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Asian Academy of Management Journal, Vol. 9, No. 2, 1–18, July 2004

THE INTERACTIVE EFFECTS OF HUMAN CAPITAL, STRUCTURAL CAPITAL AND SOCIAL CAPITAL ON FIRM PERFORMANCE

[1]*Wan Fadzilah Wan Yusoff,* [2]*Muhamad Jantan and* [2]*Daing Nasir Ibrahim*
[1]Universiti Tenaga Nasional
[2]School of Management, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia

ABSTRACT

Independent studies conducted on the impact of human capital, structural capital and social capital on firm performance have shown that a significant positive relationship can be established between each of them and performance. This study examined if each of these components of intellectual capital would show more significant relationships if they were to interact with each other, whether in a two-way or three-way interactions. Results provided by a sample collected from 298 business units of firms in the Malaysian financial services industry is consistent with the suggestion that the key driving forces in the contemporary business environment has moved from the management of tangible resources to the exploitation of intangible resources and differential outcome can be expected from the interactive nature of the components.

INTRODUCTION

The present wave of technological changes has resulted in an extraordinary transformation in the nature of competition. Firms competing in the knowledge-based economy do so very differently from their industrial-age brethren. Their core assets are now made up of the combined knowledge of the human, structural and relational resources as opposed to the physical assets they control. This new collective assets is being termed as the intellectual capital (IC) of the firm. IC, however, is an elusive phenomenon. It is context specific; something which is absolutely peculiar to each and every company. As a result, the value of an organisation differs from another by the knowledge, skills and abilities of its employees due to the creation of idiosyncratic organisational capabilities. Edvinsson and Malone (1997) describe it as "the possession of knowledge, applied experience, organisational technology, customer relationships and professional skills that provide a competitive edge in the market". However, many of the current tools used to measure the value created by a knowledge-based economy are found wanting. Still, the market values of the knowledge-based firms tend to carry the new value reflected by the IC of the firms. Thus, we find knowledge-based firms trading at multiples of ten to twenty times their traditional asset value. One contributory reason is that certain intangible

resources apply to the law of increasing returns rather than the decreasing returns typical of tangible resources.

This study attempts to enhance the understanding of the independent impact of IC on performance and whether interactions among its components, either pair-wise or all three together, would result in different organisational outcomes. The main objective of this study is to examine the concept of IC within an organisational context by investigating the independent relationships between each component of IC, as well as the interactive nature of the various components, and firm performance. Although the contributions of human capital (Wright & McMahon 1992; Youndt, Snell, Dean & Lepak 1996; Finkelstein & Hambrick 1996; Sweetland 1997; Hitt, Bierman, Shimizu & Kochnar 2001), structural capital (Walsh & Ungson 1991; Ulrich 1993; Bontis 1998; Stewart 1997; Edvinsson & Malone 1997) and social capital (Burt 1992; Tsai & Ghosal 1998; Nahapiet & Ghosal 1998; Leana & Van Buren 1999) to firm performance have been established, each of these intangible asset do not work in isolation in its contribution to firm performance. Therefore, the key contribution of this study is to extend the examination of the IC constructs by conducting business level hypotheses testing to enable greater comprehension of the components' specificity and non-appropriability created by their interactive nature.

LITERATURE REVIEW

Initial studies on IC were grounded in business practices, focusing on creating awareness of the relevance of IC, initiated by people in business who sought to understand what constitute value to their business as it was apparent that a business generally commanded better value compared to its net asset value (Edvinsson 1997; Stewart 1997; Saint-Onge 1998). Subsequent stage of studies provided a platform to investigate intellectual capital within an organisation context (Knight 1999; Nahapiet & Ghosal 1998; Leana & Van Buren 1999; Bontis, Keow & Richardson 2000). The primary focus is to understand the nature, impact and value of intellectual capital for the purpose of measurement, reporting and management (King & Henry 1999; Dzinkowski 2000; Vanderkay 2000; Stewart 2001). The theoretical roots of IC as identified by Roos, Roos, Dragonetti and Edvinsson (1997) fall under two main focus: the strategic focus and the measurement focus. The objective of the strategic focus is the ability of the firm to generate value based on its ability to identify, create and continuously manage knowledge. As a strategic tool, Roos, Bainbridge and Jacobsen (2001) suggest that IC should take the approach of an integrative, dynamic resource-based view of the firm. Differences in performance can only arise when successful firms possess valuable resources not held by other firms where competitive advantage is the result of processes of resource accumulation and

