

## **The Influence of Intellectual Capital on Firm Performance of Computer Businesses in Thailand**

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**Abstract:** The study investigates the influence of intellectual capital on firm performance of computer business in Thailand. Following to the existing literature, intellectual capital is an origin of value creation and innovative capability that leads to firm performance. Therefore, intellectual capital is important for a better performance of firms. The sample of 925 computer businesses in Thailand and statistics used are tested by ordinary least squared regression. Furthermore, response bias, validity and reliability were examined by researcher. The results reveal that organizational capital has an effect on value creation and innovative capability. Moreover, innovative capability has a positive effect with firm performance. Subsequently, managerial and theoretical contributions and suggestions for future research are presented.

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**Key words:** Intellectual capital, value creation, innovative capability, positive, Thailand

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### **INTRODUCTION**

Changes in today's world are fiercely competitive environment is now making every organization facing both a higher risk and creating a more favorable opportunity. Globalization related to technologies and social trends. Classical Organization in the 20th century cannot perform well under conditions of rapid change. The structure, systems, practices and culture are causes of delays and obstacles to make it difficult to change.

Intellectual capital has been cited as a key component for companies to survive and create an advantage in the competition. The success of business competition is fundamental on the strategic management of intellectual capital (Riahi-Belkaoui, 2003). Intellectual capital is the knowledge that is created by an employee of the organization, infrastructure, enterprise processes and social networks both inside and outside of the firms (Baum and Silverman, 2004; Edvinsson and Malone, 1997; Stewart, 2002). In generally, intellectual capital is a tool or brain material of enterprise. Businesses can use it for a competitive advantage creation in the industry.

When considered in the context of PWC (Price Waterhouse Coopers) company. In July 2557 found that the current global PC industry including Thailand faced skills gap problem that leading to lack of high skill labor problem and a shortage of talent in technology-computers which will effect on the performance of the computer industry of Thailand in the future (<http://www.manager.co.th>).

Due to the review of the literature on intellectual capital allows the researchers believe that intellectual capital influence the culture in creating a learning organization and the ability to manage organizational knowledge. These relations will add capacity for innovation of the organization and affect to the performance of the organization in the final. However, the literature review reveals that research describes the relations of intellectual capital as a result of culture in creating a learning organization and enterprise knowledge management capabilities that effect on performance of the organization in the perspective of the computer businesses in Thailand is still limit.

For the reasons mentioned above, this research studies the influence of intellectual capital on the performance of the enterprise for computer businesses in Thailand. The study's objective is to test the relationship between the learning cultures, knowledge management capability which effect on intellectual capital and leading to value creation, innovation capability and firm performance at the final. This research will study in the perspective of the computer businesses in Thailand for improve and develop computer business in this country to achieve the objectives of executives and entrepreneurs in the organization as well as to be the ways to enhance the competitiveness of the computer businesses in the most efficiency way as possible.

**Literature reviews and hypotheses development:** The conceptual model (Fig. 1) demonstrates the relationships between learning culture, knowledge management

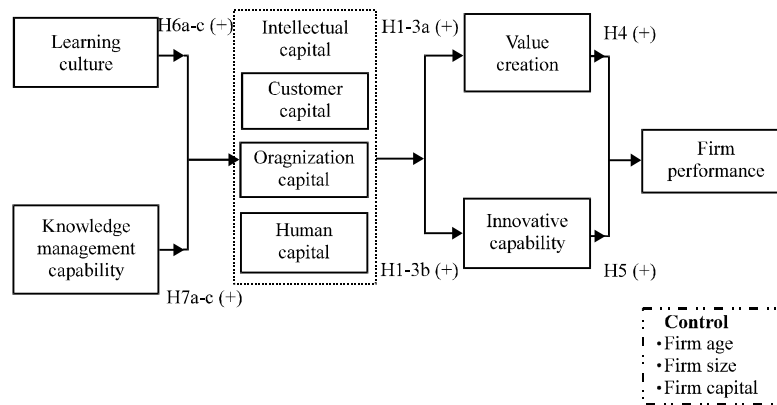


Fig. 1: The conceptual model of linking intellectual capital on firm performance

capability, intellectual capital, value creation, innovative capability and firm performance. In this study, intellectual capital consists of three dimensions, namely; customer capital, organization capital and human capital.

