

# **Innovation Networks in Knowledge-based Firms**

**Developing ICT-based Integrative Competences**



**Mitsuru Kodama**



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# Preface and acknowledgements

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This book discusses activities relating to corporate strategic management under an ICT environment from the perspective of the knowledge and networks possessed by individuals and organizations. The contents of this book were created from my close observation and analysis of the business scene over many years. The thinking of how companies include innovation processes in corporate strategy through ICT and create new business models will become increasingly important. Companies with the greatest global impact on the ICT industry, such as the search and advertising businesses of Google and Yahoo, the music distribution business led by Apple's iPod, NTT DoCoMo's i-mode pioneering (both in Japan and globally) business model, and the game businesses led by Sony PlayStation and Nintendo's DS and Wii are the result not just of the technology aspect (product innovation) of ICT development but also of service innovations through the new marketing of market creation.

My issue awareness and research objectives are to clarify, theoretically, the mechanisms behind the processes that generate product and service innovation in these ICT industries. To pursue this research objective, I opened the 'black box' of macro-corporate activity, observed the thinking and behavior of actors (business people) inside and outside the organization, and considered a new theoretical framework from micro-analysis of the processes of strategy, organization, and leadership, and the development, introduction, and application of ICT.

I have confirmed the existence of fixed frameworks for successful (and failed) business models in the ICT industry from more than 20 years of practical experience in ICT industry and field research in management studies, and the elucidation of this framework has become a great motivation for undertaking this research. This clarification not only contributes to academic research, but also becomes an important issue for companies all over the world wanting to acquire a globally competitive edge in the ICT field. My new concept is the existence of the three 'knowledge innovators' (platform, process, and content) as main players in the growth of ICT businesses. These knowledge innovators as stakeholders realize the building of new business models through close collaboration and coordination. They

then promote co-creation to create new business models and co-evolution in the ICT industry as a whole, and form dynamic 'innovation networks'. The starting point, for example, is mobile Internet businesses such as the pioneering (both in Japan and globally) i-mode business model and game business models such as PlayStation dynamically building 'innovation networks' arising out of co-creation and co-evolution. Few research studies, however, have accumulated data on an academic level on such topics as how co-creation, co-evolution, and innovation networks are created from actors inside and outside the company, and what corporate and organizational strategies should be undertaken for co-creation and co-evolution.

The progress of this book emphasizes in-depth process research on business scenes, and analyzes the relationship between the strategy formulation and implementation process, co-creation and co-evolution, and the formation of innovation networks including such questions as why managers choose certain kinds of decisions and implement appropriate strategies, and why certain types of relationships with partners are prioritized. The research methods applied qualitative and process research through ethnography at the business scene, participant observation, and interviews. On this basis, I took a grounded theory and case study approach, derived core categories and axes from raw data, and extracted core concepts and frameworks founded on this data.

I believe that the significance of this research is that the elucidation of the co-creation and co-evolution model for ICT industries presents new academic implications in the management study field, while at the same time providing beneficial practical implications with regard to practical businesspeople in various industry fields aiming to build new business models in the ICT industry or applying ICT. I also hope that the formation of innovation networks from these co-creation and co-evolution models will provide an opportunity to communicate pioneering Japanese management concepts to the world through theorizing and verifying from the features of a Japanese management system (community management) rooted in the spirit of a joint cooperative body.

Finally, this book could not have been completed without the thorough and rigorous interaction that the author has had with many practitioners. I would like to extend my gratitude to these practitioners, who are of a number too great to count. I also wish to thank my family for their support when I made the transition from the business world to academia. Concerning the publication of this book, I wish to extend my appreciation to Mr Ben Booth and Ms Jo Betteridge, editors at Edward Elgar Publishing, who provided tremendous support.

Mitsuru Kodama

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## PART I

# Network Innovation in the Knowledge-based Society





# 1. Network innovation for knowledge-based firms

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## 1.1 NEW BUSINESS MODELS THROUGH THE ADVANCE OF ICT: THE AIMS OF THIS BOOK

In recent years, the creation of new business has developed in tandem with advances in communication functions through broadband networks represented by ICT (Information and Communication Technology). The meaning of ICT extends beyond that of progress in information processing through conventional computer-focused IT to include technology infrastructures that enable interactive networking among people throughout the world and the transmission, sharing, and creation of the diverse data, information, and knowledge held by people.