deployment within the organisation. Still, the resource-based view of the firm alone is not sufficient to justify the studies in IC because as reiterated by Drucker (1993), successful firms require a systematic exploitation of opportunities for change through the productivity of knowledge work and the knowledge worker. Therefore, the resource-based view of the firm has to be complemented by the knowledge-based view of the firm (Grant 1996; 1997).

Among the early definitions of IC are the ones provided by Edvinsson (1997), who defines it as "a combination of human capital and structural capital which has the ability to transform knowledge and intangible assets into wealth creating resources". A more recent description of IC defines it simply as knowledge involving an employee's expertise, unique organisational systems and intellectual property, also known as tacit knowledge (Taylor 2001). There are three significant components identifiable from all of these literatures that centred on people, organisation and relationship. The IC embedded in people, referred to as human capital (HC), results from the blending of attributes like knowledge, abilities, attitudes and relationships. It is found in the mind, body and actions of individuals. Its essence is actually the human intellect. Since its scope is within the employee, it is lost to the organisation when people leave the organisation. The organisational component, which is the firm's structural capital, results from the systems, processes, structure, culture, strategy, policy and innovative capacity. The essence is found in organisational routines developed from internal organisational links. The relationship component, termed as social capital (either as internal social capital – ISC or external social capital – ESC), provides value to the organisation through both internal and external links. It explains the value of an organisation's relationships with people with whom it does business.

THEORETICAL FRAMEWORK

The theoretical framework for this research as depicted in Figure 1 represents the relationship between the three components of IC and performance. Each component of IC on its own can impact firm performance but a greater impact is anticipated when one component interacts with another or all three interact with each other.

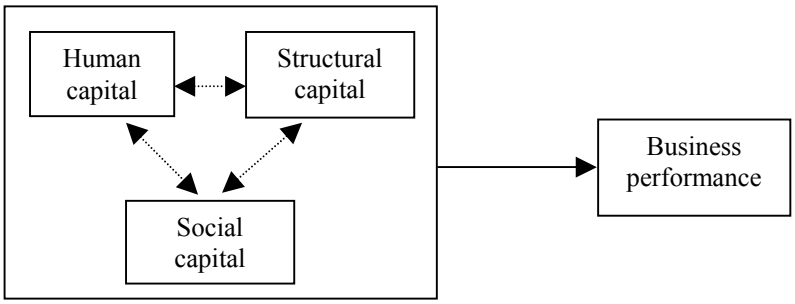

Figure 1. Theoretical framework

The Interactive Effects of IC

To successfully achieve its organisational goal, the firm's HC must be able to interact with its structural capital and social capital. The culmination of these resources builds the organisation and gives it a certain character. Knight (1999) affirms that the interaction of the IC components can create better financial performance which then leads to increased market value. These interactive activities, in fact, occur in a vicious cycle; where a decision to invest in the right HC results in the firm having a pool of competent and capable people to develop better structural capital by which they can create internal and external capital and improve the delivery of product and services which would be reflected in increased performance.

Both HC and structural capital share similar constructs by way of their multi-dimensionality. The multi-dimensional aspects of HC, which encompass the tangible and intangible aspects, static and dynamic aspects and industry-specific and firm-specific aspects, becomes the focus of human resource management in an effort to enhance performance. The intangible aspects of HC include the skills, knowledge, and abilities that employees use to accomplish tasks at hand, and ultimately achieve organisational goals (Edvinsson & Malone 1997; Youndt et al. 1996). While it is important to hire competent individuals from the start, it is this intangible and flexible component of HC that organisations seek to understand and control through the use of human resource practices. Similarly, structural capital can be both tangible and intangible; its tangible nature is found in the firm's hardware and software which support its information technology systems and its structure and operating procedures, while its intangibility is reflected in its routines, culture, business processes and informal ways of doing business (Edvinsson & Malone 1997). Due to this multi-dimensionality, HC and structural capital can have significant impact on firm performance on their own or when acting in concert with another component. Social capital, on the other

