

**B2B EC in Automobile, Electronics,  
and Construction Industries in Korea**

**Edited by**

**Jeong Hun Oh**

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**Korea University**

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## **Preface**

The global electronic commerce revolution is entering a new phase. While the first stage was fueled by the vision and innovation of business-to-consumer Internet companies, the next phase has been defined by the market success of companies engaged in business-to-business electronic commerce. The business-to-business electronic commerce is already the fastest growing area in the superheated new Internet economy and carries potentials beyond measure.

Business-to-business electronic commerce will prompt many changes in the production processes as well as in the value chains of every industry. However, the theory and research on the effect of business-to-business electronic commerce has not kept pace with the changing time. In early 1999, in view of this, the OECD launched an internationally comparable study project of the economic impacts of business-to-business electronic commerce on firm's

behavior. A first set of case studies was exercised in France in 1999 and several other OECD member countries including Korea have joined the cross-country project since 2000.

The objective of this study is to examine empirically the changes in transaction processes, relationships, market structures and value chains brought on by the business-to-business electronic commerce. For that purpose, three major industries (automobile, electronic, construction) in Korea were selected and survey researches were conducted.

Based on the empirical findings, this study suggests ways to develop and transform the business processes and infrastructures for business-to-business electronic commerce operations. The primary beneficiaries of the coming business-to-business wave will be those who use the Internet to extend business transactions, create the new business relationships, and seize the new business opportunities. With a further study to develop a verified empirical model regarding the effect of business-to-business electronic commerce on the activities of industries, this project will, with no doubt, contribute significantly to the development and propagation of business-to-business electronic commerce throughout all industries.

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## Chapter 1. Introduction

Many foreign companies are launching electronic commerce through the Internet, and Korean conglomerates are also starting to get involved in electronic commerce. Given the fact that electronic commerce encompasses not only commerce of physical products but also invisible commerce of information and service, companies have no choice but to invest in information and service in order to attain management efficiency. Until now, electronic commerce meant simply Internet shopping malls. However, business-to-business electronic commerce means that companies use information systems for efficient business operation. It is a new value creating work by open networks instead of closed information exchange routes. Because these efficiencies will affect companies' stock values and sales increase and lead to huge cost reduction, it seems natural that companies are moving toward business-to-business electronic commerce. In this competitive environment, companies expect to improve management efficiency through cost reduction and product improvement. Business-to-business electronic commerce is a process of selling, marketing and managing through the Internet, meaning that business-to-business electronic commerce can succeed only when the preparation processes for efficiency of the companies are completed. However, a vague illusion about efficiency can lead to new losses for companies. In view of this, this paper focuses on the impact of business-to-business electronic commerce on companies' activities. Business-to-business electronic commerce changes firms' internal business system and industrial market structure. And this kind of e-commerce leads to a whole value chain change by building a broad SCM, encompassing procurement, production, distribution, sales and after service.

This paper also aims to analyze the changes in commerce structures, relationships, market structures and value chains led by business-to-business electronic commerce. Because the types and characteristics of business-to-business electronic commerce differ in each industry, this report focuses on the automobile, electronic and construction industries where business-to-business electronic commerce is more active than in other industries. As a research method, theory-grounded questionnaires and interviews are used to find out the company's innovative factors and the change of value chains. As the applications that had taken charge of only restricted functions, such as EDI (Electronic Data Interchange), were pushed out, the Internet became a new medium with the development of the World Wide Web in the mid 1990s. The emergence of open architecture, with the innovative development of information and communications technology, provided an opportunity to overcome the closed business activities. When the Internet was first introduced as an electronic application within companies, its use was restricted to few activities such as sales and marketing, and the concept of electronic commerce was defined as moving off-line method to on-line commerce. American On-Line ([www.aol.com](http://www.aol.com)) and Amazon ([www.amazon.com](http://www.amazon.com)) are the leading companies of this type. But initial electronic commerce models, which just transferred traditional business models to those based on the Web, became more generally used for profits and cost reduction effects. At the same time, the electronic commerce models were getting more interested in business-to-business electronic commerce, for it provided a chance to widen the scope of doing business, from marketing and sales of business parts to customized supply chain and distribution channels. The reason for the development of business-to-business e-commerce through the Internet is simple: the limitations of time and space can be overcome, and cost reduction by innovating business process is important. With the introduction of electronic commerce, efficiency borne by the adoption of e-commerce becomes more crucial in business activities. The business-to-business electronic marketplace takes quickly the place of off-line commerce and grows rapidly.

Table 1-1 lists predictions on the size of the business-to-business electronic commerce

market, announced by domestic and foreign research institutions.

**[Table 1-1 Predictions on the Market Size of Business-to-Business Electronic Commerce]**

Region	Institutions	1998	1999	2000	2001	2002	2003	2004
World (hundred million\$)	Boston Consulting	6,710	--	--	--	--	28,000	--
	Goldman Sachs	--	--	--	--	--	--	15,000
	Forrester Research	430	--	--	--	--	13,000	27,000
	Gartner Group	--	1,450	4,030	9,530	21,800	39,500	73,000
Domestic (hundred million won)	Samsung Securities	22	132	1,218	5,784	14,193	31,443	68,093
	Anderson Consulting	--	--	2,700	6,500	14,000	26,800	49,500

As we can see from the table above, business-to-business commerce is expected to grow rapidly. Whether online or off-line, whether the information technology industry or the manufacturing industry, and whether large or small companies, all industries try to incorporate business-to-business electronic commerce to improve competitiveness. Business-to-business electronic commerce is being developed as a new paradigm in the digital age through process renovation and pattern change as well as through the creation of new relationships between companies and industry restructuring. As a result, the concept of business-to-business electronic commerce itself has changed and it is becoming a factor in industry competitiveness. In the 1990s, business-to-business electronic commerce was mainly focused on integration of internal processes through ERP (Enterprise Resource Planning), but today its application has been widened, integrating companies' internal and external business processes using SCM (Supply Chain Management) and CRM (Customer Relationship Management). Applying ICT to real business not only concerns the company's internal workflow but also the issue of strengthening Inter-Organizational System (IOS). Besides, new business-to-business models such as aggregator, exchange, and auction are emerging. The focus of electronic commerce is moving from business-to-consumer to business-to-business electronic commerce and the trend of alliance, partnership, and M&A (Merge & Acquisition) seems to be a strategy for companies to obtain competitive advantages in this business-to-business electronic commerce environment. In fact, many business-to-consumer companies have already jumped into e-marketplaces and they are accepting more open and flexible standards like XML. The ERP project is built to accept XML and it is expected to enhance the development of business-to-business electronic commerce.

At last, the e-marketplace is a virtual market that links many suppliers with many consumers. According to Gartner Group, within three to five years most companies are likely to participate in the e-marketplace, with more than 20~30 percent of their trade completed in the e-marketplace. For example, the e-marketplace is emerging throughout all industries, such as ANX in the automobile industry, Securities hub in the financial industry, and Envera in the chemical industry in the USA. In keeping with the changes abroad, the e-marketplace is growing rapidly in Korea.

Domestic e-marketplaces for major industries are shown below.

**[Table1-2 Domestic E-marketplaces for Major Industries]**

Industry	Fabrics	IT electric	Medical	MRO	Trade	Chemical
Number	22	16	16	16	14	10
Industry	Steel	Heavy industry	Construction	Power	Automobile	Agriculture
Number	9	8	7	6	5	5

Korea is trying to achieve competitive advantage by developing electronic commerce in the imminent information society. It regards electronic commerce as a major strategy for the country's growth and is making great efforts to develop and stimulate electronic commerce. Therefore, it is essential to pursue a rational and efficient electronic commerce strategy in order to adjust to the rapid changes taking place in electronic commerce and become competitive in the new environment. It is also essential to be aware of accurate information and appropriate strategy related to the maturity and current state of electronic commerce.

## Chapter 2. Research Method

Three industries (automobile, electronics, and construction) were selected as targets of analysis and the value chain of these three industries was analyzed. After the sample group was selected, a core group and a secondary group of electronic commerce were chosen.

In the automobile industry, Hyundai-Kia, Daewoo, and Renault-Samsung Motor Companies were researched as a core group, while Dukyang, Wooshin, Dongyang and Samkee parts companies were surveyed as a secondary group. In the electronics industry, Samsung, LG, and Daewoo electronics were examined as a core group, while Wooyoung, Samyoung, KEC, and Daewoo parts companies were studied as a secondary group. Among the construction companies, Samsung, Daelim, and Ssangyong were observed as a core group, while Dusan, Taeyoung, Kumkwang, and Muyeoung were studied as a secondary group.

Core companies were selected from the leading companies in electronic commerce along the value chain, and interviews and questionnaires were used for analysis. The companies in the secondary group were chosen from those recommended by the companies of the core group. Research on the secondary group was made through phone interviews and questionnaires.

