Abstract

This paper discusses a framework of the strategy-making process for executing and continuing both the building of a new, ongoing market position and the acquisition of new capabilities so that a corporation could achieve innovation in the future. This paper describes the case of high-tech corporations in the field of Information and Communication Technology which is undergoing intense change in Japan. This paper also would like to present a new viewpoint on knowledge-based theory of the firm based on data obtained from qualitative research into the time series strategy-making process over the past 11 years. These corporations successfully introduced new products and services to the market through a spiraling knowledge integrating approach through networked knowledge communities as a dynamic view of strategy aimed at deliberately and continually creating new markets.

1. Positioning of the research

Corporations naturally need to upgrade their capabilities in response to changes in their environment (market and technology). In the field of digital products for the consumer (large-screen LCD or plasma televisions, DVD recorders, digital cameras, etc.), for example, Japanese corporations such as Matsushita Electric, Canon, Sharp, and Sony have been upgrading their capabilities in the process of releasing new versions of products (two to three times a year on average) and expanding their product offerings. In recent years, these companies have been dominating the top three positions in global market share for this industry. These corporations have been able to maintain their competitive advantages in the digital products market due to the fact that they have been continually upgrading their technological capabilities (such as improving system LSI development, and adopting cell production methods aimed at cutting costs and improving quality) and process capabilities (building supply chains for global marketing, production, and support systems) while customer needs for digital products have been growing more diverse (focusing on quality, price, functions, etc.), technology has been evolving (bringing in particular greater functionality, lower power consumption, and greater miniaturization due to the development of system LSIs), and the competitive environment has been changing (caused in part by cost competition from Korean and Chinese companies such as Samsung and Haier).

In the field of third-generation (3G) mobile phone services as well, in the Japanese market, NTT DoCoMo, KDDI, and Vodafone have been continually upgrading their technological and process capabilities and introducing new mobile phones and services to the market in their efforts to respond to changes in customer needs and advances in technology. Responding to this sort of environment by constantly and dynamically changing their own capabilities is vital for high-tech companies in the digital consumer product and mobile phone markets. This is also the dynamic capability approach that these companies need (Teece et al., 1997).

At the same time, these companies also possess capabilities to create an environment that spontaneously gives birth to new markets and technologies. Some examples of this are NTT DoCoMo’s i-mode mobile Internet service, J-PHONE’s (now Vodafone’s) camera-equipped mobile phone, and the electronic money service
for mobile phones that NTT DoCoMo and Sony started in spring 2004 through a strategic alliance. These developments did not occur so much as a result of responses to customer needs, technological advances or other changes in the external environment but as a deliberate effort of these companies to create new markets and technologies. Electronics manufacturers such as Matsushita Electric and Sharp in the fiercely competitive digital consumer products market mentioned above have each been crossing into other fields of technology and industries in a deliberate attempt to create new markets and technologies. Typical examples are the ubiquitous market that merges broadband and mobile multimedia, and the telematics market that merges electronics, IT, and automobile technologies.

An important issue facing corporations as they seek to achieve future innovation is not just to respond to changes in the environment but also to follow a process of creating an environment in which they can deliberately form a new market position. Particularly in the high-tech industry, where corporations must continue to introduce new products and services in the rapidly changing environment, corporations also need a dynamic view of strategy for creating their own changes in the environment as they respond to external environmental changes (Markides, 1997, 1999; Chakravarthy, 1997).

The positioning-based view that had been the representative theory of strategy until now is a framework that identifies attractive positions through structural analyses of the market (including analyses of competition structures and transaction structures) (Porter, 1980, 1985). On the other hand, there is also the approach of the resource-based view, which emphasizes that concepts explaining gaps in competitiveness and profitability among corporations are unique competences, resources, and capabilities possessed by the corporation (Barney, 1991; Prahalad and Hamel, 1990). Given conditions in which markets and organizations can be analyzed, these theories represent a theoretical framework that can be sufficiently applied in situations where the corporate environment is relatively stable and market structures can be understood or predicted (D’Aveni, 1994, 1995; Chakravarthy, 1997; Brown and Eisenhardt, 1998; Eisenhardt and Sull, 2001).

Further, the dynamic capability approach representing a theoretical framework with a dynamic view of strategy is a concept that dynamically changes a company’s own core capabilities in line with environmental changes (Teece et al., 1997). In the dynamic capability approach, however, path dependency and market positioning are given conditions, and represent an in–out concept (from the organization viewpoint to the market viewpoint) whereby market position is strengthened after a company’s own capabilities are rebuilt by the ideas and actions of a practitioner. If one considers the framework of the company’s strategic process from the business experience of the author himself, however, does not it seem that in its activities, the company is actually forming and executing strategies while dynamically and mutually complementing and reinforcing the company’s own capabilities and market position the company should be aiming for? In other words, does not the essence of this strategy call for the company to take advantage of the view of strategy that dynamically synthesizes the internal (organization) and external (market) sides rather than allowing them to be in opposition to each other? Further, how should practitioners think and act in their efforts to cultivate new markets? What sort of strategy-making process is required of the company? These are the issues that this research addresses.

The strategy-making process that the company constantly uses to deliberately and spontaneously form new positioning (new products, new services, and new business models) beyond the company’s own core capabilities especially under an environment of dramatic change and uncertainty is an issue of daily importance to practitioners. To that end, it is important for the company to continue working hard at creating the new capabilities it will need to establish a market position that will allow the company to deliberately create a new environment. Also important at the same time is a process that enables the company to establish a new competitive position as a goal through trial and error. In other words, a basic framework of dynamic ideas and action that simultaneously synthesizes the approach from the exterior (market viewpoint) to the interior (organization viewpoint) and the approach from the interior (organization viewpoint) to the exterior (market viewpoint) is important from the practical side.

As a research approach to the research questions mentioned above, the author believes that the knowledge of individuals, groups, and organizations within and outside the company, obtained from the author’s business experience over the past 20 years (developing products and services, providing marketing and customer support, and launching new ventures in the fields of IT and communications), forms the basis of a framework for analyses aimed at dynamic strategy-making process.

