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The Complicated Relations to the Adoption of Knowledge Management

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Abstract: Knowledge is regarded as an essential asset in organizations. It plays an important role in building organizational core knowledge grounded on competences that give competitive advantages to the organizations to outperform their competitors. However, the adoption of knowledge management is associated to other factors such as the perceived usefulness of knowledge management, environmental uncertainty and organizational structure. In this research, we employ quantitative research methodology particularly using factor analyses and structural equation modeling analyses to investigate the relationships associated with the adoption of knowledge management. Further, we apply Sobel's procedure to explore the mediating role of the perception toward the usefulness of knowledge management. The findings reveal that the adoption of knowledge management is statistically associated with the perceived usefulness of knowledge management, organizational structure and environmental uncertainty. There are statistically significant mediating effects of the perceived usefulness of knowledge management on the relationships of adopting knowledge management with organizational structure as well as with environmental uncertainty. This research has some implications on how the managers, facing different types of organizational structure and different levels of environmental uncertainty should adopt knowledge management in business.

Keywords: Mediating role; Perceived usefulness of knowledge management; Adoption of knowledge management

1. Introduction

Knowledge management is the art of creating value by leveraging intangible assets, which consists of activities in all relevant managerial areas. Firms that consistently control and integrate knowledge into business activities to achieve their objectives can attain superior success (Droge et al., 2003). Knowledge management is suggested by Darroch (2005) to provide a coordinating mechanism to transform resources into competences. Adopting and performing knowledge management allows managers to enjoy many positive benefits for business (Wong and Aspinwall, 2005).

While the perceived usefulness is a strong determinant of users' acceptance behavior; it is affected by environmental factors as well as by organizational factors (Davis, 1989). Similarly, within a knowledge management context, managers' perception on knowledge management that creates competitive advantages for business can be considered as important to the adoption of knowledge management. Nevertheless, to the best of our knowledge, no research on organizational knowledge management has explored the causal relationship between the managerial perception on the usefulness of knowledge management and its determinant "organizational and environmental factors". Only a few studies have discussed the effect of the perceived usefulness of knowledge management on the adoption of the knowledge management (Kulkarni et al., 2007). More importantly, drawing on the research on the mediation by Baron and Kenny (1986), we infer that the perceived usefulness of knowledge management plays an important mediating role in leveraging organizational and environmental influences on the adoption of knowledge management. However, it seems that former researchers have not empirically investigated the mediating role of the perception on the usefulness of knowledge management in the causal relationships associated with the adoption of knowledge management in business. This research attempts to examine the roles of the perception on the usefulness of knowledge management in the relationship related to the adoption of knowledge management with organizational and environmental factors. Overall, this research employs structural equation modeling analysis to simultaneously examine the causal associations in the research model. Moreover, it applies

Sobel's method to explore whether and how the perceived usefulness of knowledge management mediates the relationships between organizational structure or environmental uncertainty and the adoption of knowledge management.

To the best of our knowledge, this research is the first to utilize structural equation modeling analysis to jointly and simultaneously explore the causal links among organizational structure and environmental uncertainty, the perceived usefulness and the adoption of knowledge management. The mediating role of the perception on the usefulness of knowledge management in these causal relationships is the first time to be empirically investigated by using Sobel's procedure. This research is also useful to managers in knowledge management by providing them with better understanding of the factors affecting the adoption of knowledge management in business. Therefore, they can make better decisions on the adoption of knowledge management for their business, which helps improve their companies' business performance.

The remainder of the paper will go on as follows. A literature review develops hypotheses in the next section, followed by the research methodology. The results are presented in a subsequent section. In the final section, some conclusions are offered.