In the construction industry, the secondary group was selected among companies less active in developing electronic commerce. But among the automobile and electronics companies, the secondary groups were chosen from the parts companies related to the core groups. In order to study the value chain and the impact of electronic commerce on the companies' activities, the selected companies must have had a certain size. Therefore, the universe of each industry was restricted to those companies listed on the Korea Stock Exchange.

**[Table 2-1 Universe of Each Industry]**

Industry	Number of Universe
The Electronics Industry	<b>80</b>
The Construction Industry	<b>47</b>
The Automobile Industry	<b>38</b>

**[Table 2-2 Classification of Sample Groups]**

Types of sample group	Selection standard
-----------------------	--------------------

<p style="text-align: center;">Core Group</p>	<p>A sample group is selected from the primary group companies.  4-5 core companies are selected as sample groups among 47 construction companies, 80 electronics companies and 38 automobile companies.</p>
<p style="text-align: center;">Secondary Group</p>	<p>Secondary groups are chosen among the companies that have electronic commerce transactions with core groups. 4-5 companies are chosen from each industry.</p>

# Chapter 3. Case Study

## 1. The Korean Automobile Industry

### 1.1: Introduction and Background

Since the 1998 IMF financial crisis, the Korean automobile industry has faced many changes. For example, the third largest automobile company in Korea, Kia Motor Company was taken over by Hyundai Motor Company. Samsung Motor Company was eventually taken over by Renault Motor Company and the future of Daewoo Motor Company is unclear after its bankruptcy. The Korean automobile industry is likely to change from the current oligopoly market led by major three automobile companies (Hyundai, Kia, and Daewoo) into a perfect competition market whereby Korean and foreign automobile companies co-exist. The Korean automobile industry has grown as the fifth largest in productivity after the U.S., Japan, Germany and France. However, the Korea's automobile industry still lags behind technology development. Until now, its international advantage has been the cheap price made possible by relatively low labor cost, but it is becoming increasingly harder to compete with low price any more. For the short term, it is necessary to supplement technological insufficiency through strategic alliance with advanced foreign companies. And thus, the Korean automobile industry should try to curtail its expenditure. The environment of the world automobile industry is changing fast. The restructuring of leading automakers is being hastened because of the surplus supply and severe technology competition. Under these circumstances, only the companies that succeed in knowledge management, such as information and standardization, can survive. Each company is competing to achieve price competitiveness and quality leadership, and is trying to build strategic alliance with its competitors. The automobile industry in the 21<sup>st</sup> century requires a new paradigm of doing business and the Internet revolution is changing the fundamental structure of the automobile industry. The world's leading automakers are pursuing e-business for survival and the information use is becoming one of the core competencies. Therefore, the restructuring of automobile parts companies will follow and this will result in acquiring consumer preference information, achieving cost reduction of parts supply and sales, and lessening the product development period. In view of this growing e-business in the automobile industry, the study will focus on the impact of business-to-business electronic commerce in the automobile industry. The aim of the study is to give us more information about the latest developments in the structure of the automobile industry as well as offer advices for planning strategies to survive in this competitive environment.

### 1.2: Value Chain and Analysis

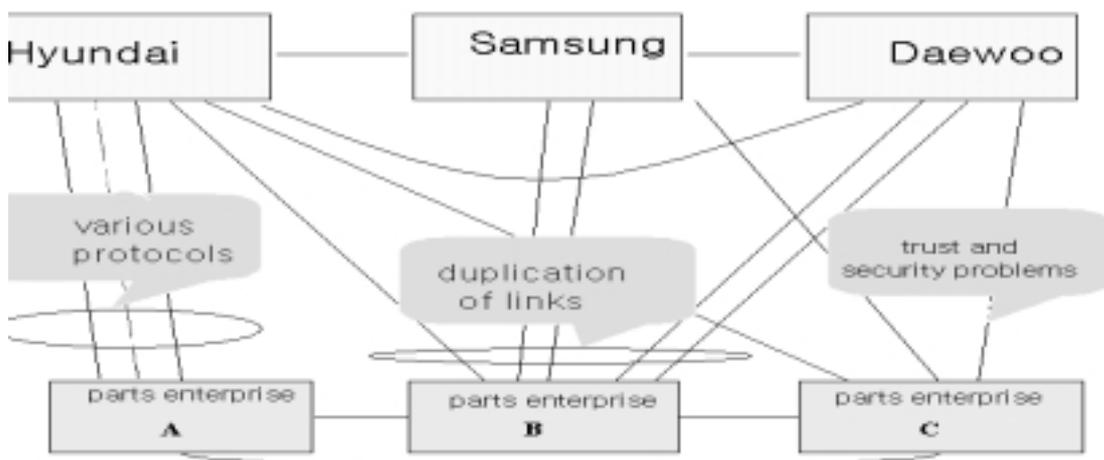
#### 1.2.1: Product and Transaction Characteristics

A car is assembled with 5,000 types of parts and 20,000 parts. To manufacture a car, multi branch materials are used, such as steel, nonferrous metal, rubber, plastics, glass, and fiber. The automobile industry is a final manufacturing industry representing the assembling manufacturing industry. Consequently the automobile industry has a close relationship with other industries related to the automobile parts production: steel, metalworking, machinery, electronics, petrochemical, and fiber. A balanced development of the automobile industry, therefore, needs the cooperation and development of the relevant industries. And it goes without saying that second-tier and third-tier automobile component companies are playing very important roles in the whole automobile industry.

Critical elements for the automobile industry are the technology and know-how of the

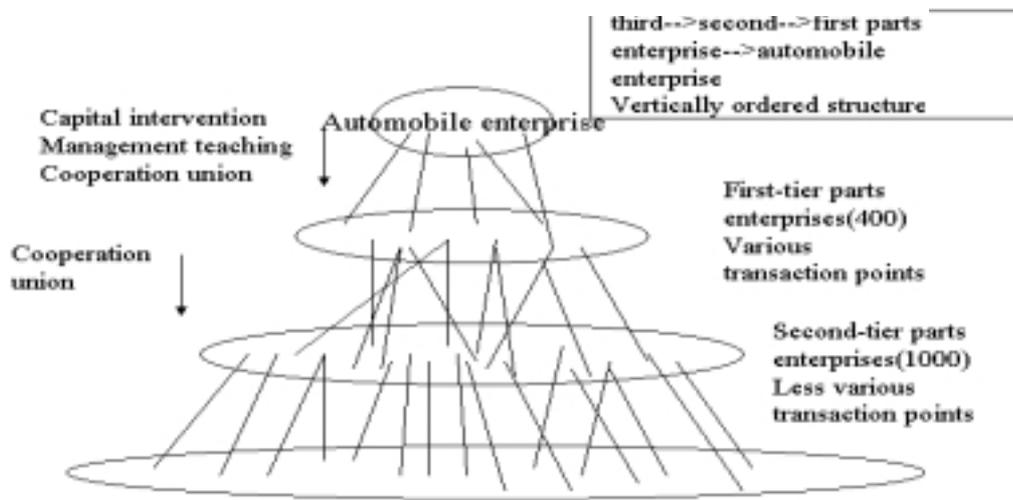
factory operation, such as management operation capability and production operation knowledge other than car-manufacturing techniques. It is difficult but important to operate efficiently technological development, large unit production equipments and long production lines, multi kinds but small quantity of production parts, and tens of thousands workers. And thus, it is important for competent factories to control logistics, product quality, prime cost and suppliers. The automobile industry has huge spreading effects to the related industries, and it has the characteristics of an industry needing a large-scale investment. The competitive equipment investment of companies to achieve economies of scale strengthens the automobile industry. It comes from the characteristics of the automobile industry that the effect of cooperation by the standardized network will be large. But there has been no global standard in the automobile industry so far. The Korean automakers and the parts companies are operating each network system separately. The representative automobile companies (Hyundai-Kia Motor Company and Daewoo Motor Company) in Korea have to overcome the limitations to survive and be competitive.

As we can see from the figures below, three companies use different EDI(Electronic Data Interchange) systems under various protocols. With the duplication of links and problems related to the reliability of network systems and security, their EDI systems are riddled with inefficiency in conducting business. The three automakers and the first automobile parts companies use the VAN(Value Added Network) system for information exchange. First and second sub parts suppliers still depend on labor.



**[Figure 3-1 Traditional Information Flow of the Automobile Industry]**

The Korean automobile industry has been developed with the leading automakers. Consequently the parts companies occupy a subordinate position in relation to automakers that complete the car. Because of the inferior business condition of the parts companies, it is not in a good position to promote an e-marketplace. Major automakers have been investing in the parts companies and the former are dispatching their executives to the latter for management guide. They collaborate on designing and developing car components. The figure below depicts the car components supply system of the Korean automobile industry.