The number of broadband users passed the 100 million mark as early as 2003. Broadband is growing in North America, Asia, and Europe, and is expected to continue its rapid advance. In Europe, the broadband household distribution rate has risen to around 20 percent. South Korea leads global broadband distribution rates, followed by Japan, where growth is rapid. Subscriber numbers have expanded to a combined figure of around 45 million in Japan, China, and South Korea. Among the various types of broadband, FTTH (Fiber to the Home) is gaining attention as the ultimate technology. In this area, Japan held a global lead as of the end of March 2007 with a total of 10 million subscribers. Meanwhile, broadband in the US and Europe focuses on DSL and CATV technology. An international comparison of broadband line rates shows Japan's to be the cheapest when each country's DSL and cable Internet speeds and rates are converted to 100 kbps.

One feature of broadband is its dramatically growing convenience of use as it embraces such developments as the popularization of the always-on connection through expansion of communication network bandwidth. All operational responses have accelerated, enabling shorter download times, popularization of always-on connections, video (mail, chat, posting, phones, and conferencing), and interactive communication incorporating image transmissions. Videoconferencing and videophones exploiting broadband

have developed remarkably in recent years, raising efficiency in business areas while evolving as ICT tools that have greatly transformed existing supply chains. John Chambers, CEO of US company Cisco Systems, put it like this:

Consider just one application: high-definition videoconferencing. With this, people as far away from each other as Singapore and Cincinnati can sit across the virtual table from one another. You hear the faraway voice as if it were in the same room. You see the other person's pupils dilate, forehead sweat, and fingers tap from thousands of miles away. This kind of instant, virtually in-person technology changes customer service models, family relationships, and even our environment. A sales rep meets via TelePresence (our brand of hi-def conferencing) with one customer in Japan at 9 a.m., another in Frankfurt at 10 a.m. and a third in New York at 1 p.m.... Multiplied over the thousands of Cisco employees who fly each year, this can lead to significant carbon reduction. We aim to cut our carbon emissions by 10 percent this year by using TelePresence (Chambers, 2007).

Since many Cisco Systems employees throughout the world have become able to work together virtually, large-scale project management is in the process of transition from a top-down to a cooperative teamwork style. Cisco Systems has held around 10 000 videoconferences since introducing this videoconferencing system. For example, contract negotiations for Cisco Systems' 3.2 billion-dollar purchase of WebEx (a US web-conferencing development and sale company) took place entirely by videoconference up to the signing stage, with the result that no more than eight days were required to put the purchase in order. As mentioned above, many of the conferences with customers throughout the world take place through videoconferencing, and this on-line collaboration technology of ICT tools is revolutionizing corporate management and the corporate supply chain, including the customers.

Meanwhile, much is expected from new content and forms of use such as music distribution (typified by the iPod), combat games, remote medical treatment, and e-learning. As the consumer markets show, this environment is developing beyond the realm of entertainment to add medical treatment and all kinds of consulting services at a virtual level. In business areas, too, ICT development is contributing to the creation of new business in diverse fields and industries, and to raising the management efficiency of a company's business process supply chain.

The increasing sophistication of information processing through computers (ICT) and the remarkable development of communications technology has also contributed to the rise in business process efficiency within and between companies (Venkatraman, 1991, 1994, 1997; Hammer and Champy, 1993; Ross et al., 1996). Figure 1.1 shows a chain process of

business activities among automakers. Automaker development processes are advancing in the areas of concurrent engineering through project management (Clark and Fujimoto, 1992) and product development meeting customer needs through frontloading (Khurana and Rosenthal, 1998). Features are the application of broadband, CAD (Computer Aided Design), and videoconferencing, and the systematic optimizing and efficiency-raising of supply-chain series from design, planning, production techniques, parts supply, production, and sales through to aftercare (Kodama, 2007c).

