
Mediating Role of Knowledge Management in Effect of Management Accounting Practices on Firm Performance

Authors: **David Han-Min Wang**, Department of Accounting, Feng Chia University, Taichung, Taiwan, hmwang@fcu.edu.tw,
Quang Linh Huynh, PhD Program in Business, Feng Chia University, Taichung, Taiwan and Faculty of Economics, Laws and Foreign Languages, Tra Vinh University, Tra Vinh, Vietnam, huynhquanglinh@yahoo.com

While adopting knowledge management can improve firm performance, it is determined by implementing level of management accounting practices. Furthermore, it plays mediating role in the relationship between implementing management accounting practices and firm performance. This paper employs path analysis to investigate causal relationships among the variables. Then it uses procedures suggested by Sobel (1982) to examine the mediation of adopting knowledge management. Moreover, this paper utilizes techniques modified from analytic hierarchy process introduced by Saaty (1980) to rank contributing levels of adopting knowledge management and implementing management accounting practices to improved firm performance. The findings offer evidence on relationships among the variables as well as mediating role of adopting knowledge management in effect of implementing management accounting practices on firm performance. This paper also reveals that adopting knowledge management is more important to improved firm performance than implementing management accounting practices. This paper is useful to management researchers as well as business managers.

Keywords: *Adoption of knowledge management; Implementation of management accounting practice; Firm performance*

Introduction

Knowledge management is one of the determinants for the success of firms. It can help firms establish long-term internal strengths and maintain competitive advantages in the dynamically changing external environments. In the first decade of the 21st century, the business communities begin to take interest in knowledge management. Consequently, it becomes a hot topic in management research. Firms that consistently control and integrate knowledge into business activities to achieve their objectives can attain superior success (Teece 1998; Droge et al. 2003). Darroch (2005) suggests that knowledge management offers a coordinating mechanism to transform resources into competences. Adopting and performing knowledge management allows firms to enjoy enhanced performance (Hsu et al. 2007; Chen and Huang 2009).

Management accounting practices play an important role in offering timely and exact important information to managers. Hence, they can make better decisions on business, which helps their firms achieve superior advantages over competitors. Prior research (Tayles et al. 2002; Novas et al. 2012) confirms that implementing management accounting practices in business leads to the higher adoption of knowledge management. Moreover, the implementation of management accounting information is regarded as the determinant of improved firm performance (Wang and Huynh 2012). The effects of adopting knowledge management and implementing management accounting practices on firm performance have been investigated in separate models. Therefore, we find it necessary to combine the adoption of knowledge management and the implementation of management accounting practices into a joint model of firm performance and examine their casual relationships.

More importantly, based on the research on the mediation by Baron and Kenny (1986), we infer that the adoption of knowledge management

plays an important role in interfering with the effect of implementing management accounting practices on firm performance. Nevertheless, to the best of our knowledge, no research has explored the mediating role of adopting knowledge management in the effect of implementing management accounting practices on firm performance. It is necessary to investigate this mediating role of adopting knowledge management. Furthermore, the evidence on the relative influencing levels of the adoption of knowledge management in comparison with the implementation of management accounting practices on firm performance is important to business managers in their decisions on performing knowledge management and management accounting practices in business. However, it seems that no studies ranked these relative influencing levels. We find it essential to compare the effecting degrees to which adopting knowledge management and implementing management accounting practices contribute to improved firm performance.

This paper applies a path analysis to examine simultaneously the causal relationships among adopting knowledge management, implementing management accounting practices and firm performance. It then uses a technique suggested by Sobel (1982) to investigate the mediating role that the adoption of knowledge management plays in the effect of implementing management accounting practices on firm performance. Finally, this paper utilizes a method modified from the analytic hierarchy process introduced by Saaty (1980) to rank the relative importance levels that adopting knowledge management and implementing management accounting practices contribute to improved firm performance.

To the literature, the findings provide evidence on the mediating influence of adopting knowledge management on the link between implementing management accounting practices and firm performance as well as evidence on the relative importance that adopting knowledge management in comparison with implementing management accounting practices contribute to improved firm performance.

To business managers, the research is useful by providing them with better understanding of the affecting levels of adopting knowledge management compared to implementing management accounting practices

on improved firm performance and how the relationship between implementing management accounting practices and firm performance is intervened by the adoption level of knowledge management in business. As a result, they can make better decisions on the choice and use of knowledge management as well as management accounting practices in their business, which will bring about the best possible performance.

The rest of the paper will be constructed as follows. The hypothesis development will be discussed in the next section, followed by the research design. The subsequent section describes the findings. Some summaries are offered in the conclusions.

Hypothesis Development

Knowledge Management and Management Accounting

It is given that the management of knowledge will help a firm create long-term competitive advantages, which results in business success in the dynamically changing environment. Knowledge management is referred to as a firm's capability that guides its employees to work together to generate, capture, share, and leverage their collective knowledge to enhance their performance (Lakshman 2007). It is also defined as the extent to which firms are contented with the adoption levels of their knowledge management resulting in different levels of knowledge sharing and knowledge application (Gold et al. 2001; Lin and Lee 2005). This definition of knowledge management is employed for this paper.

