

SMEs and Knowledge-Based Innovation Networks

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Abstract

The hierarchical structure of the conventional organization form was inadequate for the shift towards the customization of product development and global linkages of product markets. In particular, high-tech industry characteristics are short product cycles and rapid market changes. Therefore, network systems defined by long-term relationships are essential to innovation and networks offer a competitive advantage, in terms of innovations. In the era of knowledge economy, high-tech firms are facing dynamic competitive and rapid changes in global marketplaces. They have to emphasize the creation, accumulation, diffusion, transferring and application of knowledge to accelerate product, service and process innovation and value creation to meeting the needs of customers. Therefore, the main research problem for the study is "why should, and how can, companies create and operate knowledge-based innovation networks for value creation and to meeting the needs of customers?" The integrated model can be an easy-to-follow innovation model for high-tech SMEs to address when adopting knowledge-based innovation network. This helps to ensure that the essential determinants and approaches for innovation processes. In other words, from sources of innovation, open innovation, cooperation innovation to innovation network for implementation/commercialization.

Key Words: Knowledge-based innovation networks, High-tech, SMEs.

Introduction

In response to the intensification of global competition, many firms throughout the world have developed international operation strategies to establish a worldwide production, distribution, and marketing network (such as Intel and Microsoft). Investments in globalization operation such as high-tech industry are frequently made due to the strategic benefits that they can bring.

In the field of New Industrial Economics, since the early 1980s, co-operation in innovation moved in the center of interest, for two reasons: 1. New industrial economics by its very nature moved away from the idea of perfect competition by invoking the structure-conduct-performance-approach, wherein, besides prices, other means of competition, that is, marketing, R&D etc., play a role in determining firm behavior; and with the arrival of game-theory as a formal tool of analysis, additionally the explicit investigation of firm interactions becomes possible. 2. The discussion was inspired by new decisions and policies concerning the possible outcomes of allowing firms to collaborate in so-called pre-competitive R&D, despite strong anti-trust regulations (Pyka, 2002).

In the era of knowledge economy, high-tech firms are facing dynamic competitive and rapid changes in global marketplaces. They have to emphasize the creation, accumulation, diffusion, transferring and application of knowledge to accelerate product, service and process innovation and value creation to

meeting the needs of customers. In high-tech manufacturing firms, there is an increasing importance of innovation, in which knowledge turns into the main source of competitive advantage (Miles, 1993; Miles, 1994).

Szeto (2000) assumed, in long-term development, innovation sources solely relying on internal resources will limit the capacity of the firm and may also slow down the performance of the corporation. If drawing innovation resources from collaborations with network members, the sources of the resources will be amplified to enrich the innovation capacity of firms, to accelerate the transfer of innovation knowledge and to diffuse it to the hierarchy of firms as if a chain of innovation were pulled into the core of firms and pushed back to network members outside. From a network perspective, innovation emerges from collaborations or alliances for new developments (Szeto, 2000).

According to above backgrounds and motivations for the research, the main research problems for the study are:

- ◆ How can cross-organizational integration be effectively achieved to create seamless innovation?
- ◆ What “outside” environment is suitable for the development of innovation capacity of firms?
- ◆ Why should, and how can, companies create and operate innovation networks and alliances for value creation and to meeting the needs of customers?

According to the backgrounds, motivations and problems of the research, the study aims to:

- ◆ Integrate inter-firm’s innovation resource to create relevant new insights in the field of knowledge, innovation and networks through the theories of research into practices.
- ◆ Accumulate innovation capacity by leveraging sources of innovation, open innovation, cooperation innovation and innovation network.
- ◆ Promote, foster and support collaboration between practitioners, researchers and experts in the innovation network to create new knowledge and practice, create business value and 'supply' knowledge and innovation to meeting customer’s needs.

Literature Review

For discussing the developments of the field of knowledge, innovation and networks, this chapter will review sources of innovation, innovation capacity and innovation network, open-source innovation, cooperation innovation and innovation network.

