



The Development of a Knowledge Sharing Behavior Scale in the Thai Context

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Abstract

The main purposes of this study were to investigate a construct of integrated knowledge sharing behavior and consequently to develop a valid and reliable instrument to quantify the knowledge sharing behavior of Thai employees. Therefore, the main procedures of this study were establishing a definition of KSB and its elements, developing a preliminary scale, and testing the quality of the scale. Accordingly, 34 KSB items were initially listed. After being reviewed and revised by experts, 2 items were suggested to be deleted. The 32-item KSB scale, then, was used to collect data from 605 hard disk drive employees in four large companies.

Four emerging meaningful constructs of 19-item KSB scale, including explicit knowledge donation, tacit knowledge contribution, reactive knowledge receiving, and proactive knowledge acquiring, were identified by performing an exploratory factor analysis. Consequently, a confirmatory factor analysis was conducted for validating the scale. The results of the adjusted model displayed good fit with the data ($\chi^2 = 148.67$, $df = 123$, normed chi-square (χ^2/df) = 1.21, p -value = 0.06, SRMR = 0.04, RMSEA = 0.03, CFI = 0.99, and TLI = 0.99). In addition, the scale was found to be highly reliable (Cronbach's alpha of the KSB scale was 0.92) and each item possessed high discriminant value. Further studies should focus on finding score ranges for this 19-item KSB scale with other groups of Thai people and should validate the scale with similar behaviors and other variables.

Keywords: Knowledge Sharing Behavior, Scale Development, Hard Disk Drive Industry, Thai Context

Introduction

Knowledge is strongly emphasized as one of the most crucial resources for the innovation of new products and services. Additionally, it is a critical organizational asset that increases productivity, provides competitive advantages to conquer business uncertainty, and sustains long-term growth (Asrar-ul-Haq, Anwar and Nisar, 2016; Nonaka and Takeuchi, 1995). Hence, in order to effectively utilize knowledge, knowledge management is fully demanded, especially in knowledge-intensive industries (Dekoulou and Trivellas, 2014; Lu, Leung and Koch, 2006). Scholars believe that knowledge sharing is a substantial practice regarding the management of knowledge (Du, Ai and Ren, 2007; Hong, Suh and Koo, 2011) because it is an important part of enhancing not only the performance of the individuals that share knowledge but also the team's and the organization's performance (He and Wei, 2009; Lu, Leung and Koch, 2006).

The Hard Disk Drive (HDD) industry, the main sub-sector of the electrical appliance, electronics, and telecommunication equipment industry, is considered one of significant accelerated Thailand economic clusters by the Thai government (Thailand Board of Investment (BOI), 2017). Hobday and Rush (2007) have asserted that Thailand is the top leading HDD producing and exporting country but has done little research in this area. Recently, the HDD business has experienced vast opportunities and threats. For example, the personal desktop computer market is shrinking, while data storage need for cloud computing is surging worldwide in the "Internet of things era" (Charusilawong, 2015). Therefore, in order to increase organizational competitiveness and employees' efficiency, HDD enterprises are critically required to promote knowledge sharing among the knowledge workers in the organization (Pichitkarnkar, Pinthapataya and Kengpol, 2015).



Although organizations realize the necessity of knowledge sharing behavior among employees, some studies have reported that it is difficult to build it (Jo and Joo, 2011; Riege, 2005) because knowledge is a personal asset that cannot be forced to transfer (Chow and Chan, 2008). Furthermore, Bock, Zmud, Kim and Lee (2005) found that large groups of employees have decided not to exchange knowledge because this action can possibly lead undesirable consequences for them. In line with the studies, i.e. Casimir, Lee and Loon (2012); Cheng, Ho and Lau (2009) found that reasons of employees' hoarding knowledge are losing power, wasting time, knowledge abuse from receivers, etc. In addition, Yi (2015) stated that common KSB evaluation methods are not suitable for a variety of KSB among employees and do not emphasize essential processes, and as a result, organizations exhibit an extreme demand for formally-appropriate tools to assess and track knowledge sharing performance for staff in the workplace. Therefore, standardized KSB scale development is highlighted as one of the latest research topics and is expected to be broaden and deepen (Ramayah, Yeap and Ignatius, 2014).