hand, is meaningless on its own. It basically serves the function of providing a network of relationships to facilitate the exchange of valuable resources, new information or any other tacit knowledge. Burt (1997) differentiates social capital from HC by etiology and consequences. From the perspective of etiology, social capital is a quality created between people whereas HC is a quality of individuals. From the perspective of consequences, social capital is the contextual complement to HC. As such, the concept of social capital has been used to explain the influence on the development of HC (Coleman 1988) and on economic performance of firms (Baker 1990). Much of this capital is embedded within the network of mutual acquaintance which has developed from a feeling of gratitude, respect and friendship or from institutional membership.

Knowledge possessed by an employee acquired from formal education and skills training often develop into industry specific HC but to bring value to the firm, this HC must be blended with unique routines and procedures made possible by the idiosyncrasies of social capital attributes to produce firm-specific HC. In contrast to industry-specific HC, where resources can move from firm to firm without diminishing its value, firm-specific HC has limited value outside the firm because it is imperfectly inimitable and non-substitutable. Similarly, a firm that is high on structural capital may be able to enjoy the first mover advantage from innovation efforts but such competitive advantage may not sustain for long as competitors may soon catch up. Therefore, to have dynamic resources that are rare, valuable, inimitable, and non-substitutable firms need to possess dynamic relationships among resources nested by factor networks that have specific interrelationships (Grant 1991). The preceding discussions suggest that the interaction among the various components of IC have synergistic effects on performance. Hence,

H1a: The interaction effect of HC and structural capital positively impact firm performance.

H1b: The interaction effect of HC and social capital positively impact firm performance.

H1c: The interaction effect of structural capital and social capital positively impact firm performance.

H1d: The interaction effects of HC, structural capital and social capital positively impact firm performance.

METHODOLOGY

Study Population and Sample

The population frame for this study is composed of all managers of business units drawn from a list of 183 licensed banking institutions, licensed insurance companies and takaful (Islamic insurance operators), development finance institutions, savings institutions, and stock-broking companies obtained from the Bank Negara Malaysia website at http://www.bnm.gov.my. The survey questionnaire, designed to elicit responses from the respondents in respect of their views on the extent of IC in their business units, was conducted at the business level unit of analysis out of consideration for the peculiarities of the IC constructs.

Profile of Respondents

Results from the analysis of the demographic profile of respondents indicate that there is a greater representation of firms operating in the Klang Valley (69%) and in the banking sector (49%). This is viewed as being reflective of the accessibility to respondents. Fifty-two percent of the respondents are manager designated as most of the business units selected were headed by a unit manager and the 32% representing assistant managers were from business units where the managers were not available during the visits. There was almost a fair representation in the types of business units, that is, between branches of companies (55%) and that of companies (45%). About 75% of the companies have been operating for more than 20 years.

Measures

This study adopted both subjective financial performance and non-financial measures to measure performance by applying items adapted from Venkatraman (1989), Huselid, Jackson and Schuler (1997), Youndt et al. (1996) and Bontis et al. (2000). Respondents were required to provide their perceptual estimates of performance using three indicators: revenue growth, profitability, increases in customer base, technological development and overall performance. The measure for HC for this study was operationalised by looking at education, experience and skills representing the level of education, the competence of human resources, ability to accomplish objectives. These items were adapted from the Hitt et al. (2001), Huselid et al. (1997) and Bontis et al. (2000). To measure structural capital, this study adapted survey items relating to the extent of knowledge documentation, routinisation of practices, keeping track of organisational

memory and facilitating organisational learning from Edvinsson and Malone (1997) and Youndt et al. (1996). Measures of systems efficiency, easy access of information, and internal climate that supports new ideas and innovation were adopted from Bontis et al. (2000). Survey items to measure internal social capital was adapted from the empirical studies of Tsai and Ghosal (1998). To measure external relationships, survey items were developed by making adaptations to the works of Pennings, Lee and Witteloostjuin (1998). Questions were developed to measure the extent of HC, structural capital, ISC and ESC in the firm using a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The scale used to measure performance was represented by a set of fixed range percentages where 1 = (0%–5%) and 5 = (>20%).