2. Literature Review

Knowledge is defined by Alavi and Leidner (2001) as being the state of knowing and understanding, an object to be stored and manipulated, a process of applying expertise and a condition of access to information as well as the potential to affect action. In addition, Lin and Lee (2005) define the adoption of knowledge management as the extent to which organizations are contented with the adoption levels of knowledge management, resulting in knowledge sharing and application. Meantime, Kulkarni et al. (2007) refer to the perceived usefulness of knowledge management as the user's perception of the efficiency of knowledge management on job performance and productivity. They assess the perceived usefulness of knowledge management as the degree to which a worker of knowledge management believes that the adoption of knowledge management

will enhance their work performance. Kulkarni et al. (2007) also suggests that a relationship between the usefulness of knowledge management and the use of knowledge management is entirely possible. As a result, we can come to the suggestion that the perceived usefulness of knowledge management may have impact on the adoption of knowledge management. In addition, Chen and Huang (2007) define organizational structure as a variable of decentralization (versus centralization), mutual adjustment (versus formalization), and integration. Following Chen and Huang (2007), we use the above definition for organizational structure in this study. Organizational structure is suggested by Jacobides (2007) to influence organizational actions. Following Jacobides (2007), we can elicit that the organizational perception on the usefulness of knowledge management can be driven by organizational structure. Furthermore, Chen and Huang (2007) confirm organizational structure as a determinant of implementing knowledge management in business. When knowledge management is applied in business, organizational structure should be always taken into account (Yap et al., 2010). Additionally, Enayati and Ghasabeh (2012) suggest that organizational structure plays an important role in the implementation of knowledge management. Grounded on the above discussions we recommend the hypotheses below.

H1: the perceived usefulness of knowledge management puts no effect on the adoption of knowledge management

H2: organizational structure has impact on the perceived usefulness of knowledge management

H3: organizational structure determines the adoption of knowledge management

Baron and Kenny (1986) propose a kind of mediating hypothesis in which it is supposed that the influence of an explanatory variable on a dependent variable is interfered with by a mediating variable. As such, when (1) an explanatory variable significantly impacts on a dependent variable and also on a third variable, and (2) simultaneously the third variable significantly impacts on the dependent variable, and then the third variable can be assumed to intervene in the association between the explanatory variable and the dependent variable.

Furthermore, when there is a relationship between two variables partly through a third variable, then the third variable can be regarded to mediate the relationship between those two variables (Mia, 1988). It is above implied that the perceived usefulness of knowledge management determines the adoption of knowledge management, but is affected by organizational structure, while organizational structure affects the adoption of knowledge management. Based on Baron and Kenny (1986) and Mia (1988), these suggestions allow us to arrive at the hypothesis below.

H4: the perceived usefulness of knowledge management mediates the effect of organizational structure on the adoption of knowledge management.

Miller (1993) classifies environmental uncertainty into six dimensions, namely 'government policies', 'economy', 'competition', 'technology', 'product market and demand', and 'resources and services used by the company'. This definition is employed for the variable "environmental uncertainty" in this paper. It is inferred from (Davis, 1989) that the perceived usefulness is determined by external environmental variables. Hence, within the knowledge management context, based on the suggestion by (Davis, 1989) on the relationship between the perceived usefulness and the external environmental variable, we can assume that the perceived usefulness of knowledge management may be affected by environmental uncertainty. Furthermore, Droge et al. (2003) contend that environmental uncertainty is related to both the sharing and application of knowledge management. Likewise, Hsu et al. (2007) find out environmental factors may affect the extent of knowledge management adoption. Moreover, technological variables as an item of environmental uncertainty are revealed to impact on the implementation levels of knowledge management (Alazmi and Zairi, 2003; Mas-Machuca and Costa, 2012). On the premise of the knowledge management literature, we arrive at the hypotheses below.

H5: there is relationship between environmental uncertainty and the perceived usefulness of knowledge management

H6: environmental uncertainty influences the adoption of knowledge management

In the same line of thoughts as in H4, grounded on H1, H5, and H6, together with the arguments by Baron and Kenny (1986) and Mia (1988), the following mediating hypothesis can be assumed.