**Intellectual Capital (IC):** The notion of intellectual capital is related to the resource's theory. Actually, this theory views companies not through their actions on the marketing of their product, however more so as a single integration of tangible and intangible resources (Wernerfelt, 1984). The company's performance is a role of the effective and efficient use of tangible and intangible resources. It can create value by take advantage of an integration of resources.

**The decomposition of the intellectual capital:** We can begin by looking at the example that given by OECD in 1999: IC composed of:

**Human Capital (HC):** HC relates to people within a firm, a tacit knowledge collection of them. It is the knowledge that the members of staff take when they leave from their firm (Meritum *et al.*, 2002).

**Structural Capital (SC):** SC relates to all of remains when the staffs go home (Edvinsson, 2000). It collects the Customer Capital (CC) or Relational Capital (RC) "relations with the customers and the external partners of the company" and the Organizational Capital (OC) "the systems of organization, technologies of information" From here; we can divide IC into three components as HC, OC and CC. This decomposition appears to be the agreed harmony between many researchers (Stewart, 1997; Bontis, 2001).

The various forms of IC are interrelated along with the finance structure of the firm. They conform with the concretization of the knowledge of the employees that

regard to their competence having an effect on the structure of the firm and adding value to it. Furthermore, the components of IC cannot produce value by just one but by their integrate interaction. The analysis of the literature review led us to conclude IC of three components HC, OC and CC. They are continuous interaction and effect on value creation of the firm.

The numerous studies on intellectual capital provide that the financial capital of the firm and in particular the many intangible investments have an effect on the relations between the intellectual capital and the value creation of the organization. Moreover, Sullivan also asserts on the importance of the internal environment of the firm in this context. Intellectual capital is complex construct that can be classified into human, structural and relational capital (Stewart, 1997; Bontis, 1998). Furthermore, all three dimensions are sources of the organization's competitive advantage and superior performance but they are not equally important. The theoretical attentions reveal that human capital is the central of intangible factors since it is the source of renewal and innovation (Stewart, 1997).

As a result, this study implies that intellectual capital will have a positive effect on value creation and innovative capability. Thus, we hypothesize the relationship as follows:

- H<sub>1</sub>: customer capital is positively related to (a) value creation (b) innovative capability
- H<sub>2</sub>: organization capital is positively related to (a) value creation (b) innovative capability
- H<sub>3</sub>: human capital is positively related to (a) value creation (b) innovative capability

**Value creation:** Value creation can be outlined as the formulation of value, based on customer perceived values when concerning their estimate of trade-off between 'what

they get' (quality, perceived benefits or performance) and 'what they give'. Value through the sense of customers has many facets as product utility, perceived benefits with the costs, market-perceived quality, adjusted for relative price and realize benefits over sacrifices (Eggert and Ulaga, 2002). Firms that try to formulate value creation also have to improve the performance of their firm. Therefore, it is likely that value creation has a positive effect on firm performance. Hence, the hypothesis is proposed as follows:

- H<sub>4</sub>: value creation is positively related to firm performance

**Innovative capability:** A firm's innovative capability is directly related to its efficiency in taking advantage of skills and knowledge to successfully absorb, understand and improve on existing technologies as well as creating newly revised ideas (Lall, 1992). Drucker (1985) suggested that innovation can be utilised as a resource to generate wealth. Generally, it is necessary to amalgamate present resources in an advanced and beneficial way. Researcher goes on to suggest that innovative ability can be taught and learned. Lawson and Samson (2001) magnify the definition, researcher state about innovation capability as a higher order of integration capability: they have the capability to model and administer different key organizational capabilities and resources which successfully encourage the innovation activities. Thus, we can hypothesize the relationship as follows:

- H<sub>5</sub>: innovative capability is positively related to firm performance

**Learning culture:** Barrett (1995) provides learning cultures as "...contexts in which members can explore, experiment in the margins, extend capabilities and anticipate customers' latent needs." Related cultural attributes include management support for the information's role, assistance for staff to socialize and to search for supportive (Gold *et al.*, 2001; Nonaka and Toyama, 2005). Moreover, Nahapiet and Ghoshal (1998) argue that how norms and other conditions of culture assist IC by encouraging persons to synthesize knowledge. Therefore, a learning culture aids organizational capital. However, a learning culture can also facilitate social capital by advocating improved and more trusting ties amongst members (O'Dell and Grayson, 1998). Furthermore, learning culture can be seen to facilitate human capital, due to personal knowledge is enhanced by learning as a result of being associated with a culture that promotes exploration and abides

some inevitable misinterpretation (Vera and Crossan, 2004). Thus, the hypothesis is proposed as follows:

