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Employing Heckman Two-Step Sample Selection Method to Investigate Effect of Knowledge Management Adoption On Firm Performance

Quang Linh Huynh[1], Yaling Lin[2]

[1]*PhD Program in Business, Feng Chia University, Taiwan*
[1]*Faculty of Economics, Laws and Foreign Languages, Tra Vinh University, Vietnam*
[2]*PhD Program in Business, Feng Chia University, Taiwan*
[2]*Head of Administrative Department, Lin-Shin Hospital, Taichung, Taiwan*

ABSTRACT: *Knowledge management is important to business. The adoption of knowledge management is reported by prior studies to result in improved firm performance. Previous research has not considered sample selection bias problem when they investigated this casual relationship. This paper takes sample selection bias problem into account to explore the impact of the adoption of knowledge management on firm performance. Before employing the Heckman two-step sample selection procedure to examine the effect of the adoption of knowledge management on firm performance, reliability analysis, exploratory factor analysis and confirmatory factor analysis are utilized to make sure that our measurement model fits well to the data and the variables are reliable. The findings reveal that there is sample selection bias in the relationship between the adoption of knowledge management and firm performance. This paper offers knowledge management researchers and business managers with the insight into the casual relationship between the adoption of knowledge management and firm performance with the interference of sample selection bias.*

Keywords: *Knowledge management adoption, Firm performance, Firm structure, Environmental uncertainty*

I. INTRODUCTION

The success of organizations is much dependent on knowledge management. Knowledge management can help organizations build long term internal strengths and maintain competitive advantages in the dynamically changing business environments (Yap et al. 2010). It is often regarded as the conversion of intellectual assets into lasting value in organizations. Knowledge management is increasingly more important because the value of creativity, which enables the transformation of one form of knowledge to the next one, is taken into account in organizations (Carneiro, 2000). Firms that consistently control and integrate knowledge into business activities to attain their objectives can achieve superior achievements (Teece 1998; Droge et al. 2003). Adopting knowledge management allows managers to enjoy many competitive advantages for business (Wong & Aspinwall 2005). Previous studies suggest that the adoption of knowledge management adds more value to the overall performance of the organization. Hence, it can leads to improved financial performance in business (Gold et al. 2001; Hlupic et al. 2002; Toften & Olsen 2003, Droge et al. in 2003, McKeen et al. 2006). They explored the effect of the adoption of knowledge management on firm performance with the whole sample that consists of both adopters of knowledge management and non-adopters of knowledge management. The findings obtained from these studies may not correctly reflect the relationship between the adoption level of knowledge management and firm performance for firms adopting knowledge management. This paper examines the influence of knowledge management adoption on firm performance only for firms adopting knowledge management; but it also takes into account factors affect the likelihood of adopting knowledge management in business. Furthermore, firm performance is evaluated by comparing the effectiveness adopters of knowledge management achieve after implementing knowledge management to the effectiveness before implementing knowledge management.

This paper applies the Heckman two-step sample selection procedure to explore the relationship between the adoption of knowledge management and firm performance with the effect of factors on the probability of adopting knowledge management in business being taken into consideration. In addition, it also employs exploratory factor analysis to identify the possible underlying factor structure of a set of observed

variables, and then utilizes confirmatory factor analysis to test if the data fits a hypothesized measurement model. Hence, our measures are reliable for analyses and our data fits the measurement model.

To the best of our knowledge, this paper is the first to employ the Heckman tow-step sample selection procedure to discover the effect of the adoption of knowledge management on firm performance with the consideration about the effect of factors on the probability of adopting knowledge management in organizations. To management researchers, the findings offer an insight into the adoption of knowledge management as well as its relationship with firm performance. The research also provides business managers with better understanding how firm performance is improved by the adoption of knowledge management in business.

The paper will proceed as follows. A literature review supports our research model in the next section, followed by research methodology. A subsequent section presents the findings. Some conclusions are offered in the final section.

II. THEORETICAL FRAMEWORK

Knowledge management is important to the success of firms. Previous researchers report that the adoption of knowledge management adds more value to the overall performance of the organization as well as help a company become productive, more efficient and more innovative (Gold et al., 2001; Toften & Olsen 2003). While the adoption of knowledge management leads to effectiveness for business, the probability of implementing knowledge management is determined by firm structure and environmental uncertainty. The causal relationship between the adoption of knowledge management and firm performance with considering the probability of implementing knowledge management will be discussed as follows.