Sources of Innovation

John Stark Associates (2005) in its innovation management articles, assumed innovation sources in the future as follows:

- ◆ Customers’ customers
- ◆ The company’s customers
- ◆ In-house and external marketers
- ◆ In-house and external R&D
- ◆ The company’s suppliers
- ◆ The company’s management
- ◆ Engineering staff
- ◆ Production workers
- ◆ The company’s competitors

Innovation Capacity and Innovation Network

Innovation capacity can be incrementally or radically increased through the participation of activities that trigger the supply of innovation resources and conversion of the resources as the knowledge base of the firm in an interactive environment (Szeto, 2000). The interaction is a process that provides stimulation to the firm from external sources that may be convertible into innovation resources.

Internally, a firm can further develop the innovation impulse as resources and apply it to new product development that will be turned into the knowledge base of a firm if appropriate codification is systematically implemented (Miczka and Größler, 2010). Externally, inter-organizational network is an environment for the interaction and activities such as joint projects, collaborations or alliances for a specific R&D item and may benefit the participants to various degrees (Szeto, 2000).

Researchers of different perspectives still debate whether innovation can be generated from within a firm’s hierarchy or from within a networked environment. Some scholars’ different viewpoints are expressed in Table 1.

Table 1. The Debate for Innovation Can be generated from within a Firm's Hierarchy or from within a Networked Environment

From within a networked environment	From within a firm’s hierarchy
<ul style="list-style-type: none"> • Studies from a network perspective, inter-organizational network, becoming a new organization form, provides different stimulation through the collaborative activities with network members (Biemans, 1992; Forsgren and Johanson, 1992; Alter and Hage, 1993). • The hierarchical structure of the conventional organization form was inadequate for the shift towards customization of product development and global linkages of product markets (Nohria and Ghoshal, 1997). • Innovation in firms consists of continuous interactive learning that occurs in the context of formal and informal relationships between firms (Freeman, 1991; Stiglitz, 1987; Miczka and Größler, 2010). • Inter firm collaboration is an important source of knowledge; consequently, the degree to which firms learn and increase their stock of knowledge is a function of the extent of their participation in network activities (Levinthal and March, 1994; Brown and Duguid, 1991; Von Hippel, 1988). 	<ul style="list-style-type: none"> • A systemic analysis of the possible sources to maintain “purposeful innovation” when entrepreneurs start their innovation processes within their resources (Drucker, 1994). • Looking for the governance systems that affect firm capabilities in performing various activities (Whitley, 1998; Johannessen, 2013)

Nonaka and Takeuchi (1995) assumed, “What is unique about the way Japanese companies bring about continuous innovation is the linkage between the outside and the inside. Knowledge that is accumulated from the outside is shared widely within the organization, stored as part of company’s knowledge base, and utilized by those engaged in developing new technologies and products”. Since the inside and outside resources of knowledge and innovation are of such importance to accumulating innovation capacity, then what “inside and outside” environment is suitable for the development of the innovation capacity of firms? The fundamental issue is how these organizational environments increase the firm’s capacity for innovation for the continuous improvement of competitiveness.

The hierarchical structure of the conventional organization form was inadequate for the shift towards the customization of product development and global linkages of product markets. In particular, high-tech

industry characteristics are short product cycles and rapid market changes. Therefore, network systems defined by long-term relationships are essential to innovation and networks offer a competitive advantage, in terms of innovations. Consequently, it is too difficult for short-term exchange partners to transfer across organizational boundaries. Thus firms need to establish collaborative arrangements to facilitate the transfer of tacit (experiential) knowledge, of the sort frequently involved in the innovation process. In short, short-term relationships limit the transfer of technical knowledge between two related industries and cause the ability of gaining the essential knowledge to be seriously eroded, because industries cannot quickly create the next generation of products (Von Hippel, 1988; Teece, 1981; Bolton et al, 1994).

Open-source Innovation

According to Teece (1981) successful innovators are finding they must complement their in-house R&D with external technologies and offer up their own technologies to outsiders. R&D at large companies is shifting from its traditional inward focus to more outward-looking management – open innovation – that draws on technologies from networks of universities, startups, suppliers, and competitors.

Open-source innovation is an attractive alternative for micro-firms and SMEs, which have no or very limited funds for internal R&D. Moreover, it is a cost-effective way of “marketing” innovations (Ulhøi, 2004).

