

Knowledge Capital Accumulation and Value Creation: Based on Learning and Relationship Network Theories

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ABSTRACT

This study proposes an easy-to-use model for firms to create their own values. It explores the importance of learning activities, collaborative networks, knowledge value creation and their interrelationships. This paper also identifies the interactive process between capital accumulation and value creation. It explains how utilizing flexible human capital and integrated social capital through collaborative relationship networks, learning activities can accumulate intellectual capital and bring important knowledge value to an enterprise above its financial book value. A firm with the model will create its competitive values, by identifying the learning activities for critical knowledge and utilizing its relationship networks to enhance the learning effectiveness.

**Keywords: learning, collaboration, relationship networks,
knowledge value, intellectual capital, innovation**

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I. Introduction

Peter Drucker (1998) pointed out that the productivity of knowledge and knowledge workers become the decisive factor, especially for most industries in the developed countries, and knowledge not only is a resource but also makes resources mobile. Thus, to create a firm's value beyond its financial book value, it is important to make its members more knowledgeable and its resources more mobile to be shared and utilized. In this research, we propose an easy-to-use model for firms or entities to help creating their own values from their learning activities for critical knowledge via their relationship networks.

At first, the research explains the power of learning activities to shape a firm's core competences and the leverage of the relationship networks in enhancing the effectiveness of learning efforts. After that, it explains that the effect of learning activities and relationship networks on creating its values. Besides, it describes the interactive process between capital accumulation and value creation. At final, some recommendations for applying the model are suggested.

1. Contributions

- (1) This research provides a model of helping organizations in conceptually understanding the effect of learning activities and relationship networks on creating their values.
- (2) The model presented in this study can be applied as a diagnosing process for a firm's value creation. It can be easily used as analyzing current status and designing the next-step plan for improvement: (a) the learning activities for critical knowledge, (b) the relationship networks for enhancing the learning effectiveness, and (c) the competitive values generated from (a) and (b).

II. Literature Review

1. Learning Theory

According to Pawlowsky (2001), organizational learning involves four dimensions: learning modes, learning types, system levels, and learning process. Besides, to utilize knowledge and get benefit from learning, we have to consider learning strategy as the fifth dimension. The discussions for the above five dimensions are as follows.

(1) Learning Modes

Theories of learning fall into board classes: behavioral learning and cognitive learning (Nelson and Debra, 2000; Starbuck and Hedberg, 2001). The behaviorist approach to learning assumes that observable behavior is a function of its consequences and places little reliance on the perceptions of decision-makers. Alternatively, cognitive learning emphasizes the perceptions of decision-makers. Each approach has weakness. As the two approaches complement each other, Leroy and Ramanansoa (1997) suggest that using both approaches together gives a more complete picture. Besides the above two perspective, Pawlowsky (2001) deems that the learning modes include the perspective of culture, which has its roots in an interpretative approach to human behavior and builds on the notion that members of organizations create a set of intersubjective meanings.

(2) Learning Types

Learning Types can be classified into type I: single-loop or adaptive learning, type II: double-loop or reconstructive learning, and type III: deutero or process learning (Argyris and Schön, 1978; Herberg, 1981; Morgan, 1986; Lundberg, 1989, Probst and Büchle, 1997; Palowsky, 2001). Single-loop or adaptive learning is the process of adjusting effectively to given goals and norms by mastering the environments. Double-loop or reconstructive learning is the process of questioning

organizational norms and values, and building a new frame of reference. Deutero or process learning means learning to learn, and consists of gaining insight into the learning process (Probst and Büchle, 1997).

(3) System Levels

Senge (1990) provides a systematic view of learning, and deems that there are five principle of learning: *surpassing the self, improving mental models, establishing a shared vision, team learning, and the core being the fifth principle – systematic thinking*. Senge views a learning organization as a place where people are constantly driven to discover what have caused the current situations, and how they could change the present.

Pawlowsky (2001) points out that that learning can be defined for the individual, the group, the organization, and the interorganizational levels. Organizational learning involves “sharing” in the social system. According to Nonaka and Takeuchi (1995), along with the knowledge spiral, learning needs more interaction between entities in order to transform and absorb knowledge.

(4) Learning Process

Learning is a continuous, never-ending process of knowledge creation (Björkegren and Rapp, 1999). Nonaka and Takeuchi (1995) deem that learning is a process cycle between tacit and explicit knowledge, and also between personal and shared knowledge. Nonaka and Takeuchi (1995) identify that (a) four models of knowledge transformation are *socialization, externalization, combination, and internalization*, (b) five elements promoting a spiral of organizational knowledge creation are *organizational intent / ambition, employee autonomy, creative chaos, redundancy*, and (c) five-stage model of the process for organizational knowledge creation are *tacit-knowledge sharing, concept creation, concept confirmation, prototyping, and*

cross-level knowledge expansion. Pawlowsky (2001) suggests an organizational learning process as a cycle of information identification and knowledge creation, knowledge exchange and diffusion, knowledge integration, and the transformation of new knowledge into action.

(5) Learning Strategy

Clegg (1999) suggests that competitive advantage is gained through two distinct kinds of organizational learning: exploitative learning and exploratory learning. Exploitative learning suggests that the detailed prescription of tasks is the best basis for production efficiency. By Exploitative learning, continuous improvement develops via the structuring of desire, understanding, and trust. On the other hand, exploratory learning allows for complex searches, innovation, variation, risk-taking and more relaxed controls, providing flexibility, investments in learning, and the creation of new capabilities. Exploratory learning is valued for a long term. However, Clegg argues that a critical managerial dilemma is how to manage the relationship between exploratory and exploitative learning. An emphasis on exploitative learning may restrict experimentation and crush innovation. Exploratory learning might also lead to too many undeveloped ideas and too little distinctive competence. According to Clegg, a rational balance of exploitative and exploratory learning depends on the distribution and relations of power and knowledge constituting that organization.