As mentioned above, there is a drastic requirement for more research on KSB in the knowledge-based organization in emerging economic countries, e.g., HDD in Thailand. Until now, it still lacks a valid and reliable KSB scale in this context. Consequently, this study aims to develop a high-quality KSB scale, appropriate for and applicable to the use of researchers and practitioners with Thai employees. The key steps of this study, therefore, are as follows: (1) to form the definition of KSB, elements and various KSB related statements; and (2) to develop a new reliable and valid KSB scales in the Thai context. The details of key methods and results are reported.

Literature Review

In this section, the related literature has been reviewed in order to construct the integrated definitions and significant dimensions of employees' knowledge sharing behavior in the workplace as a foundation for new scale development. The details are explained as follows.

Definition of Knowledge and Types of Knowledge

In the organizational context, knowledge is described as what an individual knows and the skills required to perform tasks (Ozlati, 2012). Additionally, knowledge is widely classified into two types: explicit knowledge and tacit knowledge. The definition of explicit knowledge is knowledge that is transferred easily in a formal, systematic language in documenting format, and stored for later use (Nonaka and Takeuchi, 1995). In contrast, tacit knowledge is knowledge that is not easily communicated. It is strongly established in action and engaged in a specific context, and in addition, it is acquired through work experience or know how, professional training and connection or know who and know where (Nonaka and Takeuchi, 1995; Reyhav and Weisberg, 2010).

A Definition of Knowledge Sharing Behavior

Knowledge sharing behavior is difficult to define and evaluate. Thus, there is no consensus on the definition (Yi, 2015). On the one hand, some scholars have described KSB emphasizing the one-way action of individual as a knowledge provider to other organizational members (Ozlati, 2012). On the other hand, KSB is described as knowledge exchange by communicating and consulting with other workers by playing knowledge contributor and knowledge absorber roles (Davenport and Prusak, 1998; Van Den Hooff and De Ridder, 2004). Therefore, in order to effectively transfer and co-create new knowledge among employees throughout the organization, the individual is required to perform both roles.



In this study, the knowledge sharing behavior of employees is defined as a set of individual exchange actions on their work-related knowledge and skills among organizational members by acting as knowledge providers and knowledge receivers (Van Den Hooff and De Ridder, 2004; Reychav and Weisberg, 2010). In addition, knowledge composes of both tacit and explicit sides so two core dimensions of KSB are formed as follows: (1) knowledge donation, referring to employees' actions related to providing explicit and tacit knowledge, such as passing useful documents to others, providing tips and techniques to do a job, suggesting how to solve problems, etc.; and (2) knowledge collection; that is employees' actions related to gaining explicit and tacit knowledge, such as receiving useful documents, participating in knowledge sharing activities, asking about tips and techniques, listening to others' best practices, etc.

Methods and Results

In order to create a good-quality KSB scale that can measuring the behavior of respondents in regard to work-related knowledge exchange with their co-workers; there are two main processes of questionnaire development, including (1) scale preparation, and (2) scale testing and validating. The details were explained as follows.

(1) Scale Preparation

The definition of KSB and the questionnaire were prepared in Thai. The items used in the study were generated from three steps as follows: (1) selecting items from current KS scales and key statements from related literature, then translating them from English into Thai with the help of two translators; (2) creating more items from the author's work experience in an HDD company and the KM area; and (3) obtaining suggestions from experts.

Twenty-four positive items were initially documented. In order to reduce acquiescence responses, extreme response biases, and to increase the attention of the respondents, negative items were included (Barnette, 2000; Sauro and Lewis, 2011). Therefore, the preliminary version contained 34 items, 24 positive and ten negative items. Further, three experts from the psychology and knowledge management fields reviewed and provided comments and scored each item using a 3-point scale: -1 = Disagree, 0 = Adjustable, 1 = Agree. Later, the scale was revised by following the receiving comments, two negative items were deleted; thus, 32 questions of KSB were maintained.