Representative research results thus far, such as a knowledge-based view of the firm (Grant, 1996a, b), organizational knowledge creation (Nonaka, 1994), well-springs of knowledge (Leonard-Barton, 1992, 1995), Intellectual capital (Stewart, 1997), knowledge-based view (Davenport and Prusak, 1998), knowledge workers (Fuller, 2001), and community of practice (Brown and Duguid, 1991), give us valuable insights into how companies can strategically create new knowledge and establish their target market position, from the viewpoint of corporate activities gained from the process of generating intangible assets known as knowledge. The author believes that networked knowledge communities (Kodama, 2005), as a means of obtaining knowledge required by the company to quickly establish its own position as an environment encompassing newer markets and technologies, represents a process of integrating diverse core knowledge inside and outside the company and of obtaining new knowledge in the form of new products and services, and is a vital element of the dynamic view of strategy.
In this paper, the author wishes to propose a basic framework as a knowledge-based view of corporate strategy that forms dynamic corporate strategies from the aspect of knowledge. Based on a series of existing theoretical research results, such as knowledge communities and networked knowledge communities (Kodama, 2000, 2001, 2005), this paper also aims to identify, from longitudinal qualitative research into the IT and multimedia business in Japan over the past 11 years, a theoretical framework of a dynamic strategy-making process that enables the corporation to establish an ongoing advantageous position in a rapidly changing environment.

2. Data and method

The data presented here were collected during the author’s long-term observation as a participant in an Information and Communication Technology company in Japan. For about 7 years from 1994 to 2000, the author was engaged as Project Manager (later as “Project Leader”) in the development of new products and services in the field of broadband and the launch of corporate venture businesses at NTT, Japan’s largest telecommunications operator. For three years from 2001 to 2003, the author served as project leader in the development of new services at NTT DoCoMo. The data in this study were obtained by the author in the course of his daily development work deep inside the corporation. The research method is thus participant observation, which involves social interaction in the field with subjects, direct observation of events, formal and informal interviewing, some counting, collection of documents, and flexibility in the direction the study takes (McCall and Simmons, 1965; Spradly, 1980).

Participant observation was necessary because the research focused on the meanings and interpretations of project participants. Without observing and participating in the daily activities of product development and service tasks, the author could not have gained an understanding of the significance of timelines from the perspective of the participants.

As in the research method that the author has been reporting on until now (Kodama, 2005), the rich data obtained from a long period of participant observation are analyzed around the grounded theory approach (Glaser and Strauss, 1967; Strauss and Corbin, 1990) to identify a basic framework that forms the core of this paper.

3. Case history

NTT, Japan’s largest telecommunications carrier, is currently facing a major period of transformation. As in other regions of the world, an optical-fiber infrastructure for broadband is being constructed at a rapid pace in Japan, and new products and services need to be created to generate customer value in this environment. NTT urgently needs to create new services that can compensate for the declining income from telephone services, once its largest source of profits, due to the growing penetration of IP telephone services. Meanwhile, in 2003, NTT Group member NTT DoCoMo and others introduced a flat-rate data communications service as part of their 3G mobile phone service, as developing new services that could differentiate themselves from competitors (KDDI’s au and Vodafone) became an issue as urgent as broadband was on fixed communication networks.

This study will focus on NTT’s video multimedia strategy, one of the fields of leading-edge technology that was included in the many business strategies that the company developed over the past 11 years. This paper will describe in three general phases how NTT deliberately and strategically formed their video multimedia strategy as a new technology and market within a rapidly changing technology and market environment. Phase 1 covers new product development aimed at creating a new technology and market (Kodama, 2001) (1994–1997), Phase 2 covers the creation of new services aimed at propagating and expanding broadband services (Kodama, 2002a) (1998–2000), and Phase 3 covers the creation of new integrated services for broadband and mobile multimedia (2001–2004).


After New Year’s Day in 1994, the president of NTT at the time declared, “From now on, NTT will become transformed from a telephone company to a multimedia company!” At the time, NTT was passing through a period of great transformation from the telephone network business that it had been for some 40 years to a company that aimed to create new businesses in multimedia. A small multimedia promotion organization was launched among the staff at NTT’s head office. The promotional approach that NTT adopted then was “Multimedia is possible from today,” and NTT started providing a variety of application services to customers based on the ISDN digital network that was being promoted as a way for customers to access the Internet, a promising new market.

A representative application that could utilize ISDN and was already a product at this time was videoconferencing, a system that developed by incorporating digital moving picture technologies from a variety of domestic and overseas vendors (though most users of this system were corporate users). The aim of NTT’s strategy was not so much to further expand the base of corporate customers using videoconferencing systems as it was to develop this system as a product based on a new concept that would deliberately create completely new markets not just among SOHO or individual users but also among users engaged in medical care, education, or welfare (Kodama, 2002b). This strategy stimulated the propagation of a completely new video communications terminal, which was a major goal.
for NTT in its efforts to establish a new position for itself in the market (Fig. 1).

The major issue facing the NTT development team at this time was to come up with a new product concept and a new architecture technology (Henderson and Clark, 1990) that could make the concept possible. They needed to overcome a variety of contradictions between the basic product concepts of low price, high quality, and easy operation. Existing videoconferencing systems were configured of specialized components, such as LSIs dedicated to the compression of moving pictures or sound, and special architecture that connected the components. These components that generated high picture quality and multiple functionality were only affordable to large corporations. The development team formed internal marketing and sales teams and informal task teams which actively collected various market data and interviewed specific customers in order to come up with new product concepts (SC-a in Fig. 2: Task teams formed in the contexts of marketing, product development, and technology planning).