- H<sub>6</sub>: learning culture is positively related to (a) customer capital (b) organization capital and (c) human capital

**Knowledge Management capability (KM):** KM can be characterized as an organization's activity in doing what is necessary in order to get of knowledge resources including both precise and unstated knowledge (Sabherwal and Becerra-Fernandez, 2003). Thus, KM includes the firm processes of searching for new knowledge, transforming it in a form that is user friendly, easily to accessed and utilizing that knowledge (Verkasalo and Lappalainen, 1998). Synthesizing the KBV, our literature review also suggests that KM affects the amassing and progression of IC. The argument of the knowledge-creating firm (Nonaka and Takeuchi, 1995) identifies the effect of KM on the formulation of innovative knowledge. Moreover, Nahapiet and Ghoshal (1998) also argue that the creation of new IC can rely upon KM specifically, the activities involved in combining and exchanging knowledge. Lastly, knowledge conversion can lead to overall increase in an organization's IC through processes by which information is reformed and exchanged with others (Nonaka and Takeuchi, 1995). Hence, the hypothesis is proposed as follows:

- H<sub>7</sub>: knowledge management capability is positively related to (a) customer capital (b) organization capital and (c) human capital

## MATERIALS AND METHODS

**Sample selection and data collection procedure:** This study selects from computer businesses in Thailand as the population amount 5,552 businesses. The samples are selected from total population by using Krejcie and Morgan table as 925 businesses. The samples are random by Stratified Random Sampling Method. The database is drawn from the Department of International Trade Promotion, Ministry of Commerce, of the Thai government in March 2015. A mail survey procedure via the questionnaire was used for data collection. The key participants in this study were Chief Executive Officers (CEO), presidents/managing directors/executive directors. The questionnaire was sent to computer businesses. With regard to the questionnaire mailing, 100 surveys were undeliverable because of the business is close down. The valid mailing was 825 surveys; the completed and usable surveys were 182.

Finally, to test potential and non-response bias and to detect and consider possible problems with non-response errors, the assessment and investigation of non-response-bias was centered on a comparison of first and second wave data as recommended by Armstrong and Overton (1977). The t-test statistics were used to test the difference between early and late responses in various firm characteristics which consist of the business type, location of firm, capital investment or operation capital, average sales revenues per year; the results did not find any significant differences between the two groups. Thus, non-response bias does not pose a significant problem for this study.

**Measurements:** In this study, all constructs in the model are measured with multi-item scales. Each of these variables were measured on 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), except demographic and control variables. The measurements of dependent, independent, mediating and control variables are clarified as follows:

Intellectual Capital (ITC) is main construct of this study. It can be defined as the intangible resources about the capability and the knowledge of employee and organization which can create or form the value added of the firm (Edvinsson and Malone, 1997). It is measured by twelve-item scale which is classified into three dimensions: customer capital, organization capital and human capital.

Customer Capital (CC) is measured by four-item scale and it is defined as the value that the firms create from customer good relationship retainable. This relationship may be measure by level of satisfaction, impression and loyalty of customer (Mhedhbi, 2013).

Organization Capital (OC) is measured by four-item scale and it is defined as the value that the organizations create from good product and service of them. Moreover, these values include internal process that promote integrative operation between human, technology and system as efficiency and effectiveness (Mhedhbi, 2013).

Human Capital (HC) is measured by four-item scale and it is defined as the value that the firms create and collective for making know-how of employees and organization. Moreover, these lead to motivation and loyalty of employee (Mhedhbi, 2013).

Value Creation (VC) is measured by four-item scale and it is defined as the performance and activities that increase the value of services, goods or a business. Numerous business operators now focus on value creation both in the circumstance of creating better value for customers purchasing their products and services and for the shareholders in business that want to see their stake appreciate in value (Mhedhbi, 2013).

