure	OS1	0.761	2.189	0.682	0.937	0.922
	OS2	0.797	2.910			
	OS3	0.850	3.119			
	OS4	0.846	2.963			
	OS5	0.865	3.283			
	OS6	0.839	3.237			
	OS7	0.818	2.760			
Technology Utilization	TU1	0.860	3.021	0.719	0.939	0.922
	TU2	0.834	2.998			
	TU3	0.816	3.043			
	TU4	0.838	3.058			

	TU5	0.885	4.150			
	TU6	0.855	3.061			
Transformational Leadership	TL1	0.826	1.931	0.723	0.912	0.872
	TL2	0.858	2.403			
	TL3	0.851	2.226			
	TL4	0.865	2.360			

a. Variance Inflation Factor

b. Average variance extracted (AVE) = (summation of the square of the factor loadings)/[(summation of the square of the factor loadings) + (summation of the error variances)]

c. Composite reliability (CR) = (square of the summation of the factor loadings)/[(square of the summation of the factor loadings) + (square of the summation of the error variances)]

Table 3: Discriminant validity – Fornell-Larcker criterion

	KAcq	KApp	KC	KP	OC	OS	TU	TL
Knowledge Acquisition	0.864							
Knowledge Application	0.527	0.878						
Knowledge Conversion	0.723	0.656	0.837					
Knowledge Protection	0.516	0.792	0.629	0.904				
Organizational Culture	0.468	0.554	0.567	0.548	0.878			
Organizational Structure	0.577	0.816	0.663	0.705	0.558	0.826		
Technology Utilization	0.646	0.711	0.731	0.716	0.538	0.682	0.848	
Transformational Leadership	0.552	0.677	0.634	0.608	0.721	0.738	0.632	0.850

a. The off-diagonal values in the above matrix are the correlations between the latent constructs and diagonal are square values of AVEs.

Note: KAcq (Knowledge Acquisition), KApp (Knowledge Application), KC (Knowledge Conversion), KP (Knowledge Protection), OC (Organizational Culture), OS (Organizational Structure), TU (Technology Utilization), TL (Transformational Leadership).

Table 4: Discriminant validity – Heterotrait-Monotrait Ratio

Construct	Knowledge Acquisition	Knowledge Application	Knowledge Conversion	Knowledge Protection	Organizational Culture	Organizational Structure	Technology Utilization
Knowledge Application	0.590 ^a						
Knowledge Conversion	0.809	0.727					
Knowledge Protection	0.580	0.887	0.705				
Organizational Culture	0.510	0.600	0.616	0.597			
Organizational Structure	0.636	0.895	0.726	0.778	0.600		
Technology Utilization	0.714	0.780	0.803	0.789	0.578	0.738	
Transformational Leadership	0.624	0.761	0.715	0.688	0.795	0.825	0.701

a. The criterion for HTMT is below or 0.90 (Teo *et al.*, 2008).

Table 5: Structural relationships and hypothesis testing

Hypothesis	Path	Beta	Standard Error	T-Statistics	Decision
H1a	Organizational Culture -> Knowledge Acquisition	0.065	0.074	0.878	Not Supported
H1b	Organizational Culture -> Knowledge Conversion	0.138	0.063	2.202**	Supported
H1c	Organizational Culture -> Knowledge Application	0.061	0.064	0.951	Not Supported
H1d	Organizational Culture -> Knowledge Protection	0.138	0.081	1.709*	Supported
H2a	Transformational Leadership -> Knowledge Acquisition	0.112	0.065	1.723*	Supported
H2b	Transformational Leadership -> Knowledge Conversion	0.096	0.085	1.128	Not Supported
H2c	Transformational Leadership -> Knowledge Application	0.048	0.101	0.472	Not Supported
H2d	Transformational Leadership -> Knowledge Protection	-0.015	0.086	0.168	Not Supported
H3a	Organizational Structure -> Knowledge Acquisition	0.168	0.092	1.822*	Supported
H3b	Organizational Structure -> Knowledge Conversion	0.203	0.101	2.017**	Supported
H3c	Organizational Structure -> Knowledge Application	0.570	0.098	5.823***	Supported
H3d	Organizational Structure -> Knowledge Protection	0.364	0.095	3.846***	Supported
H4a	Technology Utilization -> Knowledge Acquisition	0.427	0.078	5.500***	Supported
H4b	Technology Utilization -> Knowledge Conversion	0.457	0.075	6.076***	Supported
H4c	Technology Utilization -> Knowledge Application	0.260	0.089	2.925***	Supported
H4d	Technology Utilization -> Knowledge Protection	0.402	0.107	3.750***	Supported

t*-values: 1.65 (10%); *t*-values: 1.96 (5%); ****t*-values: 2.58 (1%)