Following extensive dialog and debate, the task team condensed the views into ideas for two types of technical platforms—a PC type (developing a new architecture that in part uses PC architecture) and a compact telephone handset type (developing a new architecture that in part uses telephone handset architecture)—that could make the product concept possible. NTT did not have facilities to manufacture or produce devices, but it did have R&D facilities centered around research laboratories and development divisions. The development team and the various internal R&D divisions thus participated in the task team and together studied such aspects as the technical architecture that should make the new product possible (block diagrams of the product, signal processing flow, and protocol stacks, for instance), details of the product’s functions, external appearance and shape, and the operating environment and conditions.

There were two new technical viewpoints: one was the development of signal processing architecture that contained such functions as video and sound encoding and decoding for PCs, video capture, drawing, and multiplexing and transmission functions, and the other viewpoint was the development of software components that have various functions and utilize general-purpose semiconductors such as DSPs. The development team integrated internal knowledge and decided on the technical architecture that would support new PCs and compact phone handsets and on the details of the product’s functions.

The next issue that the development team had to challenge was to select a vendor that could jointly develop new products and reliably manufacture them. Through informal and flexible cooperative relations with a variety of vendors both within and outside the company, the development team at the time searched for a vendor with latent technical skills (core knowledge). NTT actively promoted exchanges of views between vendors aimed at realizing new product development and worked hard to find what NTT felt would be the best partners. As a result, NTT chose several vendors as partners in joint development, built strong cooperative relationships with them, and formed task teams with individual partners (SC-b in Fig. 2: strategic communities (SCs) in the context of new product development and production). The activities of these task teams were supported by funds approved by top management on both sides and the allocation of human resources.

NTT decided on PictureTel and Apple Computer of the United States and Hitachi, Fujitsu, and Oki Electric for the development of PC-type desktop videoconferencing, and on Mitsubishi Electric and Sharp for the development of compact videophones. (The PC-type development partners were selected between 1994 and 1996, and the compact videophone partners were selected between 1996 and 1998.) NTT formed individual task teams with each of the selected vendors. (As a result, multiple formations of SC-b in Fig. 2 were present at the same time, and non-disclosure agreements were concluded between NTT and each partner.)

These partner companies handled the design, the component development (hardware and software development), and the manufacturing of the products that would incorporate the technical architecture and detailed functions decided on by NTT (though in the end some of the details that NTT had requested were revised following discussions on technical issues between NTT and the
Professionals from various technical fields participated in the product development and production task teams (SC-b). These professionals included, for example, system design engineers specializing in product architecture, video and sound processing engineers in charge of various component technologies for subsystems, communications engineers, software engineers, semiconductor engineers, production management engineers in charge of manufacturing, and quality control engineers in charge of testing completed products, all of whom understood and shared the required product concepts and functions in each of their contexts and generated new knowledge. NTT’s development staff and the vendors’ system design engineers in particular focused on new product architectures that could bring product concepts (the required product functions) to fruition. (These engineers integrated component technologies in the various technical areas in order to optimize them as product functions.) On the other hand, specialized engineers in charge of individual component technologies also pursued overall optimization of the components themselves (that are a single system composed of many subsystems) and partial optimization of some component functions that configure the architecture of the final product that is to be developed.

Engineers on both sides needed to have common specialized technical knowledge and a common language in order to address the issues they faced toward making these efforts at joint product development a success. The issue of what portion of existing intellectual capital could be harnessed by this common specialized knowledge to bring reality to architecture or components or whether they could be utilized in version updates, or what portion of components or subsystems to be newly developed should be used to realize new architecture, was one of the important elements that enabled specialized engineers themselves to generally discriminate between differences.

I have been in charge of the development of devices and components specifically for this type of development since I first joined the company, and over the past few years I have been in charge of architecture and other system development. Through dialog and discussions with the engineers of other companies who have the same specialized knowledge that I do, I was able to intuitively understand issues such as the scale of the portion to be newly developed, how difficult it would be, and how long the development would take. I therefore believe it is important for individual engineers to share [their specialized knowledge] and develop the required new technology. (Chief engineer from Company A)

The SC-b task team produced a prototype aimed at realizing development of the new product and conducted experiments aimed at verifying the desired functions and checking the product concept by having specific customers use the product. Through this trial and error process, the task team was able to raise the level of perfection of the product that was to fulfill its positioning in the new market. The task team was also able to accumulate knowledge assets in the form of new technical capability in the area of new product development. This process aimed to synthesize capability (the organization’s knowledge assets) and the target market position (product concept).

To establish market position, however, the developed product must be marketed through firm sales channels and sufficient customer services must be provided. It is thus an urgent issue for NTT to establish a single business process of development, production, distribution, sales, and support. In parallel with the product development process,
NTT’s development team also formed an internal leading-edge sales organization (including NTT Group firms, external sales outlets, etc.) and a technical support organization (including NTT Group firms, external sales outlets, etc.), as well as an informal task team (SC-c in Fig. 2: in the context of sales and technical support) aimed at establishing sales and after-sale support systems for bringing the new products to market. Through daily training in sales and support for bringing the new products to market, new capabilities in the form of sales skills and technical skills were also accumulated within the organization along with product development know-how.

The individual task teams (SC-a, SC-b, SC-c) have different contexts. By having the same person participate in different task teams, however, they collectively understand and share the different contexts and knowledge above and beyond the borders of the task teams, and these different task teams thus form a virtual network. The roles of the leaders in the organizations (the SC leaders) are particularly important, as they are committed to more than one task team and they need to understand and share the constantly changing dynamic context with the members of each task team. Understanding and sharing dynamic context is not just a product development process but it also integrates the individual knowledge assets required by various business processes, such as sales and support or publicity and advertising, and allows new products to be brought to market. Organization leaders understand and share issues that emerge on a daily basis, such as “How much progress has each task team made for the project?” or “What are the current issues?” or “Who will be the key person responsible for finding solutions?” The leaders extemporaneously find solutions to these issues.