Traditional management accounting practices, such as traditional budgeting, cost volume profit analysis, and variance analysis, which focus on concerns internal to the firm and are financially oriented, are no more considered as a supportive means to provide sufficient information for planning and management in the current ever-changing business environment by many researchers (Kaplan 1983; Lucas 1997). In order to gain the competitive advantages, firms should also relate their control tools to more advanced management systems, such as activity based costing, total quality management and balanced scorecard, which combine both financial and non-financial information, in meeting customers' individual

requirements (Lucas 1997). Following these perspectives, we define the adoption level of management accounting practices for the current paper as the degree to which a firm chooses and implements the management accounting practices composed of both the above-mentioned traditional and advanced techniques for managing business.

Management accounting practices are reported to influence the adoption level of intellectual capital (Tayles et al, 2002; Novas et al. 2012). When having investigated the relationship between the level of intellectual capital management and the implementation of accounting management practices, Tayles et al. (2002) ascertain that the implementation of accounting management practices supports the management of intellectual capital. Likewise, the research by Novas et al. (2012), on the relationship between management accounting practices and intellectual capital, discusses the role that management accounting practices play in the development of intellectual capital, and reveal that management accounting practices place statistically positive effect on the level of investment in intellectual capital. In addition, intellectual capital is regarded as “useful knowledge” (Klein and Prusak 1994). Hence, the relationship between management accounting and knowledge management can be considered as similar to the connection between management accounting and intellectual capital. Based on the premise of extant research, a proposition that there is a relationship between the level of knowledge management adoption and the implementation of management accounting practices can be arrived at as the following hypothesis.

H1: the adoption of knowledge management is positively related to the implementation of management accounting practices

Firm Performance

Firm performance is defined as the actual accumulated results of all activities of a firm having achieved its goals. Within a firm there are often two primary outcomes analyzed, which are financial performance and non-financial performance. While non-financial performance is assessed on the items of innovativeness, quality, and customer satisfaction (Hudson et al., 2001; Kaplan and Norton, 2007); financial performance is measured on the

items of return on asset and on equity (Droge et al., 2003). Both the dimensions of financial performance and non-financial performance are used as “firm performance” for this paper.

It is reported that the adoption of knowledge management offers more value to a firm’s overall performance as well as helps the firm become productive, more efficient, and more innovative (Gold et al., 2001). Droge et al. (2003) and McKeen et al. (2006) suggest that the adoption of knowledge management in business will bring about improved performance in business. They confirm that firm performance is influenced by the adoption of knowledge management in two main ways. Firstly, knowledge management can help create knowledge, which can contribute to improved firm performance. Secondly, knowledge management can directly make improvements in firm performance. While the adoption of knowledge management is emphasized to relate to firm performance (Hsu et al. 2007), it plays a critical role in improving firm performance (Chen and Huang 2009). Relying on the above discussions, we conjecture the following hypothesis.

H2: adopting knowledge management in business will result in improved firm performance

Management accounting practices are aimed to facilitate decision-making by collecting, processing and communicating information that assists managers to plan, organize, manage and assess business processes, firm strategy as well as firm performance. In a research on management accounting, Ajibolade et al. (2010) determined a positive relationship between the implementation of management accounting practices and firm performance. In addition, Wang and Huynh (2012) claim that the higher use of management accounting information will help managers to enhance their business performance. Furthermore, Williams and Seaman 2002 also provide evidence on the role of accounting information practices in enhancing firm performance. Based on the previous findings, we come to a hypothesis below.

H3: implementing management accounting practices will enhance firm performance

Mediating Effect of Knowledge Management Adoption

Relationships between variables are often more complicated than a simple bivariate relationship between an explanatory variable and an explained variable. The relationship between an independent variable and a dependent variable is often modified by the addition of a third variable in the research model. Baron and Kenny (1986) suggest a method to consider the third variable effect on the association between the independent variable and the dependent variable. In order to determine whether the mediating influence exists, they claim that it is necessary to establish three conditions. First, an independent variable significantly predicts a dependent variable. Second, the independent variable significantly also determines a third variable. Third, the third variable, in turn, explains the dependent variable. If the three conditions are satisfied, then it can be suggested that the third or intermediate variable interferes with the relationship between the independent variable and the dependent variable. Furthermore, to investigate the mediating effect, Sobel (1982) proposes a procedure to examine the statistical significance for the indirect effect of the intermediate or mediating variable by testing the null hypothesis that states the indirect effect of the mediating variable on the relationship between the independent variable and the dependent variable is not occurred. As above discussed, it is hypothesized that the implementation of management accounting practices improves firm performance (H₃). In addition, the adoption of knowledge management is posited as being positively related to the implementation of management accounting practices (H₁), while the adoption of knowledge management is considered as a determinant of improved firm performance (H₂). Grounded on the arguments by Baron and Kenny (1986), these hypotheses allow us to arrive at the hypothesis as follows.