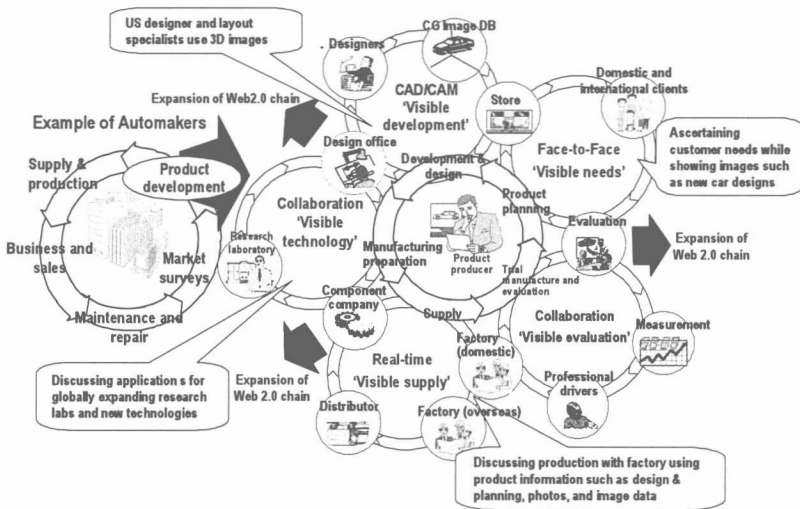
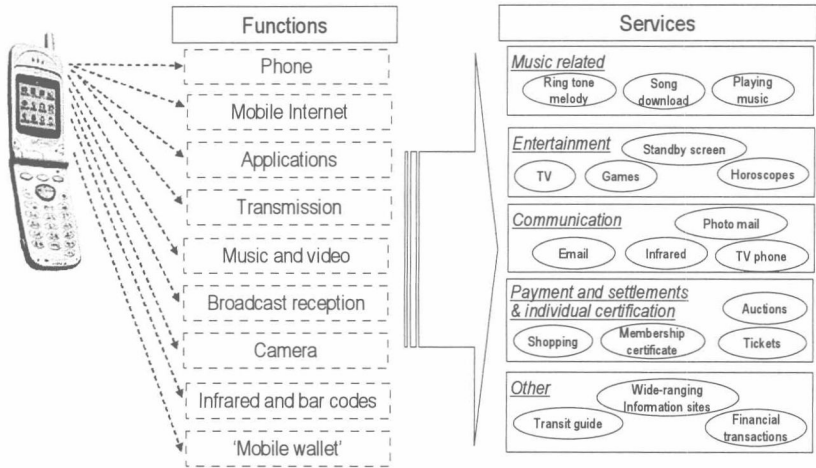


Figure 1.1 Model to raise efficiency of corporate business process – example of broadband and web 2.0 chain

Meanwhile, the mobile phone distribution rate already exceeds 50 percent in major countries. Room for growth is anticipated in such places as China, Brazil, and India, where the current distribution rate is low. Japan and South Korea head the mobile Internet support rates, exemplified by Japan's i-mode service, and new consumer services and business applications using mobile phones are expanding. Use of 3G phones (the gateway to mobile phone broadband use) is also growing in Europe and Asia, especially in Japan. 4G mobile communications systems with the speed of conventional fiber optics are being developed for deployment from 2010 onward.

Mobile phone applications are also permeating every nook and cranny of life, including corporate activities. Mobile phones are already more than just tools for communication. As Figures 1.2 and 1.3 show, they are rapidly being enabled not just for content services such as web searches, gaming,

music, and image distribution alongside broadband-enabled PCs, but also for ubiquitous services using IC tags (RF tags) and mobile commerce (such as FeliCa) e-money markets. Their use is also growing for multiple applications using infrared communication and QR codes.



*Figure 1.2 Mobile phone functions and provision of services*

Advanced information systems that incorporate the growing volume, speed, and sophistication of broadband technology and the growing volume of databases together with diversification of the means of communication through mobile phones and Web 2.0 are accelerating the expansion of corporate management change and business opportunities and having a large impact on corporate activities and individual lifestyles while developing as a base for social and economic activity. ICT enables increased efficiency for corporate business activities and strengthens the competitive edge of global business expansion. It also enables contributions to environmental problems by promoting teleworking and greatly reducing the need for individuals to move physically.

I believe the thinking that companies create new business models incorporating such ICT-inspired innovations in corporate strategies will become increasingly important. The search and advertising businesses of Google and Yahoo, the music distribution business led by Apple's iPod, NTT DoCoMo's i-mode as a business model pioneered by Japan, and Sony PlayStation's game business are examples of companies that have had the greatest impact on the global ICT industry. These businesses have succeeded as a result of service innovations through new marketing (new market

creation) as well as through the technical side (product innovation) of ICT development. My awareness of the issues and research objectives leads me to clarify, on a theoretical basis, the mechanism by which certain processes lead to product and service innovations in the ICT industry. To achieve this research aim, I will open the 'black box' of macro corporate activities, observe the thinking and behavior of actors (businesspeople) within and outside the organization, and derive a new theoretical framework after micro-analyzing strategy formation, organizational culture, leadership, and ICT development, installation, and application processes.

