

Exploring theories that explain the accumulation of National Intellectual Capital, Structural Capital and Relational Capital

(NSC 2007- 2010 Project Second Year Report)

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This is the second year report of the three years 2007-2010 project, entitled “Exploring theories that explain the accumulation of National Intellectual Capital, Structural Capital and Relational Capital”. In year 2008-2009, exploring the less-studied organizational level “structural capital” is the focus. An immediate theory connection is “institutional theory helps create and accumulate structural capital”, yet hunches are other theories can also explain structural capital from different perspectives. The two main purposes of this study include:

1. Investigate the less explored “structural capital” for how to create and accumulate this capital.
2. Explore theory connections beyond institutional theory

Since intellectual capital examines intangible assets, this study targets on the healthcare industry for case organizations. Two approaches are employed during this year. Sorting existing theories for rational inferences is a top-down approach. A bottom-up approach of three case hospitals – Wan Fang, Far Eastern, and Tsuchi helps unveil the factors that formalize structural capital. Since the focus of the second year study is “structural capital”, the following literature review will be limited to structural capital only.

I. Definition of Structural capital

Compared to other components of intellectual capital, namely human capital and relational capital, structural capital is less obvious and requires more careful specification (Carson et al., 2004). Therefore, clarifying “what is structural capital” is important. Structural capital is the knowledge and intangible assets that remain in the firm when employees leave work, including information systems, distribution networks, brands, patents, processes, organizational structures, systems and concepts

(Mouritsen et al., 2001; Roos et al., 1997). This capital embraces all forms of knowledge not supported by the human being such as organizational routines, process handbooks and database, and many more (Boisot, 2002; Walsh and Ungson, 1991). Conventionally, structural capital refers to the processes and procedures that are in some way recorded and accessible to the organization to maintain effectiveness (Carson et al., 2004). It is formed by the intellectual input of the employees but belongs to the firm and can be reproduced and shared within the firm (Stewart, 1997; Carson et al., 2004). Hubert (1996) proposed that structural capital of a firm consists of four elements, namely systems, structure, strategy, and culture. System is the way in which an organization's processes (information, communication, decision-making) and outputs (products/services and capital) proceed. Structure is the arrangement of responsibilities and accountabilities that defines the position of and relationship between members of an organization. Strategy means the goals of the organization and the ways it seeks to achieve them. Culture represents the sum of individual opinions, shared mindsets, values, and norms within the organization. In other words, structural capital consists of the structural elements with which the organizational members interact to create more knowledge or get the work done (Johnson, 1999).

Furthermore, structural capital is sometimes called “organizational capital”. It deals with the system and structure in the firm that can help support employees for optimum intellectual performance. In addition, visible assets such as the patents of the firm, copyrights, database, computer programs and intangible assets such as the methods related to business management and the culture of the company could be the factors defined to measure the organizational capital. According to the discussion above, intellectual property, infrastructure assets, innovation capital and process capital are also included (Bozbura, 2004). More specifically, it is the sum of all assets that create the ability of the organization including the mission of the firm, its vision, its basic values, strategies, working systems and internal firm processes (Bozbura, 2004).

From a more general perspective, structural capital can be regarded as the knowledge at the organizational level while human capital as the knowledge at individual level and relational capital as the knowledge at group level (Ordones de Pablos, 2004). In other words, structural capital is knowledge at organizational level through the internalization of both individual and group knowledge during the

learning process (Ordones de Pablos, 2004).

II. Importance of Structural capital

Structural capital is one of the foundation stones of creating a self-renewal learning organization (Bozbura, 2004). Even though employees possess sufficient or high capabilities, yet weak rules, systems and the inability to turn the capabilities into a value would prevent the firm from having a high performance. On the contrary, strong structural capital creates a supporting environment for its workers to take risks for organizational renewal. In Nonaka and Takeuchi's (1995) spiral of knowledge creation, the spiral which moves from individual level towards organizational or inter-organizational level ends up with the first knowledge creation spiral by generating embedded knowledge, namely structural knowledge.

The fast changing competition in today's business environment makes organizational knowledge obsolete in a shorter period of time. The firm needs to exploit the structural knowledge to efficiently create or acquire strategic knowledge that serves as a source of competitive advantage (Ordones de Pablos, 2004). A firm with strong structural capital will create favorable conditions to utilize human capital and to boost its relational capital and then increase or create its competitive advantages (Chen et al., 2004). Therefore, the knowledge-based structural capital has become the source of the competitive advantage for a company.