According to Yeung *et al.* (1999), business organizations conduct different approaches to learning in order to make themselves competitive. These approaches are segmented by *exploitation vs. exploration* and *experiences from the inside vs. the outside of the organization*. They are (a) experimentation: exploration and learning through direct experience, (b) competence acquirement: exploration and learning from the experiences of others, (c) benchmarking: exploitation and learning from the experiences of others, and (d) continuous improvement: exploitation

and learning through direct experience.

Zack (1999) suggests that an organization should have a knowledge strategy to align its knowledge resources and capabilities to the intellectual requirements of its strategy. Zack deems that exploitation and exploration are not mutually exclusive. An organization may need to develop one area of knowledge while simultaneously exploiting another. The ideal for most companies is to maintain a balance between exploration and exploitation within all areas of strategic knowledge. In addition, a firm that has the most conservative knowledge strategy is oriented toward exploiting internal knowledge. On the contrary, an unbounded innovator represents the most aggressive strategy. Especially, in knowledge-intensive industries, a firm that pursues an aggressive knowledge strategy tends to outperform those competitors who pursue less aggressive knowledge strategies over time. Zack gives the examples of Lincoln Re, Buckman, Big6 and Image Corp as evidences that a firm that operates in industries where knowledge is changing rapidly enough needs an aggressive strategy to keep up with the pace of change.

2. Relationship Network Theory

(1) Relationship Networks

A network of relationships (or called *relationship network*) refers to the “social context” formed due to substantive relationships, psychological relationships, or relationships of interests between entities. Substantive relationships may be based on contracts, agreements or treaties. Psychological relationships may be trust, empathy or mutual understandings. Relationships of interests may be joint ventures, stakeholders, or a superior-subordinate relationship. These formation reasons of relationships may co-exist.

The types of relationships may be personal relationships, commitment between individuals and organizations, or interactions

between organizations. Relationship networks between businesses are appropriate in facilitating the acquisition and transfer of new knowledge, especially in circumstances where there is uncertainty between knowledge inputs and product outputs. There are several reasons of forming collaboration networks from different perspectives as follows:

- **Resource Control.** Between the ends of market transaction and internal organization, a collaborative network is another form of resource control (Wu, 1998). In the network, parties could enjoy the benefits of professional specialization and reduce transaction costs. According to Grant (1996), there are three basic alternatives of transfer and integration of knowledge: *internalization within the firm, market contracts, and relational contracts* (individual strategic alliances or broader inter-firm networks). Besides, inter-firm collaboration through relational contracts can increase efficiency in knowledge integration while uncertainty over linkage between knowledge inputs and product outputs exist.
- **Interdependence and Complementation.** The collaborative network could include the key innovative entities (such as university R&D, enterprise R&D, alliance of related industries), and thus the caused positive externalities and spillover effects would reduce cost or risk (Feldman, 1994). Besides, innovation of small firms lacking resources can benefit from external institutions and resources. Interaction and cooperation are necessary for the successful innovation as innovation activities become more complex and uncertain (Teece, 1986). If an innovator is lacking certain complementary resources, it should obtain them to maintain its competitive advantages. Especially, the difficult-to-replicate complementary asset can be viewed as a choke point in the value chain, which allows its owner to earn super-normal rents (Teece, 1998). Wu (1998) also deems that a network enables its members to obtain key resources (complementary assets and

knowledge sources) and thus improving their competitiveness.

- **Ecology.** The power of a single organization is relatively insignificant. Confronted by pressure from the environment, organizations had better choose collaboration strategy to expand the whole resources (Wu, 1998). Morita and Takanashi (2000) deems that knowledge management places emphasis on discovering tacit information, and its focus should be on human ecology, especially interpersonal networks.

(2) Social Capital

According to Leana & van Buren (1999), social capital has been described as an attribute of individual actors who realize advantages owing to their relative status or location in a group, and on a macro level, it has been described as an attribute of communities, nations, and industry networks.

Bourdieu (1986) was the first sociologist to systematically analyze the concept of social capital (Dika and Kusum, 2002). Bourdieu (1986) suggests that a network of relationships is a valuable social resource, providing its members with *collectively-owned* capital and a kind of “*credential*”. This kind of capital is frequently embedded in *mutual acquaintance and recognition*. Bourdieu (1986:248) defines social capital as “the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition”. Two elements of social capital defined by Bourdieu are the social relationship that allows the individual to claim resources possessed by the collectivity, and the quantity and quality of those resources (Portes, 1998; Dika and Kusum, 2002).

Coleman proposes that social capital is intangible and has three forms: (a) level of trust, as evidenced by obligations and expectations, (b) information channels, and (c) norms and sanctions that promote the

common good over self-interest. Social capital is inherent in the structure of relationships between and among actors.

Bourdieu views social capital as a tool of reproduction for the dominant class, whereas Coleman views social capital as (positive) social control, where trust, information channels, and norms are characteristics of the community (Dika, and Kusum, 2002).

Leana & van Buren (1999) deems that organizational social capital is a resource reflecting *the character of social relations* within the organization, realized through *collective goal orientation* and *shared trust* of members. Social capital is categorized into *associability* (collective goals & actions) and *trust* (fragile vs. resilient trust, dyadic vs. generalized trust).

Nahapiet & Ghoshal (1998) suggests that social capital is “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.” Social capital includes the network itself, as well as the resources that can be mobilized through the network. Social capital consists of three highly interrelated facets: *structural*, *relational*, and *cognitive dimensions*. According to Tsai & Ghoshal (1998), social capital promotes value creation.