H₄: the adoption of knowledge management mediates the relationship between the implementation of management accounting practices and firm performance

Based on the above discussed literature review, the four hypotheses are reached for this paper, which suggests a research model as presented in Fig. 1. The research model demonstrates the relationships among the three

variables that are the implementation of management accounting practices, the adoption of knowledge management and firm performance. Each of the three variables and their analytical procedures are explained in more detail in the next parts.

Research Design

Data Collection

The data used for this paper was gathered from a sample of the 705 Vietnamese firms listed publicly in the two only Vietnamese Stock Exchanges, in which 397 are listed on Ha Noi Stock Exchange and the other 308 on Ho Chi Minh Stock Exchange. The initial solicitations requested responses from key informants with experience in knowledge management and management accounting. The questionnaire was completed with a manager involved in knowledge management and management accounting for each targeted firm. We sent questionnaires to 475 firms by email and in person interviewed managers in 230 firms. 243 out of 475 emailed were returned, in which 91 questionnaires did not offer enough information as required and only 152 offered the complete answers. Of the 230 interviews that were planned to be face-to-face performed, only 185 provided the good outcomes for the questionnaire. Finally, we obtained our sample of 337 good replies with sufficiently required information for this paper.

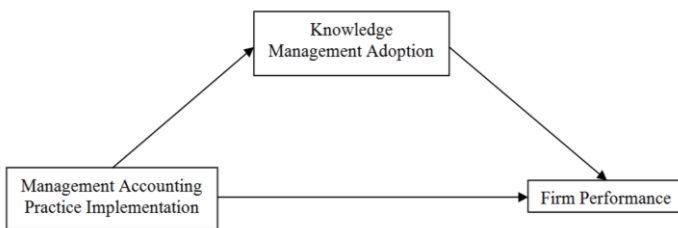


Figure 1: Research Model

Definition of Variables

The measure for “Adoption of Knowledge Management (KMA)” is made up of the five items, which are knowledge sharing between supervisors and subordinates- KMA₁, knowledge sharing among colleagues- KMA₂, knowledge sharing across the units- KMA₃, effective management of different sources and types of knowledge- KMA₄, as well as application of knowledge into practical use- KMA₅. The items are evaluated based on 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 item of knowledge management over the last year, which are adapted from Gold et al. (2001) and Lin and Lee (2005).

The measure for “Implementation of Management Accounting Practices (MPI)” is comprised of the six elements that are traditional budgeting- MPI₁, cost volume profit analysis- MPI₂, variance analysis- MPI₃, activity based costing- MPI₄, total quality management- MPI₅, and balanced scorecard- MPI₆, which are suggested by Lucas (1997), Hyvonen (2005), and Al-Omiri and Drury (2007). Each element is evaluated by using a five-point scale ranging from 1.never considering, 2.decided not to introduce, 3.favored to introduce, 4.intended to introduce, to 5.under implementation of that element, adapted from Cinquini et al. (2008).

The measure for “Firm Performance (FPF)” is based on both financial performance and non-financial performance. For the financial performance proxy, we use the two items that are return on asset- FPF₁ and return on equity- FPF₂, which are modified from Droge et al. (2003). For the non-financial performance proxy, we employ the three items, namely innovativeness- FPF₃, quality in products or services- FPF₄, and customer satisfaction- FPF₅, which are adapted from Hudson et al. (2001), and Kaplan and Norton (2007). The items are assessed by using a five-point scale from no growth, a little growth, average growth, fast growth to very fast growth. The items of our sample firms’ performance were compared to the average of the industry during the last year.

Analytical Procedures

Before the investigation of our hypotheses, a reliability analysis approach is performed to test the properties of measurement scales and the items that make up the scales. Nunnally (1978) proposed the reliability analysis to assess the degree to which multiple measures of the same scale are consistent with one another. The correlations between individual elements within the construct are provided. The scale will produce consistent and reliable results, if the correlations are high. Then, a factor analysis is carried out to evaluate the construct validity. Hair et al. (2009) introduce the factor analysis method and suggest that items should be strongly correlated with their own factors to attain internal consistency. Moreover, the correlations among the main factors are examined to check the problem of multicollinearity. Subsequently, a path analysis is utilized to investigate the casual relationships among the implementation of management accounting practices, the adoption of knowledge management and firm performance. The procedures suggested by Sobel (1982) are applied to test the mediating effect of the adoption of knowledge management on the casual relationship between the implementation of management accounting practices and firm performance. Lastly, a method modified from the analytic hierarchy process introduced by Saaty (1980) is conducted to rank the relative effects of the adoption of knowledge management in comparison with the implementation of management accounting practices on firm performance.