H7: the perceived usefulness of knowledge management mediates the causal relationship of environmental uncertainty with the adoption of knowledge management

3. Research Methodology

3.1. Variable Measurements

Adoption of Knowledge Management (AKM) is evaluated based on five items: (1) knowledge sharing between supervisors and subordinates- AKM1, (2) knowledge sharing among colleagues- AKM2, (3) knowledge sharing across the units- AKM3, (4) effective management of different sources and types of knowledge- AKM4 as well as (5) application of knowledge into practical use- AKM5. A five-point scale ranging from 1.dissatisfied, 2.a little dissatisfied, 3.a little satisfied, 4.quite satisfied, and to 5.very satisfied with the achievements in each dimension of knowledge management over the last three years is applied to assess these five items which are adapted from Lin and Lee (2005). *Perceived Usefulness of Knowledge Management (PUKM)* is measured with five items corresponding to the five items of "*Adoption of Knowledge Management"*. A five-point scale is utilized ranging from *the adoption of knowledge management* being 1.not at all useful, 2.a little useful, 3.quite useful, 4.useful, and to 5.very useful for business, adapted from Kulkarni et al. (2007). *Organizational Structure (OST)* is assessed with three dimensions: (1) decentralization (OST1), (2) mutual adjustment (OST2), and (3) integration (OST3). To measure these three dimensions, a five-point scale is employed. (1) Decentralization refers to the extent to which companies design their organization to authorize decision-making power (ranging from 1, centralizing decision-making power to 5, decentralizing decision-making power). (2) Mutual adjustment (or versus formalization) refers to the degree the rules and procedures are formalized

(ranging from 1, formalized to 5, in-formalized). (3) Integration is defined as the extent to which employees and task assignments are integrated in dealing with work (ranging from 1, no integration to 5, integration). The types and scales are slightly modified from Chen and Huang (2007). *Environmental Uncertainty (EVU)* is measured with six dimensions: (1) 'government policies' (EVU1), (2) 'economy' (EVU2), (3) 'competition' (EVU3), (4) 'technology' (EVU4), (5) 'product market and demand' (EVU5) and (6) 'resources and services used by the company' (EVU6). The used five-point scale ranges from 1.always predicted, 2.easily predicted, 3.difficult to be predicted, 4.quite difficult to be predicted to 5.very difficult to be predicted. The items and scales are adapted from Miller (1993).

3.2. Data Collection and Statistical Analysis

The data was collected from a sample of all the publicly listed companies in Vietnam (705 companies in total), in which 397 are listed on Ha Noi Stock Exchange and the other 308 on Ho Chi Minh Stock Exchange. We used the initial solicitations to get responses from key informants with experience in knowledge management and management accounting. We completed the questionnaire with a manager involved in knowledge management and management accounting for each targeted firm. The questionnaires were emailed to 475 firms and in person interviewed in the other 230 firms. Of 475 questionnaires that were emailed, 243 were returned, in which 93 questionnaires did not provide enough information as required and only 150 provided the complete answers. Of the 230 interviews that were scheduled to be face-to-face performed, only 181 offered the good outcomes for the questionnaire. Lastly, 331 good replies with sufficiently required information for this paper were obtained. After collecting the data, we conduct the data analyses. First, Reliability analysis is conducted in order to test the properties of measurement scales and the items that compose the scales. Then, an exploratory factor analysis is conducted in order for construct validity. Subsequently, structural equation modeling analyses are employed in order to test the causal relationships in the research model of

knowledge management. Finally, in order to investigate the mediating effects, Sobel's (1982) procedures are utilized.