In this way, not only was it possible for the sharing and integration of understanding of and knowledge in the different contexts of the networked SC to turn new product development into reality, it was also possible for it to integrate the series of knowledge—from marketing, product development, and technical planning, to product development and manufacturing, and on to sales and support—required for bringing the new products to market, and to build and execute new business processes. As a result, the building of a new value chain and the accumulation of new knowledge assets were promoted simultaneously, the goal of being a world-first new product to be introduced from Japan was achieved, and new market position (at the time it was the birth of a desktop videoconferencing system supporting Windows 95 and the PCI bus, and the world’s lightest and cheapest videophone with the best picture quality) and new capability were acquired at the same time (Fig. 2).


While the strategy in Phase 1 was being executed, the next new strategy that NTT became involved in was the creation of new services that utilized the new products. Specifically, NTT wanted to provide multiconnection videoconferencing services (MVS) that utilized videoconferencing systems. At the time, this market did not exist in Japan at all, and NTT had forecast that MVS utilizing broadband instead of ISDN networks would grow rapidly in the future, and the company became engaged in building a new business model. The essential feature of the business model was to build a nationwide video network dedicated to MVS, and the challenge was to launch an application service provider (ASP) that would enable many corporate users to jointly use this network. A dedicated team (business development team), completely separate from the product development team in Phase 1, was set up within NTT to promote the business development of this service. However, since there was a deep relationship between MVS and the product development and sales business in Phase 1, the same project leader directed both teams with the aim to create synergistic effects in both businesses, i.e., the expansion of product sales would expand the use of new services.

The most important issue facing the business development team was to build a service architect, an issue that was different from simple product development in Phase 1. Unlike the business model in which a product is simply sold and the business is generally completed (though after-sale support continues), the basic philosophy of service architecture is to provide the customer with ongoing services. Details concerning technology are of almost no concern to customers; their greatest concern is the sort of services they can receive and their cost. The business development team studied new business processes, such as the sort of system that should be newly developed and the methods that should be used for marketing, providing technical support, billing, and collecting fees, in their efforts to high-quality, low-cost, and easy-to-use service architecture. In the end, the business development team decided to launch a joint venture with various companies that possessed the core capabilities that were needed in building this business model that would enable these services to be launched ahead of other companies. (The business development team’s proposal for the corporate venture was authorized by top management at NTT.) NTT adopted the business structure under which joint venture firms would provide the new MVS services.

Several members of the business development team (four of seven members) transferred to the newly established venture company led by NTT (NTT Phoenix, Inc., now called NTT BizLink, Inc.) in order to execute the business model that they themselves planned and proposed. Even though the staff that transferred and the remaining members of NTT’s business development team were now formally in separate companies, they continued to share their context through an informal task team (including the sales team of NTT’s marketing and sales divisions and NTT Phoenix’s sales team; SC-a in Fig. 3), and they shared...
values aimed at realizing the new service which was one of their goals.²

In their aim to develop systems required by the new service—such as a video switching system, operation system, network system, and a billing system—NTT’s business development team and NTT Phoenix’s development team custom-developed a video switching system and operation system with PictureTel and Polycom of the United States, RadVision of Israel, and Hitachi and Mitsubishi Electric of Japan, and with NEC of Japan they jointly developed an video network (SC-b in Fig. 3). (The development teams of NTT and NTT Phoenix formed SC-b, which are separate task teams with these partner companies.) At the same time, NTT and NTT Phoenix formed task teams (SC-c in Fig. 3) with Canon Sales, Otsuka Corp., NOVA,³ NTT Group companies, and other firms that contributed capital to the joint venture, and embarked on studies aimed at establishing a sales structure, sales channels, and technical support for the new services.

By October 1998 when the new service started, the initial development and construction of the system was completed in the first step, and the construction of a series of business processes including sales and technical support was also completed. (SC-a through SC-c were networked) NTT and NTT Phoenix promoted collaboration through the networked SCs and focused on expanding sales of the new service. Catch phrases emphasizing how easy the videoconferencing system was to use gradually stimulated more frequent use among customers. In the second step, NTT Phoenix expanded new services supporting broadband (DSL and optical fiber) rather than ISDN and, with over 2000 corporate subscribers today, grew to become Japan’s largest ASP dedicated to videoconferencing services. In this way, while NTT and NTT Phoenix were establishing the new MVS service in Japan and securing new market position, they were also accumulating new knowledge assets in the form of technical skills and sales skills in the areas of service development, sales, and technical support, as well as acquiring new capabilities (Fig. 3).


While NTT was developing the product and sales business in Phase 1 and developing the service and sales expansion business in Phase 2, in Phase 3 the company was engaged in developing a business model for additional new products and services. Rather than responding to market needs, NTT was searching for a way to establish a new market position from the viewpoint of creating new communication styles for the future. In July 1999, NTT was split into three communications companies: NTT East and NTT West for local communications, and NTT Communication for long-distance and international communications. The team that continued to promote the video business, however, was split and established in each of the new NTT companies, and at the same time, NTT resonance was newly established as a leading-edge broadband company dedicated to businesses related to video communications and distribution.

²The sharing, sympathizing, and resonating of value as corporate philosophy or a project’s mission represent the basic source of new strategies and innovations. See Kodama (2001) and O’Reilly III and Pfeffer (2000).
³NOVA is a large chain of vocational language schools in Japan. In 1996, the company launched their home-based “Ochanoma Ryugaku” program utilizing videophones. At present, they have hundreds of thousand of users. NOVA is one model of a successful real-time e-learning business in Japan.
NTT DoCoMo, a member of the NTT Group at the time, started 3G mobile phone service in October 2001. This service included a videophone function that could be used through mobile phones. NTT (hereafter referring to NTT Resonance, NTT East, and NTT Communication) and NTT DoCoMo (already spun off from NTT in 1992) started to develop three basic new services aimed at realizing new communication styles. The development teams and the marketing and sales divisions of NTT and NTT DoCoMo formed task teams (SC-a in Fig. 4) to be engaged in planning new products, services, and technologies involving the companies in an effort to address the issues of how new products and services can be accepted by customers and how new markets can be created as they embark on the development of new products and services for the future. Through close communication and collaboration, the companies decided to narrow their focus down to developing three general products and services.