1. Effect of Knowledge Management Adoption on Firm Performance

Knowledge management is applied in managing firm knowledge to produce and improve firm performance and to create competitive advantage. It is also referred to as an organizational capability which allows its employees to work together to generate, capture, share, and leverage their collective knowledge to foster their performance (Lakshman 2007). This paper refer to the adoption of knowledge management as the extent to which organizations are satisfied with the achievements in their knowledge management, which are relevant to knowledge sharing with three components and to knowledge application composed of two items (Gold et al. 2001; Lin & Lee 2005). Firm performance is referred to as the actual outcomes of financial and non-financial performances in a firm. This paper measure firm performance as the effectiveness firms achieve after adopting knowledge management against the effectiveness that they gained before adopting knowledge management. Financial performance is based on the items of return on asset and on equity (Droge et al. 2003), while non-financial performance is assessed on the items of innovativeness, customer satisfaction, quality and resources utilization (Hudson et al. 2001; Kaplan & Norton 2007).

Previous studies (Gold et al., 2001; Hlupic et al., 2002; Toften & Olsen 2003) reveal that the adoption of knowledge management adds more value to the overall performance of the firm as well as help a company become faster, more efficient and more innovative. In a study of Droge et al. (2003) imply that the application of knowledge management can leads to improved financial performance in business. Additionally, knowledge management practices are directly related to organizational performance (McKeen et al. 2006). They indicate that the adoption of knowledge management may affect firms in two main ways. Firstly, knowledge management can help create knowledge, which can then contribute to improved performance for business. Secondly, knowledge management can directly cause improvements in firm performance. Hence, knowledge management is suggested by Chen and Huang (2009) to be an essential factor in supporting and improving firm performance. Furthermore, Salojärvi et al. (2005) report that knowledge management is related to company growth, while Hsu et al. (2007) suggest the extent of knowledge management adoption is linked to firm performance. The study of knowledge management and organizational performance by Zack et al. (2009) confirms that there is a significant relationship between knowledge management and firm performance. Grounded on the above discussions we posit the following hypothesis about the casual relationship between firm performance and the adoption of knowledge management.

H1: firm performance is determined by the adoption of knowledge management.

The casual relationship of firm performance with the adoption of knowledge management is also illustrated in Figure 1.

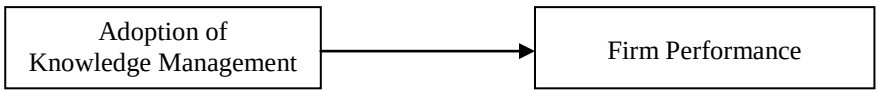

Figure 1: The Casual Relationship

2. Likelihood of Adopting Knowledge Management

The probability that firms adopt knowledge management in business is determined by firm structure and environmental uncertainty (Chen & Huang 2007, Yap et al. 2010, Enayati & Ghasabeh 2012). Firm structure is ascertained to be positively associated with the adoption of knowledge management (Chen & Huang 2007). In addition, Yap et al. (2010) and Enayati and Ghasabeh (2012) imply that firm structure plays an important role in the adoption of knowledge management, while the adoption of knowledge management is asserted by Droge et al. (2003) to have a relationship with environmental uncertainty. Similarly, the extent of knowledge management adoption is also discovered by Hsu et al. (2007) to be affected by environmental factors. Furthermore, different studies (Alazmi & Zairi, 2003; Mas-Machuca & Costa, 2012) claimed that the implementation levels of knowledge management are determined by environmental uncertainty. On the premise of the knowledge management literature, we conclude that the probability of adopting knowledge management in business is dependent on firm structure and environmental uncertainty.

III. RESEARCH DESIGN

Research design to show how the data analysis is performed, and guide how the data is collected will be discussed in the next sections.

1. Measurement of Variables

The five main constructs are employed for our research model, namely the adoption of knowledge management (AKM), the probability of adopting knowledge management (LKM), firm performance (FPR), firm structure (FST) and environmental uncertainty (ENU). They are measured as follows.

Adoption of Knowledge Management (AKM) is evaluated by using a five-point scale from 1.dissatisfied, 2.a little dissatisfied, 3.a little satisfied, 4.quite satisfied, and to 5.very satisfied with the achievements in each of the dimensions of knowledge management which are the following five items: (1) knowledge sharing between supervisors and subordinates- AKM1, (2) knowledge sharing among colleagues- AKM2, (3) knowledge sharing across departments- AKM3, (4) effective management of different sources and types of knowledge- AKM4, as well as (5) application of knowledge into practical use- AKM5. These items are adapted from Gold et al. (2001) and Lin and Lee (2005). The probability of adopting knowledge management (LKM) in business is coded 1 if satisfaction with the adoption of knowledge management is manifest in a firm, and 0 (zero) otherwise (i.e. when a firm is a little satisfied, quite satisfied, or very satisfied with the achievements in at least one of the dimensions of knowledge management, LKM is coded 1, otherwise it is coded 0).