Findings

Table 1: Results for Reliability and Factor Analysis

Item	Factor Loadings			Communalities	Item-total Correlations	Cronbach's Alpha	No of Items
	KMA	MPI	FPF				
KMA1	0.719			0.626	0.665	0.851	5
KMA2	0.696			0.608	0.653		
KMA3	0.754			0.616	0.648		
KMA4	0.774			0.668	0.692		
KMA5	0.759			0.632	0.657		
MPI1		0.735		0.698	0.739	0.884	5
MPI2		0.714		0.666	0.713		
MPI3		0.796		0.685	0.678		
MPI4	0.350	0.746		0.735	0.771		
MPI5		0.776		0.696	0.723		
FPF1			0.777	0.693	0.710	0.835	5
FPF2			0.722	0.573	0.610		
FPF3			0.660	0.593	0.628		
FPF4			0.710	0.588	0.625		
FPF5			0.792	0.638	0.611		
KMO				0.905			

Prior to doing further analysis to investigate our hypotheses, we conduct several procedures to check the reliability and construct validity of the data. The results of reliability and factor analysis are provided in Table 1. The item 'MPI6- balanced scorecard' is dropped from the data, because its item-total correlation of 0.348 (un-tabulated) is smaller than 0.5, the acceptable limit by Nunnally (1978). The 15 other items all obtain their item-total correlations of over 0.5 (the lowest is 0.610 of FPF2). The Cronbach's alphas for the three factors (KMA- the adoption of knowledge management, MPI- the implementation of management accounting practices, and FPF- firm performance) are all larger than 0.7, the lowest limit suggested by Nunnally (1978). These results indicate that our scales achieve sufficient

internal reliability. Therefore, all of them can reasonably continue to “Factor Analysis”. All the 15 communalities exceed 0.5, the smallest level stipulated by by Hair et al. (2009). Because we suppressed the factor-loadings of under 0.35, the cross-loadings are implied to be all greater than 0.3, and the factor-loadings are all well over 0.4, the preferred levels by Nunnally (1978). In addition, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) is greater than 0.7, the smallest limit proposed by Hair et al. (2009). These findings suggest that all our 15 retained items satisfy the construct validity and reliability. Hence, they are all suitably used for next procedures.

Table 2: Correlations among the variables

	MPI	KMA	FPF
MPI	1.000		
KMA	0.608***	1.000	
FPF	0.543***	0.458***	1.000

(Significance Level: ***= 0.01, Pearson: 2-tailed).

In order for the problem of multicollinearity to be examined, we carry out the correlation procedure. Before performing the correlation procedure, we create new composite variables for each factor by averaging items within factors. The three new variables created are MPI, KMA and FPF, which stand for the implementation of management accounting practices (MPI), the adoption of knowledge management (KMA), and firm performance (FPF). The results of correlations among the three variables (MPI, KMA and FPF) are shown in Table 2. The three correlations among the three factors are much lower than 0.8, the highest value proposed by Kennedy (1992), which indicates that the problem with multicollinearity does not occur for our data.

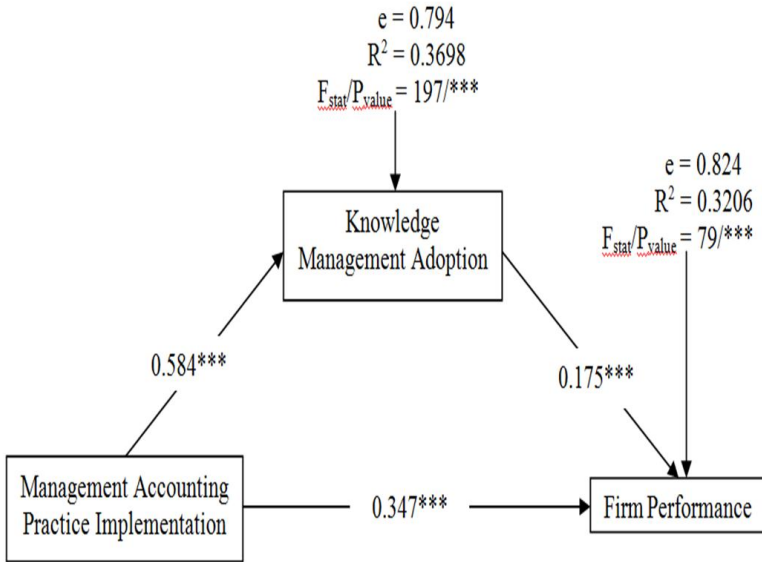


Figure 2: Path Diagram with Multiple Relationships
(Significance Level: ***= 0.01)

Having ensured that our retained measures satisfy the construct validity and reliability as well as have no problem of multicollinearity, we apply path analysis to explore the casual relationships of the adoption of knowledge management with the implementation of management accounting practices and with firm performance. Fig. 2 and Fig. 3 provide the results of path analysis as a causal model of relationships among the adoption of knowledge management, the implementation of management accounting practices, and firm performance.