More and more firms are exploring “open-market innovation”. This thinking is due to the tools of franchising, joint venture and strategic alliance etc. to absorb free trading strength, to increase the flow of new ideas. According to “open-market innovation”, firms focus on suppliers, customers and even competitors can systematically open innovation boundaries to increase the input and output of new ideas. Thus, firms can improve the speed, quality and cost of innovation. Moreover, “open-market innovation” can lead firms to evaluate the real market value of internal ideas. Thus, firms can identify their self-core business more effectively (Rigby and Zook, 2002).

Recently, Bain & Company surveyed more than two hundred top global executives. The results express that the ideal of chasing for “open-market innovation” is a kind of aspiration which should be constrained. 57% of respondents assumed that their firms placed too much emphasis too much on internal innovation. In addition, the executives of global firms all know that the best creative ideas are not really derived from the R&D laboratories of firms. The case studies found that for some of the fastest growing and most profitable industries, “open-market innovation” will be an important source of competitive advantage (Rigby and Zook, 2002).

The creativeness of “open-market innovation” produces the corporate trend and technological trend of some businesses co-operation and provides four items of advantage (Rigby and Zook, 2002):

- ◆ Input of new ideas is the best way to expand innovation base.
- ◆ Output of new ideas is a good way for collecting cash and maintaining creative employees.
- ◆ Input of ideas can help firms to clarify their strength.
- ◆ Output of ideas can help firms to clarify their strength.

Innovation Networks

Innovation and Interfirm Collaboration:

Innovation in firms is one of continuous interactive learning that occurs in the context of formal and informal relationships between firms (Stiglitz, 1987; Lundvall, 1992; Freeman, 1994). Inter firm collaboration is an important source of knowledge; consequently, the degree to which firms learn and increase their stock of knowledge is a function of the extent of their participation in network activities (Levinthal and March, 1994; Brown and Duguid, 1991; Von Hippel, 1988).

Von Stamm (2004) assumed: “To increase the odds of success, leaders need to understand why they should collaborate with outsiders and how to do it effectively.” There are two major benefits of engaging “outsiders”:

- ◆ They challenge company-internal assumptions.
- ◆ They bring a new body of knowledge to the party. Innovation most often happens when some previously unconnected bodies of knowledge converge. So for companies that want to stretch the business boundaries and innovate around markets and business models, external collaboration with other firms and customers is critical.

Innovation and Inter-Organizational Network:

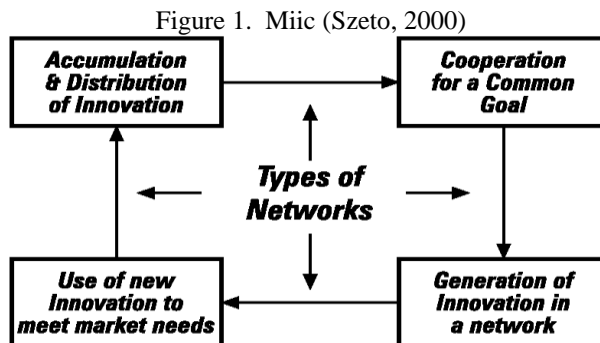
Flows of knowledge on customers’ needs increase the firm’s degree of innovation. The needs and experiences of customer are one of the most important sources of innovation. Externally, the inter-organizational network is an environment for interaction and activities such as joint projects, collaborations or alliances for a specific R&D item and may benefit the participants to various degrees. When thinking of marketing knowledge, one should think of issues such as competition, suppliers, customers, markets, target groups, consumers, clients, users, interested parties, sales, after sales, trade and distribution and relation management (Daniel, 2002).

Knowledge that is accumulated from the outside is shared widely within the organization, stored as part of the company’s knowledge-base, and utilized by those engaged in developing new technologies and products” (Nonaka and Takeuchi, 1995). What “outside” environment is suitable for the development of innovation capacity of firms? Studies from a network perspective (Biemans, 1992; Forsgren and Johanson, 1992; Alter and Hage, 1993) show that an inter-organizational network, becoming a new organizational form, provides different stimulations through collaborative activities with network members.

Sustainability and Network Collaboration:

In long-term development, innovation sources solely relying on internal resources will limit the capacity of the firm and may also slow down the performance of the corporation. If drawing innovation resources from collaborations with network members, the sources of the resources will be amplified to enrich the innovation capacity of firms, to accelerate the transfer of innovation knowledge and to diffuse it to the hierarchy of firms as if a chain of innovation were pulled into the core of firms and pushed back to network members outside (Szeto, 2000).