Firm Performance (FPR) is assessed by using a five-point scale from (1) no growth, (2) a little growth, (3) average growth, (4) fast growth to (5) very fast growth. A comparison in the performance between before and after implementing knowledge management is made. The following items are put into comparisons: returns on asset- FPR1, returns on equity- FPR2, (modified from Droge et al., 2003), innovativeness- FPR3, quality in products or services- FPR4, and customer satisfaction- FPR5, which are adapted from prior studies (Hudson et al. 2001; Kaplan & Norton 2007).

Firm Structure (FST) is of three types: (1) decentralization (FST1), (2) mutual adjustment (FST2), and (3) integration (FST3). A five-point scale is used to assess the three types of organizational structures. (1) Decentralization range from 1.centralizing decision-making power to 5.decentralizing decision-making power. (2) Mutual adjustment ranges from 1.formalized to 5.informalized. (3) Integration range from 1.no integration to 5.integration. The types and scales are adapted and slightly modified from Rogers (1995), and Chen and Huang (2007).

Environmental Uncertainty (ENU) is measured with six dimensions: (1) 'government policies' (ENU1), (2) 'economy' (ENU2), (3) 'competition' (ENU3), (4) 'technology' (ENU4), (5) 'product market and demand' (ENU5), and (6) 'resources and services used by the company'(ENU6), using a five-point scale ranging 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).

2. Analysis of Data

Reliability analysis is conducted in order to test the properties of measurement scales and the items that compose the scales. Meantime, an exploratory factor analysis is conducted in order for construct validity and then a confirmatory factor analysis is applied to test whether the data fits a hypothesized measurement model. Next, the Heckman tow-step sample selection procedure is utilized to investigate the relationship between the adoption of knowledge management and firm performance with considering the effect of factors on the possibility of adopting knowledge management in business.

3. Collection of Data

The objects for this paper are companies in Vietnam. To ensure that our measures for this study are appropriate to suggestions by Donna et al. (2011), we undertake a pilot test of construct measures with 20 knowledge managers or managers involved in knowledge management before the collection of the data. The sample comprises 169 companies that are granted with the certificates of quality management system by QMS Certification Services and 238 companies by VinaCert Certification Body. Totally, the sample is composed of 407 companies. The initial solicitations were carried out to obtain responses from key informants with experience in knowledge management. For each of these firms, we contacted a knowledge management manager or a manager involved in knowledge management to complete a questionnaire by email. Of the 407 questionnaires that were emailed, 367 were returned, in which 28 questionnaires did not provide enough information as required. Finally, 339 useful replies with sufficiently required information are acquired for our research.

IV. EMPIRICAL RESULTS

To test the internal consistency of the questionnaire, the reliability procedure was employed. The lowest acceptable levels of the item-total correlations and the Cronbach's alphas suggested by Nunnally (1978) are 0.5 and 0.7 respectively. Only four of the five contructs need the reliability procedure, namely the adoption of knowledge management (AKM), firm performance (FPR), firm structure (FST) and environmental uncertainty (ENU), because each of them has more than one item. The results of the reliability analysis are shown in Table 1. All of the Item- Total Correlation are greater than 0.5 (the smallest is 0.594), and the Cronbach's alphas are all above 0.7. This indicates that all the constructs have sufficient internal reliability, so they are retained for next steps.

Table 1: Reliability

Scale	Smallest of Item- Total Correlations	Cronbach's Alpha	N of Items
AKM	0.676	0.884	5
FPR	0.708	0.905	5
FST	0.594	0.781	3
ENU	0.607	0.854	6

Additionally, in order for construct validity, an exploratory factor analysis is performed. Discriminant validity, convergent validity and communality are applied to assess construct validity. The lowest preferable levels of the cross-loadings and the factor loadings should be 0.3 and 0.4 respectively to make sure that discriminant validity and convergent validity are satisfied (Nunnally 1978). At the same time, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and communalities should exceed 0.7 and 0.5 (Hair et al. 2010). Table 2 presents factor-loadings whose values of less than 0.4 are suppressed, communalities and KMO. All the factor loadings and the communalities are larger than 0.4 and 0.5, while KMO obtains a value of 0.893 more than 0.7. In addition, Table 2 also implies that all the cross loadings are above 0.3. These findings come to the conclusion that all the variables achieve construct validity. As a result, all the variables are reasonable to be retained for further analyses.