It is indicated from Figure 2 that the implementation of management accounting practices leads to a higher adoption level of knowledge management at a statistical significance of 0.01. An increase of the implementation level of management accounting practices by 1 will bring about a raise of the adoption level of knowledge management by 0.584. It implies that implementing management accounting practices make managers become more interested in adopting knowledge management. It is also estimated that the implementation of management accounting

practices explains 36.98% of the variance in the adoption of knowledge management. Moreover, the goodness of fit of the model enjoys F-statistic of 197 at the significance of 0.01. These findings support our hypothesis 1 that the adoption of knowledge management is positively related to the implementation of management accounting practices.

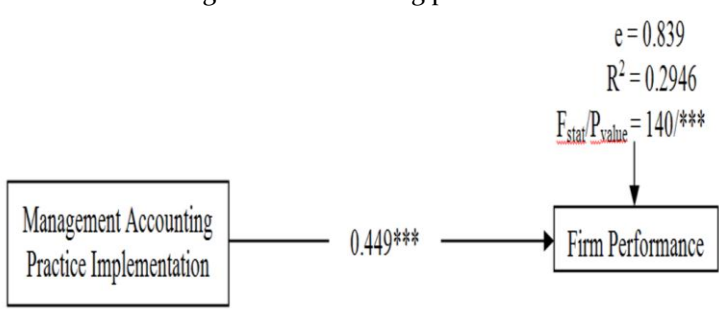


Figure 3: Path Diagram with a Simple Relationship
(Significance Level: ***= 0.01)

In regard to the effects on firm performance, the adoption of knowledge management and the implementation of management accounting practices both statistically affect firm performance at the significance of 0.01 with the coefficients of 0.175 and 0.347 respectively. In order words, when the adoption of knowledge management or the implementation of management accounting practices goes up by 1, firm performance will increase by 0.175 or 0.347 respectively. Hence, the implementation of management accounting practices improves more firm performance than the adoption of knowledge management. It is also shown that the adoption of knowledge management and the implementation of management accounting practices explain 32.06% of the variation in firm performance. Furthermore, the model achieves the goodness of fit with F-statistic of 79 at the significance of 0.01. In short, these results offer evidence to support our hypotheses 2 and 3 that the adoption of knowledge management and the implementation of management accounting practices both result in improved firm performance.

The path analysis also demonstrates the direct and indirect effects of the implementation of management accounting practices on firm

performance. In addition to the direct influence on firm performance, in which the implementation of management accounting practices puts a statistical impact on firm performance at the 0.01 significance level with the estimate of 0.347, the implementation of management accounting practices still imposes an indirect effect on firm performance through the third variable “the adoption of knowledge management”. The total effect of the implementation of management accounting practices on firm performance is a total of the direct and indirect effects where the indirect effect coefficient is 0.102 (equal to 0.584×0.175). As a result, the total effect of the implementation of management accounting practices on firm performance is 0.449 (equal to 0.347 plus 0.102) as exhibited in Fig. 3. Consequently, we are in agreement with Baron and Kenny (1986), and argue that the adoption of knowledge management may intervene in the relationship between the implementation of management accounting practices and firm performance. The path analysis suggests that the adoption of knowledge management mediates the effect of the implementation of management accounting practices on firm performance. However, the path analysis does not offer methods to test the statistical significance for the mediating effects.

Table 3: Results for Sobel Test

Mediation	Relationship	$t_{indirect}$	P_{value}	Supported
KMA	MPI and FPF	3.4581	***	Hypothesis 4

(Significance Level: *** = 0.01)

Therefore, we apply the procedure by Sobel (1982) to test whether the mediating relationships are statistically significant. The mediations are determined by examining the statistical significance for the indirect effect of the mediating variable. To investigate the mediating relationship, the null hypothesis, which there is not a difference between the total effect and the direct effect (or an indirect effect is zero), is tested. The two models, which are “ $FPF = a_1 + b_1 * MPI + c_1 * KMA$ ” and “ $KMA = a_2 + b_2 * MPI$ ”, are employed to explore the mediating effect of adopting knowledge management on the relationship between the implementation of management accounting practices and firm performance. To test whether the indirect effect of the

implementation of management accounting practices on firm performance is different from zero, we use a t-test, in which t-statistics (tindirect) is a ratio of the indirect effect coefficient (bindirect) to its standard error (sb-indiecr). While bindirect is $c_1 \cdot b_2$, sb-indiecr is equal to $\sqrt{c_{12} \cdot sb_{22} + b_{22} \cdot sc_{12}}$. Table 3 offers the result of Sobel test. The result indicates that the mediating effect of knowledge management adoption on the relationship between the implementation of management accounting practices and firm performance obtains a statistical significance of 0.01 with statistics of 3.4581. This finding provides support on hypothesis 4 that the adoption of knowledge management mediates the relationship between the implementation of management accounting practices and firm performance. This implies that when entered into the model of the relationship between the implementation of management accounting practices and firm performance, the adoption of knowledge management will interfere with the influence of the implementation of management accounting practices on firm performance.