The first focus, product development, was the joint development of NTT DoCoMo’s FOMA 3G mobile phone handset and a fixed videophone capable of mutual communications among NTT East, NTT DoCoMo, and Mitsubishi Electric (SC-b in Fig. 4). The core of this development was the development of a new architecture design and new core components (a new system LSI). The new product was released for sale in March 2002.

The second focus, service development, involved the development between NTT DoCoMo and Mitsubishi Electric of a new service that enabled multipoint video communication among the mobile phones of many people at any time and any place with the newly developed fixed videophone mentioned above (SC-b in Fig. 4). The core of this development was to conceive a completely new service architecture that could utilize the i-Mode service of mobile phones to reserve or call videoconferencing sessions, and to promote the new development of system architecture and various components that supported this architecture. This service started in October 2002.4

The third focus on service development centered on NTT, NTT DoCoMo, RadVision of Israel, and NEC of Japan, and involved the development of a PC-type videophone software supporting broadband and a platform that enables mutual exchanges between a wall-mounted videophone supporting broadband and a FOMA videophone (SC-b in Fig. 4). The development of a platform that made this new mutual communications possible came as a result of integrating the world’s leading

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4In developing this service, the author was project leader of the development team that was in charge of service concepts, technical architecture as well as detailed service and system functions. Mitsubishi Electric was in charge of detailed system design and component development and manufacturing. Since engineers were responsible for integrating knowledge in the different technical fields (communications, computers, video communications, human interfaces, etc.), a large number of specialists gathered at Mitsubishi Electric from research laboratories, info-communications development centers, software development centers, design centers, manufacturing plants, marketing and sales divisions and other areas. They joined multilayered cross-functional teams formed from various layers of management. (Many SCs were formed within Mitsubishi Electric for each role in charge of technology, and a hierarchy was formed among them at the management layer.) NTT DoCoMo to extend its video services to FOMA. See Web site; http://www.japancorp.net/Article.asp?Art_ID=3917. The platform for the “M-Stage Visual Net” service was selected on the 2003 R&D 100 Awards program (R&D Magazine in US) as one of the 100 most technologically significant products introduced into the marketplace over the past year; see Web site; http://rdmag.com/scripts/ShowPR.asp?PUBCODE=014&ACCT=1400000100&ISSUE=0309&RELTYP=PR&PRODCODE=00000000&PRODLETT=AG. The details of “M-Stage Visual Net” regarding the technologies and service are described in Kodama et al. (2002c) and Ohira et al. (2003).
knowledge. Experimental service was launched in February 2003, and trial service started in September 2003.⁵

The above three focuses in new product and service development became the first of its kind in the world. Many members of the product and service development task team (SC-b), the product and service planning and technical planning task team (SC-a), and the sales and technical support task team (SC-c) together shared dynamic context. Not only did they develop products and services but they also built a variety of business processes that led to sales and technical support, and integrated the knowledge dispersed among the SCs in order to execute the processes. As a result, they were able to acquire new knowledge assets and new capabilities as they achieved market position for the first time (Fig. 4).

4. Discussion

In this section, the author wishes to shed some light on existing research into theoretical frameworks obtained from qualitative research conducted over a long period of time, and to identify a new point of view.

4.1. Knowledge differences and a spiraling knowledge integrating approach

In using the dynamic view of strategy approach toward product and service development, it is important for actors first to deliberately establish new concepts concerning the new products and services as a new market position. Concepts in products and services refer not to technical architecture or component technologies but to how value is to be provided to customers. In this case, the many new product and service concepts came not from facts underlying detailed marketing data but from the strong desire of actors to provide customers with value through certain brand new concepts for products and services that would foster an advanced information-oriented society for the future. To achieve this, the organizations were required to transform existing mental models, abandon attachments to precedents, and to nurture radical ideas (also incorporating external knowledge) (Hamel, 1996, 2000; Markides, 1999). Actors for their part were required to set high goals for strategic market position and to cultivate a challenging new business while always bearing the risks of development. Particularly in the viewpoint of creating new business while always bearing the risks of development strategic market position and to cultivate a challenging new business where speed is required. However, in this case study where the environment undergoes severe change and the need to merge complex technologies or develop new elements carries considerable weight, the knowledge integrating approach through the networked SCs (Kodama, 2005), whereby capability is acquired by quickly accessing many core technologies of other companies while utilizing one’s own company’s core technology and then integrating them to realize new development, is more effective from the practical aspect. In this paper, the author shall define the knowledge integrating approach not only as knowledge integration for new product and service development but also as the integration of diverse knowledge required for building a series of business processes such as sales, promotion and advertising, and technical support, aimed at bringing new products to market.

The concept of “knowledge difference” is based on the author’s many years of experience with development work in the fields of IT and telecommunications and on dialogs with engineers at many partner enterprises. The same sorts of concepts were also obtained from dialogs with DVD development teams at Matsushita Electric in the field of home electronics and with developers of the Lexus brand automobile at Toyota Motors.
This ability to recognize knowledge differences that accurately identify new development elements as innovation is related to the common knowledge (Carlile, 2002; Cramton, 2001; Star, 1989) shared by engineers. The existence of common knowledge is also necessary for enabling engineers to share and access domain-specific knowledge required by the new product development that they are targeting. In this case, SCs are formed with a variety of partner companies, these individual SCs comprising various corporate engineers transcend the boundaries of their organizations, they together share and understand the context, and they then identify elements for new development based on their common knowledge (which in this case includes technical terms and the past experiences and know-how of individual engineers in such fields as basic architecture for video communications technology, moving picture and sound compression technology, communications technology, Internet technology, and computer technology, which constitute both explicit and tacit knowledge that they can all understand). Engineers in the SC share dynamic context, asking a variety of questions such as “What sort of architecture do we need to bring new product concepts to reality?” or “What sorts of component technologies and communication protocols do we need to use?”