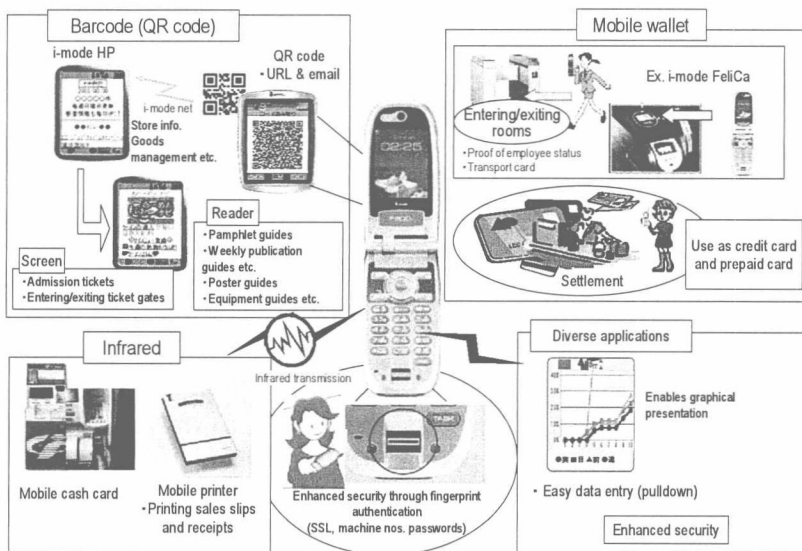


Figure 1.3 Various usage structures for mobile phones

The new concept that I present in this book identifies three general categories of knowledge innovators (platform, process, and content) implicated in ICT business growth as main players, and shows how these knowledge innovators, as stakeholders, manage to build new business models through close coordination and collaboration. The knowledge innovators also form dynamic innovation networks and promote 'co-creation' and 'co-evolution' for the ICT industry as a whole to build new business models. For example, mobile Internet businesses including i-mode (pioneered in Japan), and game business models such as PlayStation originate from the dynamic building of innovation networks created from this co-creation and co-evolution. Few research results have been gathered at

a scientific level, however, as to how co-creation, co-evolution, and innovation networks are created from practitioners within and outside the company, and how corporate and organizational strategies should adapt to the demands of co-creation and co-evolution.

This book's significance is to clarify the co-creation and co-evolution model in the ICT industry, but I think it will present new learning implications for management studies (especially strategic management, organization theory, and innovation management) while providing beneficial practical implications for various industry practitioners aiming to build new business models applicable to ICT and the ICT industry.

## 1.2 ICT AND NETWORK INNOVATION

Many companies today are dealing with the important management issue of creating new networked business while investing resources in ICT development, installation, and application and promoting efficiency among existing business processes. ICT has conferred great benefits on corporate activities. According to existing research, ICT may increase product quality (Thatcher and Pingry, 2004), improve workflow (Buhler and Vidal, 2005), enhance a company's flexibility to respond to customer needs (Gunasekaran and Ngai, 2004), and improve communication between a company and its customers and suppliers (Fiala, 2005). ICT of itself cannot be a start point for competitive excellence, however (Porter, 1991, 2001; Mata et al., 1995; Clemons and Row, 1991; Barney et al., 2001; and Carr, 2003, 2004). It is important for management leaders to recognize the significance of ICT for companies while holding the insight that ICT is helpful as a corporate strategy tool (Kodama, 1999a, 1999b).

Figure 1.4 shows results of surveys regarding ICT and company resources and competences from questionnaires and interviews targeting 300 Asian, European, and US companies in fields including ICT, manufacturing, finance, distribution, and broadcasting. According to these, companies targeted at the time of ICT introduction mentioned such factors as faster information sharing, activity, and decision making, more efficient business processes, enhanced productivity, and greater precision of development efficiency as key focal areas. Much of the previous research (Brynjolfsson and Hitt, 1995, 1998) elucidated that all of these elements help enhance efficiency through such means as applying ICT to improve corporate management productivity. When introducing ICT, moreover, many companies emphasized that enhancing employees' ability to support ICT and implementing employee training while reviewing business processes, organizational structure, and decision-making to that end are of greater

importance than the actual introduction of ICT. This indicates a high correlation between ICT and productivity among companies that invest in intangible assets, such as organizations, business processes, and personnel, at the same time as they introduce ICT, a result that chimed with previous research findings (Brynjolfsson, 2000).

