Virtual Organizations in Korea

Baek Seung Ik and Kim Byoung Suk

Abstract

A virtual organization is a group of legally separate organizations that act as though they are one. The success of a virtual organization heavily depends on its ability to manage a massive information flow throughout its business partners. Today's corporations cannot be characterized as either virtual organizations or non-virtual organizations, but they can be characterized as organizations which have different degree of virtuality.

This paper attempts to explain virtuality of Korean corporations by examining e-businesses, particularly the B2B e-business. Although the user population of high-speed Internet service is growing quickly in Korea, most users use the Internet for entertainment or personal needs, rather than for work. The Internet usage rate of Korean corporations in enhancing their productivity is relatively low. Especially in the areas of B2B e-business, such as B2B e-marketplaces and SCM (Supply Chain Management), the usage rate is even worse. This paper examines Korean corporations' virtuality associated with e-marketplaces and SCM and suggests a roadmap of e-marketplaces and SCM.

Keywords: virtual organizations, virtuality, Internet business, B2B e-business, e-marketplace, SCM

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Introduction

Today's organizations are experiencing an extremely competitive and turbulent business environment. In this environment, they are under pressure to react more rapidly and accurately to changes in customer's needs and competitor's actions. Many organizations have coped with this pressure through radical decentralization of their hierarchical structures (Halal 1996; Mohrman et al. 1995). More recently, the proliferation of personal computers and communication networks has enabled organizations to acquire and retain distributed organizational structures (Ahuja 1996; Tapscott and Caston 1993; Tapscott 1995). By using a computer network, geographically dispersed people with common goals can communicate, coordinate, and collaborate with each other across time and space barriers. These groups have been called "virtual teams" (Geber 1995). Jessup et al. (1996) defines virtual teams as "turbo task forces, with teams forming and disbanding as needed, with team size fluctuating as necessary, and with team members coming and going as they are needed." Since members in a virtual team may, at times, participate in multiple teams and the life of their team may be very short, they must have easy, flexible access to other members, meeting contexts, and information (Jessup et al. 1996; Snizek 1995). As the complexity of the market has increased, many organizations have extended the scope of virtual collaboration from the team level collaboration to the inter-organizational level collaboration. These organizations have been called "virtual organizations" (Davidow and Malone 1992).

Davidow and Malone (1992) and Turban et al. (2001) define a virtual organization as "an organization composed of several business partners sharing costs and resources for the purpose of producing a product or service." A virtual organization is a group of organizations, or a group of legally separate entities, that act as though they are one. In order to achieve a common purpose, business partners coordinate their business activities within a virtual organization. The success of a virtual organization depends on its ability to gather and integrate a massive flow of information throughout its business part-

ners and intelligently act upon that information (Davidow and Malone 1992). Generally, the electronic exchange of information through the Internet, between separate organizations (business-to-business, B2B), or between an organization and its customer (business-to-customer, B2C), has been defined as a part of e-business. B2B e-business, in particular, may be used to support business partnerships, which is an important success factor to virtual organizations. Therefore, many organizations have tried to be virtual organizations by adopting B2B e-business partnerships (Lethbridge 2001).

Since virtual organizations can bring together the right mix of business partners who have the appropriate combination of knowledge, skill, information, and authority to solve difficult problems quickly and easily, they are receiving a considerable attention from various other organizations. As the numerous benefits and advantages of virtual organizations, which facilitates the effectiveness and efficiency if works, become widely recognized, organizations have tried to introduce the concept of a virtual organization across various tasks and at various levels. At one extreme, an organization can perform all business activities outside its core boundary, with the organization acting as a coordinator. Business partners coordinate their activities by using various information technologies. At the other extreme, a single organization can perform all business activities within the organization's boundaries by coordinating its internal resources which are geographically distributed. Today, most organizations are situated somewhere between these two extremes. Their differences are the number of business activities performed outside the traditional organizational boundaries. Venkatraman and Handerson (1994) define this phenomenon as virtuality. They state that "virtuality is the ability of the organization to consistently obtain and coordinate critical competences through its design of value-adding business processes and governance mechanisms involving external and internal constituency to deliver differential, superior value in the marketplace." Today's organizations cannot be characterized as either virtual or non-virtual organizations, but they can be characterized as organizations which have different degrees of virtuality. This paper diagnoses virtuality of Korean corporations by examining e-businesses, especially the B2B e-business in Korea.