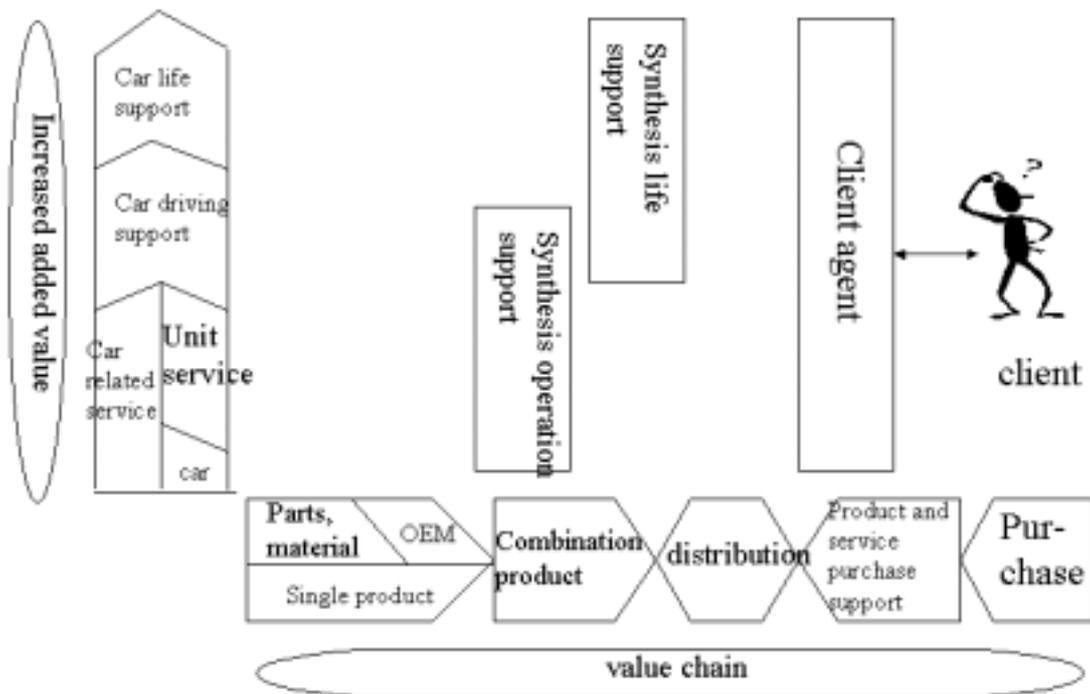


[Figure3-2 The Parts Supply System of Korean Automobile Industry]

## 1.2.2: Value Chain Characteristics

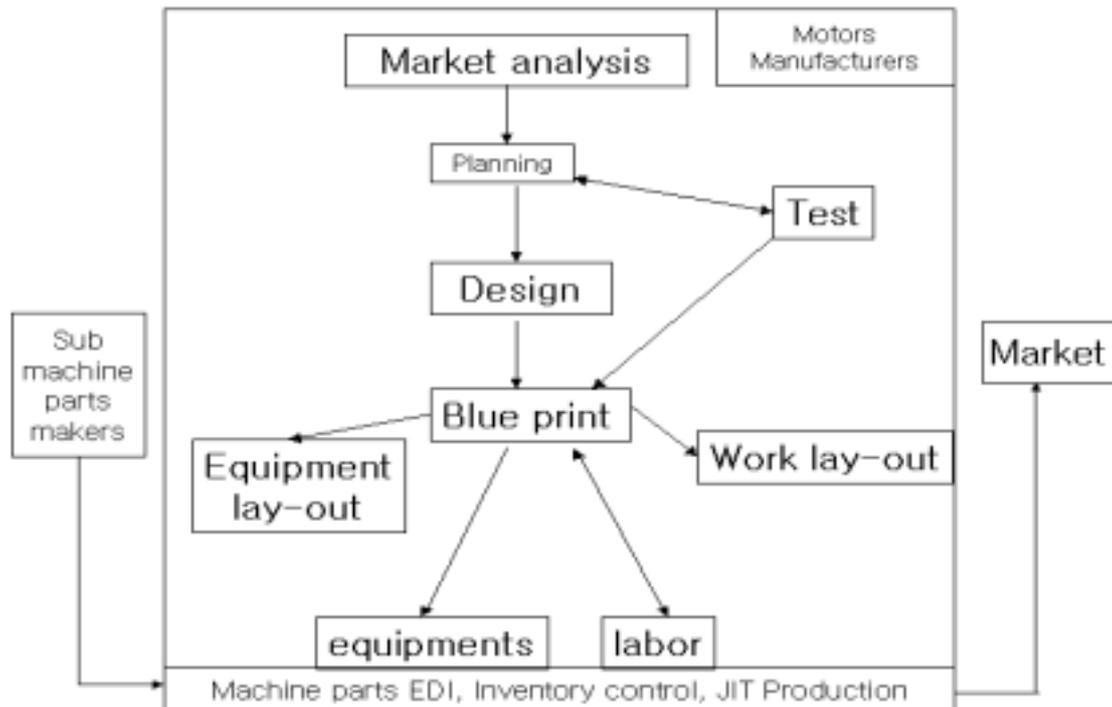
### 1) Factors of the Value Chain

The life cycle of an automobile can be phased into the production of material supplies, manufacturing and production, sales and distribution, and after service. The enormous processes range from transactions of companies with their cooperative companies to the transaction with final customers. Looking at the value chains of each automobile company, the automobile parts company assembles the components and the part modules, passes them over to the final manufacturing automaker. And each final automobile firm combines products to make finished products and distributes them to dealers and their own shops. Commercial agents or direct management shops play a role of delivering goods and conducting post-sales services.



**[Figure 3-3 The Value Chain Inside Each Enterprise of the Korean Automobile Industry]**

Looking at the information flowchart of the automobile industry, it is clear that market research leads to product planning that satisfies shorter development duration and high development productivity. After a short planning period, a basic plan is completed and a blue print is finished. Based on the blue print, an equipment plan and a work plan will be made and companies enter into car manufacturing whereby they control the stock by applying Just-in-time (JIT) and maintain a high manufacturing quality. Every company is endeavoring to sell a product which has price competitiveness.

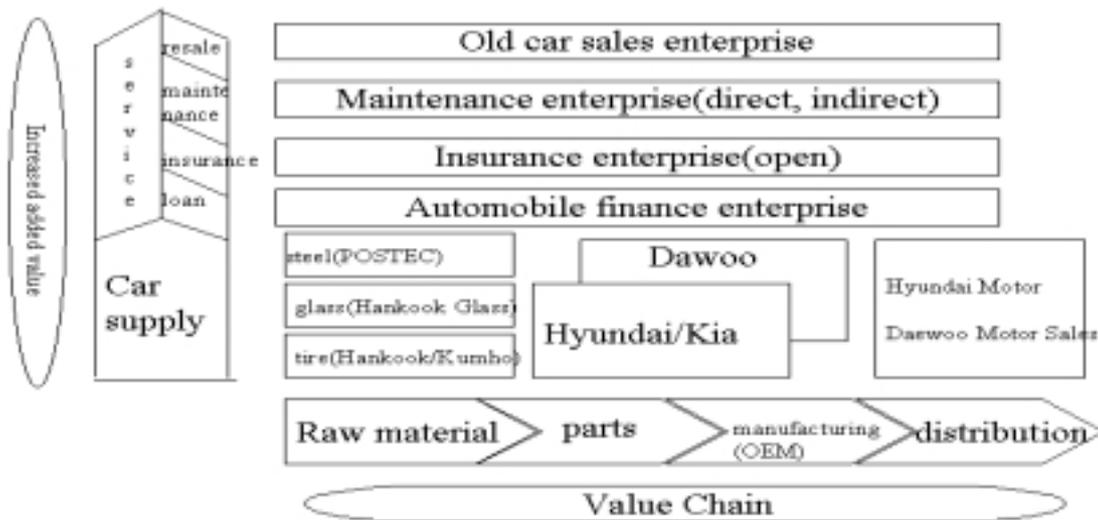


[Figure3-4 Information Flowchart of the Korean Automobile Industry]

## 2) Value Chain Characteristics

The domestic automobile market is now experiencing a slowdown because the current economic downturn is discouraging people from buying cars. And the possibility of trade frictions with the United States and Europe always exists. The Korean automobile industry is faced with a dilemma of dealing with the saturation of the domestic market and the sagging automobile export. The pressing objective of the Korean automobile industry is learning how to reorganize the value chain to compete efficiently against with other advanced companies. The present inefficient value chain must change into an active value chain that creates a new value for the whole automobile industry. In this way, these critical matters do not just remain the concern of the final manufacturing automobile companies. To improve core competitiveness of the Korean automobile industry, organic cooperation with the automobile parts companies is essential for the final car manufacturing company. Internationally, GM and Ford have close relationships with the worldwide automobile components companies such as Delphi and Visteon. Japan's Toyota has Denso, while the competitiveness of Europe's Mercedes-Benz, BMW and Renault is deemed to come from their suppliers such as Bosch and Valeo. In contrast, Korean automobiles components companies, such as Mando Machinery Corporation, Halla and Daewoo Delphi, do not possess cutting edge technologies that can enable them to compete with the world's best. The situation is not much better at home. Domestic competition or the need for it does not exist, for parts companies are vertically interrelated to car manufacturers. Nevertheless, the domestic component companies are facing a changing business environment internally and externally because of the reorganization of the Korean automobile industry. Superior foreign automobile companies are penetrating into the domestic market and the business trend of the global automobile industry is moving towards an expansion of module production among interregional parts companies.