4. Results

Table 1 provides the results of the reliability analysis to assess the internal reliability of items as well as the results of the exploratory factor analysis to evaluate construct validity. The lowest suggested limit of item-total correlations is 0.5, whereas the acceptable level of the Cronbach's alpha is 0.7 (Nunnally, 1978). The reliability analysis removes MAP6 from the factor MAP, because its item-total correlation obtains a value of 0.336 (untabulated) less than 0.5, the smallest suggested limit. The item-total correlations for the remaining variables are all more than 0.5 as presented in Table 1. It is also indicated from Table 1 that all the Cronbach's alphas for the five factors (OST, EVU, PUKM, AKM and MAP) exceed 0.7. These findings suggest that the scales achieve sufficient internal reliability. Therefore, all these 24 remaining items are reasonably retained for the next analysis, an exploratory factor analysis. An exploratory factor analysis is conducted with the 24 retained items in order for construct validity. The results from the exploratory factor analysis are also shown in Table 1, which suppresses the values of factor loadings below 0.35. Nunnally (1978) stipulates that in order to achieve discriminant validity, an item should obtain a cross loading larger than 0.3. Moreover, in order to satisfy convergent validity, its factor loading should be more than 0.4. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Communalities should be greater than 0.7 and 0.5 respectively, proposed by Hair et al. (2010). Table 1 implies that all the cross loadings are more than 0.3. In addition, all the factor loadings are well over 0.4. Furthermore, KMO obtains a value of 0.849 more than the acceptable level of 0.7, while all the communalities exceed the suggested level of 0.5. These results indicate that all our measures satisfy the construct validity and reliability. Hence, all the 24 items are appropriately retained for further analyses.

Table 1: Results for Reliability and Exploratory Factor Analysis

Item	Factor				Item-total Correlations	Communalities
	EVU	AKM	PUKM	OST		
OST1				.774	.588	.667
OST2				.766	.585	.657
OST3				.859	.697	.788
EVU1	.748				.673	.623
EVU2	.734				.642	.600
EVU3	.778				.671	.619
EVU4	.755				.652	.615
EVU5	.726				.609	.548
EVU6	.750				.636	.580
PUKM1			.785		.626	.641
PUKM2			.660		.628	.594
PUKM3			.716		.612	.568
PUKM4			.778		.713	.699
PUKM5			.722		.632	.615
AKM1		.689			.670	.616
AKM2		.681			.654	.608
AKM3		.758			.647	.632
AKM4		.767			.688	.665
AKM5		.756			.656	.645
N of Items	6	5	5	3	∑ = 24	∑ = 24
Cronbach's Alpha	.854	.851	.838	.775		
KMO	0.892					

After ensuring that these items used are reliable, we undertake the structural equation modeling analysis, which includes latent variables into the research model to eliminate measurement errors, and simultaneously examine the causal relationships in our research model of knowledge management. The results for the structural equation modeling analysis are displayed in Figure 1 and Tables 2 and 3. Figure 1 demonstrates that the variables used in the structural equation model consist of both measured variables and latent variables, which eliminate measurement errors and examine the casual relationships simultaneously. Table 2 displays the indices to assess the goodness

of fit of the model for the structural equation modeling analysis. The indices in Table 2 indicate that our structural equation model achieves the goodness of fit to the data (Hair et al. 2010). The results from Table 3 provide statistically significant supports for our hypotheses H3 and H6, in which organizational structure and environmental uncertainty almost equally influence the adoption of knowledge management with the estimates of 0.205 and 0.206 respectively at the 0.01 significance level. The null hypotheses H1, H2 and H5 are rejected, because the alternative hypotheses that the perceived usefulness of knowledge management is associated with the adoption of knowledge management, organizational structure as well as with environmental uncertainty are statistically significant at the 0.01 level. The perceived usefulness of knowledge management is an important determinant of the adoption of knowledge management (an estimate of 0.486 at a significance value of 0.01), while it is also considerably affected by environmental uncertainty with an estimate of 0.251 at a significance level of 0.01. In addition, the relationship between the perceived usefulness of knowledge management and organizational structure is also statistically significant. Its estimate just obtains 0.171 at the 0.01 significance level. The results imply that the companies, which perceive knowledge management as important, will be most likely to adopt knowledge management in business. High environmental uncertainty enables companies to regard knowledge management as an essential tool to manage business. As a result, they will implement knowledge management to gain competitive advantages. Organizational structures with more decentralization, more mutual adjustment, and more integration will induce managers to consider knowledge management as necessary, and then lead them to adopt knowledge management in business. In short, the perceived usefulness of knowledge management is an important factor that affects the adoption of knowledge management, while it is also affected by the uncertainty level of the business environment as well as by organizational structure.