Virtual Organizations and Virtuality

DeSantis and Monge (1999) define a virtual organization as a collection of geographically distributed and functionally diverse entities that are linked by communication technology and rely on lateral, dynamic relationships for coordination. Lethbridge (2001) states that, in order to achieve a common purpose, a virtual organization is formed by agreement of separate organizations to collaborate, to share knowledge and expertise. Table 1 summarizes the characteristics of virtual organizations.

Table 1. Characteristics of Virtual Organizations

	Characteristics
DeSanctis and Monge (1999)	• Geographically distributed • Electronically linked • Functionally or culturally diverse • Laterally (vs. Hierarchical) connected
Kraut et al. (1999)	• Boundary-crossing production processes • Flexible production process (with different parties at different times) • Multiple partners involved • Electronic collaboration
Ahuja and Carley (1999)	• High degree of informal communication • Nonhierarchical and decentralized organization

Lethbridge (2001) identifies six different structures of virtual organizations: virtual face, star alliance, market alliance, co-alliance, value alliance, and parallel alliance.

Virtual Face Organization

A typical virtual face organization offers a virtual shop front to its customers. This is the simplest virtual organization structure. The virtual face organization uses the Internet to provide services equivalent to or in addition to those available in a physical shop or office. Many corporations that operate a B2C (business-to-customer) e-business are included in this type of virtual organization. The virtual face organization produces goods or services by itself and share operational information with its customers over virtual space. For example, most off-line manufacturers use the Internet as an additional channel to sell their products/services.

Star Alliance Organization

Unlike virtual face organizations, star alliance organizations consist of multiple, independent organizations and are led by a core organization. An organization that outsources some of its operation can be defined as a star alliance organization. Member organizations normally perform particular functions or tasks within a star alliance organization. As needed, a new member who is able to perform the same function or task can replace the original members. However, a core organization cannot be replaced and takes full responsibility for customer relations and overall coordination among member organizations. For example, a large car manufacturer purchases major assembly parts from other manufacturers. In this case, the car manufacturer is the core organization taking a lead role in a star alliance organization, and the suppliers are the member organizations. The seamless exchange of business information and communication between the core organization and its member organizations are the essential ingredients for a successful star alliance organization. To facilitate the seamless exchange of business information and communication, many organizations have used various information technologies.

Market Alliance Organization

Like the star alliance organization, a market alliance organization consists of separate member organizations. However, a market alliance organization differs from the star alliance in the core organization's responsibility. The core organization of a star alliance organization has an overall responsibility for the virtual organization, whereas in a market alliance organization, the core organization takes responsibility only for sales and marketing. The core organization in a market alliance organization offers a marketplace where sellers provide goods for sale and pay commission for the use of the market. The marketplace can be open or closed. A group of producers may create its own market, with closed membership, paid for by subscription and commission. Market alliance organizations can be used for both B2C e-businesses and B2B e-businesses.

Co-alliance Organization

Unlike the star alliance and the market alliance organizations, a co-alliance organization does not have a core organization. The co-alliance organization consists of a group of independent organizations, each with equal commitment to the alliance. Each member organization deals directly with its customers, normally for its own products or services. Because each member organization is involved in a project from the beginning, it is very difficult to replace any member, particularly during the life of a single project. From this perspective, a co-alliance organization is less flexible than a star alliance or a market alliance organization. Although member organizations within a co-alliance organization can sell their products or services directly to the customers, in order to satisfy their customers specific needs and to share the overall cost, they participate in a co-alliance organization.

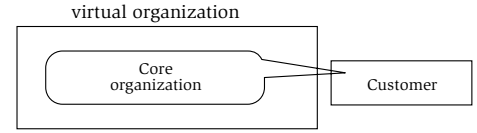
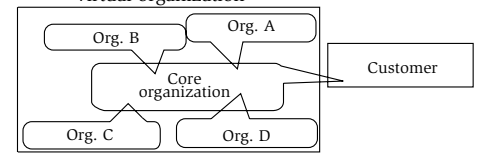
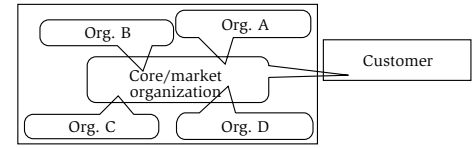
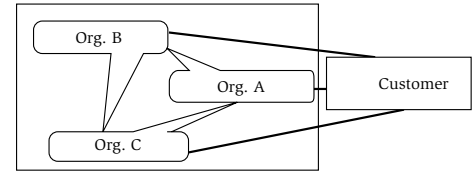
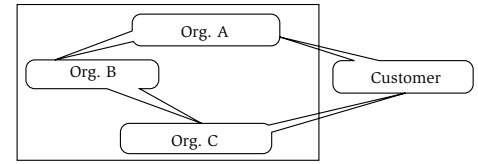
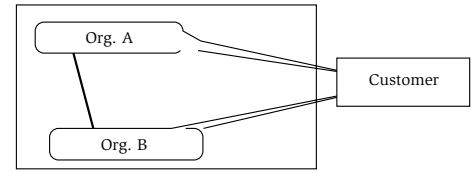
Value Alliance Organization