3. Intellectual Capital and Knowledge Value

(1) Intellectual Capital

“Intellectual capital” is knowledge that can be converted into value (Edvinsson and Sullivan, 1996). A company’s value can be categorized into financial capital and intellectual capital (Roos *et al.*, 1998). Financial capital is sum of property assets and monetary assets, while intellectual capital can be divided into human capital and structural capital. Synthesizing the discussions in literature, this research has re-classified the components of intellectual capital as shown in Table 1.

Table 1: The Components of Intellectual Capital

Human Capital
(1) Competences: personal abilities, knowledge, skills and experiences of all employees
(2) Work attitudes including value created by the behavior of employees at work, which is affected by the employees' motivations, behavior and character
(3) Agile responsiveness: innovative ability, imitative ability, adaptive ability, and integrative ability
Structural Capital
(1) Procedural capital: business process and production management (e.g., quality control) program
(2) Innovation capital: <ul style="list-style-type: none"> ● Infrastructure (including tangible system used to communicate and store intellectual materials, organizational structure, and intellectual property rights) ● Organizational innovative culture ● Renewal and development value – the intangible part of any object, and anything that can be used to create value in the future through improving financial capital or intellectual capital.
(3) External relationships: relationships with clients, suppliers of raw materials, business affiliates, shareholders, and other investors

Source: Adapted from Roos *et al.* (1998) and Edvinsson & Malone (1997)

(2) Knowledge Value

The logic of organizational strategies should be founded on value, and be driven by the needs of consumers (Wu, 1998). The sources of knowledge value include (a) diversified combinative product inventions, (b) various value-added innovative activities, (c) value chain restructuring, (d) embedded or developed tacit knowledge, (e) integration of existing knowledge to develop unique acumen (Wu, 1998; Zack, 1999). The characteristics of knowledge value consist of (a) uniqueness and difficulty to imitate, (b) difficulty to purchase ready-to-use knowledge from the

marketplace, (c) much time consumption for competitors to acquire similar experiences, (d) certain limits for competitors to accelerate learning by increasing investment (Miller & Shamsie, 1996; Teece, 1998; Wu, 1998; Zack, 1999). By exploiting the characteristics of knowledge value, an organization can get some competitive advantages. According to Edvinsson and Sullivan (1996), there are several major sources of value for knowledge firms: innovations created by human capital, innovations coupled with structural business assets, and the firm's ability to leverage the intellectual property of other companies. This research has further categorized knowledge value as in Table 2.

Table 2: Types and Some Examples of Knowledge Value

Types	Examples
Business value	Brands, products, processes, services, intellectual property rights
Customer value	Customer relationships, contracts, database, information sources
Employee and team value	R&D capabilities, tacit understanding, growth
Organizational structure value	Plans, programs, processes, innovative culture
Alliance value	External relationships, complementary resources acquisition, resource sharing, collaborative development capabilities, synergy

III. Conceptual Model and Propositions for Knowledge Value Creation

Based on learning theory (e.g. learning strategy, modes, types, and process, and system levels), relationship network theory (e.g. resource control, interdependence and complementation, and ecology, and social capital theory) and from the view of intellectual capital, which are discussed in the above literature review, a conceptual model of creating

knowledge value is proposed as shown in Figure 1. At the beginning, the structures of relationship networks will be explained, since it will be more specified than the past literature. After that, the propositions regarding the relationships among learning activities, collaborative networks, and knowledge value creation will be discussed.