Data Analysis

Data were analysed using SPSS 11.5 for Windows. Descriptive statistics were computed to ensure that all data were coded correctly and to obtain details of the demographic profiles. Measures of adequacy sampling were conducted to identify any preliminary relationships among the variables examined, followed by factor analysis and reliability analysis to identify a common construct within some of the dimensions. Results of the factor analysis gave the following dimensions for each IC component; HC – skills, experience and education, structural capital – implicit knowledge and explicit knowledge, ISC, and ESC – future customer relationship, social interaction and former contact. Finally, hierarchical regression analysis was conducted to test the hypotheses in determining the interactive effects.

RESULTS

The effects of any interaction were determined by examining the relative power of a set of independent variables on respective dependent variables. A significant coefficient for the interactive models was interpreted as having an interaction effect. A differential impact of the interactions among the independent variables on performance were considered as statistically significant if indicated as such by the change in R^2; where R^2 is the percentage of variability in the dependent variable that was explained by the significant factors and the respective predictive ability is obtained by looking at the corresponding beta value (Hair, Anderson, Tatham & Black 1998).

Two-Way Interactions

Of the 37 two-way interactions conducted to determine their significant impact of the interactions between IC components on financial performance, only two of such interactions were found to be statistically significant as shown by Model 2 (Table 1). In both cases, ESC generated by keeping in touch with former staff bring a more significant impact on performance when it interacts with HC skills ($\beta = 2.242$, $p = 0.004$) and with ISC ($\beta = 2.761$, $p = 0.000$). The interactions between any two IC components were also found to have significant effects on non-financial performance. As can be seen from Model 2, the model as a whole was able to explain 34.6% of the variance in non-financial performance while the R^2 change explained an additional 12.6% of the variance. The most significant contribution to non-financial performance is from the interaction between HC experience and ISC ($\beta = 2.281$, $p = 0.003$).

TABLE 1
RESULTS OF TWO-WAY INTERACTIONS ON FIRM PERFORMANCE

DV: Financial performance					DV: Non-financial performance				
Model	R^2	ΔR^2	ΔF	Sig. ΔF	Model	R^2	ΔR^2	ΔF	Sig. ΔF
1	0.170	0.170	6.574	0.000	1	0.221	0.221	9.055	0.000
2	0.296	0.126	1.252	0.164	2	0.346	0.126	1.346	0.099
Model	Two-way Interactions		Beta	Sig.	Model	Two-way Interactions		Beta	Sig.
2	ESC former contact* HC skills		–2.242	0.004	2	HC experience* ISC		–2.281	0.003
	ESC former contact* ISC		2.761	0.000		HC education* HC experience		0.991	0.023
						HC education* ISC		1.632	0.036
						ESC former contact* HC education		–0.783	0.033
						ESC former contact* ESC social interaction		0.791	0.040

The levels at which these interactions were most significant can be better explained by looking at the interaction plots shown in Figures 2 and 3. Figure 2 shows the graph of the impact of the interaction between HC skills and ESC former contact. When ESC former contact is low and moderate, the impact of HC skills on financial performance is positive. It is more positive when ESC former contact is at moderate level. However, when ESC former contact is high, the impact of HC skills on financial performance is negative when HC skills is low to moderate and positive when HC skills is moderate to high.