When we see the whole value chain of the automobile industry, the final manufacturing automobile companies, which are supplied with raw materials such as steel, glasses and tires from material suppliers and components producers, assemble, manufacture and distribute the final product, cars.



[Figure3-5 Value Chain of the Korean Automobile Industry]

### 1.3 Dynamics and Trends

Recently electronic commerce using information communication technology (ICT) has increased throughout all kinds of industry. The ICT is a tool that enables the automobile industry to exchange enormous amounts of information, thereby allow for fast decision-making and curtail production and stock management cost. The automobile industry is deemed as an industry with high potentials for developing e-business because its value chain is very long and the added value from the application of the Internet and information communication technologies is expected to be high. Using information technology in the production process will make it easier for the final automobile manufacturing companies and automobile components companies to manage supply chains. Shortened time in producing new models will result in cost reduction. Global production integration and the fast decision-making will raise their strategic competitiveness. Although the final manufacturing automobile companies and large components companies already have been using the EDI system, only five percent of business transactions are linked through EDI and most of them still depend on paper works. The lack of a standardized and reliable information system is an obstacle to efficient communication. Electronic commerce using new ICT is expected to eliminate inefficiency in business. The final automobile manufacturing companies and the intermediate components companies have great interests in business-to-business electronic commerce because of cost reductions that are likely to come from business applications of the World Wide Web and Internet EDI. As business-to-business electronic commerce becomes more popular, greater cost reduction in business is expected.

a. Product development:

A common plan with automobile components companies  
 Decreasing duplicated engineering  
 Cost reduction in product development

b. Subsidiary material cost:

Cost reduction through competitive biddings and integration of ordering processes

c. Manufacturing cost:

Accurate demand forecasts, productivity improvement through a designed production plan

Reduction of indirect cost by purchasing directly through the Internet

Cost reduction by lowering the occurrence of inferior goods

d. Sales / marketing cost:

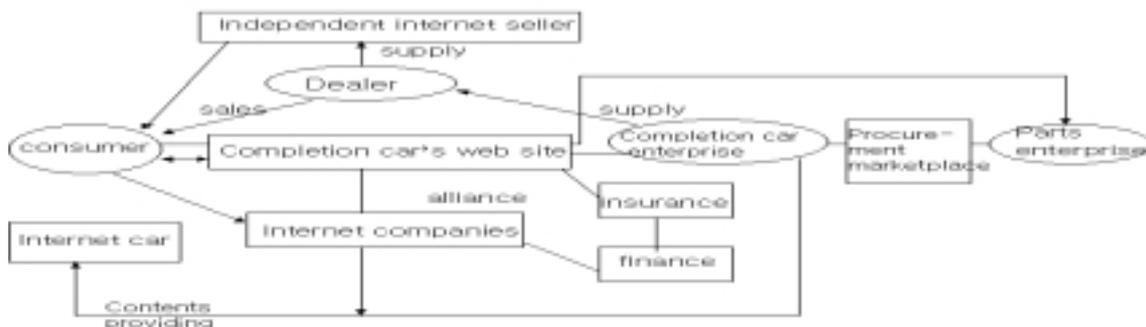
Automation of information exchange with dealers and reduction of sales staff

Stock reduction through accurate demand forecasts and correct perception about consumer needs

Transportation cost reduction through optimization of the network and logistics rationalization

The application of electronic commerce makes it possible to rationalize firms' business structure and reduce costs.

The automobile industries around the world are actively introducing information technology. The United States' automobile industry introduced the ANX (Automotive Network eXchange) network system. Currently Ford, GM and Benz-Chrysler began to purchase through Covisint, which is a business-to-business e-marketplace. European automobile companies are also starting electronic commerce within their industries. The leading automobile manufacturing companies are adapting information and communication technology into all fields of business, such as production, sales, and after service. E-business enables each automobile company to create tremendously positive effects in a short time with the expenditure of small investment. As e-business is being diffused to all the business sections, the automobile industry faces a lot of structural changes, such as a shortened development period for a new car and 20-30 percent reduction in the cost of production and stock operation in just 2~3 years after leaping into e-commerce. Electronic commerce in the automobile industry implies electronic information exchange among suppliers and buyers, electronic businesses like e-finance, e-catalogue, and e-ordering/payment among components companies, final automobile companies and consumers. The electronic transaction structure of the automobile industry looks like the figure below when e-commerce in the automobile industry is operated actively.



## **[Figure 3-6 Structures of Electronic Transactions in the Korean Automobile Industry]**

### **1.3.1 Electronic Transactions in the Korean Automobile Industry**

In the Korean automobile industry, only EDI systems that support procurement are being operated. But the government and automakers are trying to build up KNX (Korea automotive Network exchange) that is a standard information and e-business network for the automobile industry.

The current level of information operation process in the Korean automobile industry is not so much advanced as in the United States or Europe. First, industrially unified standard concerning the protocol and application jargon, which is very critical in sharing information, is lacking. Second, automakers and their sub parts companies have their own, separate EDI system. Third, the information flow that is necessary for production is relatively slow because processes related to production depend heavily on paper works. Fourth, automobile components companies in Korea are ill-equipped to invest in business and transaction automation. Finally, government policies do not support firms' investment in electronic commerce.

### **1.4 Position of Proactive Firms in the Value Chain**

Electronic transactions among Korean automobile companies are not as much active as those among their counterparts in economically advanced countries. Although the Korean automobile industry is facing many difficulties like the bankruptcy of Daewoo Motor Company, Hyundai- Kia Motor Company is trying to accomplish business-to-business electronic commerce.

#### **The Core Group – Automobile Manufacturing Companies**

Among the car-completion companies in Korea, only Hyundai-Kia Motor Company has leaped into electronic commerce. Daewoo Motor Company is not ready to get involved in electronic commerce because of their financial troubles, while Renault-Samsung Motor Company does not even have a plan to venture into electronic commerce. Ssangyong Motor Company went bankrupt and is now under the management of creditors. Consequently, the firms other than Hyundai-Kia Motor Company are ill-disposed to invest in electronic commerce, although they fully recognize the importance of electronic commerce. In fact, Hyundai-Kia Motor Company is already constructing web-based e-commerce. The firm introduced various kinds of equipment for e-commerce and is preparing to launch autoever.com, which is an e-marketplace for components suppliers.

#### **Secondary Group - Automobile Components Suppliers and Assemblers**

So far, the automobile components companies have not pursued electronic commerce aggressively. But Hyundai Mobis is introducing web-based EDI system to its second-tier and third-tier component suppliers for them to bid on supplying production materials. The current electronic commerce of Hyundai Mobis is limited to components purchase, so it cannot be regarded as full-scale e-business. However, it is considered a positive trial that can eventually expand electronic commerce to the whole operation of the Korean automobile industry.

### **1.5 Case Analysis**

### 1.5.1. Sampling

This section deals with a case analysis and this section explains the choice of cases and companies. For each case, a proactive company, a company which has anticipated trends and integrated e-commerce into its business operations, has been selected. Another guideline for case selection was that every link of the chain should be as fully represented as possible. The companies chosen for the case analyses also had strong influences in, and served as examples for, the Korean automobile industry.

For the core group of final manufacturers, we selected Hyundai-Kia Motor Company, Daewoo Motor Company, and Renault-Samsung Motor Company. Hyundai-Kia Motor Company is the leading e-commerce initiator among automakers in Korea. Daewoo, the second largest automaker in Korea, has been going through a financial crisis and is ill-disposed to prepare for e-commerce. Renault-Samsung, a subsidiary of Renault Motor Company, is a motor company which made mid-size cars in Korea.

Occupying the second group of the Korean automobile industry are suppliers and automotive parts assemblers of three major final manufacturers (Hyundai-Kia, Daewoo, and Renault-Samsung). Duckyang is an automobile interior supplier and is a main supplier for Hyundai-Kia Motor Company. Wooshin Industrial Company is an automobile muffler and pipe supplier and is a main supplier for Hyundai-Kia Motor Company. Dongyang Mechatronics is an assembler and manufacturer of automobile internal motor and is a main supplier for both Daewoo and Hyundai. Samkee Machinery Co. Ltd is an automobile engine and mission parts manufacturer and assembler and is a main supplier for Kia Motor Company.