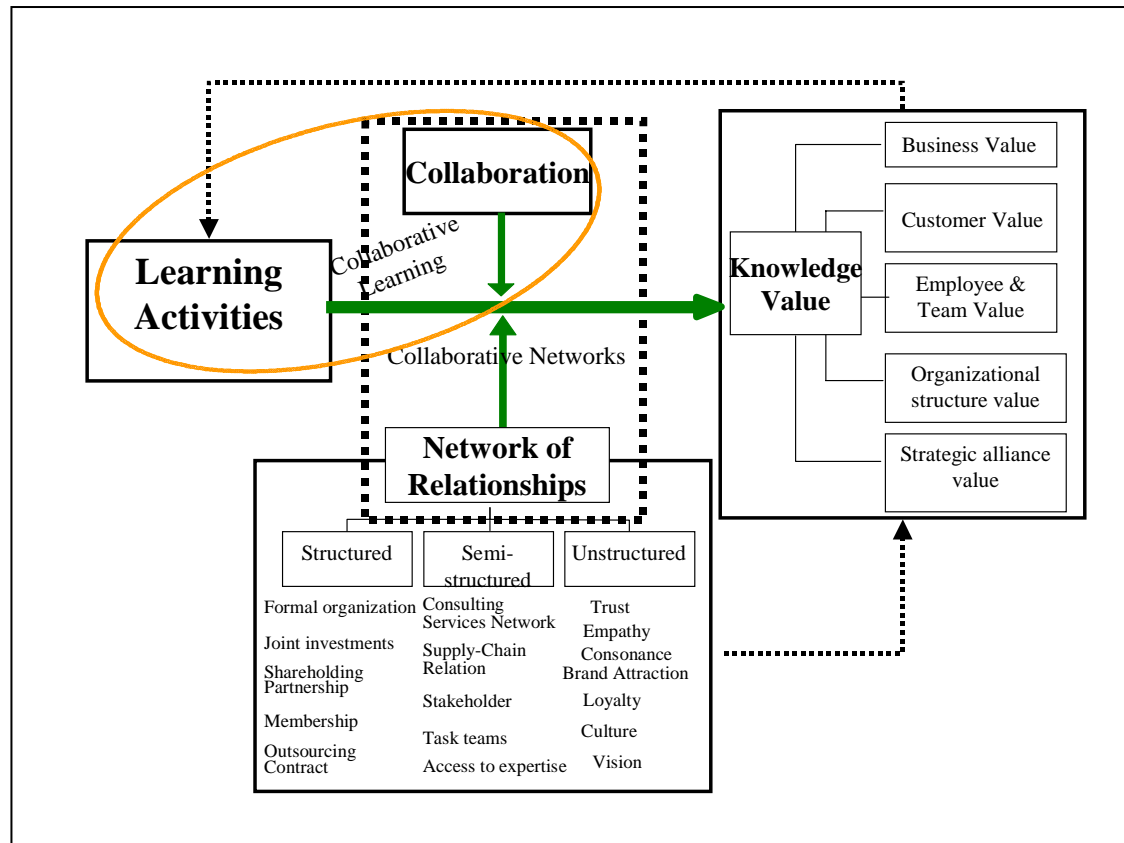


Figure 1: A Conceptual Model of Knowledge Value Creation

1. Structures of Relationship Networks

The networks of relationships can be categorized into structured, semi-structured and unstructured according to their degrees of structures. As a network of relationships becomes more tacit, its degree of articulation would decrease and then it would tend more unstructured. The relationships include internal and external interactions. Furthermore, as shown in Table 3, the former can be classified into interactions between two individuals, an individual and his (her) related team, an individual and the organization, two teams (or departments), one team (department) and the organization. The latter further includes alliances

among organizations, between the organization and external consultants, as well as the organization with customers.

A structured relationship is more likely to be a formal organization, or relationship governed by explicit rules or restrictions, such as articles of contracts or constitutions. There might be a codified common language as its medium of communication and sharing. An unstructured relationship is more likely to be an informal organization or a relationship through long-term interpersonal interactions. Most of its constraining rules are implicit, or could come from some intangible forces, such as shared visions, trust, mutual recognition or understanding.

In fact, the varieties of relationships come from combinations of some restrictive and attractive forces. In some cases, a relationship may be dynamically created because one party is given some powers or the other party is forced to do something. In other situations, there may be a certain magnetic, attractive guiding force driving someone to do voluntarily. The former can be explained by power-politic and coercion theory, while the latter is related to social exchange theory and trust theory. In respect of trust theory, according to Jone and George (1998), trust may be conditional or unconditional. They indicated that development of such special abilities (kind of tacit knowledge) depends on unconditional trust between individuals. Only unconditional trust will promote high-level interpersonal collaborative and effective relationships.

Table 3: Structures of Relationship Networks

Network Structure(Internal Interaction)			
Involved Entities	Structured Relationship	Semi-structured Relationship	Unstructured Relationship

Individual & Individual, Individual & Team, Individual & Organization	Formal organization (regular project teams, organizational superiors & subordinates, master & trainee), formal agreements between individual & organization (contracts, professional rules, confidentiality agreements), quality control systems, regular meetings, employee shares	Irregular task teams, relationship with colleagues from past projects or prior to transfers, master & trainee relationship (for special duties), irregular meetings	Informal organizations (occasional task teams for special events, temporary master & trainee relationship, family & friends relationships), obedience to experts, mutual trust, empathy, personal loyalty to organization, personal identification with organization, enterprise culture, etc.
Team & Team (Department & Department) Team (Department) & Organization	Regular committees as communication channels	Special committees, communication between contact persons or mediators	Committees for special events, mutual trust, empathy, enterprise culture, etc.
Network Structure(External Interactions)			
Involved Entities	Structured Relationship	Semi-structured Relationship	Unstructured Relationship
Alliance among Organizations, Organization & External Consultants	Shareholding partnerships, exclusive & general cooperation agreements, complementary resources between subsidiaries, relationship with parent company after merger & acquisition, joint investments, out-sourcing relationships	Non-express contractual relationship of channels (supply chain, distribution chain), stakeholder relationships, communication channels with external experts	Mutual or tacit understanding between organizations
Organization & Customers	Customer procurement contracts, maintenance agreements, membership systems, customer shares	Responsible customer services, customer inquiry services, customer product maintenance units	Brand attraction, customer trust, customer loyalty

2. Relationships among Learning Activities, Collaborative Networks, and Knowledge Value Creation

(1) Effect of Learning Activities on Knowledge Value Creation

According to Nonaka and Takeuchi (1995), when the learning effects have been internalized to become an individual's foundation of tacit knowledge through socialization, externalization and combination, learning activities can create a valuable asset, i.e., the accumulation of human capital. When a majority of members within an organization utilize the same tacit mental model, this knowledge would become a part of organizational culture, which is part of the structural capital within intellectual capital. Further, the style of learning activity will result in differences in enterprise performance. According to the study of Yeung *et al.* (1999), the learning styles of 3M and HP are "experimentation". 3M has continued to produce new products, and sell an average of 600 new products a year. The learning styles of Mckinsey and Anderson Consulting are "competence acquirement". The acquisition of new skills is the main driving force behind their growth, and they also make profits by selling intellectual capital. The learning style of TSMC has been "continuous improvement" since it continuously sought to improve its manufacturing processes. TSMC increases its production capacity for semi-conductors and strives to be cheaper, better and faster than other leading competitors. The study of Yeung *et al.* (1999) also indicated that "benchmarking" style firms not only failed to improve performance, but also experienced substantial barriers to learning. According to their explanations, if an enterprise fails to place importance on innovation, while it might be cost effective to replicate the methods of other companies, it would be difficult to absorb the methods successfully. Benchmarking learning is rarely successful if it is adopted alone. In addition, according to the "Top 100 of e-Value Survey" (conducted by the "eWorld" magazine through a panel of experts), not only does TSMC

rank first amongst the 2000 major Taiwanese enterprises being assessed, it also ranks first in the categories of internal operations, external relationships, and leadership styles. Therefore, we state:

***Proposition 1:** The more learning activities (such as exploration, exploitation, or innovation) a firm is engaged in, the more intellectual capital and higher knowledge value can be created.*

(2) Reciprocity between Collaboration and Relationship Networks

The establishment of an affiliated relationship does not guarantee success. However, if there have been pleasant collaboration experiences, then the organization will possess the ability to overcome new and unfamiliar circumstances, and so to maintain subsequent relationships. Problems owing to the complexity of knowledge, cultural or organizational differences will be reduced, because the moderating effect of collaboration will reduce the possible “ambiguity” of knowledge. Such an effect will be also beneficial to knowledge transfer between organizations and future maintenance of the relationship networks (Lei and Slocum, 1992; Powell *et al.*, 1996; Simonin, 1999).