In this way, common knowledge and knowledge differences help engineers to efficiently and effectively promote knowledge sharing and knowledge integration processes as they work toward building a prototype that reflects the new product concepts and realizing concrete products and services. The product development process through which knowledge differences are recognized and desired product concepts are realized stimulate ideas and behavior among actors from external points of view (realizing new market position dictated by new product concepts) to internal points of view (acquiring new capability in the organization). (The process of interactive strategic dynamics in this case is illustrated in Fig. 5.)

To confirm whether or not the new product concepts as the goal for new product development are being realized, it is also important to conduct trial and error tests through experimentation of business models in the actual field (such as experimental services with specific customers or through consortia and other means) and repeat various hypothetical tests (Hamel and Getz, 2004; Prahalad and Ramaswamy, 2004; Markides, 1999). The construction of a business process is another important issue for bringing new products and services to market in a commercially viable manner. Not only knowledge of product development and production but also different types of knowledge such as sales and support (establishing a sales structure and sales channels inside and outside the company, a structure for technical support and after-sale services, as well as employee training) is also required. To this end, the actors must understand and share the different contexts of their specialities, integrate their different knowledge extending across development, production, sales, and support through their networked SCs, and build a solid value chain by establishing a business model that can reliably bring the new products to market. The actors must direct their ideas and behavior from the internal point of view (of acquiring new capability in the organization) to the external point of view (realizing new market position by bringing new products and services to market). (The process of interactive strategic dynamics in this case is illustrated in Fig. 5.)
Executing the knowledge integrating approach through the ideas and behavior of actors from the external (market) to the internal (organization) and from the internal (organization) to the external (market) is a vital element in the dynamic view of strategy. Then in their aim to establish their goal of new market position, the actors recognize their knowledge differences, integrate internal and external knowledge through the networked SCs in order to acquire the new organization capabilities that they need, and synthesize the new capabilities with the new market position.

By executing the series of processes in the knowledge integrating approach, the actors must share and integrate the various internal and external knowledge required not only in product development but also in the various business process through the networked SCs that they form. The actors then accumulate new knowledge assets required for bringing the new products and services to market, and build a value chain. As a result, acquisition of new market position and new capabilities can be achieved simultaneously. By spiraling this knowledge integrating approach at each stage along the time axis (spanning past, present, and future), the actors in this case are able to realize a dynamic strategy-making process in which they can deliberately acquire market position and new capabilities.

The dynamic view of strategy using the spiraling knowledge integrating approach in this case is illustrated in Fig. 6.

4.2. Four specific factors in the dynamic view of strategy for forming networked SCs: context-specific, people-specific, timing-specific, and network-specific

It is important to form networks SCs when executing the spiraling knowledge integrating approach. In order to sustainably produce new market position and new capabilities through the knowledge integrating approach, companies rebuild networked SCs on the time axis according to their goals. This study has yielded the following four points that are significant from both the theoretical and practical points of view.

The first point is context specificity. Actors must constantly form and link SCs by identifying new meaning from dynamic contexts. SCs are also organizational platforms for creating and practicing new concepts through constructive and creative dialog into questions that ask why, how something should be, or how something can be accomplished, as members aim to achieve their vision or mission. Another factor determining the nature of strategic concepts is the nature of specific contexts. Overcoming contradictions occurring in the diversity of contexts gives birth to a further context, and an SC is formed and linked at the same time. The nature of this specific context determines the nature of the knowledge that arises as a result. In this case, the creation of a new market itself is a vision for the future, and as professionals with various backgrounds and skills aimed at realizing this vision, the actors either themselves are together question meanings, which lead them to dynamically produce and share specific contexts.

The second point is people specificity. At the source of context specificity noted above are specific people who form and link SCs. This cannot simply be any person but rather a number of specific people with human skills to tirelessly pursue self-reforms. Expressed in the context of engineers, they are specific people who share common knowledge. These people use their own beliefs and ideas to independently produce contexts of specificity and to
execute the formation and linking of SCs. Specific people are also leaders and members of management positions in organizations, leaders and members of partner companies, or progressive customers (such as leading users who have promoted joint experiments with specialists in the fields of medicine, welfare, and education toward new product development) (Kodama, 2002b).

The third point concerns the dynamics of generating and linking SCs in time and space, and one of these is timing specificity, a time characteristic of SCs. The meaning of this point is who will form and link an SC with what sort of context in the specified time. The element of timing is important in strategy decision-making. This is because when and how the company forms and executes its strategy leads to widely varying results. The timing of SC formation and linking on the time axis extends considerable impact on the development decisions and market introduction of new products and services. NTT's multimedia strategy in this case is to constantly forecast new markets (while anticipating risk) and set new goals. In Phase 1, for instance, product development was executed to time with the release of Windows 95; in Phase 2, service development was timed with the shift from narrowband to broadband; and in Phase 3, product and service development was timed with the shift in mobile phones from 2G to 3G.

The fourth point, concerned with space characteristics, is the element of network specificity. This point represents the form of the human network as a structural element in the formation and linking of SCs, and is a specific network that creates valuable knowledge. This specific network is important for when actors rebuild on the time axis in accordance with strategic goals. It is thus more accurate to call it a changing specific network.

According to lessons learned from the results of past research, systems integrators (such as the automotive industry or the hard disk drive industry) that independently execute R&D, design, architecture, assembly and other aspects of product development build loosely coupled networks with many parts suppliers, facilitating efficient product development. On the other hand, since telecom manufacturing companies that develop mobile phones need to respond to dramatic changes in the environment, it would be better for them to build tightly coupled networks in vertical integration with parts developers and manufacturers (Busoni et al., 2001; Busoni and Prencipe, 2001). These results can be considered a theoretically appropriate conclusion if the network structure is taken from the aspect of coordination via systems integration or coordination via vertical integration. On the other hand, however, a different interpretation is possible if taken from the aspect of the environment that companies face (the growing diversity of customer needs and rapid advances in technology in particular), the technological context (in the fields of technology and products), and how much knowledge is shared among partners.