Table 2: Factor Loading Matrix

Item	Factor				Communality
	1	2	3	4	
FST1				0.776	0.669
FST2				0.779	0.678
FST3				0.861	0.792
ENU1		0.753			0.625
ENU2		0.735			0.596
ENU3		0.779			0.616
ENU4		0.761			0.613
ENU5		0.723			0.542
ENU6		0.756			0.585
AKM1	0.820				0.765
AKM2	0.803				0.748
AKM3	0.790				0.669
AKM4	0.836				0.761
AKM5	0.792				0.690
FPR1			0.703		0.693
FPR2			0.754		0.746
FPR3			0.792		0.687
FPR4			0.735		0.670
FPR5			0.745		0.684
KMO					0.893

Furthermore, a confirmatory factor analysis is used to test whether the data fit the measurement model. The results obtained from the confirmatory factor analysis are displayed in Tables 3 and 4.

The indices in Table 3 are applied to evaluate the fit goodness of the model. They indicate that our measurement model passes the goodness of fit. The value of the χ^2/df (2.373) falls into the range of 2 to 3, the preferably accepted limit by Koufaris and Hampton-sosa (2002). In addition, a Comparative Fit Index (CFI) of 0.969 and a Tucker-Lewis Index (TLI) of 0.964 exceed the acceptable level of 0.90 suggested by Hair et al. (2010). Root Mean Square Error of Approximation (RMSEA) obtains a value of 0.066 smaller than the preferable value of 0.07 (Hair et al. 2010). These results allow us to come to a conclusion that our measurement model achieves a good fit to the data.

Table 3: Summary for Goodness of Fit

Fit Index	X^2/df	TLI	CFI	RMSEA
Value	2.373	0.964	0.969	0.064
Results	Good	Good	Good	Good

Further, in order for convergent validity, factor loadings, average variance extracted (AVE), and construct reliability (CR) are specifically considered. The factor loadings are all greater than 0.665, which is far above the acceptable limit of 0.5 suggested by Hair et al. (2010), and additionally these factor loadings are all statistically significant at the 0.001 level (untabulated). Table 4 provides values of AVEs, CRs, and SICs. All the AVEs exceed 0.503 and all the CRs are larger than 0.801, which satisfies the lowest limits of 0.5 and 0.6 respectively, suggested by Hair et al. (2010). These results imply that our measurement model achieves convergent validity. In order to assess discriminant validity, the average variance extracted estimates (AVE) for each construct is compared with the squared interconstruct correlations (SIC) related to that construct. All of the AVEs exceed the corresponding squared interconstruct correlations. This implies that our measurement model enjoys discriminant validity (Hair et al. 2010).

Table 4: Matrix of IC, AV, CR, and SIS (3)

Correlations		IC	SIS	AVE	CR
FST	ENU	0.073	0.005	0.574	0.801
	AKM	0,371	0.138		
	FPR	0.322	0.104		
ENU	FST	0.073	0.005	0.503	0.859
	AKM	0.301	0.091		
	FPR	0.294	0.086		
AKM	FST	0.371	0.138	0.949	0.989
	ENU	0.301	0.091		
	FPR	0.918	0.843		
FPR	FST	0.322	0.104	0.650	0.902
	ENU	0.294	0.086		
	AKM	0.918	0.843		

IC is interconstruct correlation, SIC is squared interconstruct correlation, AVE is average variance extracted estimate, and CR is construct reliability

After ensuring that our measurement model fits well to the data and the variables used are reliable, we calculate the summated scales of the variables for the Heckman two-step sample selection procedure. Next, Heckman selection two-step model is employed to investigate the causal relationship between the adoption of knowledge management and firm performance with considering the effect of factors on the probability of adopting knowledge management in business.

The Heckman two-step model is used to take into account potential sample selection bias (Heckman 1979). This procedure is carried out in two steps. The first step of the Heckman two-step procedure is the development of a selection equation (i.e. a model of factors related to survey non-response). A probit model by MLE is employed to perform this step for all the observations. The estimates of γ from this probit model are then utilized to create consistent estimates of the inverse Mills ratio- $\lambda_i(-Z_i\gamma)$.

$$\lambda_i(-Z_i\gamma)= \varphi(Z_i\gamma)/\Phi(Z_i\gamma) \qquad (1)$$

Where φ denotes the standard normal density function and Φ denotes the standard normal cumulative distribution function.