Collaboration and partnership can be considered as tools of organizational learning. According to Teece, Pisano and Shuen (1997), learning is by nature a collaborative and social concept. Except for learning by imitation (such as in teacher & student, or master & trainee relationships), organizations should also learn by jointly pursuing the understanding of complex problems.

Thus, we postulate:

***Proposition 2:** The reciprocity between collaboration and relationship networks exists, i.e., collaboration promotes greater closeness in relationship networks, and the existence of a relationship network will be beneficial to collaboration.*

(3) Effect of Relationship Networks on Knowledge Value Creation

The influences of a relationship network on the creation of knowledge value may be positive or negative as shown in Table 4. Many advantages are generated from relationship networks, although there are several disadvantages brought by relationship networks. To reduce possible disadvantages (including the conflicts of interest and the public infringement of private guanxi), as Dierkes *et al.* (2001) and Nonaka *et al.* (2001) suggest, an organization needs a shared vision that orients the entire organization to its target knowledge and wins spontaneous commitment by the individuals and groups involved in knowledge creation. Nonaka *et al.* (2001:505) points out that top management have to articulate the vision of target knowledge and communicate it throughout and beyond the company.

Table 4: Influences of a Relationship Network on Creation of Knowledge Value

Within Organization	
Pros (positive)	Cons (negative)
<ul style="list-style-type: none"> ● Self-organization and reinforcement with positive feedback ● Trust relationship is beneficial to risk acceptance ● Promoting development of intellectual capital (Coleman, 1990) ● Leveraging knowledge effectiveness <ul style="list-style-type: none"> - More willing to share knowledge - Complement each other - Collaboration ● Stable employment and an interactive relationship between workers and managers are beneficial to achieving high levels 	<ul style="list-style-type: none"> ● Inertia hindering organizational restructuring, e.g. conservative norms (Coleman, 1990) ● Produces common blind spots, such as “group-thinking” (Janis, 1982) ● Costs of maintaining relationships (Leana and van Buren, 1999) <ul style="list-style-type: none"> - Efforts on absorbing new members into organizational norms and value system - Input by old members, such as spent time, resource waste and other opportunity costs ● Burden of interpersonal relationships ● The ethical issue of business guanxi: Some people ruthlessly use

<p>of performance (Levine and Tyson, 1990)</p> <ul style="list-style-type: none"> ● Explicit collaboration, trust and coordination building through the experience of working together will be beneficial to achieving high levels of performance (Pil and MacDuffie, 1996) ● Unstructured relationships (such as positive interpersonal, informal interactions) are beneficial to compensating for the gaps in structured relationships (such as formal contracts) 	<p>guanxi in their pursuit of personal gains, causing egregious or invisible long-term permanent damage to the society (Fan, 2002)</p> <ul style="list-style-type: none"> ● Formation of organizational reaction forces <ul style="list-style-type: none"> - E.g., cohesion of cliques is greater than commitment to the whole organization ● The goals of the unstructured relationship networks conflict with the goals of the structured relationship networks, which may result in inconsistent actions and dilution of organizational strength
Between Organizations	
Pros (positive)	Cons (negative)
<ul style="list-style-type: none"> ● Collaboration reduces ambiguity in knowledge transfer ● Resource complementary, acquisition of capabilities ● Risk sharing in collaborative R&D ● Moving from organizational learning to learning economy, mutual growth through positive inter-organizational interactions ● Flexible network structure, flexible acquisition of required resources 	<ul style="list-style-type: none"> ● Costs of maintaining relationships – combination and maintenance of diverse cultures ● Risk of losing the advantage from unique technology. A monopolist must adopt unbalanced strategies to incorporate weaker parties into its forces, otherwise it would risk losing the advantage ● Upon completion of a project, nodes of the related knowledge network would disappear. Unless properly maintained and recorded, knowledge will be lost suddenly.

The unstructured relationships, as shown in table 3, created by

intangible centripetal forces towards the organization, such as trust, culture, vision, commitment, and mutual and tacit understandings, are frequently the keys to the successful creation of knowledge value. The complementary interrelations among unstructured, semi-structured and structured relationships could enhance the quality of the relationships, so as to create a positive environment for innovation. For instance, in Chaparral Steel there is a culture of high sharing that has helped to remove many vertical and horizontal obstacles, and production workers are free share their views in any problem situation (Leonard-Barton, 1992, 1995).

With the Internet development, there will be a change in an individual's feeling of belonging towards a company. A manager must change his/her management attitude with a more open mind, and the key to business success is to create a "consonance" culture (Morita and Takanashi, 2000). Therefore, in order to enhance employees' capabilities effectively, the prerequisite is not only that top management must indicate the proper business vision, but also that the vision must be recognized and trusted by all company employees. Furthermore, as Tushman and O'Reilly (1997) stated, a vision accepts all conflicts. Innovative management is related to management of conflicts; while maintaining consistency and control, it also allows variances and learning on the job. High-level managers should resolve all conflicts and should appropriately utilize the tension and compromising effects caused by the simultaneous manipulation of multiple capabilities. Only through a clear vision is it possible to mediate between the several conflicts, and to manage the "innovative streams" in advance.