Innovative Capability (IC) is measured by four-item scale and it is defined as firms capability to utilize knowledge and skills for successful understand, improve and master existing technologies to create new ones (Lall, 1992)

Firm Performance (FP) is measured by four-item scale and it is defined as the result of business operations. This scale measure is adopted from (Pongpearchan and Ussahawanitchakit, 2011).

Learning Culture (LC) is measured by four-item scale and it is defined as the contexts which staff can explore, experiment, extend abilities and prepare for customers (Barrett, 1995).

Knowledge Management Capability (KMC) is measured by four-item scale and it is defined as organizations doing about the necessary to get the most of knowledge resources that include both tacit and explicit knowledge (Sabherwal and Becerra-Fernandez, 2003).

Firm Size (FS) affect the ability to redefine, adjust or renew firm's strategy (Baden-Fuller and Volberda, 1997). Large firm tend to rapidly renew firm's strategy than those small ones (Jansen *et al.*, 2005). It was measured by the number of employees in a currently registered full time of the firm.

Firm Age or Firm Experience (FA) is measured by the number of the years that the firm has operated in businesses (Kotabe *et al.*, 2011; Patel *et al.*, 2012). Traditional firms have experience in monitoring environmental changes faster than new firms and more appropriate to improve creative and innovative products that create a competitive advantage and firm survival. Mature firms tend to renew strategy or renew organization more than those younger firms (Baden-Fuller and Volberda, 1997).

Firm Capital (FC) is measured as the money or asset on investment operation in organization. According to Leiblein *et al.* (2002), large firm may also have greater market power or positional advantages compared to their smaller rivals and larger firms often have superior financial.

Factor analysis was firstly utilized to assess the underlying relationships of a large number of items and to determine whether they can be reduced to a smaller set of factors. The factor analysis was conducted separately on each set of the items representing a particular scale due to limited observations. With respect to the exploratory factory analysis, this analysis has a high potential to inflate the component loadings. Thus, a higher rule-of-thumb, a cut-off value of 0.40 was adopted (Nunnally and Bernstein, 1994). All factor loadings are greater than the 0.40 cut-off and are statistically significant. The reliability of the measurements was

evaluated by Cronbach alpha coefficients. In the scale reliability, Cronbach alpha coefficients are >0.70 (Nunnally and Bernstein, 1994). The scales of all measures appear to produce internally consistent results; thus, these measures are deemed appropriate for further analysis because they express an accepted validity and reliability in this study. Table 1 presents the results for both factor loadings and Cronbach alpha for multiple-item scales used in this study.

The Ordinary Least Squares (OLS) regression analysis is used to test and examine all hypotheses following the conceptual model. Then, the aforementioned variables play significant roles in explaining the research relationships. Because all dependent variables, independent variables, moderating variable and the control variables in this study were neither nominal data nor categorical data, OLS is an appropriate method for examining the hypothesized relationships (Hair *et al.*, 2006). With the interest of understanding the relationships in this study, the research model of these relationships is depicted as follows:

$$VC = \beta_{01} + \beta_1 CC + \beta_2 OC + \beta_3 HC + \beta_4 FA + \beta_5 FS + \beta_6 FC + \varepsilon_1 \quad (1)$$

$$IC = \beta_{02} + \beta_7 CC + \beta_8 OC + \beta_9 HC + \beta_{10} FA + \beta_{11} FS + \beta_{12} FC + \varepsilon_2 \quad (2)$$

$$FP = \beta_{03} + \beta_{13} VC + \beta_{14} IC + \beta_{15} FA + \beta_{16} FS + \beta_{17} FC + \varepsilon_3 \quad (3)$$

Table 1: The results of measure validation

Items	Factor loadings	Cronbach alpha
Customer Capital (CC)	0.526-0.924	0.792
Organization Capital (OC)	0.795-0.922	0.861
Human Capital (HC)	0.748-0.856	0.802
Learning Culture (LC)	0.500-0.906	0.730
Knowledge Management Capability (KMC)	0.614-0.887	0.801
Value Creation (VC)	0.829-0.913	0.903
Innovation Capability (IC)	0.843-0.926	0.897
Firm Performance (FP)	0.900-0.966	0.946