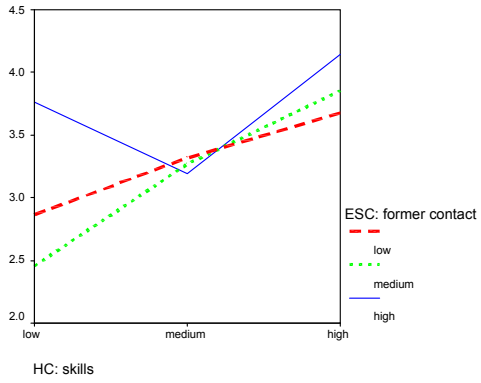

Figure 2. Human capital and external social capital

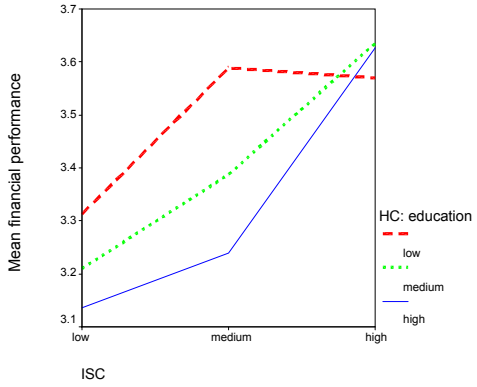

Figure 3. Internal social capital and human capital

The interaction between HC education and ISC is illustrated in Figure 3. There is no evidence of any interactive effects when ISC is low to medium but when ISC is medium to high, then a positive impact of ISC on non-financial performance is positive when education is medium to high but no impact when education is low.

The Three-Way Interactions

With the addition of the three-way interactions to the hierarchical regression model, the variance explained in the financial performance increased by 6.6% and 6.2% in the non-financial performance. The results of the three-way interactions on financial and non-financial performance is summarised in Table 2.

TABLE 2
RESULTS OF THE THREE-WAY INTERACTIONS ON PERFORMANCE

DV: Financial performance					DV: Non-financial performance				
Model	R^2	ΔR^2	ΔF	Sig. ΔF	Model	R^2	ΔR^2	ΔF	Sig. ΔF
1	0.170	0.170	6.574	0.000	1	0.221	0.221	9.055	0.000
2	0.296	0.126	1.252	0.164	2	0.346	0.126	1.346	0.099
3	0.398	0.101	0.948	0.561	3	0.472	0.126	1.347	0.098
Model	Three-way Interactions		Beta	Sig.	Model	Three-way Interactions		Beta	Sig.
3	HC skills* ISC* ESC social interaction		–10.744	0.013	3	HC skills* ISC* ESC social interaction		–11.884	0.004
	HC skills* ESC future customer* ESC social interaction		8.441	0.039		HC skills* ESC future customer* ESC social interaction		11.688	0.002
						HC education* HC skills *ESC future customer		–5.349	0.003
						HC education* StC explicit* ISC		–5.943	0.027

As shown in Table 2, Model 1 as a whole managed to explain only 17.0% of the variance in the financial performance and 22.2% for non-financial performance. However, after considering the three-way interactions, it can be seen from Model 3 that the model as a whole now is able to explain 39.8% and 47.2 of the variance in financial performance and non-financial performance respectively.

Graphical presentations of these interactions at different levels of HC skills, ISC and ESC social interaction on financial performance are shown in Figures 4a–4c. In Figure 4a, when HC skill is low and ESC social interaction is low, there is no impact of ISC on financial performance but is positive only when social interaction is medium and ISC is medium to high. However, when social interaction is high, the impact of ISC on financial performance is positive only when ISC is low to medium. From Figure 4b, it can be seen that when HC skills is medium, the impact of ISC on financial performance is positive at all levels of ISC and for all levels of social interaction. In the case of high HC skills, Figure 4c shows that the impact of ISC on financial performance is positive only when ISC is low to medium ESC social interaction is at low level and high level but when ISC is medium to high and ESC social interaction is low the impact of ISC on financial performance is just marginal and at high ESC social interaction level the impact of ISC on financial performance turns negative.

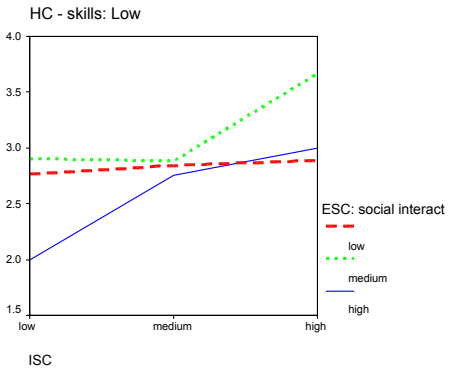

Figure 4a. Low human capital with internal social capital and external social capital