The quality of network members influences the quality of the relationship networks. The formation of a flexible and strong collaborative network by selecting the right partners at the right times, together with the reconciliation of intra-organizational and

inter-organizational structured, semi-structured and unstructured relationships, will be the key to create knowledge value. In addition, when balancing the relationship between an individual and the organization, development of organizational capital should be focused on management of relationships within internal organization and among external organizations, rather than emphasizing on the reduction of costs (Wu, 1998; Leana and van Buren, 1999).

After above discussions, we state:

Proposition 3: *The more relationship networks that help in facilitating the acquisition and transfer of new knowledge, the more intellectual capital and higher knowledge value can be created.*

(4) Effect of Collaborative Networks on Knowledge Value Creation

Wu (1998) stated that collaboration is a voluntarily induced long-term relationship of interdependence. It involves compromise of self-interests and mutual benefits. By devoting resources to each own specialized area under a balanced and interdependent relationship, the network would bring greater benefits to all parties. Collaboration would lead to a win-win situation in the pursuit of individual and organizational goals. According to Suomi and Pekkola (1999), assuming rational market mechanisms, a comparison of competitive and collaborative behaviors is given in Table 5.

Table 5: Comparison of Competitive and Collaborative Behaviors

	Competitive Behaviors	Collaborative Behaviors
Principal Emphasis	<ul style="list-style-type: none"> ● Zero-sum game ● Winning in the marketplace ● Conflicts 	<ul style="list-style-type: none"> ● Non-zero-sum game, pursues win-win situation for individual and organization ● Complexity of relationship ● Harmony between the parties
Non-princip	<ul style="list-style-type: none"> ● Collaboration 	<ul style="list-style-type: none"> ● Competition

al Emphasis	<ul style="list-style-type: none"> ● Complexity of relationship ● Renewal and growth of living standards 	<ul style="list-style-type: none"> ● Winning or losing in the marketplace
Role of Competition	Deciding who's winner	Work undertaken by collaboration, competition is a secondary driving force
Role of Information Technology	<ul style="list-style-type: none"> ● Developing competitive advantage ● Increase barriers to competition 	<ul style="list-style-type: none"> ● Develop continuous advantage for all members ● Reduce barriers to collaboration

Source: Edited from Suomi and Pekkola (1999)

In collaborative networks, learning will create new knowledge by means of communication and conversation. According to Davenport and Prusak (1998), knowledge may be produced through informal networks of independent organizations. Giving sufficient time, these organizations may become more formal organizations. Social groups that come together because of common interests or relationships of interests will converse with each other through intermediaries, so as to share their professional knowledge and solve problems together. When members in such a network have shared sufficient knowledge to ensure the effectiveness of communication and collaboration, continuing communication will often produce new knowledge.

Business success increasingly depends not only on improvements in efficiency, but more importantly on injecting concepts and knowledge into products and services themselves, so that these products and services can be developed quickly and commercially adopted (Nonaka and Takeuchi, 1995). The integration of new concepts and knowledge, so as to produce outstanding functionality and benefits, frequently requires the involvement of many different experts. It means traditional business practices must also be reformed. Therefore, there is a need for

cross-functional, or even cross-organizational collaboration (Hastings, 1993).

In order to manage the diverse combinations within a collaborative connection, and to accumulate capabilities to benefit each other from the interdependence, it is absolutely necessary to have cooperation experiences (Powell *et al.*, 1996). The lack or neglect of collaborative experiences is frequently criticized as the main causes of alliance problems and failures (Lei and Slocum, 1992). Evidence shows that past experiences will lead to the appearance of unique collaborative know-how, which consequently helps subsequent alliances achieve greater benefits (Simonin, 1999). Collaborative know-how would influence organizational abilities to adopt proper mechanisms of collecting, interpreting, or distributing information. According to the study of Simonin (1999), companies with greater levels of collaborative know-how are better able to cope with the barriers created by the complex nature of a technological capability spread across various organizational units and areas of expertise, and better able to overcome cultural and organizational differences with their partners. Collaborative know-how is the source of collaborative advantage; it reinforces the ability to overcome new and unfamiliar circumstances. When there is lack of collaborative know-how, businesses may try to employ people familiar with its partnership culture, and carry out training programs to avoid the impacts of cultural and organizational distances.

According to a survey conducted by Booz-Allen and Hamilton in 1995 (cited in Friedham, 1998), out of the Fortune top 500 companies, the 25 U.S. companies that placed the greatest emphasis on alliances had an average rate of return on investment in excess of 17%, while the average rate of return for the 500 top companies was merely 12%. The average rate of return for the 25 companies that placed the least emphasis on alliances was only 10%. In addition, alliances could produce a strong

learning effect, which occurs in the U.S. as well as all over the world. The rate of return achieved by experienced companies through alliances was two times that of inexperienced companies; the rate of success of alliances was also higher than that achieved by mergers and acquisitions or speculative funds (Friedham, 1998).

Therefore, we state:

***Proposition 4:** The reciprocity between collaboration and relationship networks will be beneficial to creation of knowledge value.*

A relationship network is a very valuable resource in a human society. As expressed by Nahapiet and Ghoshal (1998), “social capital” is the aggregation of actual and hidden resources that can be obtained from an individual or a social unit’s relationship networks. These resources are either embedded in or derived from relationship networks. Social capital includes the network itself, as well as the resources that can be activated through the network. According to the empirical study conducted by Tsai and Ghoshal (1998), social capital promotes value creation. A recognized collaborative network will become important intellectual capital. Such an intangible asset with an innovative nature will create its own value. Thus, we postulate:

***Proposition 5:** Collaborative networks are valuable social capital, which is one of essential components of the intellectual capital.*

(5) Effect of Collaborative Network on the Learning Effect on Value Creation

Dodgson (1993) stated that collaboration potentially encourages a higher level of learning. It not only provides the possibility for learning new technology, but also enables us to learn about the possibility of creating future technologies that could affect current business methods. It will teach new ways for doing business and even change the nature of business. Complicated technical learning relies on the flexible

collaboration of the departments within an organization. The five-stage model of the organization knowledge creation process, presented by Nonaka and Takeuchi (1995), requires collaborative networks. For example, in stage 1, mutual trust is helpful for sharing; in stage 2, group discussions are beneficial to concept creation; in stage 3, a collective vision and consistent organizational goals are contributive to concept confirmation; in stage 4, the development of prototypes further depends on the expertise integration of different departments (since this process is relatively complex, flexible collaboration of the departments within the organization is also crucial); and in stage 5, cross-level expansion knowledge by related businesses, customers, suppliers, competitors and other entities can be generated through organizational interactions (Nonaka and Takeuchi, 1995).