Table 2: Descriptive statistics and correlation matrix

Matrix	CC	OC	HC	VC	IC	FP	LC	KMC	FS	FC	FA
Mean	4.554	4.273	4.302	3.881	3.909	3.582	4.118	4.078	0.050	0.050	0.400
SD	0.452	0.563	0.503	0.627	0.800	1.019	0.515	0.612	0.217	0.217	0.491
CC											
OC	0.570**										
HC	0.555**	0.562**									
VC	0.252**	0.500**	0.322**								
IC	0.374**	0.694**	0.531**	0.566**							
FP	0.014	0.491**	0.319**	0.250**	0.631**						
LC	0.459**	0.608**	0.285**	0.499**	0.652**	0.346**					
KMC	0.260**	0.633**	0.452**	0.580**	0.709**	0.507**	0.642**				
FS	0.099	0.069	0.141	0.048	0.066	0.006	0.108	0.127			
FC	0.029	0.024	0.074	0.037	0.026	0.069	0.059	0.064	0.052		
FA	0.139	0.126	0.049	0.067	0.132	0.094	0.204**	0.143	0.279	0.020	

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

$$CC = \beta_{04} + \beta_{18} LC + \beta_{19} KMC + \beta_{20} FA + \beta_{21} FS + \beta_{22} FC + \varepsilon_4 \quad (4)$$

$$OC = \beta_{05} + \beta_{23} LC + \beta_{24} KMC + \beta_{25} FA + \beta_{26} FS + \beta_{27} FC + \varepsilon_5 \quad (5)$$

$$HC = \beta_{06} + \beta_{28} LC + \beta_{29} KMC + \beta_{30} FA + \beta_{31} FS + \beta_{32} FC + \varepsilon_6 \quad (6)$$

## RESULTS AND DISCUSSION

Table 2 exhibits the descriptive statistics and correlation matrix for all variables. With respect to potential problems relating of multi-collinearity, Variance Inflation Factors (VIFs) were used to grant information on the extent to which non-orthogonality among independent variables inflates standard errors. The VIFs range from 1.009-1.740, well below the cut-off value of 10 recommended by Neter *et al.* (1990), meaning that the independent variables are not correlated with each other. Therefore, there are no substantial multicollinearity problems confronted in this study.

Table 3 presents the results of OLS regression analysis of the relationships among three dimensions of intellectual capital, value creation, innovative capability, learning culture, knowledge management capability and firm performance. Only one dimension of intellectual capital that is organization capital has significant positive effect on value creation ( $b_2 = 0.547$ ,  $p<0.01$ ). Thus, hypothesis 2a is supported whereas, hypothesis 1a and 3a are not supported. For the consequence as innovative capability, the organization capital and human capital has significant positive effect on innovation capability ( $b_8 = 0.872$ ,  $p<0.01$ ;  $b_9 = 0.411$ ,  $p<0.01$ ). The consistent with the study by Stewart (1997) find that organization capital and human capital have positive effect on innovation capability. Hence, hypothesis 2b and 3b is supported. Interestingly Hypothesis 1b, customer capital has significant negative effect on innovation capability ( $b_7 = -0.227$ ,  $p<0.10$ ). This is more likely that in computer

Table 3: Results of regression analysis

Independent variables	Dependent variable					
	Model 1 (VC)	Model 2 (IC)	Model 3 (FP)	Model 4 (CC)	Model 5 (OC)	Model 6 (HC)
CC	-0.106 (0.117)	-0.227 (0.121)*				
OC	0.547 (0.094)***	0.872 (0.097)***				
HC	0.121 (0.106)	0.411 (0.109)***				
VC			-0.264 (0.114)**			
IC			0.921 (0.090)***			
LC				0.428 (0.077)***	0.375 (0.079)***	-0.002 (0.086)
KMC				-0.048 (0.064)	0.384 (0.066)***	0.373 (0.072)***
FA	0.051 (0.087)	0.104 (0.090)	0.048 (0.125)	0.033 (0.065)	0.003 (0.067)	-0.039 (0.072)
FS	-0.292 (0.196)	-0.061 (0.202)	-0.249 (0.283)	0.094 (0.145)	-0.058 (0.149)	0.206 (0.161)
FC	-0.133 (0.188)	0.117 (0.194)	0.191 (0.270)	0.013 (0.139)	-0.061 (0.143)	-0.226 (0.154)
Adjust R <sup>2</sup>	0.242	0.507	0.404	0.195	0.455	0.200

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

businesses of Thailand, the increase of customer capital will decrease the capability in innovation creation of their staff. Surprisingly in hypothesis 4, value creation has significant negative affect on firm performance ( $b_{13} = -0.264$ ,  $p<0.05$ ). Thus, hypotheses 4 is not supported. Due to this result, it can explain that in the context of computer businesses in Thailand, the attempt in create value of their firm lead to performance reduction of Thailand's computer business.