The questionnaire has two main parts. The first part is the cover letter informing the participants of the study's purpose, the anonymous use of data, and right to not participate, and in addition each participant was required to fill in the consent form before completing the scale. The second part had precise instructions and a table of 32-item statements with a Likert scale ranging from 6 = very true for me to 1 = very untrue for me. The main purpose of using a 6-point scale was to avoid midpoint response bias, to enhance scale sensitivity, and to gain more reliable information (Cummins and Gullone, 2000; Matell and Jacoby, 1971; Tsang, 2012). In order to ensure the comprehension of the cover letter content, instructions and item wording, the fully-designed questionnaire file was reviewed by three staff members in three different HDD manufacturers and by two PhD students. Afterward, the initial 32-item KSB questionnaires were prepared for data collection.

(2) Scale Testing and Refinement

In this stage, item analysis, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Composite Reliabilities (CR) and Average Variance Extracted (AVE) were performed by using data collection



from monthly Thai employees in four large HDD manufacturers, including two product owners and two-part producers. The questionnaires were distributed to 1, 234 employees, later, of the 691 questionnaires returned, 605 completed questionnaires were usable (a response rate of 55.99%).

By adopting the rule of thumb method for the calculation, the number of responses to items should range from 10–20 to 1 in order to conduct a factor analysis (Kline, 2011). In addition, the minimum sample size for confirmatory factor analysis should be at least 200 (Yang, 2005). Accordingly, 605 usable questionnaires were separated into two groups i.e. 320 and 285. Which the first sample, 320 participants, was employed for item analysis and exploratory factor analysis of the preliminary scale. As well as, the last sample, 285 participants, was used for confirmatory factor analysis, convergent validity, and item analysis of the final scale.

The demographic characteristics of the first sample, 320 employees were as follows: the majority of respondents were female (63.44%) and the participants' average age was 34.23 years (SD = 6.16, ranging from 22 to 52 years of age). More than half of the samples (58.75%) had 1–10 service years at their current company. In addition, more than half of the respondents (51.88%) had total work experience of 6–15 years. In addition, 160 samples achieved a bachelor's degree or higher. For the second sample, 285 employees, the data repeatedly showed that the majority were female workers (66.32%), and the participants' average age was 37.14 (SD = 7.39 ranging from 21 to 53 years of age). Almost half of the samples (45.61%) had 1–10 service years at their current company and 133 participants (46.66%) had total work experience longer than 15 years. Almost half of the samples (46.66%) earned a bachelor's degree or higher.

First, item analysis was employed in order to eliminate low-quality items (Churchill, 1979; Hinkin, 2005); thus, two statistical approaches, item-total correlation and item discrimination, were performed in order to determine the effectiveness of each item in the scale by using the data of the first group, and in order to ensure that each item was significantly related to the total score without that item, item-total correlation was calculated. The minimum value for retaining each item was 0.30 (Cristobal, Flavián and Guinaliú, 2007). In addition, a single item requires the ability to differentiate lower and upper groups of respondents in order to demonstrate item discrimination based on the analyses of the t-values that meet the criteria of p-value < 0.05 (Bhanthumnavin, 2008). The results indicated that all 32 items were maintained because all of the criteria were achieved.

Next, Exploratory Factor Analysis (EFA) was employed to test construct validity, to develop and to refine the new questionnaires (Hinkin, 2005). In addition, the selected extraction and rotation methods in this study were the principal component analysis and Varimax with Kaiser normalization. These methods reduce large variable sets into smaller groups while retaining as much of the original total variance as possible and creating interpretable uncomplicated patterns (Conway and Huffcutt, 2003; Costello and Osborne, 2005; Yang, 2005). In this research, five criteria for EFA were applied: (1) the measure of sampling adequacy (Kaiser-Meyer-Olkin test) should be greater than 0.50; (2) the Bartlett test of sphericity should be significant; (3) Eigenvalues for each construct should be greater than one; (4) the retained number of constructs should yield the total cumulative percentage for explaining the total variation of at least 60% and (5) item should load at 0.50 or higher (Hinkin, 2005).