In network collaboration, sustainability is crucial to the development of innovation capacity. Innovation is hardly a one-time effort due to the incremental nature of innovation; even if the nature is radical, the capacity of the innovation required is sustainable development. If sustainability is absent in the collaboration, continuous improvement of the capacity will be impossible (Szeto, 2000). Nohria and Ghoshal (1997) mention that reactions of network organizations to new opportunities will start from collective actions. Then, codification, accumulation and application of the data will shape the knowledge platform for increasing the innovation capacities that may be exclusive for the network organizations. In practice, the cycle of improvement in which new concepts, experiences and experiments will improve the innovation resources, becomes a mechanism to increase innovation capacity. The above theories within networks generate an MIIC, as shown in Figure 1.



The grounding of the MIIC is the types of networks that determine the generation of new innovation, sharing and renewal of the firm's knowledge through repeated collaboration. Meanwhile, network members may also acquire financial information, the latest technology and marketing intelligence, which supplement the collective innovation activities within networks (Szeto, 2000).

As a whole, the inter-organizational network facilitates the improvement of innovation capacity that comprises the resource and knowledge factors for the network members. With different network types, innovation capacity will be improved with various impacts on product development. For example, the types of network activities activated by SoftCo indicate an MIIC is emerging (Szeto, 2000).

National and Regional Systems of Innovation:

As a common basis, however, a national system of innovation can be understood as a system of structured interactions between agents who are involved in the process of generating technological progress. Their interaction is structured in the sense that relations are often repeated, and thus institutionalized, and in the sense that formal and informal institutions exert an important influence on innovative performance (McKelvey, 1996; Johannessen, 2013).

Some of the most famous examples of outstanding innovative regions are Silicon Valley, Route 128, Wissenschaftsstadt Ulm and Emilia-Romagna, to name but a few. Also, there is a famous outstanding innovative region in Taiwan namely as the Scientific park of HsinChu; its successful semiconductor and IT industries have earned large profits and created many innovative R&D talents (IDC Taiwan, 2005). Recent approaches to explain regional agglomeration advantages claim that it is the clustering of resources and capabilities, which leads to regional technological spillovers, which are the factors responsible for the innovative and economic success of firms in these regions. On the one hand, the localized pattern of development spurs the process of collective learning, in the sense that new know-how is diffusing more quickly, thereby enhancing the creative capacity of the firms and institutions in the region. On the other hand, the dynamic uncertainty of innovation processes is also reduced within the regional agglomeration, allowing the firms a better foundation for their strategic decisions (Camagni, 1991; Johannessen, 2013).

Formal and Informal Networks:

The design of a specific innovation network can vary on a spectrum between formal contractual agreements and loosely coupled informal networks. Freeman (1991), from surveying the empirical literature states, "Although rarely measured systematically, informal networks appeared to be most important. Multiple sources of information and pluralistic patterns of collaboration were the rule rather the exception". In this respect, following (Hakanson, 1989), a dynamic component also exerts influence "with an increasing duration of formal R&D co-operative relationships, they mutate to informal relationships as mutual trust and confidence between the partners is built up". Formal contracts get increasingly displaced by more flexible informal relationships in the course of time. Accordingly, although the formal arrangements end, for example, after the successful development of a new product, the relationship between the firms or the employed engineers and scientists remains, offering an efficient channel for knowledge flows in the future.

Innovation Networks in the Knowledge-Based Approach

Innovation networks need to be understood not only in terms of transaction cost considerations, but also in terms of learning, path dependencies, technological opportunities, and complementary assets. Networks do not only influence the co-ordination of resources but also assert a significant impact on their creation (Pyka, 2002). This has to be seen in a twofold perspective:

- ◆ The pooling of different competencies in the network of firms of course enhances this process of resource creation by exploiting complementary effects.
- ◆ The co-operation in networks also creates a real surplus or synergy in this process (Brousseau, 1993).

In this light, networks represent a mechanism for innovation diffusion through collaboration, and the interactive relationship becomes not only a co-ordination device to create resources, but an essential enabling factor of technical progress (Zuscovitch, and Justman, 1995). Pyka (2002) argues that it is not enough just to know what others are doing, but the firms also need to know how the respective technologies function and work together and to support this inter-firm learning of often long-range cumulative, tacit and local know-how, a stable and long-lasting collaborative environment is necessary.