So far, this paper has already proved evidence on the effects of the adoption of knowledge management and the implementation of management accounting practices on firm performance. The findings are consistent with previous research. However, it seems that no research has ranked the relative influencing levels of the adoption of knowledge management in comparison with the implementation of management accounting practices on firm performance. The evidence on these relative effecting levels is important to business managers in their decisions on performing knowledge management and management accounting practices in business. Consequently, we would like to compare the effect degrees to which the adoption of knowledge management versus the implementation of management accounting practices contribute to improved firm performance. A method modified from the analytic hierarchy process introduced by Saaty (1980) is employed to rank the comparative influence levels of the factors on firm performance.

First, the structural equation modeling procedure is applied to explore the correlations between the items belonging to the main factors (the adoption of knowledge management, the implementation of

management accounting practices, and firm performance) and their main factors as well as the correlations between the factors. The local weights at each level of the hierarchy are calculated based on the percentage of each correlation (estimate) in the correlation total of the items within their own main factor as well as on the correlations between the factors. Second, the global weights are calculated as the formula of “ $w_i = \sum(a_{ik}b_k)$ ”, where w_i is the global weight of the item component, a_{ik} is the local weight of the item component to the main factor, and b_k is the local weight of the main factor to the dependent variable. The procedure yields the results as displayed in Fig. 4 and Tables 4 to 6. Fig. 4 demonstrates the casual relationships of the adoption of knowledge management and the implementation of management accounting practices with firm performance as well as the correlations between items and their own factors.

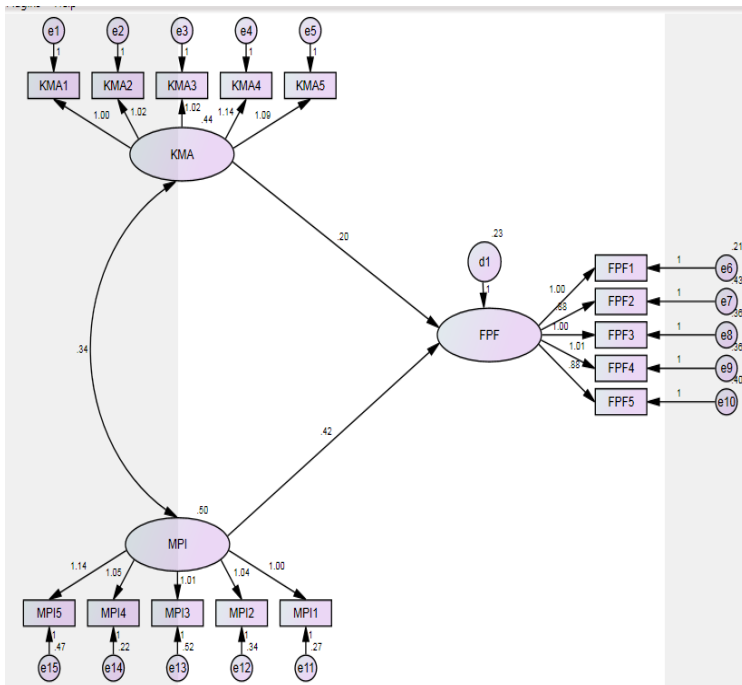


Figure 4: SEM Diagram

Table 4 indicates that X^2/df falls in the range of 2 – 3, the acceptable level suggested by Koufaris and Hampton-sosa (2002). GFI, IFI, TLI, and CFI are all more than 0.9, the proposed limit by Hair et al. (2009). Root Mean Square Error of Approximation (RMSEA) is 0.072 less than the 0.07 cut-off (Hair et al., 2009). These results suggest that the model obtains the good fit to the data.

Table 4: Summary for Goodness of Fit

Fit Index	X^2/df	GFI	IFI	TLI	CFI	RMSEA
Value	2.749	0.917	0.940	0.928	0.940	0.072
Results	Good	Good	Good	Good	Good	Good

Table 5 shows that while the correlation between the adoption of knowledge management and firm performance is statistically significant at the 0.05 level, the correlation between the implementation of management accounting practices and firm performance is statistically significant at the 0.01 level. Furthermore, except for the links (FPF₁ with FPF, KMA₁ with KMA, and MPI₁ with MPI) that do not obtain the values of P value, because they were constrained to 1, the other loading estimates are all statistically significant at the 0.01 level. Therefore, the variables are suitable for this analysis.

Table 5: Regression Weights

Relationships		Estimate	S.E.	P _{value}	Weight
FPF	<--- KMA	0.202	.081	**	0.324
FPF	<--- MPI	0.422	.077	***	0.676
Σ		0.624			1.000
FPF ₁	<--- FPF	1.000			0.210
FPF ₂	<--- FPF	0.883	.075	***	0.185
FPF ₃	<--- FPF	0.998	.075	***	0.210
FPF ₄	<--- FPF	1.006	.075	***	0.211
FPF ₅	<--- FPF	0.876	.074	***	0.184
Σ		4.763			1.000
KMA ₁	<--- KMA	1.000			0.190
KMA ₂	<--- KMA	1.019	.078	***	0.193
KMA ₃	<--- KMA	1.023	.083	***	0.194
KMA ₄	<--- KMA	1.142	.087	***	0.216
KMA ₅	<--- KMA	1.093	.087	***	0.207
Σ		5.277			1.000
MPI ₁	<--- MPI	1.000			0.191
MPI ₂	<--- MPI	1.042	.066	***	0.199
MPI ₃	<--- MPI	1.005	.073	***	0.192
MPI ₄	<--- MPI	1.048	.061	***	0.200
MPI ₅	<--- MPI	1.135	.075	***	0.217
Σ		5.230			1.000