In addition, structural capital also adds value when it contributes to a cost reduction or a product improvement, which may reduce total cost and increase a firm's profit and productivity (Bozbura de Pablos, 2004). From the cost transaction theory, companies tend to invest significant resources into its capital management to reduce risk and to capitalize on its productivity potential when the uniqueness of structural capital increases (Ordones de Pablos, 2004).

The following comparison of the elements of structural capital based on several researchers helps us more clearly understand the concept and the difference of the major components of structural capital (Bontis et al., 2000).

Table 2 The comparison of structural capital elements

Annie Brooking	Goran Roos	Thomas Stewart	Nick Bontis
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<p><u>Infrastructure assets</u></p> <p>All the technologies, processes and methodologies that enable company to function</p>	<p><u>Organizational capital</u></p> <p>All organizational, innovation, processes, intellectual property and cultural assets</p>	<p><u>Structural capital</u></p> <p>Knowledge embedded in information technology All patents, plans and trademarks</p>	<p><u>Structural capital</u></p> <p>Non-human assets or organizational capabilities used to meet market requirements</p>
<p><u>Intellectual property</u></p> <p>Know-how, trademarks and patents</p>	<p><u>Renewal and development capital</u></p> <p>New patents and training efforts</p>		<p><u>Intellectual property</u></p> <p>Protected asset and has a legal definition</p>

Conformity to expectations for behavior is the means through which firms gain legitimacy and acceptance in the eyes of stakeholders (Huselid, Jackson & Schuler, 1997). According to Crossan et al., (1999), the organizational learning is a dynamic process of strategy renewal occurring across individual level, group level and organizational level. The institutionalizing process is the last stage in the organizational learning process (Ordonez de Pablos, 2004). The key challenge that the firm must face is the transformation of learning across individual, group, organizational and inter-organizational levels. The conversion process from individual knowledge to organizational knowledge is called institutionalization. Structural capital is knowledge within an organization created through the institutionalization of individual and group knowledge in the firm during the learning process (Ordonez de Pablos, 2004). The importance of institutionalization leads to the reification of knowledge as explicit and treats all knowledge as easily distinguishable from human experience.

III. Dynamics of Structural Capital

From a dynamic perspective, structural capital is essentially “captured” human capital, and depends on the skills of human capital for its existence (Carson, et al.,

2004). Structural capital is subject to human capital, for the reason that human capital is a determinative factor of the organizational form. However, structural capital exists independently from human capital after influenced by human capital. Since structural capital and human capital enable the firm to develop and use innovation capital and customer capital, a firm with sufficient structural capital will create valuable circumstances to facilitate human capital to achieve its potential and boost its innovation capital and customer capital. A proper structure can efficiently exploit the human capital and customer capital and thus increase the firm's value (Chen, et al., 2004).

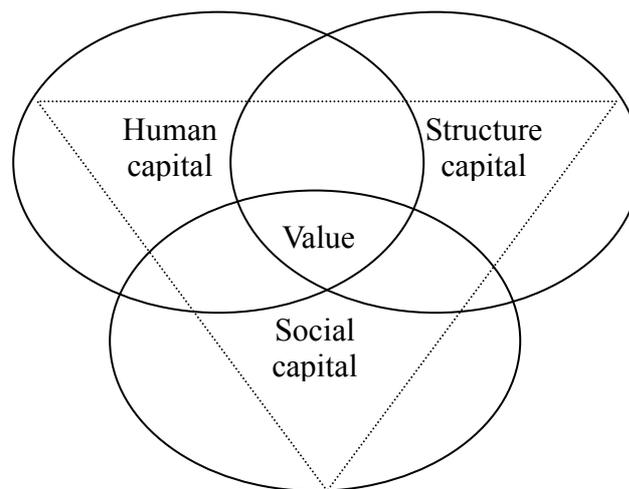
Yet, structural capital will not have a direct relationship with the firm's performance. It would be useless if the workers in the firm don't have the abilities to use the visible assets such as the system and make them knowledge (Fitz-enz, 2000). As long as they are not put to use, the existence of systems that possess knowledge is not means of adding value (Bozbura, 2004). In addition, structural capital can contribute to human capital by enabling the transfer of knowledge of procedures, processes etc., to individuals or groups in the firm by training or induction (Carson, et al., 2004). Social network in the workplace plays a significant role when human capital and structural capital interact with each other.