Table 2: Summary from Structural Equation Modeling Analysis for Goodness of Fit

Fit Index	X^2/df	TLI	CFI	RMSEA
Value	2.438	0.906	0.919	0.066
Results	Good	Good	Good	Good

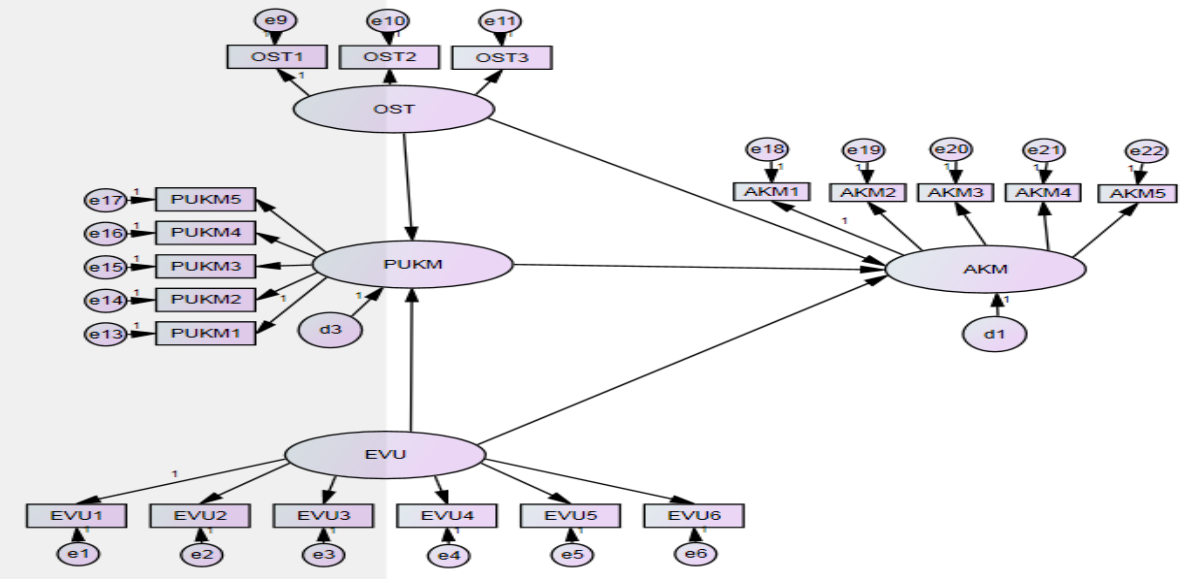

Figure 1: Structural Equation Model of Knowledge Management

Table 3: Results for Structural Equation Modeling

	Paths		Coefficient	Standard Error	P_{value}	Supported
AKM	<---	PUKM	0.486	0.084	0.000	H1
PUKM	<---	OST	0.171	0.040	0.000	H3
AKM	<---	OST	0.205	0.046	0.000	H3
PUKM	<---	EVU	0.251	0.052	0.000	H5
AKM	<---	EVU	0.206	0.058	0.000	H6

For next analyses, we calculate for the main factors OST, EVU, PUKM and AKM by averaging their own items. In order to explore the mediating effects, multiple regressions and Sobel's (1982) procedures are applied. The results for multiple regressions are demonstrated in Table 4. Organizational structure and environmental uncertainty both influence the perceived usefulness of knowledge management as well as the adoption of knowledge management at a statistical

significance of 0.01. The perceived usefulness of knowledge management decreases the effect of organizational structure on the adoption of knowledge management from the coefficient of 0.278 to 0.204, whereas it also reduces the effect of environmental uncertainty on the adoption of knowledge management from the coefficient of 0.320 to 0.203. Hence, concurring with Baron and Kenny (1986), we argue that the perceived usefulness of knowledge management intervenes in the effect of organizational structure on the adoption of knowledge management as well as in the effect of environmental uncertainty on the adoption of knowledge management. To investigate these mediations statistically, Sobel's (1982) procedure is employed. Sobel's (1982) procedure is to examines the statistical significance for the indirect effect of the mediating variable by testing the null hypothesis that states no difference between the total effect and the direct effect.