In the second step, the outcome equation is estimated by OLS where the outcome equation includes both the original x (explanatory variables) and the constructed value of the inverse Mills ratio.

$$y = a*x + b*\lambda_i(-Z_i\gamma) + e \qquad (2)$$

Table 5: Summary for Heckman first step

LKM	Coef.	Std. Err.	z	P>|z|
FST	0.3644	0.0775	4.70	0.000
ENU	0.4128	0.1065	3.88	0.000
CONS	-1.9629	0.4011	-4.89	0.000

Prob > chi2 = 0.0000, Pseudo R2 = 0.0977

The second step only uses the uncensored observations. The estimators (‘a’ and ‘b’) obtained from the Heckman two-step model are consistent and asymptotically normal. The Heckman two-step analysis produces indices in Tables 5 and 6. Table 5 presents the results obtained from the selection equation. The likelihood of adopting knowledge management in business is explained by firm structure and environmental uncertainty at the significance level of less than 0.01 with the coefficients of 0.3644 and 0.4128 respectively. In addition, the model fit achieves a statistical significance at the level less than 0.01. These results indicate that environmental uncertainty puts more statistically significant effect on the likelihood of adopting knowledge management than firm structure does. This step also help us to calculate the inverse Mills ratio (INVMILLS) as described in equation (1).

After including INVMILLS into our outcome equation, we run the second step of the Heckman sample selection procedure as described in equation (2), and the results are shown in Table 6. The results from the Heckman sample selection procedure show that our outcome equation enjoys the model fit at a significance

level of smaller than 0.01. The coefficient of INVEMILLS (-2.4791) is different from zero at a statistical significance level of less than 0.01. This implies that there is selection bias in our research model.

Table 6: Summary for Heckman second step

FPR	Coef.	Std. Err.	T	P>|z|
AKM	0.3527	0.0706	5.00	0.000
INVMILLS	-2.4791	0.6171	-4.02	0.000
CONS	4.2106	0.3763	11.19	0.000

Prob > F = 0.0000, R-squared = 0.858

To make a further comparison, we run the OLS regression for our outcome equation, and get the results as in Table 7. There is difference between effect coefficients of the adoption of knowledge management on firm performance in Table 6 and Table 7, in which the effect coefficient of the adoption of knowledge management on firm performance is larger for the regression without INVMILLS than for the regression with INVMILLS. This evidence allows us to state that the effect of the adoption of knowledge management on firm performance, when potential sample selection bias is not taken into account (as in Table 7), is greater than when potential sample selection bias is included into the model (as in Table 6). Consequently, sample selection bias may make the results gained from the OLS regression model for casual relationships become incorrect. The researchers should consider sample selection bias, when dealing with models associated with sample selection problem, so that the research results reflect more accurately.

Table 7: Summary for OLS regression

FPR	Coef.	Std. Err.	T	P>|z|
AKM	0.4069	0.0716	5.68	0.000
CONS	3.0111	0.2367	12.72	0.000

Prob > F = 0.0000, R-squared = 0.1266

V. CONCLUSIONS

The casual relationship between the adoption of knowledge management and firm performance has been empirically investigated in prior research. However, to the best of our knowledge, no studies have explored this casual relationship with considering sample selection bias. This paper employs the Heckman two-step sample selection procedure to examine the impact of the adoption of knowledge management on firm performance.

This paper makes some contributions to both the knowledge management literature and business practices. The evidence provided by this paper indicates that there is sample selection bias in our research model at the significance level of less than 0.01. And also there is difference between the effects of the adoption of knowledge management on firm performance when potential sample selection bias is not taken into consideration and when potential sample selection bias is allowed for. This offers knowledge management researchers with an insight into the importance of sample selection bias problem when they examine the influence of the adoption of knowledge management on firm performance. The sample selection bias problem can distort the research results and make them become less exact. It is also useful to business managers by helping them better understand the casual relationship between the adoption of knowledge management and firm performance with the interference of sample selection bias. Hence, they make better decisions on implementing knowledge management which, in turn, improves firm performance.

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REFERENCES

[1]. Alazmi M. and M. Zairi. (2003). Knowledge management critical success factors. *Total Quality Management & Business Excellence*, 14(2), 199-204.

[2]. Carneiro, A. (2000). How does knowledge management influence innovation and competitiveness? *Journal of Knowledge Management*, 4 (2), 87 – 98.