The value alliance organization is based on the value chain. Each member organization adds value to the work of the previous organization in the chain. Each member organization receives a "work in process," a partially completed product or service. Throughout the value-adding process of the member organizations, a final product or service is attained. Like the co-alliance organization, a value alliance organization does not have a core organization. However, unlike the co-alliance organization, a value alliance organization only allows the first or last member organizations to contact the customers. For example, if a car is manufactured by a value alliance organization, one company manufactures steel, a second company shapes the steel into car body parts, and a third company assembles the parts into a complete car body. Since it is assumed that all processes of a value alliance organization will work, a close collaboration among member organizations is very important.

Parallel Alliance Organization

Like the member organizations of a value alliance organization, the members in a parallel alliance organization perform value-adding activities within a value chain. Each member organization is responsible for tasks that are mutually dependent. Unlike the value alliance organization, the parallel alliance organization asks member organizations to perform their activities in parallel rather than in sequence. These organizations should not be integrated but linked. A parallel alliance organization can be found in concurrent engineering (CE). Under CE, all the functional areas of a corporation participate in the product/service development activity from the beginning. Suppliers and customers can be included. If all functions required to develop a product or service are performed by independent, geographically distributed organizations, a parallel alliance organization can be an option. Since all member organizations work in parallel, their close coordination is required. Table 2 explains the six different types of

Table 2. Different Types of Virtual Organizations

Type	Figure
Virtual face organizations	
Star alliance organizations	
Market alliance organizations	
Co-alliance organizations	
Value alliance organizations	
Parallel alliance organizations	

virtual organizations graphically.

As many organizations have recognized the importance of fast, flexible, and reliable product/service development in today's fiercely competitive marketplace, they have tried to use the Internet in order to support their business activities. Therefore, they outsource all their business activities except their core activities. All of today's organizations adopt one of the six virtual organizations mentioned above. As for the degree of information technology's usage, process integration, member organization's independence, and so forth, each organization is different. It is called virtuality.

Since a virtual face organization uses the Internet only in limited areas, such as sales and marketing, and consists of a single organization, its virtuality is the lowest among the other six virtual organizations. It can be used for B2C transactions but not for B2B transactions. Star alliance organizations can be found in many manufacturing companies. To enhance their productivity, they tend to produce goods or services under a close collaboration with their suppliers. Recognizing that the more efficient their relationships with their business partners, the greater the edge they will have over their competition, they have tried to use various information technologies and strategies to manage their relationships. It is normally called Supply Chain Management (SCM). The star alliance organization can be the simplest SCM strategy. By reducing the centralized control mechanisms and assuring independence of business partners, organizations can increase their virtuality and transform from star alliance organizations into co-alliance, value alliance, or parallel alliance organizations. This paper investigates the types of virtual organizations Korean corporations have used for SCM, and suggests a roadmap for future SCM.

A market alliance organization can be found in the B2B e-marketplace. Depending on the composition of the member organization and the power structure of the core organization, various e-marketplaces can be built. Large companies or governments implement some forms of e-procurement over the Internet. This is the simplest type of an e-marketplace. Benefits sought through e-procurement are

to have a wider choice of suppliers which is expected to lead to lower cost, better quality, improved delivery, and reduced cost of procurement. In this type of e-marketplace, a core organization, such as a large company or government, normally holds the maximum power over member organizations and the least collaboration among member organizations (because most e-procurement sites are open to sellers). By reducing the power of the core organization and facilitating collaboration among member organizations, e-marketplaces can increase their virtuality. In terms of virtuality, this paper assesses the current status of e-marketplaces in Korea.

E-Businesses in Korea

In Korea, the number of Internet users has been growing rapidly, nearly doubling each year since 1997. What is even more interesting is that most Internet users subscribe to the high-speed Internet service. In 2001, the number of subscribers per 100 people was 21.8 people in Korea (about 40% of all Internet users), 4.5 people in the United States (about 9% of Internet users), and 2.2 people in Japan (5% of Internet users). This dramatic expansion of the high-speed Internet service has even received worldwide attention. The International Telecommunication Union (ITU) and the Organization of Economic Co-operation and Development (OECD) announced that Korea is ranked first in the diffusion of the high-speed Internet service. Although the user population of the high-speed Internet service is growing quickly in Korea, most high-speed Internet users are younger people who are more inclined to use the Internet for entertainment or personal needs, rather than for work (see Table 3). The Internet usage rate of Korean corporations in enhancing their productivity is relatively low, compared to American corporations.