Table 5 shows the results of the Sobel test. The results in Table 5 report that the mediating role of the perception on the usefulness of knowledge management in the relationship between organizational structure and the adoption of knowledge management and in the relationship between environmental uncertainty and the adoption of knowledge management are both statistically significant at the 0.01 level, which significantly supports our mediating hypotheses H4 and H7. It is implied that when the perceived usefulness of knowledge management is included to predict the adoption of knowledge management, it will lessen the direct causal relationships of adopting knowledge management with organizational structure as well as with environmental uncertainty.

Table 4: Regression Results for Mediation

Dependent Variable	Independent Variable	Coefficients	Standard Error	*t-statistics*	P_{value}
AKM	OST	0.287	0.041	6.992	0.000
PUKM	OST	0.185	0.036	5.055	0.000
AKM	OST	0.204	0.039	5.215	0.000
	PUKM	0.450	0.057	7.912	0.000
AKM	EVU	0.320	0.057	5.651	0.000
PUKM	EVU	0.249	0.049	5.040	0.000
AKM	EVU	0.203	0.054	3.783	0.000
	PUKM	0.470	0.058	8.131	0.000

Table 5: Results for Sobel Tests

Mediating Variable	Relationship	$t_{indirect}$	P_{value}	Supported
PUKM	OST and AKM	4.3068	0.000	Hypothesis 4
PUKM	EVU and AKM	4.3052	0.000	Hypothesis 7

5. Conclusions

Prior studies have investigated the role of the managerial perception on the usefulness of knowledge management in the use of knowledge management. However, they have not examined the causal relationships of the perception toward the usefulness of knowledge management with organizational structure as well as with environmental uncertainty. Moreover, none of them has investigated the mediating role of the perceived usefulness of knowledge management in the causal relationships of adopting knowledge management with organizational structure as well as with environmental uncertainty. This research introduces the perceived usefulness of knowledge management and then utilizes Sobel's technique to examine whether and how this variable intervenes in the relationships of adopting knowledge management with organizational structure as well as with environmental uncertainty. Moreover, this research employs the structural equation modeling analysis to simultaneously investigate the causal relationships among the variables in a joint model.

Our empirical findings demonstrate that organizational structures and environmental uncertainty significantly have statistical influence on the perceived usefulness of knowledge management as well as on the adoption of knowledge management. The perceived usefulness of knowledge management put a statistically significant effect on the adoption of knowledge management. The results also indicate that the relationships of adopting knowledge management with organizational structures as well as with environmental uncertainty are significantly mediated by the perceived usefulness of knowledge management. While the perceived usefulness of knowledge management determines the adoption of knowledge management, it also diminishes the direct causal relationships of adopting knowledge management with organizational structure as well as with environmental uncertainty.

To the extant literature, this research offers some contributions in knowledge management. It is the first to introduce the perceived usefulness of knowledge management and discuss the causal relationships of the perception toward the usefulness of knowledge management with the adoption of knowledge management, environmental uncertainty or organizational structure. The findings reveal that the perceived usefulness of knowledge management plays an important role in adopting knowledge management in business.

To management researchers, this research offers an insight into the perceived usefulness and the adoption of knowledge management as well as their relationships with organizational structure or environmental uncertainty. The findings are also useful to managers involved in knowledge management by equipping them with the knowledge of the factors affecting the perceived usefulness of knowledge management and the adoption of knowledge management. This helps them to make better decisions on the choice and implementation of knowledge management in order to build competitive advantages, and hence improve their firm performance.

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