In order to perform EFA, the first sample data were loaded, and the EFA results for 32 KSB items showed a good fit of Kaiser-Meyer-Olkin test (KMO = 0.93) with a significant Bartlett test of sphericity ($\chi^2 = 6338.67$, $df = 496$, $p < .001$, $n = 320$). The results indicated five emerging constructs of the KSB measure. Particularly, the highest loaded construct was induced by all 8 negative items, which should be allocated to each



dimension. Additionally, this unexpected construct did not provide any sense. Likewise, DeVellis (2017) suggested that negative items should not be included in the scale because they distort the factor structure. In line with the previous study, Schmitt and Stuits (1985) emphasized that mostly or wholly negative items can regularly establish a single dimension in the factor analytic process. Consequently, all eight negative items were excluded and 24 positive items were retained. The first sample data of 24 positive questions were repeatedly analyzed by using the same methods of EFA. At this stage, the items remained according to the five previously-mentioned EFA criteria as well as the appropriate loading of items on the relevant dimensions (Hinkin, 2005). The results showed one low loading value item and four items loadings on unsuitable dimensions. Thus, five items were dropped and only 19 items were retained. Subsequently, the EFA was rerun using the same dataset. The output for the 19 KSB items presented a good fit of Kaiser–Meyer–Olkin test ($KMO = 0.92$) with a significant Bartlett test of sphericity ($\chi^2 = 3630.73$, $df = 171$, $p < .001$, $n = 320$). Four essential constructs emerged, with each Eigenvalue above one, describing 67.41% of the total variance, which were (1) Explicit Knowledge Donation (EKD) refers a set of action to deliver explicit knowledge to other employees.; (2) Tacit Knowledge Contribution (TKC), defines a set of action to provide tacit knowledge to other employees; (3) Reactive Knowledge Receiving (RKR) refers a set of responding action to gain knowledge from other employees; and (4) Proactive Knowledge Acquiring (PKA) defines a set of enthusiastic action by creating own opportunities to obtain knowledge from other employees. In addition, the item loading value for each item was between 0.54 and 0.84. Consequently, the EFA output affirmed the construct validity of the 19-item KSB measure. The summarized results of EFA were presented in Table 1.

Table 1 Summary EFA Results of the 19-Item KSB Scale

Tacit Knowledge Contribution (TKC)		Proactive Knowledge Acquiring (PKA)		Reactive Knowledge Receiving (RKR)		Explicit Knowledge Donation (EKD)	
Factor Loading	Factor Loading	Factor Loading	Factor Loading	Factor Loading	Factor Loading	Factor Loading	Factor Loading
TKC 1	0.54	PKA1	0.68	RKR1	0.57	EKD1	0.80
TKC 2	0.75	PKA2	0.68	RKR2	0.75	EKD2	0.84
TKC 3	0.80	PKA3	0.77	RKR3	0.73	EKD3	0.75
TKC 4	0.80	PKA4	0.70	RKR4	0.71		
TKC 5	0.64	PKA5	0.56	RKR5	0.69		
TKC 6	0.60						
Eigenvalue	3.74	Eigenvalue	3.45	Eigenvalue	2.93	Eigenvalue	2.68
% of Variance	19.70	% of Variance	18.17	% of Variance	15.43	% of Variance	14.11
Cumulative %	19.70	Cumulative %	37.87	Cumulative %	53.30	Cumulative %	67.41

In this part, confirmatory factor analysis (CFA), was performed for validating the final KSB scale. Moreover, the main objectives for conducting the CFA for this scale development were to consider how well the *a priori* model derived from the theoretical foundation fit the data, and to analyze whether the newly-generated items conformed to the hypothesized structure (Hurley et al., 1997; Kline, 2011). Important goodness-of-fit indices and acceptable values to assess a model are CFI and TLI (> 0.90), RMSEA (< 0.08), SRMR (< 0.08), the χ^2/df ratio (< 2.00), and the χ^2 with non-significant level criterion (Hair, Black, Babin and Anderson, 2010; Hooper, Coughlan and Mullen, 2008). In order to conduct a second-order CFA of the KSB measure,

the last sample data were used. After adjusting based on the suggestions according to some modification indices, the model demonstrated a good fit with the data ($\chi^2 = 148.67$, $\chi^2/df = 1.21$, p -value = 0.06, SRMR = 0.04, RMSEA = 0.03, CFI = 0.99, TLI = 0.99). In addition, the factor loading scores for single items ranged from 0.47–0.90 with a p -value < .001, reaching above the 0.40 criterion level with significance (Hinkin, 2005). As a result, the 19-item KSB scale with four dimensions was accepted.