Bontis (1998) also advocated that structural capital contains the mechanism and structure of the firm to help the employees for optimum intellectual performance and business performance. Thus, structural capital can be viewed as the organizational knowledge focused on converting human capital into intellectual capital (Swart, 2006). In addition, the cultural dimension of structural capital usually resembles the influencer of the content and process of communication, shared objectives and organizational membership (Keenan, 2000). Only certain type of culture capital is conductive to innovation, learning and the conversion of human capital into intellectual capital (Swart, 2006).

Structural capital can also support and promote the development and creation of social capital. It enables the firm to establish relationships within network that are external to the firm (Swart, 2006). The way in which work is organized together with the customer relationship strategies within the organization will influence the closeness of the firm and its customers (Swart and Kinnie, 2003). From the discussion

above, it is realized that structural capital can not singly work efficiently in the firm. It is only when it interacts with the other two capitals that structural capital can contribute to the firm well.

Edvinsson and Malone (1997) proposed a value platform of intellectual capital which predicts the interrelationship between the three major components of intellectual capital, as shown in the following figure. As scholars stated intellectual capital= human capital + structural capital + social capital, the dotted line represents the management of the intellectual capital, and the objective of the firm is to increase to number of inter-relationships to maximize the firm's value. Unfortunately, many managers are currently incapable of collaborating because of their mental orientation and their lack of interpersonal skills. They have never been exposed to environments with a level of interdependence that would encourage them to develop the interpersonal skills that collaboration requires.



The value platform of intellectual capital

From the above literature review, we know that structural capital can be tackled from various perspectives with various dimensions. As mentioned earlier, structural capital is a less studied capital among the major components of intellectual capital for its complexity. This researcher attempts to build a structural capital model that can assess and guide the creation and accumulation of this very important capital.

IV. Methods

As described in the project proposal, health care industry is the target of this second year study. Three hospitals, namely Wan Fang Hospital, Far Eastern Memorial Hospital, and Tsuchi Hospital have been selected as the case hospitals. Semi-structured in-depth interviews were conducted to explore their strategy, structure, systems, and organizational culture.

As both top-down and bottom-up approaches were adopted to investigate the accumulation of structural capital, the preliminary results of both approaches are described hereunder.

V. Top-down approach – Extensive literature review

After a comprehensive review of relevant theories, the following theories from strategy, operation, and interface level may contribute to the accumulation of structural capital.

Strategy level:

Prospect theory

Resource dependency theory

Organization – environment fit theory

Operation level:

Structural contingency theory

Social cognition theory

Expectancy theory

Organization development theory

Institutional theory

Interface level:

Power/politics

VI. Bottom-up approach – In-depth interview 3 hospitals

The following table summaries the interview results based on organizational culture, strategy, structure, system, and innovation.

Structural capital based on the interview scripts and archive data of three hospitals

Structural Capital components	Wan Fang Hospital	Far Eastern Memorial Hospital	Tsuchi Hospital
Culture	Patient-centered, two-way information flow, renewal mentality, embracing change, team work, core persons are partners rather than employees, respect diversity, artistic atmosphere	Self-determined goal setting, team work, make something different	Four “Wholes” – whole person, whole process, whole team, and whole family
Strategy	Niche medical technology, name brand, innovation, ISO 9000, 14001, 18001 certification to meet international standards, art gallery	Become patients’ best choice for heart surgery	Outreach to the poor, the weak, and aboriginal areas; overseas rescue and relief, provide patient comfort through religion
Structure	Support of Taipei Medical school, good medical equipment, flat organization	“Organ” system department, patient association, team structure	Six hospitals covering the north, central, south, and east part of Taiwan. Tzuchi International Medical Association with 58 stations in 11 countries (Jan. 2009), own TV station, radio station
System	Patient information system for immediate response, reward for informing irregular medicine response, journal paper awards, overseas training for a whole team, problem-based learning/practicing,	Strong mutual support, seed doctor to teach new medical technology, 24 hours out-patient care, two-way information flow improvement, solid training, unified	Volunteer system, covering health care, charity, education, humanity, environment issues. Volunteers evaluate doctors, no basic salary – performance based

	worldwide e-journal, evidence-based medicine, morning meeting everyday for every department, detailed internal control, flexible service flow, digitalized case reporting system, quality and SOP	medical treatment process, case review	
Innovation	Medical technology patents, niche technology - skin care	Artery pick up for bypass with micro incision, micro incision surgery	

From the summary of the above table, Figure 1 was drawn to delineate the formation of structural capital with the theories that apply to its stage development.