In the 2003 e-readiness ranking of Economist Intelligent Unit (EIU), Korea ranked 16th among 60 countries, and its rank between 2002 and 2003 shows the largest change among the 60 countries (see Table 4). Korea received a higher rank in technological infrastructure

Table 3. Age Distribution of Internet Users

Unit: %

	10–19	20–29	30–39	40–49	50–
Korea	34.6	29.1	22.3	10.5	3.5
USA	21.3	20.3	23.2	18.1	17.1

Source: Electronic Commerce & Development Association of Korea (www.b2b.or.kr) (2003).

Table 4. E-Readiness Ranking

Country	Score (2003)	E-Readiness Ranking			Country	Score (2003)	E-Readiness Ranking		
		2003	2002	Diff.			2003	2002	Diff.
Sweden	8.67	1	4	3	**Korea**	**7.80**	**16**	**21**	**5**
Denmark	8.45	2	7	5	Belgium	7.78	17	16	1
Holland	8.43	3	2	1	New Zealand	7.78	17	18	1
America	8.43	3	1	2	France	7.76	17	17	2
England	8.43	3	3	0	Taiwan	7.41	20	20	0
Finland	8.38	6	10	4	Italy	7.37	21	19	2
Norway	8.28	7	11	4	Portugal	7.18	22	24	2
Swiss	8.26	8	4	4	Spain	7.12	23	22	1
Australia	8.25	9	6	3	Japan	7.07	24	25	1
Canada	8.20	10	9	1	Israel	6.96	25	26	1
Hong Kong	8.20	10	14	4	Greece	6.83	26	23	3
Singapore	8.18	12	11	1	Czech	6.52	27	27	0
Germany	8.15	13	8	5	Chile	6.33	28	28	0
Austria	8.09	14	13	1	Hungary	6.23	29	29	0
Ireland	7.81	15	15	0	Poland	5.57	30	31	1

*A score is 10 scale.

Source: Economist Intelligence Unit, "The 2003 e-Readiness Ranking," (http://graphics.eiu.com/files/ad_pdfs/eReady_2003.pdf).

and Internet adoption rate of individuals and organizations, whereas it rank dropped in the category of external environments such as law, tax, politics, and labor markets. It also shows that the Internet adoption of organizations mainly focused on B2C transactions. Currently, in order to enhance productivity, many Korean corporations have used Internet technology across their various business activities, ranging from selling products/services via the Internet to collaborating and communicating with their business partners via the Internet. As it is shown in Table 5, the amount of money that Korean corporations invested in e-businesses has rapidly increased.

Table 5. E-Business Investment in Korea

Unit: billion won (US$ one billion)

	2000	2001	2002
Total investment	11,840 (9.87)	11,040 (9.2)	13,480 (11.23)
Investment for system	10,188 (8.49)	9,080 (7.57)	11,130 (9.28)
Investment for education	793 (0.66)	829 (0.69)	919 (0.77)
Investment for consulting	909 (0.76)	1,131 (0.94)	1,431 (1.19)