According to the above discussion, innovation networks offer a possibility to overcome the restrictions of the irreversibility's and instead build on different specific knowledge bases. With the fusion of different technological capabilities the exploration of new opportunities becomes possible – the cross-fertilization effects. In this respect, the essential dynamic properties of innovation networks become obvious.

To summarize, within the knowledge-based approach, innovation networks are thus considered to have three major implications:

- ◆ They are seen as an important co-ordination device enabling and supporting inter-firm learning by accelerating and supporting the diffusion of new technological know-how.
- ◆ Within innovation networks the exploitation of complementarities becomes possible, which is a crucial prerequisite to master modern technological solutions characterized by complexity and a multitude of involved knowledge fields.
- ◆ Innovation networks comprise an organizational setting, which opens the possibility of the exploration of synergies by the amalgamation of different technological competencies. By this, innovation processes are fed with new extensive technological opportunities, which otherwise would not exist, or whose existence would at least be delayed (Pyka, 2002).

Methodology

The theoretical framework developed in this research needs to be compared to practitioners' perspectives. Based on the comprehensive literature review, the study will adopt the methodology below to examine the theories and construct a complete and practical model to link the theories and practices and to fulfill the objectives of the study.

The Study Design

This study involves a two-phased design, and each phase with its distinct methodology. First, an initial questionnaire guide to the interview was sent to 50 high-tech SMEs in Taiwan, in order to select 8 companies as case study for this research. Second, in-depth interviews with senior managers from 8 selected high-tech companies were used to collect data. Interviews are one of the most intensively used methods of data collection (Bryman and Burgess, 1999). The individual in-depth interviews that the study conducted were face-to-face and of a semi-structured nature, which is one of the most common approaches to interviewing in qualitative research (Bryman and Burgess, 1999). This type of interview involves the implementation of a number of predetermined questions and/or special topics. That allows the respondents to determine the direction and content of the interview within a broader framework provided by the interviewer. After each department's interviews, the results were assembled, transcribed and e-mailed to the respondents for their review and approval, eliminating any misinterpretation. This was expected to provide a richer and more holistic appreciation of the problems regarding the integrated model.

This research adopts the case study method to assess actual sources of innovation and determinants of external supporting processes of innovation and how they can be leveraged to accumulate innovation capacity to the decision to implement an innovation management in the context of the high-tech SMEs. The completed questionnaire, company reports/industry-specific newsletters and an in-depth interview created an established chain of evidence for the company.

The Development of an Integrated Knowledge Based Innovative Network Model for High-Tech SMES

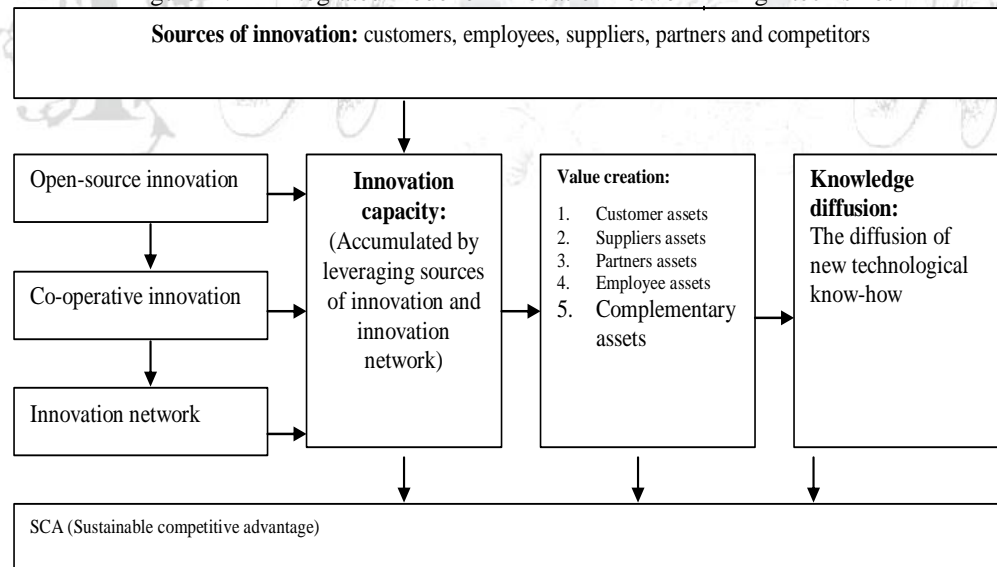
Based on the comprehensive literature review on sources of innovation, innovation capacity and innovation network, and the examination of 8 case study companies, an integrated knowledge-based innovation network model for high-tech SMEs will be developed as Figure 2.