1. Stage one – institutional theory

Initial structural capital is formulated through *institutionalization*, such as basic infrastructure is similar in the same industry.

2. Stage two – structural contingency theory

As time goes by and conditions change, existing structural capital may erode or decrease. New structural capital building is required for companies to survive and thrive; *structural contingency theory* plays a role in the reformulation of structural capital. The contingency may result from the interactions of *prospect theory*, *resource dependency theory*, and *environment-organization fit theory*.

stage 2.1 – prospect theory

In the reformulation process, the prospect held by the organizational members is very important.

stage 2.2 – resource dependency theory

With the prospect, matching resources need to be ready to build the desirable structural capital

stage 2.3 - environment-organization fit theory

The prospect and resources have to be examined through the lenses of environment-organization fit to come up with the desirable culture, strategy,

structure, and system.

3. Stage three – social cognition theory

The above structural contingency stage needs to be socially recognized by the top management team and all the organizational members, that is when *social cognition theory* comes in. With the cognition, consensus of organizational goals should be reached and the platform for achieving the goals should be built.

4. Stage four – expectancy theory

The actual structural capital formulation should be processed through people, that is each relevant individual should understand what to achieve, how to achieve it, and what to expect. This is when *expectancy theory* comes in.

5. Stage five – organization development theory

When all the above stated elements are ready, a period of time is required to promote, formulate, and develop the planned structural capital. *Organization development theory* applies at this stage.

6. Stage six – institutional theory again

When the desirable structural capital is well developed, it has to be *institutionalized* for company wide implementation.

How Figure 1 model works for structural capital accumulation is elaborated hereunder with the evidences from the three hospitals.

1. Stage one – institutional theory

At the initial stage, all three hospitals have similar infrastructure based on the industry standard.

2. Stage two – structural contingency theory

As time goes by, each hospital has its own evolution with a clear structural contingency according to the prospect/vision, available resources, and perceived environment-organization fit. Yet, these theories and processes apply to every hospital and are elaborated hereunder.

stage 2.1 – prospect theory

Wan Fang – to become patient-centered and artistic hospital, to obtain ISO certification

Far Eastern – to become patients' best choice for heart surgery, with the support of a strong surgery team

Tsuchi – outreach to the poor, the weak, and the aboriginal areas; to provide

international relief

stage 2.2 – resource dependency theory

Wan Fang – Taipei Medical School

Far Eastern – well-trained medical doctors from National Taiwan Hospital and nurses

Tsuchi – donation including money and volunteers' time

stage 2.3 - environment-organization fit theory

Wan Fang – southern part of Taipei city is seriously lacking medical resources

Far Eastern – Pan Chiao area is also lacking of medical resources, in addition the heart disease is rapidly increasing

Tsuchi – the hospital is originated in the east coast of Hwalien, where well-equipped hospitals are lacking

3. Stage three – social cognition theory

Top management teams of the three hospitals are pretty successful in advocating their visions to the employees. As a result, each hospital has its niche market with clear organizational goals.

4. Stage four – expectancy theory

From the performance of each hospital, it should be fair to say that employees know what to expect in each hospital.

5. Stage five – organization development theory

Each hospital has gone through a clear path of organization development to come to this stage.

6. Stage six – institutional theory again

At the present stage, the current structural capital of each hospital has apparently been institutionalized.

VII. Conclusion

This second year study focuses on conducting a comprehensive literature review to identify relevant theories that explain the accumulation of structural capital. As a result, a total of eight theories were identified at the strategy, operation, and interface level (power/politics theory functions in the “platform” in Figure 1) for an organization to progressively accumulate structural capital. Three hospitals were selected to examine the application of the identified theories. Apparently, events

reported in the hospital interviews prove the applicability of the Structural Capital Formation Model proposed by this study.

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Figure 1 Structural Capital Formation