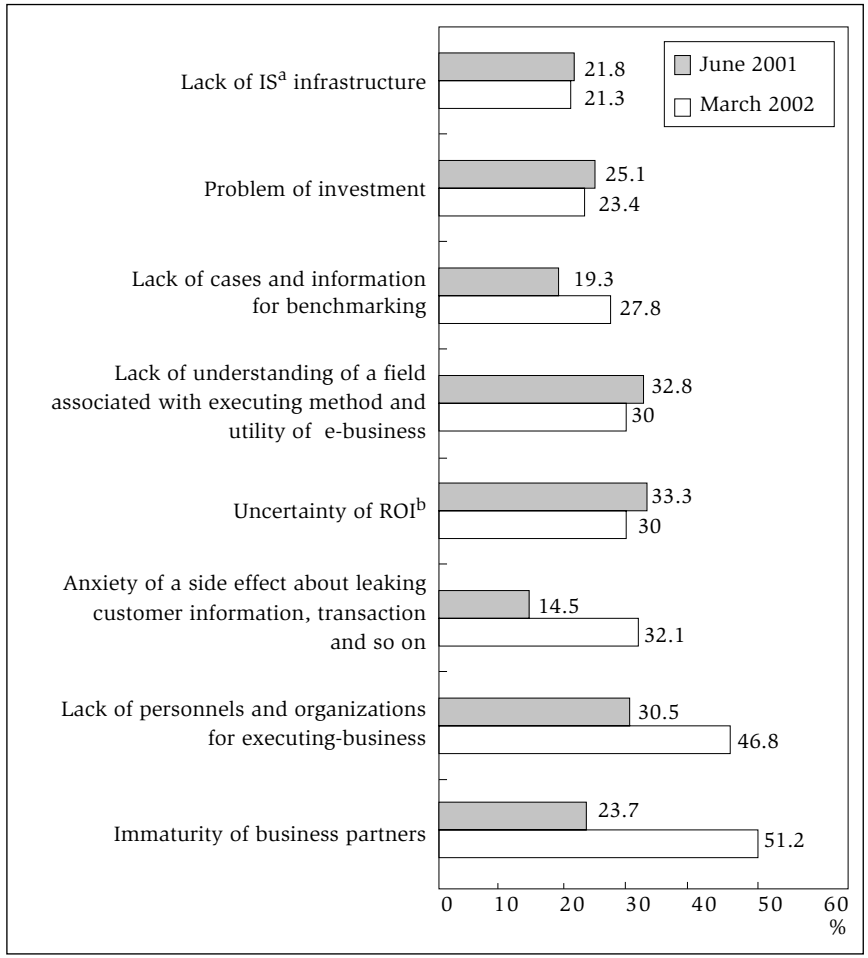
Source: Electronic Commerce & Development Association of Korea (www.b2b.or.kr) (2003).

Table 6. E-Business Initiatives

Item	E-Marketplace	E-Procurement	SCM[a]	CRM[b]	KM[c]
No plan	51.0	47.2	41.7	31.4	32.0
Preparing plan	30.1	11.1	13.9	20.0	18.9
Building plan	2.8	2.8	13.9	11.4	10.8
Implementing plan	11.1	13.9	19.4	22.9	22.6
Completing implementation	5.0	25.0	11.1	14.3	15.7
Total	100.0	100.0	100.0	100.0	100.0

a. SCM (Supply Chain Management)
b. CRM (Customer Relationship Management)
c. KM (Knowledge Management)

Source: Electronic Commerce & Development Association of Korea (www.b2b.or.kr) (2003).



* Respondents choose multiple answers.
a. IS: Information Systems
b. ROI: Return of Investment

Source: Electronic Commerce & Development Association of Korea (www.b2b.or.kr) (2003).

Figure 1. Bottlenecks of E-Business

According to the 2003 study of the Electronic Commerce & Development Association of Korea, which tracks current e-business initiatives of 300 Korean corporations, many corporations have completed e-procurement (25%), knowledge management (15.7%), and customer relationship management (14.3%), and they are currently working on customer relationship management (22.9%) and knowledge management (22.6%) (see Table 6). It shows that many Korean corporations have focused on customer-centered e-business initiatives. It also points out the major bottleneck which prevents Korean corporations from pursuing e-businesses: immaturity of business partners (51.2%), shortage of e-business personnel (46.8%), and security of customer information (32.1%) (see Figure 1). Although Korea has the highest level of Internet use for individuals and organizations in the world, the Internet use for collaboration among business partners is still very limited .

B2B E-Business in Korea

The growth of Internet usage spurred by rapidly advancing network technologies has been bringing broad changes in the way businesses are conducted. In order to enhance effectiveness and efficiency of e-businesses, many Korean corporations are trying to extend the scope of virtual collaboration among their business partners. This is called a B2B e-business. Through these trials, corporations have been transformed into virtual organizations. As the number of Korean corporations that have implemented an e-business increases, the transaction volume of B2B e-business will surpass the transaction volume of B2C e-business. In 2002, the transaction volume of B2B e-business was over 70% of the total e-business transactions (B2C, B2B, and B2G).

The ways that corporations use the Internet to collaborate with their business partners can be categorized into e-marketplaces and Supply Chain Management (SCM). The Internet allows corporations to create a virtual marketplace where their customers can order products and services without going to the physical marketplace. A virtual

marketplace can facilitate transactions between corporations, as well as transactions between corporations and their customers. The virtual marketplace is called an e-marketplace. E-Marketplace is a specific site that offers a marketplace where corporations can buy and sell their products or services. Another type of B2B e-business is the SCM. SCM steers the entire process from product and service creation to their delivery to the customers. Through SCM, corporations can manage the complex network of relationships which they must maintain with their business partners in order to outsource, manufacture, and deliver products. It allows business partners to build a business network in which they can freely share their resources and exchange information as in a single corporation.