Positive relationship networks embedded in organizations are conducive to knowledge transfers (Argote, 1999). Learning via voluntary collaboration helps promoting innovation. According to the study by Kim and Mauborgue (1999), a firm seeking value innovation must possess a culture of willingness to share and collaborate. Only when every person is willing to collaborate will there be knowledge creation and sharing. In the voluntary collaboration situation, everyone may exceed his (her) scope of duties, voluntarily contributes his/her own expertise, and devote efforts or energy. On the other hand, compulsory collaboration is compelled by the organizational power, which enforces members to follow its rules, regulations and standards to work together. To achieve the status of voluntary collaboration, it needs unstructured relationships (such as trust and commitment). Compulsory collaboration alone will not be effectively able to provide the knowledge necessary for value innovation (Kim and Mauborgue, 1999).

If the chain of learning activities is built upon a collaborative network, knowledge value will be constantly produced and reinforced

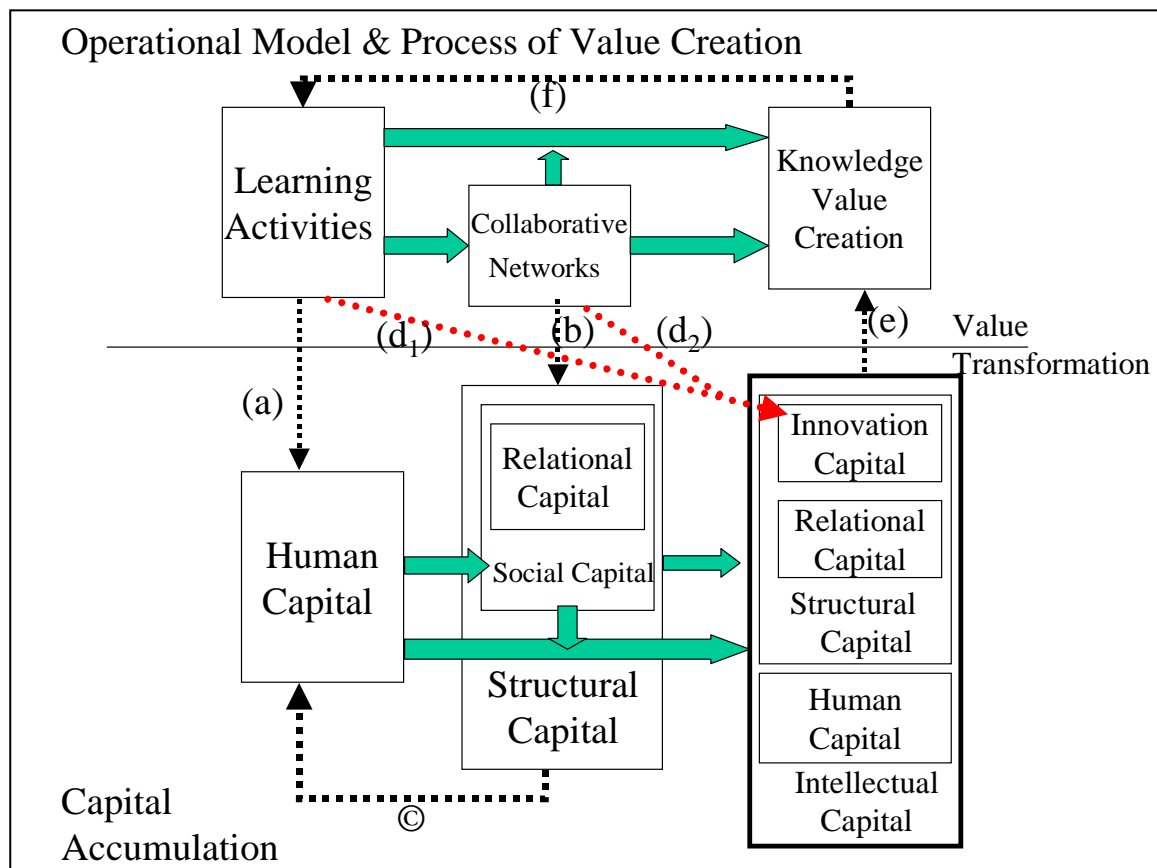
through learning. In the process of learning activities, new products (services or technologies) are created; new knowledge is constantly acquired through learning, and is also combined with existing knowledge. This process not only replicates existing knowledge, but also creates new knowledge by virtue of the chemical reaction of knowledge combination. It then materializes and embeds acquired new knowledge into current work or processes, so as to create new products (services or technologies). These new products (services or technologies) are the fruits of learning, and finally businesses will be able to profit from management of intellectual property. Thus, we state:

***Proposition 6:** The collaborative networks will enhance the influence of learning activities on knowledge value creation; in other words, the more voluntary collaboration in a relationship network, the higher the effect of learning on a firm's value creation.*