[Table 3-1 Overview of Selected Cases]

<b>Korean Automobile Industry</b>	<b>Case company</b>	<b>Position in the chain</b>
<b>Core group</b>	Hyundai-Kia Motor Company	A final automobile manufacturer, wholesale trade and retailer
	Daewoo Motor Company	A final automobile manufacturer
	Renault-Samsung Motor Company	A final automobile manufacturer, wholesale trade, and retailer
<b>Secondary group</b>	Duckyang Ind.Co	An automobile interior supplier A first supplier of Hyundai-Kia Motor Company
	Wooshin Industrial Company	An automobile muffler and pipe supplier A first supplier of Hyundai-Kia Motor Company

	Dongyang Mechatronics	An automobile internal motor assembler and manufacturer A first supplier of Daewoo Motor Company and Hyundai Motor Company
	Samkee Machinery Co., Ltd	An automobile engine and mission parts manufacturer and assembler A first supplier of Kia Motor Company

## Case Analysis

### A. Core Group:

#### a. Hyundai-Kia Motor Company

##### *The Position in the Value Chain*

Hyundai-Kia Motor Company is a final automobile manufacturer, wholesale trader and retailer in the value chain. The number of employed people nationally totals about 50,000 and world wide about 60,000. The total revenue both domestic and international sales is 27.6 billion dollars. The number of countries in which Hyundai-Kia Motor Company has subsidiaries is ten, including seven worldwide corporations. The number of suppliers is over 1,000 and its customers is over 1,000 including individual customers. The number of intermediaries of Hyundai-Kia Motor Company is over 20 as purchasers and sellers. The distribution of main suppliers by size is as follows: 20 percent for very small suppliers'; 40 percent for SMEs (Small and Medium size Enterprises); and 30 percent for large companies. As for the distribution of main customers by size, the percentage of very small companies is 0.5 percent, SMEs 1 percent, large companies and public administration 1 percent, and the individuals 95 percent. The percentage of overseas suppliers is 25 percent, while overseas customers is 50 to 75 percent. The number of firms that has recently entered and/or exited the market is almost nothing.

##### *Business Profile*

Hyundai-Kia Motor Company is an automobile manufacturer. Domestically Hyundai-Kia Motor Company runs its own retailers and distributes cars to dealers, and that internationally it just distributes cars to dealers in different regions. Factors related to the business structure are car manufacturing and sales. Factors related to production inputs are mainly composed of the material cost and the labor cost. The percentage of the material cost is 80 percent, while the labor cost is 20 percent.

##### *Technology Profile*

Types of transaction or related business functions with customers or suppliers supported by the application of electronic commerce are numerous. In dealing with customers, e-mail and the Internet serve main business functions, such as advertisement, catalogue, information service,

negotiation and ordering. Similarly, applications for business by suppliers are e-mail, the Internet, EDI, Internet EDI and Extranet. They are mainly used as a means of providing catalogues, information services, billing and payment, ordering, finance and delivery. In regard to business to consumers, the purpose of using ICT is to encourage more buying of cars through the web. As for business to business, the purpose of using ICT is to reduce production cost.

### ***Interview Responses***

#### ***Motivations***

Hyundai-Kia Motor Company first became engaged in electronic commerce to reduce the production cost through cooperative buying of general and productive materials. A large number of the operational processes of Hyundai-Kia Motor Company are automated. The automation takes place in negotiation, ordering, payment/billing, and finance. Due to the integration of an information system between Hyundai-Kia Motor Company and its suppliers, the period of production development is reduced. This is especially true in the design part of a new car: the firm and its suppliers exchange electronic blue prints, component module design and function. The integration of the computing system leads the firm and its suppliers to reduce production cost. Moreover, the automated ordering system yields market information. The method of payment is left to the automobile component companies partly due to practical considerations since secure payment systems do not yet exist on the Internet. Delivery is made by means of physical transport. Catalogues are used with descriptions of automobile components and cars in order to reach target groups, i.e., suppliers and individual customers, as effectively as possible. The autoever.com, which is a website of Hyundai-Kia Motor Company, is being built for auction exchanges of MRO materials. This website is being built as one of KNX projects. Through this website the firm expects that the transaction cost will be cut and that its sub-component firms will get new markets due to the standardization of transaction systems. And customers will have access to more detailed product information by means of e-mail and the product's website.

#### ***Obstacles & Advantages***

Factors that aided and facilitated Hyundai-Kia Motor Company's efforts to achieve electronic commerce goals are described below.

#### ***Telecommunications Infrastructure***

Low telecom costs and reliable telecommunication networks are factors for the success of the electronic commerce initiative. And telecom operators offer a sufficient range of services.

#### ***Strategic Factors Relating to Competitiveness:***

Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce facilitated the management of business relationships.

#### ***External Factors Pertaining to Relations with Other Enterprises***

Human factors encourage the use of electronic commerce. The firm employs more proficient workers, and the availability of a variety of transaction systems may not discourage electronic commerce. For Hyundai-Kia Motor Company, its brand image became an asset in establishing the electronic commerce profile of the firm. Electronic commerce encouraged more flexible commercial structures

Factors that impeded progress in achieving electronic commerce are described below.

### ***Regulatory Factors***

Low levels of security, poor authentication and certification system, and unplaced legal structures hinder electronic commerce. Weak protection of intellectual property discouraged electronic commerce.

### ***Internal Factors***

The existing in-house technologies are insufficient to support electronic commerce, and the existing staff training and skill levels are also insufficient for electronic commerce. But investment cost has been justified since 1999. Managers want to introduce electronic commerce because of growing significance of business-to-business electronic commerce in the market.

### ***Government Policy***

The lack of tax exemption and insufficient financial support for R&D discourage the firm from engaging in electronic commerce. But the government uses online electronic services such as KNX.

### ***Impact***

For Hyundai-Kia Motor Company, electronic commerce concerned with transaction progresses and business functions makes its business and transaction more efficient and faster, especially in catalogues, information services, negotiation, billing and payment, finance, information capture, management and market analysis. But the amount of data is so small that the definite effects or impacts cannot be known at present. Its electronic commerce has not impacted the employment and profitability of the firm yet. Hyundai-Kia Motor Company has begun its active engagement in the regular electronic commerce with its customers and suppliers since 2000. Therefore, although the impact of electronic commerce on the firm's profitability and employment is insignificant, its impact and effects will be significant in the future. But the firm's electronic commerce does have effects on the firm's turnover. It is able to communicate quicker with other first-tier and second-tier automobile assemblers and makers, which are placed in the value chain in the part of production and transaction processes. Mainly the firm takes returns by reducing costs of transaction and sustaining stock, including reduction in communication time with other factors in the value chain.

## **b. Daewoo Motor Company**

### ***The Position in the Value Chain***

Daewoo Motor Company is a final automobile manufacturer in the value chain. It has a subsidiary company that is a domestic retailer selling Daewoo automobiles. The number of people employed nationally is 19,979 as of December, 2000. The combined revenue of domestic and worldwide sales is 7,349,760,000 dollars. The number of countries in which Daewoo motor company has subsidiaries is ten, including five worldwide corporations. The number of suppliers is over 1000, and the number of intermediaries of Daewoo Motor Company as purchasers and sellers is over 20. The distribution of main suppliers by size is that very small suppliers' share is 5 percent, SMEs 75 percent, and large companies 20 percent. Individuals are its main customers. The distribution of individuals is 97 percent. The percentage of overseas suppliers is less than 25 percent, while that of overseas customers is 50 percent to 75 percent. Daewoo Motor Company is the second largest automobile company in Korea. So the number of firms (suppliers, competitors, and intermediaries) that have recently entered and/or exited the market is almost nothing.

### ***Business Profile***

Daewoo Motor Company is an automobile manufacturer. Domestically Daewoo Motor Company has its subsidiary retailers and distributes cars to its subsidiaries and dealers, and internationally it just distributes cars to dealers in each region. Factors related to the business structure are car manufacturing. Factors related to production inputs are mainly composed of the material cost and the labor cost. The percentage of the material cost is 75 percent and the labor cost is 12 percent, while other operation expense is 13 percent.

### ***Technology Profile***

Types of transaction or related business functions with customers or suppliers supported by electronic commerce are two or three. The Internet (website, [www.dm.co.kr](http://www.dm.co.kr)) is a main technology of business functions to customers as a means of advertisement, catalogue, and information service. And the application for business with suppliers is WWW for information service and order until now. E-mail, EDI, Internet EDI, and Extranet are not being used. Papers and telephone are still their main applications of business. Concerned with business to business, the purpose of using ICT is to reduce production cost. It starts online applications such as Internet EDI and WWW in finance and payment/billing from off-line applications.

### ***Interview Responses***

#### ***Motivations***

Daewoo Motor Company engages in electronic commerce to reduce the stock operation cost by about 20 percent. Daewoo Motor Company has only a long-range plan to implement e-commerce in negotiation, ordering, payment/billing, finance, etc. It innovated on the logistics system. The period of logistics was short by applying WWW and EDI.

#### ***Obstacles & Advantages***

For Daewoo Motor Company, factors that aided and facilitated its efforts to achieve electronic commerce goals are given below.

#### ***Telecommunications Infrastructure***

Low telecom costs and reliable telecommunication network are factors for the success of the electronic commerce initiative. And telecom operators offer a sufficient range of services. Strategic factors related to competitiveness are as follows: Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce will facilitate the management of business relationships.