E-Marketplace

E-Marketplace is defined as an interactive business community providing a central market space where multiple corporations can engage in transactions among corporations (Jensen and Skovgaard 2001). Both buyers and sellers can benefit through the e-marketplace. Buyers can purchase good quality products and services at a lower price, and sellers can sell their products and services at a better price. As the numerous benefits and advantages of e-marketplace become widely recognized, many Korean corporations are building various e-marketplaces. For example, Hyundai Motor company has implemented an e-marketplace, called Vaatz (www.vaatz.com), to simplify and automate its procurement processes. POSCO has also implemented an e-marketplace, called Steel-N (www.steel-n.com), to support its procurement processes. Table 7 shows the current status of e-marketplace in Korea. As shown in Table 7, many e-marketplaces have been developed in the machines/computers/telecommunications (14.6%), textile (13.1%), and chemicals (12.5%) sectors. And 65 e-marketplaces (45%) have been developed by strategic alliances between offline manufacturers and distribution corporations. Large Korean enterprises have invested vast amount of money and effort in building e-marketplaces (see Table 8).

Table 7. E-Marketplaces in Korea

	B2C[a]	B2B[b]	IT-Offline[c]	Offline[d]	Total
Food/drink	0	2	4	3	9
Textile/clothing	1	5	2	11	19
Chemical products	0	3	3	12	18
Steel	0	1	1	6	8
Car	0	0	4	3	7
Machine/computers/ telecommunication	1	4	6	10	21
Heavy industry	0	0	1	6	7
Construction	0	0	3	1	4
Medical & pharmacy	0	1	2	4	7
Environment	0	1	0	0	1
Trade/logistics	0	2	3	3	8
Jewelry	0	1	0	0	1
Energy/electronic power	0	2	0	0	2
Furniture	0	0	1	0	1
Knowledge	0	0	1	1	2
General marketplace	3	11	9	5	28
Total	5	33	40	65	144

a. B2C: B2C corporations build B2B e-marketplaces.
b. B2B: B2B corporations build B2B e-marketplaces.
c. IT-Off-line: IT corporations, offline manufacturers and distribution companies build e-marketplaces together.
d. Off-line: Off-line manufacturers and distribution companies build e-marketplaces together.

Source: Electronic Commerce & development Association of Korea (www.b2b.or.kr) (2003).

Generally, e-marketplaces can be categorized into three different types of e-marketplaces: public e-marketplaces, private e-marketplaces, and consortium e-marketplaces. A public e-marketplace offers a third site where buyers and sellers can perform business transactions freely. The site is developed and operated by a third party. Unlike a public e-marketplace, a private e-marketplace is developed by a buying corporation. It is mainly used for procurement of larger firms. A consortium e-marketplace is a site located between a public

Table 8. E-Marketplaces of Korean Large Enterprises

Corporation	B2B E-Marketplaces	Areas
Hyundai Corporation (www.hyundaicorp.co.kr)	www.SteelnMetal.com	Steel & Metal
	www.Morningnetwork.com	Network Hardware & Software
	www.BuymarineKorea.com	Ship
	www.eshiprepair.com	Ship Repair
Samsung Corporation (www.samsungcorp.co.kr)	www.carecamp.com	Medical Products
	www.chemcross.com	Chemical Products
	www.ichemnet.com	Chemical Products
	www.fishround.com	Fishery
	www.Textopia.com	Textile
LG Corporation (www.lgicorp.com)	www.Chemround.com	Chemical Products
SK Global (www.skglobal.com)	www.SKteleplaza.co.kr	Mobile phones
	www.Skcomplaza.co.kr	Computers
	www.emedicals.co.kr	Medical Products
	www.Skuniform.co.kr	Fashion

e-marketplace and a private e-marketplace. MROKorea (www.mrokorea.com), ITMEX (www.itmex.com), and FoodMerce (www.foodmerce.com) are examples of a public e-marketplace. A private e-marketplace is generally implemented around a larger firm. e2open (www.e2open.com) is a consortium e-marketplace. It is developed and operated by a group or consortium of participating corporations, such as LG Electronics, Hitachi, IBM, Panasonic, and so on. The procurement volume of LG Electronics through e2open is about 10% (about US$6 billion) of its total procurement volume.