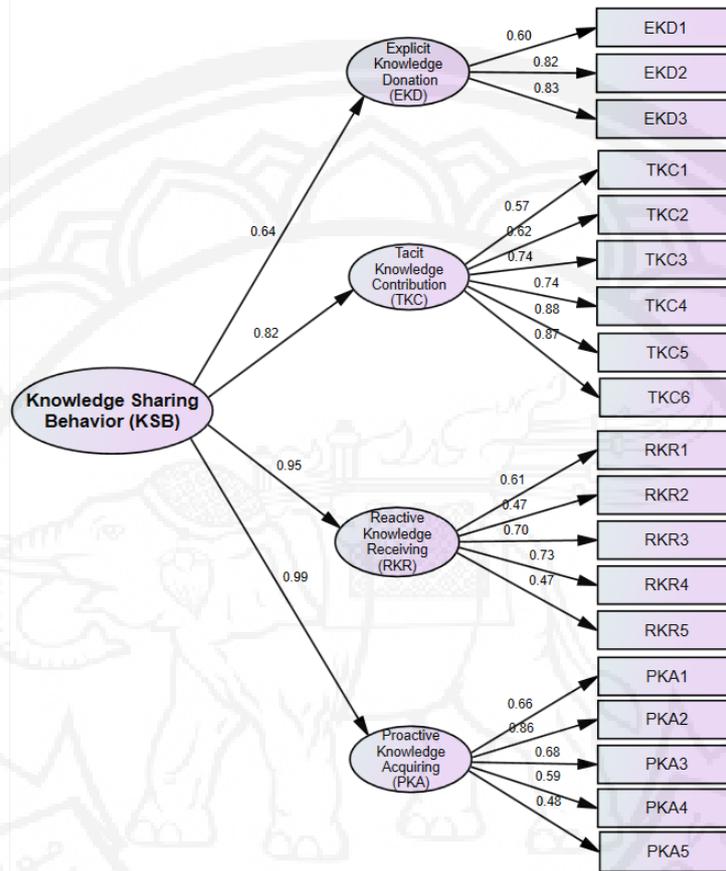


Figure 1 Second-order factor analysis of 19 items and 4 dimensions of the KSB Scale

In order to evaluate the construct and convergent validity of the measure, composite reliabilities (CR) and average variance extracted (AVE) were conducted. The CR values of all dimensions were 0.74–0.83, which were higher than the minimum criterion at 0.7 (Hair et al., 2010). In addition, Table 2 displays the AVE values of explicit knowledge donation (EKD) and tacit knowledge contribution (TKC), which were 0.56 and 0.57; thus they were higher than 0.5, but the AVE values of the other two dimensions, reactive knowledge receiving (RKR) and proactive knowledge acquiring (PKA), were at 0.40 and 0.44, lower than 0.5. However, the AVE at 0.4 was bearable since the CR was greater than 0.6 (Fornell and Larcker, 1981; Huang, Wang, Wu and Wang, 2013). In addition, the CR and AVE of the overall scale were 0.94 and 0.50, respectively, which were greater than the recommendation.

Next, Cronbach’s alpha was performed for demonstrating the reliability of each dimension and the overall scale reliability. The four construct reliability coefficients were 0.78–0.88 and the overall scale reliability coefficient was 0.92, which exceeded fair to excellent levels ($\alpha > 0.70$, George and Mallery, 2003). Further analyses were item total correlation and discriminant t-value. Again each item of the KSB scale



had a significant t -value discrimination (t -values > 8.64 , p -values < 0.001) and the values of the item total correlation ranged from 0.43 to 0.81, with p -values < 0.001 . Consequently, the validity and reliability of the finalized version of the KSB scale were acceptable. More details are shown in Table 2.