#### ***External Factors Relating to Relations with Other Enterprises***

The company expects that human factors will encourage the use of electronic commerce. The firm has a plan to employ more proficient workers. And the availability of a variety of transaction systems may not discourage electronic commerce. For Daewoo Motor Company, its brand image will help it establish the electronic commerce profile of the firm. Electronic commerce is expected to encourage more flexible commercial structures

Factors that impeded progress in achieving electronic commerce are detailed below.

#### ***Regulatory Factors***

Low levels of security, poor authentication and certification system, and unplaced legal structures hinder electronic commerce. Weak protection of intellectual property discouraged electronic commerce.

### ***Internal Factors***

The existing technology within in-house technologies is insufficient to support electronic commerce, and the existing staff training and skill levels are also insufficient for electronic commerce. Top managers want to introduce electronic commerce because of the rising prominence of business-to-business electronic commerce in the market. But Daewoo Motor Company cannot afford to invest in e-commerce because of its financial troubles.

### ***Government Policy***

Taxation measures and insufficient financial support for R&D discourage the firm to engage in electronic commerce. But the Korean government is trying to use online electronic services such as KNX.

### ***Impacts***

Daewoo Motor Company may not show significant impacts of electronic commerce concerned with transaction progress and business function because it does not have much data of doing e-commerce. In addition, Daewoo motor company is faced with the question of its existence. Therefore, it has neither time nor money to spare for investing in e-commerce.

## **c. Renault-Samsung Motor Company**

### ***The Position in the Value Chain***

Renault-Samsung Motor Company is a final automobile manufacturer and retailer in the value chain. It is a subsidiary company of Renault Motor Company. It does not have any subsidiaries both domestically and overseas. The number of people employed nationally is 1,500 as of December 2000. The revenue from both domestic and worldwide sales is 36 million dollars. The number of suppliers is between 100 and 1,000 and the number of customers is over 1,000, including individual customers. The number of intermediaries of Renault-Samsung Motor Company as purchasers and sellers is over 20. The distribution of main suppliers by size is 80 percent for very small suppliers, 15 percent for SMEs, and 5 percent large companies. Its main customers are individuals. The distribution of individuals is almost 100 percent. The percentage of overseas suppliers is less than 25 percent and overseas customers less than 25 percent. Renault-Samsung motor company is a newly launched automobile company in Korea. So the number of firms (suppliers, competitors, and intermediaries) that have recently entered and/or exited the market is many.

### ***Business Profile***

Renault-Samsung Motor Company is an automobile manufacturer and retailer. Domestically Renault-Samsung Motor Company has its subsidiary retailers and distributes cars to its subsidiaries and dealers, and internationally it just distributes cars to dealers in each region. Factors related to the business structure are car manufacturing and selling. Factors related to production inputs are mainly composed of the material cost and the labor cost. The percentage of the material cost is 80 percent, while the other operation expense 20 percent.

### ***Technology Profile***

Types of transaction or related business functions with customers or suppliers supported by electronic commerce application are very simple. The Internet ([www.renaultsamsung.co.kr](http://www.renaultsamsung.co.kr)) and e-mail are main technologies of business functions to customers as means of advertisement and information service. And until now, the application for business with suppliers is WWW for

information service and order. E-mail is only used for advertisement. Papers and telephone are still their main applications of business. Concerned with business to business, the purpose of using ICT is to reduce production cost. Advertisement and payment/billing, which were done off-line, are done through such online applications as WWW and e-mail. But the company has not invested in e-commerce yet because it is interested in making revenues first.

### ***Interview Responses***

#### ***Motivations***

Renault-Samsung Motor Company engages in electronic commerce to reduce the stock operation cost by about 20 percent. Its intention is to implement e-commerce in negotiation, ordering, payment/billing, finance etc., but it has not initiated any innovation yet.

#### ***Obstacles & Advantages***

At Renault-Samsung Motor Company, factors that aided and facilitated its efforts to engage in electronic commerce are described below.

#### ***Strategic Factors Relating to Competitiveness***

Its electronic commerce is expected to encourage lock-in strategies, and decrease the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce will facilitate the management of business relationships.

#### ***External Factors Pertaining to Relations with Other Enterprises***

The company expects that human factors will encourage the use of electronic commerce. The firm has a plan to employ more proficient workers. And the availability of a variety of transaction systems may not discourage electronic commerce. The brand image of Renault-Samsung Motor Company will help it to establish the electronic commerce profile of the firm. Electronic commerce encouraged more flexible commercial structures.

#### ***Regulatory Factors***

Required levels of security encouraged the firm's electronic commerce. And systems such as authentication and certification application generate trust and encourage electronic commerce. Sufficient protection encouraged electronic commerce.

Factors that impeded progress in achieving electronic commerce are discussed below.

#### ***Internal Factors***

Technologies existing in-house technologies are insufficient to support electronic commerce, and the existing staff training and skill levels are also insufficient for electronic commerce. Top managers want to introduce electronic commerce because of the increasing prominence of business-to-business electronic commerce in the market. But Renault-Samsung Motor Company cannot afford to invest in e-commerce because of the recent bankruptcy of Samsung Motor Company.

#### ***Government Policy***

Taxation measures and insufficient financial support for R&D discourages the firm to engage in electronic commerce. Regarding telecommunications infrastructure, high telecom costs inhibit the success of the electronic commerce initiative. Poor network reliability has also impeded the success of the electronic commerce initiative. Telecom operators do not offer a

sufficient range of services to encourage and enable firms to engage in electronic commerce.

### ***Impacts***

Renault-Samsung Motor Company does not actively engage in e-commerce, so the impact of the latter cannot be readily shown. In addition, Renault-Samsung Motor Company is a newly launched company, so generating revenues is the firm's most pressing need at present.

The selected core group comprises three firms, namely Hyundai-Kia Motor Company, Daewoo Motor Company, and Renault-Samsung Motor Company. Daewoo Motor Company, faced with financial crisis, cannot afford to invest in the implementation of electronic commerce. Similarly, Renault-Samsung Motor Company is strapped for cash. The firm has just begun operating its business since September 2000. It will tap into electronic commerce after the firm engages in actual business activities first. Consequently, the analysis of the case of Hyundai-Kia Motor Company may represent the current impact of electronic commerce.

Hyundai-Kia Motor Company has engaged in electronic commerce most actively in the Korean automobile industry. The company utilizes automated applications such as e-mail, WWW, EDI, Internet EDI, and Extranet. These applications contribute mainly to product innovations, process innovations, and relational innovations in the transaction preparation stage and to process innovations in the transaction completion stage. The use of information services, e-catalogues, and negotiations leads to product diversification. Hyundai-Kia Motor Company gets process innovations, especially in the design, logistics, production lines coordination and integration section. Exchanging electronic blue prints lessens the design development period in designing car frames and components. Sharing stock information cuts the cost of maintaining stock. In the transaction completion, the firms got process innovations mainly by a means of automation system in orders, billing and payment. These kinds of electronic service bring them sub-suppliers' royalty and trust. Although Hyundai-Kia Motor Company's engagement in electronic commerce is at a beginning stage, its impact seems to be taking effect immediately.

[Table 3-2 Hyundai-Kia Motor Company Analytical Grid]

		Electronic Commerce Innovations											
		Transaction Preparation				Transaction Completion				Production Support			
		advertising	catalogues	info services	negotiation	Orders	Billing & payment	Finance	delivery	transaction info capture	information management	market analysis	market development
Product innovations	Diversification	O	O	O	O	O							
	Differentiation												
	Customization												
	Bundling												
Process innovations	Design	O	O	O	O	O							
	Logistics		O	O	O								
	Production lines			O	O								
	co-ordination and integration			O	O								
Relational innovations	Geographical expansion	O	O										
	Market segmentation	O	O										
	Trust	O	O										
	Loyalty	O	O										

**B. Secondary Group**

Duckyang Ind.Co, Wooshin Industrial Company, Dongyang Mechatronics, and Samkee

Machinery Co., Ltd are the selected secondary group members of the Korean automobile industry. The result of surveys on the secondary group, four companies that are assemblers and suppliers of the final automobile manufacturer, is almost the same.

#### **a. Duckyang Industrial Company**

##### ***The Position in the Value Chain***

Duckyang Ind. Company is an automobile parts supplier producing Crash Pad, Antivibration Pad and Arm Rest. It is a first supplier of Hyundai-Kia Motor Company assemblers and Hyundai Mobis. The number of people employed nationally is about 757 in total and its size is quite large for a parts firm. The revenue including worldwide revenues are about 1 billion dollars. The number of suppliers is over 100 and below 1000, and most of them are SMEs. The number of customers is below 10 and most are conglomerates. The percentage of suppliers abroad is below 25 percent and that of customers abroad is over 25 percent and below 50 percent. The impact of suppliers, competitors and intermediaries on the market is normal, but the impact of customers is large.