If, for example, the author’s experience as a developer in the field of IT and info-communications is compared with the details obtained from discussions with developers at electronics manufacturers, in reality, there are numerous scenarios in which consistency in architecture and components among parts manufacturers and systems integrators, a number of delicate adjustments in hardware and software to be developed, and in-depth discussions and exchanges among engineers with tacit knowledge are necessary. In a case like this, for instance, once a decision has been made to form ties with vendors and detailed task-based collaboration has started among engineers, in the aspect of the extent to which information and knowledge is shared, loose relationships change to tight relationships as sharing at a deeper level is required.

Though telecom carriers like NTT and telecom manufacturers like NEC and Fujitsu also rely on target development products, handsets that change dramatically with customer needs or technology, multimedia products, software and other products are very different from communications equipment related to infrastructure (such as switching and transmission equipment), and there are many cases (especially in the mobile field) in which not only tight relationships need to be maintained but also partners must be frequently recombined while monitoring many candidate partners.

This paper will thus examine the features of networks that require loosely coupled and tightly coupled networks, from the viewpoint of sharing knowledge. NTT as a knowledge integrator in this case formed a number of flexible loosely coupled networks (Weick, 1976; Morgan, 1981; Orton and Weick, 1990) with various internal and external vendors in the process of forming new strategies at each stage, and monitored a variety of internal and external information and knowledge (Weick, 1982). (NTT was in charge of the overall system except R&D, product concepts, device design, product functions, architecture, etc.) NTT then selected what they felt was the best vendor, and when they formed a strategic alliance with the vendor, the SC that was in a flexible relationship changed to a tightly coupled network aimed at an integration in which context and knowledge was shared at a deeper level for the sake of product development (SC-b in Fig. 2, for example). To build a solid business process, NTT established strong links between the SC with the vendor and other internal and external SCs such as the sales and support divisions (SC-a and SC-c in Fig. 2, for example), fostered the sharing and understanding of different contexts, and promoted the process of sharing and integrating the different knowledge.

The SCs that were in a tightly coupled network with the vendor, however, were not continually maintained, and the SCs were rebuilt in response to the company’s own desires and changes in the environment. The linked relationships were reviewed according to changes in customer needs and technology, an SC was formed with another partner, and the SC that had the character of a tightly coupled network changed to loosely coupled network or decouple network. The relationships with Apple, Hitachi, and Oki Electric in Fig. 2 actually disappeared at this time and became
decoupled networks, and in the loosely couple networks with Sharp, Fujitsu, and PictureTel (currently Polycom), the companies monitored each other’s information and knowledge with the aim to identify new business opportunities. At this time, SCs in tightly coupled networks existed with new partners Sony and NEC and existing partner Mitsubishi Electric.

One observation that can be made from these phenomena is that the character of the relationships with the partners, from the viewpoint of sharing and integrating knowledge, constantly changed on the time axis between a tightly coupled network and a loosely coupled network. A second observation is that companies build tightly coupled networks with the best partners timed with decisions made concerning strategic ties while loosely coupled network relationships are maintained at the same time with other vendors to search for new businesses. A practical benefit of paradoxical management concerning networks among organizations that synthesize different modes of SC formation on both the time axis and space axis could be that it is an effective way for these companies to avoid falling into core rigidities or competency traps caused by path dependence. In other words, project leaders in charge of development promote product and service development currently in progress through tightly coupled networks while they search at the same time for future business opportunities through loosely coupled networks (Fig. 7). These companies’ use of the bipolar mode with loosely coupled networks and tightly coupled networks can be seen as being similar to the research results of Pettgrew noted below (Pettgrew, 2000).

There is a long tradition in management and organization theory of using bipolar modes of thinking and action. The bipolar concepts are variously explained and used as paradoxes and dualities. Pettgrew reported nine key dualities that innovative firms use to simultaneously build hierarchies and networks, seek greater performance accountability upward and greater horizontal integration sideways, empower and hold the ring, maintain the discipline to identify knowledge and the good citizenship of these four specific factors. From the viewpoint of networked SCs, are not independent of each other but are mutually dependent. The partial optimization of these four individual elements and their overall optimization build ideal networked SCs for the dynamic knowledge integrating approach, create superior products and services, and sustainably achieve the construction and practice of business processes. The spiraling knowledge integrating approach in Fig. 6 was executed by the dynamic view of strategy that had these four specific factors. Specific people dynamically building a specific network that generated and linked SCs in specific time, and the process of dynamically producing specific context and sharing and integrating new knowledge are most important from the practical aspect.

### 5. Issues and future studies

For actors, SCs in a knowledge-based view of corporate strategy are knowledge platforms for sharing dynamic context and producing new knowledge. Individual SCs through functioning with other SCs share contexts with other entities, and by changing these contexts, the SCs are entities in time and space that produce and change. SCs represent the time and space in which tacit knowledge and explicit knowledge is shared and actors engage in dialog and practice with one another. Clarifying the

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7Very little research conducted in the field of paradoxical management has considered time fluctuations related to networks among organizations. Ford and Bockoff (1988) described the paradox perspective of dualities in synchronic and diachronic organizations. If such paradoxes provide corporations the chance for innovation, the content and quality of innovation must greatly be influenced by the nature of the paradox conditions. Therefore, it may become more and more important to have the point of view that the paradox phenomenon is constructively and positively understood as being the motive power for the radical transformation of corporations indicated by Quinn and Cameron (1988).
organizational mechanism at the center of an SC is thus thought to have important significance.