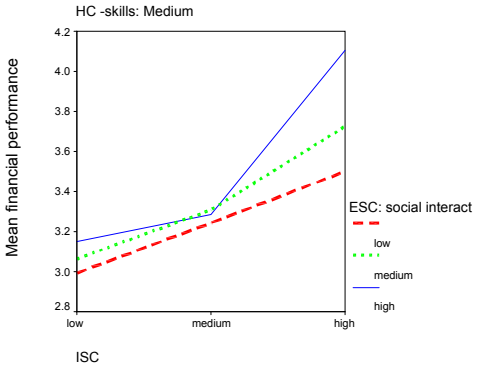

Figure 4b. Medium human capital with internal social capital and external social capital

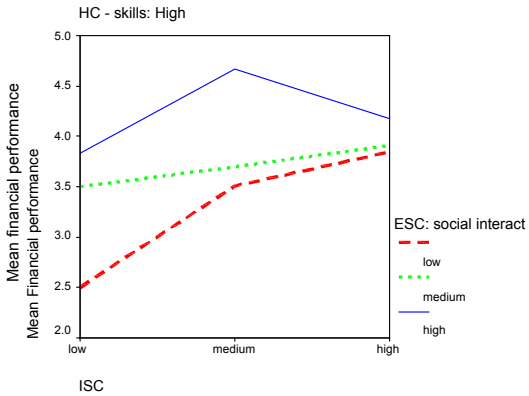

Figure 4c. High human capital with internal social capital and external social capital

As can be seen from Table 2, the two sets of HC and ESC interactions described earlier as giving significant impact on financial performance are also giving similar significant impact on non-financial performance, albeit at different levels. This can be seen in Figure 5a, when HC skills is low and ESC social interaction is low, the impact of ISC on performance is almost negligible at all levels of ISC. However, when ISC is low to medium and ESC social interaction is medium the impact of ISC on non-financial performance is positive and becomes distinctly positive when ISC is medium to high. When ESC social interaction is high and ISC is low to medium the impact of ISC on non-financial performance is positive but only to turn negative when it is medium to high.

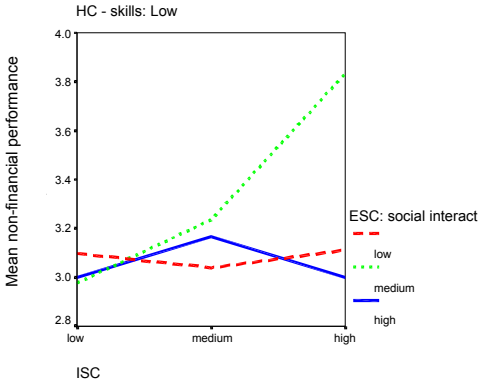

Figure 5a. Low human capital with internal social capital and external social capital

Under a situation where HC skills is medium and ESC social interaction is low, the graph in Figure 5b reveals that the impact of ISC on non-financial performance is positive when ISC is low to medium but becomes negative when ISC is medium to high. Conversely, when ESC social interaction is medium and ISC is low to medium the impact of ISC on non-financial performance is positive at medium level ESC social interaction and is negative at medium to high ISC. There is no interaction when ESC social interaction is high and the impact of ISC on non-financial performance is negative at all levels of ISC. From Figure 5c, it can be observed that when HC skills is high and ISC is low to medium, the impact of ISC on non-financial performance is positive at all levels of ESC social interaction but when ISC is medium to high, the impact of ISC on non-financial performance is marginally negative when ESC social interaction is low, continues to be positive when it is medium but turns negative when it is high.

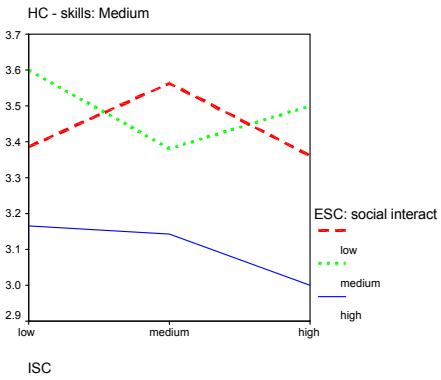

Figure 5b. Medium human capital with internal social capital and external social capital