##### ***Business Profile***

Crash Pad, Antivibration Pad and Arm Rest are its main products. Duckyang is an automobile parts supplier and is a first supplier of Hyundai-Kia Motor Company assemblers and Hyundai Mobis. Factors related to the business structure are car component assembling and manufacturing. Factors related to production inputs mainly comprise the material cost and the labor cost.

##### ***Technology Profile***

Types of transactions or related business functions with customers or suppliers supported by electronic commerce application are various. E-mail, Internet EDI, and Extranet are main types of business function to customers as a means of communication and ordering. Other business process is done off-line. They also have a plan to change Internet EDI for WWW for communication, payment and distribution. But they are using those applications with only the conglomerates and domestic customers. And the applications for business with suppliers are Internet EDI and fax. They are mainly used as a means of ordering and distribution. They are using Internet EDI in transactions with conglomerates and SMEs, but they still use fax with small companies. But they have a plan to change Internet EDI for WWW. Concerned with business with suppliers, the purpose of using ICT is to improve efficiency. Gradually the use of ICT will be expanded to provide a higher level of efficiency.

##### ***Interview Responses***

Duckyang does not invest actively in electronic commerce. Hyundai-Kia Motor Company implemented electronic application and network being used today.

##### ***Motivations***

Duckyang became engaged in electronic commerce to build an environment to trade with major suppliers and customers and to improve competitiveness. In sales and on the demand side, the reason for electronic commerce is to improve transaction and customer efficiency.

### ***Obstacles & Advantages***

Factors that aided and facilitated Duckyang's efforts to achieve electronic commerce are described below.

#### ***Internal Factors***

The existing in-house technologies are sufficient to support electronic commerce, and the existing staff training and skill levels are also sufficient for electronic commerce. Management wants to introduce electronic commerce.

#### ***Government Policy***

Taxation measures and sufficient financial support for R&D encouraged the firm to engage in electronic commerce. The firm expects to use online electronic services such as KNX.

#### ***Telecommunications Infrastructure***

Reasonable telecom costs and network reliability supported the success of the electronic commerce initiative. The competition between telecom operators encouraged a sufficient range of services and enabled the firm to engage in electronic commerce.

Factors that impeded progress in achieving electronic commerce are discussed below.

#### ***Regulatory Factors***

Required levels of security encouraged the firm's electronic commerce. But systems such as authentication and certification application are not sufficient to generate trust and they discourage electronic commerce.

#### ***External Factors Relating to Relations with Other Enterprises***

There is no relationship between external factors and the electronic commerce initiatives.

#### ***Strategic Factors Relating to Competitiveness***

Its electronic commerce encourages lock-in strategies, and increases the cost of reaching new customers and/or suppliers. New intermediation services facilitated the initiative of electronic commerce. On balance, its electronic commerce facilitated the management of business relationships.

#### ***Impacts***

For Duckyang, electronic commerce concerned with transaction progress and business function makes its business and transaction more efficient and faster, especially in regard to communication abilities, cost reduction in stock management, ordering, distribution and production management. In the strategic investment side, cost reduction was acquired, but its electronic commerce has not impacted employment and venture capital. Although the accessibility to customers and suppliers has increased, its electronic commerce has not affected new products and new customers. In addition, while cost reduction was achieved through customer information as well as supplier and customer loyalty, the company brand and image was not affected by electronic commerce.

### **b. Dongyang Mechatronics**

#### ***The Position in the Value Chain***

Dongyang Mechatronics is a large automobile parts supplier with 720 workers employed nationally. It has two subsidiaries and the revenues including world wide is 96million dollars.

The number of suppliers is over 100 and below 1000, and the number of customers is over 10 and below 100. The distribution of main suppliers by size is 60 percent for SMEs and 40 percent for mid-sized companies. The distribution of main customers by size is 80 percent for large companies (Hyundai and Kia Motor Company), 15 percent for mid-sized companies and 5 percent for individuals. The number of intermediaries for purchase and sales is over 5 and below 10 for each. The percentage of suppliers abroad is below 25 percent, but that of consumers is over 25 percent and below 50 percent. The impact of suppliers on market development is normal and that of consumers is often, while that of intermediaries is rare.

### ***Business Profile***

Factors related to product characteristics are physical product, such as POWER WINDOW MOTOR, FAN MOTOR, WIPER MOTOR, SUNROOF HORN, and BLOWER. Factors related to the characteristics of the transaction structure are that Dongyang Mechatronics is the first domestic vendor from Volkswagen.

### ***Technology Profile***

Types of transaction or related business functions with customers or suppliers supported by electronic commerce application are various. E-mail, Internet EDI, Videotex and WWW are main types of business function to customers as a means of communication, advertising, ordering, negotiation and marketing, payment, distribution, and A/S. In the future they will use E-mail and WWW instead of Videotex in communication, negotiation, billing and A/S. They use Videotex with small size companies, E-mail with SMEs, WWW with medium and big size companies. The reason they use different applications based on the size of the company is that there exist differences in systems based on the size. Besides, EDI, Internet EDI, and WWW are used with overseas customers, while Videotex, E-mail, and WWW are used with domestic customers.

### ***Interview Responses***

#### ***Motivations***

Dongyang Mechatronics became engaged in electronic commerce to build an electronic commerce environment, avoid threat from competitors and improve long-term competitiveness. In the demand side, main motives for electronic commerce were market expansion, customer efficiency and improved strategic input factors. In the supply side, main motives for electronic commerce were to improve relationship management with suppliers, enhance efficiency with suppliers and better strategic input factors.

#### ***Obstacles & Advantages***

Factors that aided and facilitated Dongyang Mechatronics' efforts to achieve electronic commerce are discussed below.

#### ***External Factors Relating to Competitiveness***

Close relationship encourages the use of electronic commerce. And the availability of a variety of transaction systems encourages electronic commerce. But a weak brand image discourages the initiative of electronic commerce.

#### ***Telecommunications Infrastructure***

High telecom costs encourages the success of the electronic commerce initiative. Poor network reliability impedes the success of the electronic commerce initiative. The competition between telecom operators encourages sufficient range of services and enables firms to engage in electronic commerce.

### ***Strategic Factors***

Its electronic commerce encourages lock-in strategies, and increases the cost of reaching new customers and/or suppliers. Intermediation services and suppliers and customer management skills have no relationship with electronic commerce.

Factors that impeded progress in achieving electronic commerce are shown below.

### ***Regulatory Factors***

Required levels of security encouraged the firm's engagement in electronic commerce. But systems such as authentication, payment and certification application are insufficient to generate trust and discourage electronic commerce. Sufficient electronic commerce law encouraged electronic commerce.

### ***Internal Factors***

Technologies are insufficient to support electronic commerce. The staff's skill levels and existing staff training programs are also insufficient for electronic commerce. Managers are passive in electronic commerce and the firm does not have the capability to invest.

### ***Government Policy***

Financial support for R&D does not have anything to do with electronic commerce. The services provided by the government are insufficient to allow the firm to engage in electronic commerce.

### ***Impacts***

For Dongyang Mechatronics, electronic commerce concerned with transaction progress and business function makes its business and transaction more efficient and cost effective, especially in negotiation, payment, communication ability, ordering, financial service and A/S. In acquiring strategic material input, R&D and information technology have brought cost reduction. But electronic commerce has not impacted employment and venture capital. It has helped in expanding the market and product development. The accessibility to customers and suppliers has increased, and new products and new customers were acquired. Building partnership and direct relationship with customers brought new business functions. Besides, cost reduction was achieved through customer information and supplier and customer loyalty, and the company brand and image brought new business functions.

## **c. Samkee Machinery Co., Ltd**

### ***The Position in the Value Chain***

Samkee Machinery Co., Ltd is an automobile engine and aluminum parts supplier. The company has two subsidiaries and the number of people employed nationally is about 220. Revenues domestically and internationally are 39.6 million dollars. The number of suppliers is over 10 and below 100, while the number of customers is over 10 and below 100. Its main suppliers are SMEs and its customers are conglomerates. The number of intermediaries is below 5. The percentage of suppliers abroad is 50 to 75 percent, while customers abroad are below 25 percent. The number of firms that have recently entered and/or exited the market is a few.

### ***Business Profile***

It makes products, such as automobile engine and aluminium parts manufacturing. Samkee Machinery Co., Ltd is an automobile parts supplier to Kia Motor Company.

### ***Technology Profile***

Types of transaction or related business functions with customers or suppliers supported by electronic commerce application are various. E-mail, Internet EDI and WWW are main types of business function to customers as a means of communication, negotiation, ordering, and billing. Other business processes are done off-line. But they have a plan to use E-mail for negotiation and use Internet EDI for payment and billing. And the applications for business with suppliers are e-mail, Internet EDI and WWW. They are mainly used as a means of communication, advertising, marketing and negotiation. Samkee Machinery Co., Ltd is using those applications with domestic and overseas customers, but only with SMEs.