3. Interaction between Knowledge Capital Accumulation and Value Creation

Innovative knowledge strategies should be adopted to plan various kinds of organizational learning activities. An organization relies on learning activities through collaborative networks to strengthen its core competences and create knowledge value continuously. Actually, this entire process of value creation can accumulate the various elements of intellectual capital. The interactive process between capital accumulation and value creation, as shown in Figure 2, is described as follows. (a) Learning activities can inspire creativities and competence of employees, and then accrue to human capital, which becomes a part of intellectual capital. (b) In collaborative networks, social capital is accumulated and thus structural capital is enriched. (c) Social capital, as a component of structure capital, helps attracting, keeping, and developing good people, and thus helps enhancing human capital (Baker, 2001). (d_{1*2}) The intellectual property rights, which can be generated from the learning

activities within collaborative networks, are a form of innovation capital. The excellent interactions with customers as well as strategic partners contribute to relational capital. (e) Finally, intellectual capital is accumulated. The firm can utilize it as business intelligence, in order to enhance its market value and competitiveness. (f) As a type of learning, the firm may adapt or even reconstruct its learning goal as well as strategy in case it needs to adjust effectively to given goals, or even build



a new frame of reference since its environment has been changed.

Figure 2: Value Accumulation and Transformation Process

IV. Conclusion

Production in the Industrial Age was industrial capital; however, in the today's economy the means of production is knowledge capital (Housel and Bell, 2001:21). Although a firm's market value consists of financial capital and intellectual/ knowledge capital, the latter brings

important knowledge value to an enterprise beyond its financial book value. Knowledge capital is composed of human and structural capitals. A firm can realize huge bottom-line benefits by managing and leverage its knowledge capital.

The Learning activities of critical knowledge contribute to human capital. The relationship network contributes to structural capital. To generate innovation, human capital needs the support of structural capital. The collaborative networks help enhancing the influence of learning activities on knowledge value creation.

An organization's learning activities depend on its learning strategy to close strategic knowledge gap. To reach that purpose, they involve different learning modes and learning types in the learning processes toward capturing certain knowledge of different system levels. Through learning activities, an organization can reinforce core competences to attract its partners.

Valuable relationship networks give their owner a competitive advantage. One might acquire its lacking key knowledge via these networks. Structured relationships provide parties articulate responsibilities and obligations, which also imply certain control and power. Semi-structured relationships provide an organization more managerial flexibility and give its members more autonomy. Unstructured relationships such as trust, innovative culture and shared vision are very helpful to the creation of knowledge value. Collaboration is important for learning in case the target knowledge is tacit, complex, and/or ambiguous. In the positive feedback, the learning activities in collaborative networks become more active. And thus, the more intellectual capital and knowledge value are created as well as accumulated. It not only creates wealth, but more importantly it also attracts more partners, and bring more resources and opportunities. In other words, the collaborative networks are taken to be incubators, where continuous learning and

innovative activities create more knowledge value and business opportunities.

V. Practice Implications And Recommendations

An organization is encouraged to create its innovative values by applying the model, as shown in Figure 1. At first, it has to identify its critical knowledge and then specify its learning strategy and activities (for example, exploiting its intellectual properties and/or launching its experiments to innovate). Secondly, it need to decide what relationship networks have to be connected in order to enhance the learning effectiveness and thus create its competitive values.

Putting the model into practice, the recommendations are as follows. (a) Managers' support and commitment are keys to success. As Stewart (1997) stated, if management of structural capital is to be successful, leadership is still the most important factor. (b) The identification of critical knowledge is a prerequisite to knowledge learning activities and knowledge utilization and/or development. One might use a critical knowledge function analysis (Wiig, 1995) or develop a knowledge strategy (Zack, 1999) to locate its core competences and key knowledge. (c) Appropriate personnel assignment is beneficial to learning activities, and appropriate transfers are conducive to the development of diversified skills and reasoning abilities. (d) Incentive systems should be fair to enliven the learning activities in collaborative networks. And (e) an organization must have core knowledge resources in order to find its collaborative partners (Wu, 1998). Finally, information technology (IT) plays a vital role in this model. (i) IT is essential to collective learning, networks of relationships, and promoting innovation. IT possesses value-added effects via the accumulation, combination, integration, presentation in new forms, and distribution/diffusion of data, information, and knowledge. Interactive mechanisms for collaboration enable

individuals to communicate directly through sharing tacit knowledge across barriers of time and space. Useful tools include e-mail, work flow systems, database applications, electronic conferences and e-learning, etc. (ii) Information networks enable relationships to become tighter. Knowledge-based products tend to have increasing returns or positive feedback effects. These effects occur through the outcomes of “sharing”, network externalization and customer lock-in (because the more people use the product, the greater the number of complementary products would be developed) (Afuah, 1998). (iii) Although IT could promote and strengthen relationship networks, the unstructured relationships created by intangible centripetal forces (such as trust, vision, commitment, and mutual and tacit understandings) towards the organization are more important. Frequently, these unstructured relationships are keys to the willingness of members to cooperate and share knowledge, as well as whether organizational restructuring and innovation will be successful.

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知識資本蓄積及價值創造：以學習和關係網路理論為基礎

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摘要

本研究以組織學習和關係網路的相關理論為基礎，提出學習活動透過合作式關係網路創造知識價值之模式。其中，結合智慧資本的觀點，探討在此模式中藉由知識而產生的智慧資本的蓄積與轉換成企業價值的互動情形。文中闡述了學習活動、合作網路、與知識價值創造等三者的重要性與彼此間的關係，以及說明了學習活動透過共通合作的關係網路，在活絡人力資本與結合社會資本的運用下，蓄積智慧資本的能量，進而可為企業帶來一般帳面以外的重要知識價值。此些價值有的可轉為財富，有的緊黏在企業體或合作網路關係上，是促使企業與團隊更具競爭優勢的力量。本研究結果將作為組織以知識為基礎，在學習關鍵知識的活動、以及人際與合作關係網路的運作下，創造自我價值之參考。

關鍵詞：學習、合作、關係網路、知識價值、智慧資本、創新