Table 2 Results of the Final 19-item KSB Scale

Dimension	Items	t -values	Item Total Correlation	CFA Factor Loading	CR	AVE	Cronbach's Alpha
Explicit Knowledge Donation	EKD1-EKD3	9.91-10.24	0.54-0.67	0.60-0.83	0.80	0.57	0.78
Tacit Knowledge Contribution	TKC1-TKC6	8.65-11.83	0.55-0.81	0.57-0.88	0.83	0.56	0.88
Reactive Knowledge Receiving	RKR1- RKR5	8.78-14.00	0.49-0.70	0.47-0.73	0.74	0.40	0.80
Proactive Knowledge Acquiring	PKA1-PKA5	9.70-14.96	0.43-0.69	0.48-0.86	0.79	0.44	0.79
Total 19 items: CR = 0.94, AVE = 0.50, α = 0.92							

Note: Significance Level of t -values < 0.001

Conclusion

The findings clearly answered the main purposes of this study which were searching a KSB construct and establishing an appropriate KSB scale to measure the level of KSB among organizational members in the Thai context. Therefore, the completed version of the 19-item, 6-response choice KSB scale with agreeable validity and reliability was developed. The results depicted four significant domains which are (1) explicit knowledge donation (2) tacit knowledge contribution (3) reactive knowledge receiving and (4) proactive knowledge acquiring. In addition, the results also showed the highest loading construct of KSB i.e. proactive knowledge acquiring and the lowest loading construct i.e. explicit knowledge donation.

Discussion

The construct of the KSB and the KSB scale were the major findings of the current study. Although previous studies emphasized that the knowledge shared by the employees can be tacit as well as explicit in one-way action as only knowledge delivering (Yi, 2015; Ozlati, 2012) or two-way action, including, knowledge donating and knowledge collecting parts (Van Den Hooff and De Ridder, 2004; Reychav and Weisber, 2010). However, four separated knowledge sharing dimensions were found in this study. In terms of knowledge offering side, i.e. explicit knowledge donation, and tacit knowledge contribution, could be definitely separated by similar types of knowledge in prior studies. This implies that employees deliver explicit knowledge by passing useful documents and explaining their own know-how as tacit knowledge to others. In fact, both dimensions of knowledge interact with each other in organizational members' activities, which has been called knowledge conversion (Nonaka and Takeuchi, 1995; Nonaka and Von Krogh, 2009). However, for the knowledge gathering side, it could be categorized by different criteria. Gaining informative documents and being told about knowledge from other organizational employees is considered to be the reactive knowledge receiving dimension; and obtaining information from enthusiastic joining knowledge sharing activities and asking other workers for



information is identified as the proactive knowledge acquiring. The results showed in accordance with ancient gurus' wisdom; deep listening and questioning are core principles of eastern and western philosophies, as can be seen in the teaching of Buddha and Socrates, which encourages the learners to follow it (Vale, 2013). In addition, Davoudi and Sadeghi (2015) claimed that in learning processes, questions play a vital role in helping learners to collect information, examine ideas, and clarify and reflect on their understanding, which is beneficial for future applications, including making decisions and solving problems. Moreover, the explicit knowledge donation was found as the least important in KSB. This suggests that document sharing is necessary but it is less important than other constructs of knowledge sharing behavior.

Implication, Limitation and Future Research

Naturally, employees exchange their knowledge by playing roles of knowledge contributors and knowledge collectors in organizations. Thus, to nurture effective knowledge sharing behavior among employees, organizations should create strategies, plans and projects to raise awareness and skills of "proactive knowledge absorbers and providers". As the absorbers' side, employees should be encouraged to build their own opportunities for seeking knowledge related to their roles, as well as, being active listeners for collecting knowledge from others staff. As the providers' role, employees should be promoted to convey their tacit knowledge by teaching, answering, and proposing their knowledge such as new ideas, tips and techniques, success stories, lesson learned, and so on. In addition, practitioners can apply the KSB scale for evaluating actual knowledge sharing in order to promote this expecting behavior among employees in the workplace.

The current research has some limitations which can potentially lead to future research. Though the quality of the measure achieved the expected criteria, it was limited to being conducted with HDD companies. Therefore, this KSB measure should be replicated in other industries and also expanded to other sectors, such as government agencies, state enterprises, educational institutes, etc. Moreover, the scale should be further refined by validating it with other variables, for example, criterion validity examination with possible related variables, including work performance and job satisfaction, etc. Ultimately, the study findings have supplied vigorous KSB concepts and a well-developed scale for academics to pursue more research in this young research field.

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