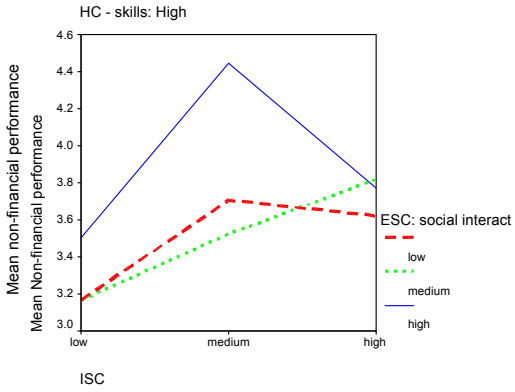

Figure 5c. High human capital with internal social capital and external social capital

DISCUSSION

This research has enhanced the understanding of how IC brings value to business. It explored the findings of earlier researches in investigating the relationship between each IC component and performance. Specifically, it attempted to answer the questions relating to the impact of IC on firm performance, the extent that each IC components impact performance focusing on whether the IC components, when acting in concert would be able to explain additional variance in performance. Existing literatures also imply that IC possesses certain degree of dynamism and therefore, is adaptable but there is no definitive discussion as to what types of combinations of IC components are meaningful or what specific impact such combinations would have on performance.

This study also provides one of the initial empirical tests in Malaysia on specific key issues related to IC and how it contributes to performance. Firstly, this study confirms the suggestion that the key driving forces in the contemporary business environment has moved from the management of tangible resources to the exploitation of intangible resources manifested in the knowledge and expertise possessed by employees, the leveraging of organisational learning through codification of implicit and explicit knowledge, and the availability of a specific medium to provide a platform for sharing through social relations and networks. Secondly, although each of these resources, on their own, contributes to firm performance, it is only when the components act in concert do we find firms achieving differential outcomes.

Overall, the results of this research provided strong support for the arguments that while each IC component facilitates value creation for the firm, it is the interactions among the components or within the dimensions that enhance the value of the firm. This is evident form the results of a two-way or three-way interactions where social capital on its own did not show any impact on performance but when interacted with HC or structural capital or even with another dimension of social capital, the impact on performance becomes significant. The results clearly indicate that to sustain competitive advantage through having dynamic capabilities, firms need to be able to manipulate the interactive activities of their intangible resources. This is consistent with the arguments put forth by Amit and Schoemaker (1993) that resources which are valuable, unique and difficult to imitate can provide the basis for the firms' competitive advantage and superior performance. To ensure a steady performance and a stable position, a firm is expected to be able to strike an optimal balance between its employment of tangible resources like physical and financial resources and intangible resources like people and technology. Thus, IC is central in capturing the stock and flows of an organisation's knowledge since it represents the knowledge stored in and created by a firm's people, its information systems and processes and its social network (Edvinsson 1997).

Results also show that both HC and structural capital share similar constructs in the sense that each has a unique impact on performance while also being enhanced by and reliant upon other components. On the other hand, social capital is totally reliant upon HC and structural capital. Relationships cannot be used to exchange valuable resources, new information, or tacit knowledge unless competent employees make up the network. Structural capital is required to facilitate the creation and maintenance of social capital through socialisation process and organisational culture. In addition, structural capital in the form of information technology facilitates communication among members of the social network and provides tools for problem solving; that is, structural capital enables

the development of social capital. Thus, social capital is uniquely peculiar compared to the other two components in that it is totally reliant on human and structural capitals.

Limitations

In an effort to understand the impact of IC on performance within the context of Malaysian organisations, the outcome generated from this study can only be regarded to be at an exploratory stage, at best. A number of hurdles still need to be cleared when attempting to answer research questions related to this study. For example, studies on IC have been predominantly associated with information technology. The financial services industry may have undergone numerous radical changes, among which were orchestrated mergers, deregulations and rapid changes in technology, but this industry is still not as innovative as some others in technology-based industries. As such, using this sample may represent a conservative test of the relationship between IC and performance. High technology companies might be able to exhibit a stronger relationship between IC and performance while commodity-driven industries might display weaker relationships. Thus, more within industry studies followed by cross industry studies should be conducted before a more definite pattern would emerge. Then only, a move towards having a universally accepted framework for IC evaluation and measurement could begin to gain acceptance.

In conclusion, successful firms are those that can respond well to the new dynamics of firm competition by being able to strike an optimal balance between their employment of tangible and intangible resources by exploiting the firm's dynamic capabilities in responding the dynamism in the environment.

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