(Significance Level: **=0.05, ***= 0.01)

Local and global weights are provided in Table 6. In comparison between the effects of the adopting knowledge management and implementing management accounting practices on firm performance, the adoption of knowledge management is ranked the first, whereas the implementation of management accounting practices is ranked the second. Within the adoption of knowledge management, effective management of different sources and types of knowledge- KMA₄ is ranked the first, and application of knowledge into practical use- KMA₅ ranked the second. On the other hand, knowledge sharing across the units- KMA₃, knowledge sharing among colleagues- KMA₂, and knowledge sharing between supervisors and subordinates- KMA₁ are ranked the third, the fourth and the

fifth respectively. Within the implementation of management accounting practices, total quality management- MPI5, activity based costing- MPI4, and cost volume profit analysis- MPI2 are ranked the first, the second, and the third respectively. In contrast, variance analysis- MPI3, and traditional budgeting- MPI1 are the fourth and the fifth respectively. For the global or overall ranking, KMA4, KMA5, KMA3, KMA2, and KMA1 are ranked the first, second, third, fourth, and fifth respectively; while MPI5, MPI4, MPI2, MPI3, and MPI1 are ranked the sixth, seventh, eighth, ninth and tenth respectively. In sum, the adoption of knowledge management is more important in leading to improved firm performance than the implementation of management accounting practices. Overall, ‘effective management of different sources and types of knowledge’, and ‘application of knowledge into practical use’ of the knowledge management adoption are the two most important elements to the improved firm performance. In contrast, ‘variance analysis’, and ‘traditional budgeting’ of the management accounting practice implementation are the two least important elements to the improved firm performance.

Table 6: Local & global weights and ranks of levels 1 and 2

Explained Variable	Explanatory Variable	Local Weights	Local Rank	Items	Local Weights	Local Rank	Global Weights	Overall Rank
Firm Performance	Management Accounting Practice Implementation	0.324	2	MPI1	0.191	5	0.0619	10
				MPI2	0.199	3	0.0645	8
				MPI3	0.192	4	0.0622	9
				MPI4	0.200	2	0.0648	7
				MPI5	0.217	1	0.0703	6
	Knowledge Management Adoption	0.676	1	KMA1	0.190	5	0.1284	5
				KMA2	0.193	4	0.1305	4
				KMA3	0.194	3	0.1311	3
				KMA4	0.216	1	0.1460	1
				KMA5	0.207	2	0.1399	2

Conclusions

The importance that the adoption of knowledge management and the implementation of management accounting practices contribute to

improved firm performance has been investigated in prior studies. They have explored relationships in separate research models. We combine the adoption of knowledge management with the implementation of management accounting practices to form a joint research model of firm performance. This paper employs a path analysis procedure to investigate the causal relationships among the adoption of knowledge management, the implementation of management accounting practices and firm performance. Furthermore, grounded on the arguments by Baron and Kenny (1986), we can posit that the adoption of knowledge management intervene in the effect of the implementation of management accounting practices on firm performance. Nonetheless, no research has examined this intervenient effect. We find it necessary to explore this mediating relationship. Hence, we utilize a analysis technique suggested by Sobel (1982) to test the statistical significance for the mediating effect. In addition, the contributing levels that the factors make to improved firm performance are necessarily explored. We apply a method modified from the analytic hierarchy process proposed by Saaty (1980) to rank the relative importance levels that the adoption of knowledge management versus the implementation of management accounting practices contribute to improved firm performance.

This paper finds out that implementing management accounting practices make managers become more interested in adopting knowledge management and thereby they more likely adopt knowledge management in their business. In addition, implementing management accounting practices and adopting knowledge management both result in enhanced firm performance. The results also reveal that when included into the research model of the influence of management accounting practice implementation on firm performance, adopting knowledge management will intervene in the impact of the implementation of management accounting practices on firm performance, in which it reduces this impact. This paper offers evidence that adopting knowledge management is more important in contributing to enhanced firm performance than implementing management accounting practices. 'Effective management of different sources and types of knowledge', and 'application of knowledge into practical use' of the

knowledge management adoption are the most important elements; whereas, 'variance analysis', and 'traditional budgeting' of the management accounting practice implementation are the least important elements to improved firm performance.