By 2004, about 500 e-marketplaces are expected to survive in the world. A numerous e-marketplaces can be integrated and reorganized around each industry. Only few e-marketplace can survive in each industry. Although many Korean e-marketplaces are facing difficulties, two Korean e-marketplaces, in particular, have recently shown successful results. A consortium e-marketplace for chemical products, ChemCross (www.chemcross.com), has mediated more than US$850 million worth of chemical products in two years. Surprisingly, ChemCross is one of the first chemical exchanges to record a net profit in their operation. Another successful Korean e-marketplace is FishRound, an online fishery marketplace. It offers comprehensive services that are required by the industry, such as procurement, logistics, MRO services, financing, and auction. Like ChemCross, it is also a consortium e-marketplace. In 2002, more than US$3 billion worth of fishery products had been traded through FishRound. Currently, the focus of Korean e-marketplaces has shifted from private e-marketplaces to consortium e-marketplaces. This trend represents a move by e-marketplaces to increase their virtuality by reducing the power of a core organization and facilitating collaboration among member organizations. Because consortium e-marketplaces are developed and operated under closed membership, the degree of collaboration among member organizations is relatively high, and the degree of a core organization's power is relatively low. Many Korean e-marketplaces concentrate on the areas in which Korean corporations traditionally had held advantage over other corporations, such as fishery, shipbuilding, chemical, and recently semiconductor. Another trend is that larger enterprises, such as Hyundai, SK, Samsung, and LG, are taking the initiative to open e-marketplaces, aiming for the global market, instead of just the domestic market. They try to build gateways to Asian markets for manufacturers, traders, and end-users worldwide.

Supply Chain Management (SCM)

A company's supply chain includes the facilities where raw materials, intermediate products, and finished goods are acquired, transformed, stored, and sold (Kalakota and Robinson 1999). Ideally, the supply chain consists of multiple companies that function as efficiently and effectively as in a single company, with full information visibility and accountability (Kalakota and Robinson 1999). Simchi-Levi et al. (2000) define SCM as "a set of approaches utilized to efficiently

integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time." One of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as sole entities, but rather as a group of entities (Lambert and Cooper 2000). SCM is a method to streamline the flow of information, goods, and services within this group. The primary objective of SCM is to integrate the organization's entire supply network in order to secure the flow of the right products to the right places at the right time and for the right price. Before the Internet became popular in organizational settings, a primary goal of SCM had been to coordinate material, information, and financial flows among functional departments within an organization. Nowadays, its goal has become an inter-enterprise integration, not an intra-enterprise integration. SCM includes not only the integration of internal processes within a company, but also the integration of external resources outside the company. Recently, the integration of different components or companies has become heavily dependent on the Internet technology. Through SCM, corporations can become virtual organizations. SCM enables corporations to transform a group of ad hoc and fragmented processes into a cohesive system capable of delivering value to customers.

SCM mainly consists of Supply Chain Planning (SCP) and Supply Chain Execution (SCE). SCP supports the delivery of products and services, the information flow from suppliers to customers, and the process optimization, at the strategic level. Its main activities include distribution/deployment planning, manufacturing planning, production scheduling, supply planning, demand panning/forecasting, and supply chain network designing. SCE is an execution-oriented application that supports effective flow management of materials, services, and information among business partners, in order to satisfy customer requirements. Its main activities include order management, inventory management, logistics management, transportation management, warehouse management, supply chain event management/visibility, and customer-supplier supply chain collaboration.

Many SCM solutions focus on SCP, rather than SCE. Tables 9 and 10 show the market size of SCP and SCE applications. The SCP modules of production scheduling and supply planning are widely used in many companies (See Table 9). Although SCE has a smaller market share than SCP, SCE becomes popular among distribution corporations. As shown in Table 10, many corporations have quickly started adopting Warehouse Management System (WMS) and Transportation Management System (TMS).

Table 9. Market Size of SCP

Major Application	Revenue (US$ million)	Growth Rate
Distribution/deployment planning	50	50%
Manufacturing planning	135	46%
Production scheduling	407	65%
Supply planning	300	62%
Demand planning/forecasting	213	52%
Supply chain network designing	36	70%

Source: AMR Research, 2001.

Table 10. Market Size of SCE

Major Application	Revenue (US$ million)	Growth Rate
Order management	147	32%
Inventory management	165	19%
Logistics management	49	–3%
Transportation management	234	52%
Warehouse management	255	35%
Supply chain event management/visibility	56	51%
Customer-supplier supply chain collaboration	133	87%

Source: AMR Research, 2001.