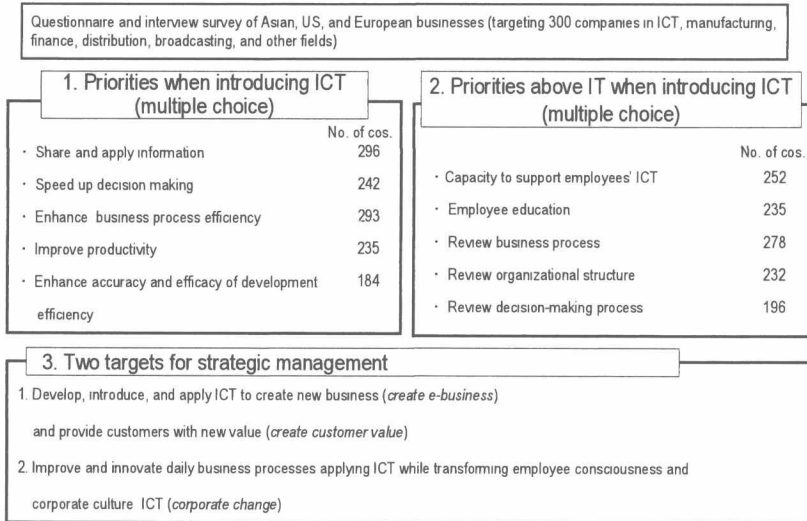


Figure 1.4 ICT and resources/capabilities – survey results (2003 to 2006)

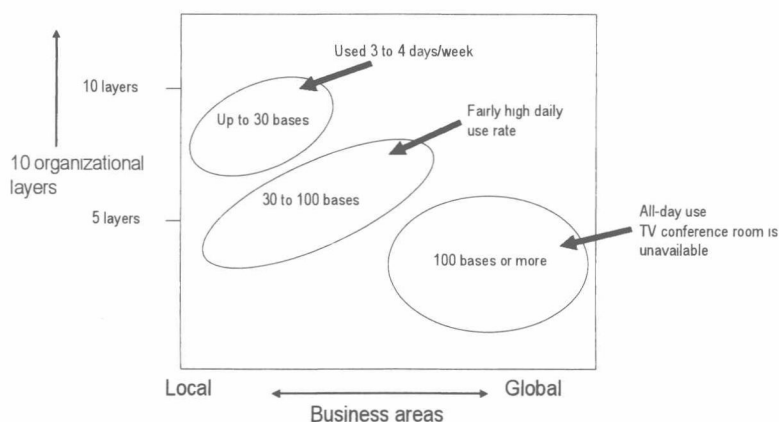
Systematic research from Brynjolfsson and Hitt (1995, 1998) on the relationship between ICT and productivity indicated the need to implement business process change alongside complementary investment in intangible assets as organizational resources in order to enhance productivity through ICT. The authors suggested that ICT investment enables companies to demonstrate productivity effects by linking them with investment in human and organizational intangible assets. The research also noted significant differences in productivity increases among companies spending similar amounts on ICT (Brynjolfsson, 2000).

Considering ICT from the viewpoint of the relationship between organizations and business processes can lead to the following interpretation. Generally, the strategic (strategy formulation and implementation) and organizational (including business processes, decision-making processes, organizational structure, political power in the organization, and corporate culture) contexts at individual companies differ even within the same industry and under the same business conditions. It



follows that ICT embedded in individual companies increases the likelihood of creating a differentiated, hard to imitate organizational capability and a continuous competitive edge through the mutually helpful contexts of ICT and a company's inherent strategic and organizational contexts (Clemons, 1991a, 1991b; Clemons and Row, 1991; Weill and Broadbent, 1998; Weill and Ross, 2004).

The digital organization indicated by Brynjolfsson (2000) can be interpreted as an organization that enables the creation of a continuous competitive edge and a differentiated organizational capability (hard for others to copy) through the mutual complementarity of a company's strategy, organization, and ICT contexts. In the digital organization, strategies for organization and personnel training are developing positively in such areas as business process change through ICT, distributed decision making, activation of information sharing and communication, meritocracy, embedding of business domains and target sharing, hiring the best talent, and investment in employee training.



Notes:

2003–2006 survey results

Questionnaire of 200 domestic and foreign companies

Figure 1.5 Collaborative ICT tools and organization

Meanwhile, our research survey on collaborative ICT tools and organizational change indicates that global organizations and those with few organizational layers (flattened structures) will further promote the use of ICT tools (this survey examined collaborative ICT tools such as videoconferencing), as with the case of Cisco Systems mentioned above.