This paper contributes to the literature by providing evidence on the mediating influence of adopting knowledge management on the relationship between implementing management accounting practices and firm performance. It also offers evidence on the relative importance between adopting knowledge management and implementing management accounting practices in leading to improved firm performance. The findings will help firm managers to get better understanding of the relationships among the adoption of knowledge management, the implementation of management accounting practices and firm performance. Therefore, they can make better decisions on implementing knowledge management as well as management accounting practices in business, so that their firms will attain the best possible performance.

References

- [1] Ajibolade S. O., Arowomole S. S. A. and Ojikutu R. K., 2010. *Management accounting systems, perceived environmental uncertainty and companies' performance in Nigeria*. International Journal of Academic Research, 2(1), 195-201
- [2] Al-Omiri M. and Drury. C., 2007. *A Survey of factors influencing the choice of product costing systems in UK organizations*. Management Accounting Research, 18(4), 399-424.
- [3] Baron R. M. and Kenny. D. A., 1986. *The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations*. Journal of Personality and Social Psychology, 51, 1173-1182
- [4] M., and A. Bhimani. 1994. *Management Accounting: Pathways to Progress*. Chartered Institute of Management Accountants, London, England
- [5] Chen C. J. and Huang. J. W., 2007. *How organizational climate and structure affect knowledge management: The social interaction*

- perspective*. International Journal of Information Management, 27, 104–118.
- [6] Cinquini L., Collini P., Marelli A. and Tenucci A., 2008. *An exploration of the factors affecting the diffusion of Advanced Costing techniques: a comparative analysis of two surveys (1996-2005)*. 31st Annual Congress of the European Accounting Association, Campus of Erasmus University, Rotterdam, Nederland
- [7] Darroch J., 2005. *Knowledge management, innovation and firm performance*. Journal of Knowledge Management, 9(3), 101 – 115
- [8] Droge C., Claycomb C. and Germain. R., 2003. *Does knowledge mediate the effect of context on performance? Some initial evidence*. Decision Sciences, 34(3), 541–568
- [9] Gold A. H., Malhotra A. and Segars. A. H., 2001. *Knowledge management: An organizational capabilities perspective*. Journal of Management Information System, 18(1), 185–214
- [10] Hair J. F., Black W. C., Babin B.J., Anderson R. E. and Tatham R. L., 2009. *Multivariate Data Analysis*, Ed. New Jersey: Pearson Prentice Hall, USA
- [11] Hsu R. C., Lawson D. and Liang. T. P., 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] Hyvonen J., 2005. *Adoption and benefits of management accounting systems: Evidence from Finland and Australia*. Advances in International Accounting, 18, 97–120
- [14] Kaplan R. S., 1983. *Measuring manufacturing performance: a new challenge for managerial accounting research*. The Accounting Review, 58 (4): 686-705
- [15] Kaplan R. S. and Norton D. P., 2007. *Using the balanced scorecard as a strategic management system*. Harvard Business Review, July-August, 150–161

- [16] Kennedy P. 1992. *A Guide to Econometrics*, 3rd ed. MIT Press, Cambridge, MA, USA
- [17] Klein D.A. and Prusak. L., 1994. *Characterizing intellectual capital*. Working Paper, Centre for Business Innovation, Ernst and Young, London, England
- [18] Koufaris M. and Hampton-sosa. W., 2002. *Customer Trust Online: Examining the Role of the Experience with the Web Site*. Information Systems Journal, 5, 1-22
- [19] Lakshman C., 2007. *Organizational Knowledge Leadership: A Grounded Theory Approach*. Leadership and Organization Development Journal, 28(1), 51-75
- [20] Lin H. F. and Lee. G. G., 2005. *Impact of organizational learning and knowledge management factors on e-business adoption*. Management Decision, 43(2), 171-188
- [21] Lucas M., 1997. *Standard costing and its role in today's manufacturing environment*. Management Accounting, 75 (4): 32-35
- [22] 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, USA
- [23] Novas J. C., Sousa A. and Alves M. C., 2012. *On the Relations between Management Accounting Systems and Intellectual Capital: Evidence for Portuguese Companies*. CEFAGE-UE, Working Paper 2012/13, Portugal
- [24] Nunnally J. C., 1978. *Psychometric Theory*. New York: McGraw-Hill, USA
- [25] Saaty T.L., 1980. *The Analytic Hierarchy Process*. New York, McGraw-Hill, USA
- [26] Sobel M. E., 1982. *Asymptotic confidence intervals for indirect effects in structural equation models*. Sociological Methodology, 13, 290-312
- [27] Tayles M., Bramley A., Adshead N. and Farr. J., 2002. *Dealing with the management of intellectual capital: the potential role of strategic management accounting*. Accounting, Auditing and Accountability Journal, 15(2), 251-67

-
- [28] 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
- [29] Wang D. H.M. and Huynh. Q. L., 2013. *Effects of Environmental Uncertainty on Computerized Accounting System Adoption and Firm Performance*. International Journal of Humanities and Applied Sciences, 2(1), 13-21
- [30] J. J., and Seaman A. E., 2002. *Management accounting systems change and departmental performance: the influence of managerial information and task uncertainty*. Management Accounting Research, 13: 419-445