Organizations and individuals are in dialectical relationships, and practitioners change organizations through the human powers of individuals while practical consciousness that is the here and now of space and the tacit knowledge in dynamic context become cyclically involved with the organization (Giddens, 1984; Giddens and Pierson, 1998). While people are subject to limitations by the very organizations they created, they have the power to transform the organization with their own behavior. The SC is a platform that acts as a bridge between individuals and organizations (companies). People in their micro existence bear influence on macro structures such as organizations, companies, industries and society overall through the formation (or disappearance) of SCs and networked SCs. The SC is thus positioned not only as an important linkage between the micro and the macro in societal networks, it is an important analysis unit from the viewpoint of how individuals in the relationships between individuals, organizations, SCs, companies, and industries can manage SCs, form and accumulate social capital (Coleman, 1988; Burt, 1997; Nahapiet and Ghoshal, 1998; Cohen and Prusak, 2000), and influence the performance of companies, or conversely, how individuals are affected by these influences (Fig. 8).

On the other hand, social capital in the form of knowledge assets is generated mainly around SCs from the flow of knowledge management, and SCs are important also from the viewpoint of process clarification that transcends SC boundaries and is synthesized. SCs are also considered important to practitioners in the aspect of how new knowledge is generated in a practical way through the formation and linking of SCs.

The new viewpoint obtained from this study is the fact that diverse SCs with different contexts and SC networks always exist. This came as a result of actors who generated and linked SCs by independently involving the environment (customers, etc.) and other people in the organizations. Though it is believed that consciously formed and linked SCs, what sort of typology can be considered? While a detailed qualitative study has already been reported in this research, in the context of developing various businesses and technologies, it is also necessary to promote many qualitative studies in order to test greater generalization of theoretical frameworks that have been identified.

A major issue for future research is to study SC formation obtained from lots of data and to qualitatively observe in detail and in time series the dynamism of networking, as well as to clarify how the mechanism integrates diverse knowledge that has been dispersed both inside and outside the organization.

Another issue that is important for both research and practice concerns the handling of the time factor in strategic and organization theory. How can the knowledge

8In the field of empirical studies of strategic or organizational theory, there already is a large body of static snap-shot research based on detailed quantitative analyses. However, little qualitative research or process research has been conducted concerning time fluctuations in strategies or organizations, and there is also little field research into the formation of strategies stimulated by the values of actors. How would practitioners (especially top management and strategists) evaluate the analysis results, important as they may be academically, that were recognized to be logical, quantitative, and scientific in the narrow range of market structure and organizational behavior? What sort of strategy or organization could work effectively under any kind of environment or conditions? What individual relationships of cause and effect or mechanisms related to success and failure in the strategies or organizational structure have been executed for building a business model? What do top or middle
6. Managerial implications and conclusion

In recent years, the need to merge and integrate different technologies has been becoming increasingly important in efforts to develop new products and services in the field of high-tech. In the past, innovations in technology have developed through the deep pursuit of specialized knowledge. Now, there are numerous cases in which the technology of one field had to be merged with the technology of another field in order to develop new products (in the ubiquitous market or the telematics market, for instance) based on new ideas that had never existed before. An important issue is how to synthesize different knowledge that has been dispersed, e.g., how knowledge in different fields of technology can be integrated. In the context of time and space, dispersed knowledge lies in the SCs. To integrate this knowledge, the individual bits of knowledge must be amalgamated over a network that transcends the boundaries of the SCs. In other words, the dispersed SCs need to be connected over a network, and the knowledge dispersed in each SC need to be deeply accessible on the network. In social network theory parlance, the SCs can be seen as cliques comprising closely linked actors, and those that connect each SC to another SC over the network are equivalent to ties.

Actors committed to more than one SC play a central role in linking individual SCs and integrating their knowledge. To integrate different knowledge, actors must deeply understand and share the tacit and explicit knowledge of each SC, and they then need to make the shared knowledge deeply accessible over the network that transcends the SCs’ boundaries (the important element of deep embeddedness) (Kodama, 2005). In sharing tacit knowledge, it is particularly important for context to be deeply shared over the network and for SCs to be strongly tied to each other. In the case of product and service development in this study, from the moment when the company decided to form strategic ties, strong ties among the SCs were formed (which can be interpreted as the tightly coupled network mentioned above), and the deep accessibility of different types of knowledge allowed new knowledge to be created in the form of technical integration embodied in new products and services. In this way, the building of a network of SCs with strong ties was a vital issue in the effort to integrate different knowledge, and actors had to conscientiously and deliberately consider the nature of the relationships in these strong ties.

Social network theory, on the other hand, teaches that weak ties can build bridges to new information of different types (Granovetter, 1973). In his description of the structural hole, Burt asserts that weak ties with structural holes allow actors the high possibility of accessing new information and acquiring new business opportunities (Burt, 1992). The actors in this case sense the core knowledge of many external partners by forming SCs with weak ties (which can be interpreted as the loosely coupled network mentioned above), and they search for the best partner that can help them integrate core knowledge for developing products and services.

In designing organizations that aim to develop new businesses, it is important for companies to not only build a tightly coupled network of SCs with strong ties but also to build a loosely coupled network of SCs with weak ties, and actors probably need to conscientiously and deliberately promote a paradoxical management that will always synthesize the relationships of these sorts of strong ties and weak ties at the same time. While they maintain the strong ties, they also need to form a network of SCs with weak ties and to bridge the structural holes in a timely manner so that different knowledge can be absorbed and integrated. The “small-world” networks espoused by Watts (1998) offer practical insights into how SC networks can be quickly and efficiently designed to access valuable knowledge dispersed around the world and to integrate this knowledge for creating new businesses.

From a detailed qualitative study in time series, this paper has described one approach for a strategy-making process framework that would enable companies to continuously execute both the construction of a new market position and acquire new capabilities aimed at achieving new innovations for the future. To continuously create new markets on their own, innovative enterprises must deliberately execute the spiraling knowledge integrating approach through the networked SCs and integrate internal and external knowledge. In the knowledge-based society of the 21st century, the diverse knowledge that people have (not just related to technology) represents a source for creating new products and services of value to customers who bring new competitiveness. The author believes that the knowledge-based view of the firm offers new and valuable insight for many practitioners aiming to realize innovation.
References


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