In practice, in integrating external sources of innovation, high-tech SMEs should link open-source innovation, co-operative innovation and innovation network. These are a step-by-step innovation process for the external supporting processes of innovation. A good linkage will form a synergy to enhance innovation capacity. In acquiring sustainable competitive advantage (SCA), high-tech SMEs should leverage innovation capacity to further create value for the firm itself, customers, partners, and suppliers and diffuse knowledge. In summary, high-tech SMEs through sources of innovation and innovation network to accumulate innovation capacity and to create values and diffuse knowledge and then to achieve SCA.

The innovation network aims to enhance the competitiveness of its members by inspiring innovation. It brings together a diverse range of businesses and facilitates the exchange of practical experiences associated with managing innovation. By joining the innovation network, the members will have the opportunity to:

- ◆ Learn from 'best practice' examples across industry sectors
- ◆ Keep updated with latest thinking on innovation management practices
- ◆ Evaluate your practices against similar organizations
- ◆ Identify opportunities for collaboration and partnership
- ◆ Engage in peer-to-peer networking with other managers

Figure 2. An integrated model of innovation network in high-tech smes



Conclusion

What Does Innovation Network Focus On?

Innovation involves converting creative inputs into value added outputs, through management foresight and strategic planning. It requires a holistic approach, covering products, processes, technologies, service

offerings and business models. The innovation network addresses innovation as a management process, encompassing business practices associated with:

- ◆ Fostering a culture of innovation
- ◆ Exploiting innovation assets
- ◆ Developing innovation management processes
- ◆ Evaluating innovation performance

Firms do not exist in isolation. Strategies are first created to identify attractive market segments to enter, customers to target and products or services that need to be developed and sold to generate revenue and profit. Suppliers are a necessary component of the value chain to build a product or service. Employees are needed to tackle a whole host of issues including: managing organizational efficiency; deploying and maintaining all types of information technology; providing research and development expertise; acting as marketing and selling agents; providing customer service and even providing general and administrative support. Partners are needed to distribute and sell, or are leveraged to outsource and manage components of a firm's business. And, of course, customers are needed to purchase (initially and repeatedly) the product or service – either directly or indirectly – that the firm offers. It easily becomes apparent that the firm's success is ultimately derived from relationships, both internal and external. To manage the turbulent waters effectively as we enter a new century on a note of uncertainty, we must understand that relationship assets are the most valuable store of any firm's capital.

Four Strategies to Create Value

The core issue of the integrated innovation network model is to create value for customers. It provides a language that executive teams can use to discuss the direction priorities of their enterprises. They can view their strategic value measures, not as performance indicators in four independent perspectives, but as a series of cause-and-effect linkages among objectives in the four balanced perspectives. The integrated innovation network model is based on four strategies to create value, as follows:

Value creation starts with valuing your customers

Strategy is based on a differentiated customer value proposition: Satisfying customers is the source of sustainable value creation. Strategy requires a clear articulation of targeted customer segments and the value proposition required to please them. Clarity of this value proposition is the single most important dimension of strategy. This includes low total cost (offer products and services that are consistent, timely and low-cost), product leadership (products and services that expand existing performance boundaries into the highly desirable), complete customer solutions (provide the best total solution to customers) and system lock-in (high switching costs to end-use customers and add value to complementers).

Treat your employees as value-creating assets; manage them with this in mind

The key asset to competitive advantage is outstanding people. Managing people in a modern way will be most important – stimulating and empowering them to act on their own. Given the multitude of assets necessary to drive a firm's economic value, one key asset remains the same: people. A firm's employees will continue to remain fundamental to economic growth. Employees do have a significant impact on a firm's outcomes, especially the firm's market value. How a business finds, develops and retains them is a fundamental management challenge for competing in an era in which intangible assets, such as employees, constitute the majority of a firm's value.