Hypothesis 5 proposed innovative capability would be positively associated with firm performance. As shown in Table 3, indicates that innovative capability is positively and significantly related to firm performance ( $b_{14} = 0.921$ ,  $p<0.01$ ). Hence, hypothesis 5 is supported. Furthermore, Hypotheses 6 indicates that learning culture has significant positive effect on customer capital and organization capital ( $b_{18} = 0.428$ ,  $p<0.01$ ;  $b_{23} = 0.375$ ,  $p<0.01$ ) and has not significant positive effect on human capital. Thus, hypothesis 6a and 6b are supported whereas, hypothesis 6c is not supported. For the supportive hypothesis, the consistency with the study by O'Dell and Grayson (1998) argued that learning culture is suitable way which helps to achievement of organization capital. Hypothesis 7 predicted that knowledge management capability would be positively associated with intellectual capital of all dimensions. The significant parameter estimate is consistent with organization capital and human capital as shown ( $b_{24} = 0.384$ ,  $p<0.01$ ;  $b_{29} = 0.373$ ,  $p<0.01$ ). On the contrary, the significant parameter estimate is not consistent with customer capital. Therefore, hypothesis 7b and 7c is supported whereas hypothesis 7a is not supported. According with Nonaka and Takeuchi (1995) provided that knowledge capability affect the amassing and progression of IC. Interestingly however, in the context of computer businesses of Thailand knowledge management capability does not effect on customer capital.

## Contributions

**Theoretical contribution:** This study propose the escalation understanding of relationship among the three dimensions of intellectual capital and firm performance via value creation and innovative capability following the antecedence effects of learning culture and knowledge management capability that influences intellectual capital. For progressing the field theoretically, this research attempted to concentration on the above-mentioned relationships of computer businesses in Thailand. Therefore, the need for further research is obviously seen that should shift to a variety of sample from the other sectors in order to obtain a precise and reliability of this framework offering. Interestingly, the contribution of theoretical was spread the extent of the dimension of intellectual capital and empirically testing with antecedent and consequence constructs which distinctive aspect further previous study.

**Managerial contribution:** This research also helps administrators justify and identify the key components that may be more critical in the competitive market. From a managerial and practical contribution, many important insights can be received from this research. This research can facilitate CEO's or the general executive, particularly in computer businesses to perceive how their organization can complete intellectual capital and achieve organization sustainability more than their competitors. Extension competitiveness of organization is becoming a basis for firm survival. Hence, intellectual capital had become an important topic for executive in business sector. Consistence to the results of this study, show that organization capital and human capital have significant relate to innovative capability and leading to better performance of firm. This empirical study helps to formulate solutions in business problems that provide the basis of survival and successful for organization.

Therefore, to maximize the benefit of firm's strategy, CEO's should try these resources to boost effectiveness and create new opportunities in the competitive advantage.

## CONCLUSION

This study discusses intellectual capital in the perspective of computer businesses in Thailand. Coping with an uncertain environment which may incur from the consequences of Asian association or facing after Thai political crisis. According to, these the external factor are direct impact on organization survival. The aim of this research indicates that to study the relationships among three dimensions of intellectual capital and firm performance via value creation and innovative capability following the antecedence effects of learning culture and knowledge management capability that influences intellectual capital. The model testing is collected data from mail survey of 925 information and computer businesses in Thailand. Interesting, this study finds that organization capital and human capital have significant positive effect on innovative capability. Then, innovative capability has significant positive effect on firm performance, respectively. Whilst, learning culture has significant positive influence on customer capital and organization capital and then knowledge management capability has significant positive effect on organization capital and human capital. Surprisingly, value creation has significant negative effect on firm performance.

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