Table 6: IPMA Results

Construct	Knowledge Acquisition		Knowledge Conversion		Knowledge Application		Knowledge Protection	
	Importance	Performance	Importance	Performance	Importance	Performance	Importance	Performance
Organizational Culture	0.064	84.111	0.128	84.111	0.066	84.111	0.141	84.111
Organizational Structure	0.182	81.126	0.207	81.126	0.674	81.126	0.409	81.126
Technology Utilization	0.422	80.163	0.425	80.163	0.280	80.163	0.412	80.163
Transformational Leadership	0.119	81.598	0.096	81.598	0.056	81.598	-0.016	81.598

Note: Importance = total effects of structural model, Performance = average values of latent variable scores (Hair Jr *et al.*, 2013).

Appendix A: Measurement items

	Construct	Item	Source
1	Technology Utilization	TU1 Systems are in place to locate individuals with the expertise or 'know how' that is necessary to perform my job effectively. TU2 The organization has IT platform in place to support knowledge sharing. TU3 Communication channels are in place that allow for the sharing of knowledge between SMEs. TU4 The organization has invested in effective knowledge management technologies to enable knowledge sharing between employees (e.g. intranets/extranets, groupware, repositories, etc.). TU5 Employees are able to acquire important work related knowledge from the Internet and other electronic sources. TU6 Information technology plays a critical role in facilitating knowledge sharing.	(Lee and Lan, 2011); (Chan and Chao, 2008); (Valaei and Rezaei, 2016)
2	Organizational Structure	OS1 The organization encourages knowledge sharing amongst employees. OS2 The organization has processes in place to facilitate knowledge exchange and conversion across business functions (e.g. organizational departments and/or divisions). OS3 The organizational structure promotes collaborative rather than individualistic working behaviour. OS4 The organizational structure facilitates knowledge discovery and creation. OS5 The organization possesses the system to collect various successful and failed experiences. OS6 The organization has a high "Reuse Rate" of important knowledge. OS7 The organization has a common knowledge platform to enable employees to seek for work-related assistance.	(Lee and Lan, 2011); (Chan and Chao, 2008)
3	Organizational Culture	OC1 Employees realize the importance of knowledge asset to the organization success. OC2 Employees have high level of trusts in knowledge sharing. OC3 The organization support sufficient resources and trainings to increase employees' work efficiency. OC4 Employees are encouraged to seek for work related knowledge. OC5 Overall organizational vision and objectives are clearly stated. OC6 The organization understands that the benefits of sharing knowledge outweigh the costs.	(Lee and Lan, 2011); (Chan and Chao, 2008)
4	Transformational Leadership	TL1 Top management seeks different views. TL2 Top management considers the moral/ethical standards. TL3 Top management suggests new ways. TL4 Top management talks enthusiastically. TL5 Top management emphasizes the collective mission of the company. TL6 Top management teaches and coaches.	(Avolio <i>et al.</i> , 1999)
5	Knowledge Acquisition	KACQ1 The organization has the procedures to acquire supplier and customer related knowledge. KACQ2 The organization has the procedures to create new knowledge from exiting knowledge. KACQ3 The organization has the procedures to acquire and exchange knowledge between employees. KACQ4 The organization has the procedures to acquire new product/service and competitor related knowledge within the same industry sector.	(Lee and Lan, 2011); (Chan and Chao, 2008)
6	Knowledge Conversion	KC1 The organization has the procedures to convert knowledge to new products or designs. KC2 The organization has the procedures to convert competitive intelligence to operational plan. KC3 The organization has the procedures to promote the operational knowledge and transfer it to employees. KC4 The organization has the procedures to transform knowledge from employees and business partners to its operations.	(Lee and Lan, 2011); (Chan and Chao, 2008)
7	Knowledge Application	KAPP1 The organization has the capability to exploit knowledge gained from the failures and experiences. KAPP2 The organization has the capability to utilize knowledge for solving new problems. KAPP3 The organization is able to utilize knowledge for improving work effectiveness and fine-tuning strategic vision. KAPP4 The organization can rapidly supply the necessary knowledge to appropriate parties.	(Lee and Lan, 2011); (Chan and Chao, 2008)
8	Knowledge Protection	KP1 The organization has the procedures to protect organizational knowledge and assure it is not accessed unauthentically. KP2 The organization has login and access policies to protect organizational knowledge. KP3 The organization has clear information to employees with regard to the importance of knowledge protection.	(Lee and Lan, 2011); (Chan and Chao, 2008)