- ◆ To capture new knowledge (measure and control data with guidance from a “select few” staff and supported possibly by information technology)
- ◆ To codify knowledge (promulgation of new product information, policy and procedures, etc.)

- ◆ To generate new knowledge (cross-functional project groups, creative approaches, innovation centers, quality improvement teams, etc.)
- ◆ To circulate knowledge (team-based learning programs, skills development workshops, feedback loops, etc.)

Treat your suppliers as critical assets

In the extraction of value from relationship assets, suppliers do indeed play a dynamic role in creating corporate worth and growth and are a key determinant of a firm's performance and ultimately market valuation. Careful attention and measurement must be given to this component of the value chain. A firm's supply chain is a network of facilities that aims to have the right products/services in the right quantities at the right moment, all at minimal cost. Today, the Internet is acting as a great "aggregator" of supply chains. With the ability to create electronic supply-chain processes and real-time delivery of information, and the ability to review and contract with suppliers from anywhere in the world – all nearly instantaneously – many firms now find themselves on equal billing with the largely closed environment of the EDI-based supply chains of the past.

Manage your partners as valuable assets

Forward-thinking firms recognize that the economic ecosystem "contract" is the tie that binds their success in the marketplace. As such, value from the various partner relationships must be evaluated with the same rigour as other relationship assets. Although many firms have a variety of partnerships, we believe they can fundamentally be divided into five distinct categories:

Alliance partners

The ability to leverage alliance partners is no longer a "nice to have" proposition, but rather a strategic imperative today. Alliance partnerships are proving to be not only a good vehicle for achieving the growth goal, but also an extremely important corporate asset. Alliance partners typically constitute relationships between firms focused on filling single and multiple gap deficiencies, creating integrated products and/or services or forming a breakout offering. Joint partnerships might also leverage R&D capabilities as a means of sharing costs or creating proprietary technology or standards. In an era of increasing speed, creating alliance partnerships can also serve as a means of getting to market faster, ahead of competitors.

Research institute partners

Research institute partners constitute relationships between firms and research institutes, focused on co-creating advance products, services and processes to form a breakout offering. Joint partnerships might also leverage innovation R&D capabilities as a means of transferring technology or standards and as a means of getting to market faster, better and cheaper.

Government partners

Government partners constitute relationships between firms and various supporting program from government, focused on co-operative innovation programs to form an industrial upgrading and turnaround. Co-operative partnerships might also leverage innovation R&D capabilities as a means of promoting upgrading of technology or industries and as a means of maintaining sustainable competitive advantage.

Academic partners

Academic partners constitute relationships between firms and various universities, focused on co-operative innovation R&D program to form a win-win situation for industrial needs of talents and supply from

universities. Co-operative partnerships might also leverage innovation R&D capabilities as a means of transferring the results of technology and research and as a means of assisting SMEs to establish innovation R&D centers.

Distribution/indirect channel partners

Many firms rely heavily on distribution and indirect channel partners. High-tech and drugs, sell as much as 60 to 70 per cent – even 100 per cent – of their product through indirect channels. Delivering the right product or service, at the right time, at the right place and at the right cost may require multiple sales channels, especially for firms competing in global markets.

Indeed, for firms to compete in such markets, both direct and indirect selling are necessary. Therefore, the channel partner, while in some respects under threat via the Internet, is still a viable and thriving component of a firm's relationship assets. Managing channel partners for market value creation is tricky at best. However, partnerships, whether they are in the form of alliance partners, channel partners or both, do significantly enhance a firm's ability to create value in the market and, thus, its financial performance. Careful partner selection, coupled with the ongoing management and the nurturing of trust throughout the life-cycle of the partnership, is critically important to ensure optimal performance.

The integrated model can be an easy-to-follow innovation model for high-tech SMEs to address when adopting knowledge-based innovation network. This helps to ensure that the essential determinants and approaches for innovation processes are covered during ICI (Ideas, Concepts, Invention), pre-project, project and project product launch/follow-up. In other words, from sources of innovation, open-source innovation, cooperation innovation to the innovation network to accumulate innovation capacity for values creation (implementation/commercialization) and diffuse knowledge and then to achieve SCA. For industries, this provides a practical and complete business model for them to use as a reference and study the innovation approaches (the advantage and disadvantage), which are crucial for the success of knowledge-based innovation network in high-tech SMEs.

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