[3]. Chen C. J. and J. W. Huang. (2007). How organizational climate and structure affect knowledge management: The social interaction perspective. *International Journal of Information Management*, 27, 104–118.

[4]. Donna F., H. Mahle, and S. Cohen. (2011). *How to Conduct Effective Pre-tests*. AIDSCAP's Behavior Change Communication Unit.

[5]. Droge C., C. Claycomb and R. Germain. (2003). Does knowledge mediate the effect of context on performance? Some initial evidence. *Decision Sciences*, 34(3), 541–568.

[6]. Enayati G. and M. S. Ghasabeh. (2012). Studying the effects of organizational culture, organizational structure, and information technology on effectiveness of knowledge management: Using Khorasan Regional Electricity Company as a case study. *African Journal of Business Management*, 6(24), 7170-7183.

[7]. Gold A. H., A. Malhotra and A. H. Segars. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information System*, 18(1), 185–214.

[8]. Hair J. F., W. C. Black, B. J. Babin, and R. E. Anderson. (2010). *Multivariate Data Analysis*. New Jersey: Prentice Hall.

[9]. Heckman, J., 1979. Sample selection bias as a specification error. *Econometrica*, 47 (1), 153–162.

[10]. Hlupic V., Pouloudi A. and Rzevski G. (2002). Towards an integrated approach to knowledge management: 'hard', 'soft', and 'abstract' issues. *Knowledge and Process Management* 9(2), 90-102.

[11]. Hsu R. C., D. Lawson and T. P. Liang. (2007). Factors affecting knowledge management adoption of Taiwan small and medium-sized enterprises. *International Journal of Management and Enterprise Development*, 4(1), 30–51.

[12]. Hudson M., Smart A. and Bourne M. (2001). Theory and practice in SME performance measurement systems. *International Journal of Operations & Production Management* 21(8), 1096 - 1115.

[13]. Kaplan R. S. and Norton D. P. (2007). Using the balanced scorecard as a strategic management system. *Harvard Business Review* July-August, 150–161.

[14]. Koufaris M. and W. Hampton-sosa. (2002). Customer Trust Online: Examining the Role of the Experience with the Web Site. *Information Systems Journal*, 5, 1-22.

[15]. Lakshman C. (2007). Organizational Knowledge Leadership: A Grounded Theory Approach. *Leadership & Organization Development Journal*, 28(1), 51-75.

[16]. Lin H. F. and G. G. Lee. (2005). Impact of organizational learning and knowledge management factors on e-business adoption. *Management Decision*, 43(2), 171–188.

[17]. Mas-Machuca M. and C. M. Costa. (2012). Exploring critical success factors of knowledge management projects in the consulting sector. *Total Quality Management & Business Excellence*, 23(11-12), 1297-1313.

[18]. McKeen J. D., Zack M. H. and Singh S. (2006) Knowledge management and organizational performance: An exploratory survey. *In Proceedings of the 39th Hawaii International Conference on Systems Sciences*

[19]. Miller K. D. (1993). Industry and country effects on managers' perceptions of environmental uncertainties. *Journal of International Business Studies*, 24(4), 693-714.

[20]. Nunnally J. C. (1978). *Psychometric Theory*. New York: McGraw-Hill.

[21]. Rogers E. M. (1995). *Diffusion of innovations, Fourth Edition Ed*. New York, Free Press.

[22]. Salojärvi S., Furu P. and Sveiby K. E. (2005). Knowledge management and growth in Finnish SMEs. *Journal of Knowledge Management* 9(2), 103 – 122.

[23]. Teece D. J. (1998). Capturing value from knowledge assets: The new economy, markets for know-how, and intangible assets. *California Management Review*, 40(3), 55–79.

[24]. Toften K. and S.O. Olsen. (2003). Export market information use, organizational knowledge and firm performance: A conceptual framework. *International Marketing Review*, 20, 95-110.

[25]. Wong K. Y. and E. Aspinwall. (2005). An empirical study of the important factors for knowledge management adoption in the SME sector. *Journal of Knowledge Management*, 9(3), 64 – 82.

[26]. Yap L. S., R. Tasmin, M. S. C. Rusuli and N. Hashim. (2010). Factors Influencing Knowledge Management Practices among Multimedia Super Corridor (MSC) organizations. *Communications of the IBIMA*, Article ID 834296.

[27]. Zack M., McKeen J. and Singh S. (2009). Knowledge management and organizational performance: an exploratory analysis. *Journal of Knowledge Management* 13(6), 392 – 409.