Although Korean corporations have invested a great amount of money and effort in building e-business infrastructures, their investments have been focused on implementing front-end systems, rather than back-end systems and their integration. Table 11 shows the ratios of Korean corporations that build e-business systems. As shown in Table 11, the implementation of e-business systems, with the exception of Enterprise Resource Planning (ERP), is insignificant among Korean corporations, especially small and medium corporations. Among the five e-business systems, SCM is implemented into the fewest number of Korean corporations. However, many studies forecast that more and more corporations will adopt SCM. As many Korean corporations have confirmed tangible and intangible benefits from effective production planning and execution and many SRM solutions are now available in the market, the Korean market of SCM solutions has increased by more than 24% every year. The world-leading SCM vendors, such as i2 Technologies, SAP, Oracle, EXE Technologies, have a large market share in Korea. Table 12 summarizes corporations that have implemented the SCM. As shown in Table 12, the corporations that have implemented the SCM are mainly large manufacturing corporations. And, by adopting the simple modules of SCM solutions, such as scheduling or inventory management (focusing on SCP, not SCE), most of them have partially reengineered and integrated fragmented, ad hoc processes of suppliers, manufacturers, warehouses, and stores. Among the six virtual organizations mentioned previously, they have started to adopt a star alliance organization to pursue SCM. By reducing the power of the core organization, a large manufacturing corporation, they can increase their virtuality. In addition, by facilitating the two-way communication among member organizations while maintaining their independency, they can perform collaborative forecasting and replenish goods between retailers and suppliers. Throughout these processes, they can be transformed into co-alliance, value alliance, or parallel alliance organizations.

Table 11. E-Business Systems

Unit: %

	Large Firms	Small/Medium Firms	Total
ERP	42.3	19.7	23.5
Knowledge Management Systems (KMS)	22.1	1.1	4.7
E-Procurement Systems	15.8	9.2	10.4
Customer Relationship Management (CRM)	11.4	2.4	4.0
Supply Chain Management (SCM)	9.9	1.1	2.6

Source: Ministry of Commerce, Industry, and Energy, 2003 *hanguk inteonet baekseo* (Korea Internet White Paper 2003).

Table 12. Examples of SCM Implementation

Vendor	Solution	Implementation Cases
i2 Technologies	TRadeMatrix	Samsung Semiconductor Co. Samsung Electronics Co. LG Electronics Co. Mando Machine Co. Hyundai Motos Co., etc
SAP	APO	Sambo Computer Co. CJ Co., etc
Oracle	APS	LG Electronics Co. Hankook Cosmetics Co. Hyosung Co., etc EXE Technologies Exceed Korea Tires Co. Dong-A Pharmaceutical Co. etc

Summary

A virtual organization is a group of legally separate organizations that act as though they are one. In order to achieve a common purpose, business partners coordinate their activities. The success of a virtual organization heavily depends on its ability to manage a massive amount of information flow throughout its business partners. Recently, many corporations have used various information technologies and strategies to manage their information. Today's corporations cannot be characterized as either virtual organizations or non-virtual organizations, but they can be characterized as organizations which have a different degree of virtuality. Virtuality can be defined as an ability to coordinate internal and external business processes. Organizations that react rapidly and flexibly to the dynamic environment have higher virtuality than organizations that do not. Although virtuality relies on information technology, the heavy use of information technology cannot guarantee high virtuality. When organizations have flexible, reconfigurable business processes with the appropriate use of information technology, they have higher virtuality. This paper examined the virtuality of Korean corporations, focusing on B2B e-business.

To adopt a B2B e-business, corporations use B2B e-marketplaces and SCM. B2B e-marketplaces are interactive business communities providing central market spaces where multiple corporations can engage in transactions among them. The current trend in Korean e-marketplaces is a shift from private or public e-marketplaces led by small and medium corporations to consortium e-marketplaces led by larger enterprises. Although current Korean B2B e-marketplaces have lower virtuality, by shifting consortium e-marketplaces, they can increase their virtuality. The shift to consortium e-marketplaces requires a close collaboration among member organizations and a tight integration of their business processes.

SCM is a method to streamline the flow of information, goods, and services within this group. The primary objective of SCM is to integrate the organization's entire supply network in order to secure the flow of the right products to the right places at the right time and for the right price. In terms of virtuality associated with SCM, Korean corporations are immature. In Korea, many supply chain networks is still operated by a single leading organization, a large manufacturing company, and the processes of member organizations is still fragmented.

Although the user population of the high-speed Internet service is growing quickly in Korea, most of the people use the Internet for entertainment or personal needs, rather than for their works. After examining virtuality of Korean corporations, it is observed that, even if they try to use the Internet to support their business activities, they still use the Internet in very limited areas and only at the operational level, not at the strategic level. Taking into the consideration the limitations of the technology-oriented e-business implementation, Korean corporations begin to pay attention to the harmonization of information technology and organizational changes. Throughout this process, Korean corporations can increase their virtuality.

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