### ***Interview Responses***

#### ***Motivations***

Samkee Machinery Co., Ltd became engaged in electronic commerce to reduce the transaction cost and improve information sharing. Even though the firm is willing to invest a lot in the automation of process and business, it is not investing actively in electronic commerce because of its small-scale operation.

#### ***Obstacles & Advantages***

Factors that aided and facilitated Samkee Machinery's efforts to achieve electronic commerce are described below.

#### ***External Factors Relating to Competitiveness***

Close relationship encourages the use of electronic commerce. And the availability of a variety of transaction systems encourages electronic commerce.

#### ***Strategic Factors***

Its electronic commerce encourages lock-in strategies, and increases the cost of reaching new customers and/or suppliers. Intermediation services, suppliers and customer management skills have no relationship with electronic commerce.

#### ***Government Policy***

Financial support for R&D encourages electronic commerce. The services provided by the government are sufficient to encourage engagement in electronic commerce.

Factors that impeded progress in achieving electronic commerce are discussed below.

#### ***Telecommunications Infrastructure:***

High telecom costs discourage the success of the electronic commerce initiative. Poor network reliability has impeded the success of the electronic commerce initiative.

#### ***Regulatory Factors***

Required levels of security encouraged the firm's electronic commerce. But systems such as authentication, payment and certification application are insufficient to generate trust which, in turn, discourage electronic commerce. Insufficient electronic commerce law discourages electronic commerce.

### ***Internal Factors***

The existing in-house technologies are insufficient to support electronic commerce, and the existing staff training and skill levels are also insufficient for electronic commerce. Management is passive about electronic commerce and the firm does not have the capability to invest.

### ***Impacts***

For Samkee, electronic commerce concerned with transaction progress and business function is likely to make its business and transaction more efficient in communication, negotiation, payment and billing. But the amount of data is so small that the definite effects or impact cannot be known in the present stage.

## **d. Wooshin Industrial Company**

### ***The Position in the Value Chain***

Wooshin Industrial Company is an automobile muffler and pipe supplier. It is a first supplier of Hyundai-Kia Motor Company assemblers and suppliers in the value chain. The number of people employed nationally is about 260 and it does not have foreign corporations. The combined total of domestic and overseas revenues is about 5million dollars. The number of suppliers is below 10, while the number of customers is from over 10 to less than 100. The number of intermediaries of Hyundai-Kia Motor Company as purchasers is over 20 and sellers less than 5. The distribution of main suppliers by size is 65 percent for very small suppliers', 25 percent for SMEs, and 10 percent for large companies. The distribution of main customers by size is 100 percent for large companies (Hyundai and Kia Motor Company). The percentage of suppliers and customers abroad is 0 percent. The number of firms that have recently entered and/or exited the market is rare.

### ***Business Profile***

Factors related to product characteristics are physical product, muffler and pipe. Wooshin Industrial Company is an automobile supplier. Factors related to the characteristics of the transaction structure are that Wooshin Industrial company receives an order from Hyundai and supplies Hyundai-Kia Motor Company with all products as in an OEM way. Factors related to the business structure are car component assembling and manufacturing. Factors related to production inputs are mainly composed of the material cost and the labor cost.

### ***Technology Profile***

Types of transaction or related business functions with customers or suppliers supported by electronic commerce application are various. E-mail, Internet EDI, Extranet, and WWW are main types of business function to customers as a means of information service and ordering. Other business process is done off-line. The reason for using Internet EDI and WWW is to reduce communication time and improve information sharing. And the applications for business with suppliers are e-mail, Internet EDI and WWW. They are mainly used as a means of information service and negotiation. In regard to business with buyers, the purpose of using ICT is to improve information sharing. Gradually the use of ICT is expanding because of the investment of Hyundai-Kia Motor Company.

### ***Interview Responses***

Wooshin Industrial Company does not invest in electronic commerce actively. Electronic applications and networks being used today were implemented by Hyundai-Kia Motor Company, which is its main buyer of automobile mufflers and pipes.

### ***Motivations***

Wooshin Industrial Company became engaged in electronic commerce to reduce the transaction cost and improve information sharing. Even though the firm is willing to invest a lot in the automation of process and business, the firm does not invest in electronic commerce actively because of the firm's small-scale operation. Electronic applications and networks used at present were implemented by Hyundai-Kia Motor Company, which is a main buyer of Wooshin's automobile mufflers and pipes. However, such automation is only used in negotiation and ordering.

### ***Obstacles & Advantages***

Factors that aided and facilitated Wooshin Industrial Company's efforts to achieve electronic commerce are discussed below.

### ***External Factors Relating to Competitiveness***

Human factors encourage the use of electronic commerce. The firm is trying to employ more proficient workers. And the availability of a variety of transaction systems may not discourage electronic commerce. Electronic commerce encouraged more flexible commercial structures.

### ***Strategic Factors***

Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce facilitated the management of business relationships.

### ***Regulatory Factors***

Required levels of security encouraged the firm's electronic commerce. And systems such as authentication and certification application generate trust and encourage electronic commerce. Sufficient protection encouraged electronic commerce.

Factors that impeded progress in achieving electronic commerce:

### ***Internal Factors***

The existing in-house technologies are insufficient to support electronic commerce, and the existing staff training and skill levels are also insufficient for electronic commerce. A chief manager wants to introduce electronic commerce because of the increasing prominence of business-to-business electronic commerce in the market, but the firm does not have the capability to invest.

### ***Government Policy***

There was no tax cut and insufficient financial support for R&D did not encourage the firm to engage in electronic commerce. The firm expects to use online electronic service such as KNX.

### ***Telecommunications Infrastructure***

High telecom costs inhibit the success of the electronic commerce initiative. Poor network reliability has impeded the success of the electronic commerce initiative. The telecom operators do not offer a sufficient range of services to encourage and enable firms to engage in electronic commerce.

### ***Impacts***

For Wooshin, electronic commerce concerned with transaction progress and business function is likely to make its business and transaction more efficient in information services and negotiation. But the amount of data is so small that the definite effects or impact cannot be known in the present stage. Wooshin has vertical interrelation with Hyundai-Kia Motor Company. Therefore, the automation of Wooshin is processed by Hyundai's investment and implementation plan. The degree of firm's automation depends on the willingness of Hyundai Motor Company and the support of government regulation.

The Korean automobile component suppliers cannot manage to actively engage in electronic commerce and use applications and networks. Most of automobile component firms have utilized the applications and networks installed by the final car-manufacturing firms. EDI and Extranet are main applications that the firms have used.

The effects of electronic commerce on the companies of the secondary group of the Korean automobile industry are manifested similarly. Therefore, these impacts will be illustrated in one analytical table.

[Table 3-3 Secondary Group Analytical Grid]

		Electronic Commerce Innovations											
		Transaction Preparation				Transaction Completion				Production Support			
		Advertising	Catalogues	info services	Negotiation	Orders	Billing & payment	Finance	Delivery	Transaction info capture	Information management	Market analysis	Market development
Product innovations	Diversification	O											
	Differentiation												
	Customization												
	Bundling												
Process innovations	Design	O	O			O	O						
	Logistics					O							
	Production lines					O							
	Co-ordination and integration												
Relational innovations	Geographical expansion												
	Market segmentation												
	Trust												
	Loyalty												

The secondary group utilizes applications such as e-catalogue in the transaction preparation stage. This contributes to a product diversification, prompting product innovations. Using information service leads to process innovations, especially in logistics, coordination and integration section. In the completion of transaction, the firms realized process innovations mainly by means of automation system in orders, billing and payment.

The Korean automobile industry's engagement in electronic commerce is still in an infant stage. So the impact of electronic commerce is insignificant. However, the firms recognize the need for electronic commerce and they are trying to incorporate automation systems. Consequently, electronic commerce will expand toward all sections of the Korean automobile

industry and the rate of innovation will fasten. The core group and the secondary group in the Korean automobile industry are vertically interrelated to each other. The business-to-business e-commerce is done mainly in the transaction preparation stage. There is a little process innovation but no relational innovations in the transaction completion and production support stages. The process innovation is only generated. The main applications of e-commerce are Internet EDI and e-mail. In general, then, the impact of e-commerce on the Korean automobile industry has been small until now.

## **1.6 Conclusion**

### **1.6.1. The Structure of Electronic Commerce in the Korean Automobile Industry**

The Korean automobile industry manifests a vertical interrelated industry structure whereby final car manufacturing firms control automobile component suppliers. The final car-manufacturing firms, such as Hyundai-Kia and Daewoo, financed the founding of suppliers for each company. The Korean car manufacturing firms and the component suppliers are thus joined by their common fate. That is why the bankruptcy of Daewoo Motor Company has led to a domino effect of bankrupting its subcontract component suppliers. Automobile component suppliers cannot promote electronic commerce and automation business process for themselves due to the structural characteristics of the Korean automobile industry. In addition, Daewoo Motor Company's suppliers that face bankruptcies do not have neither time nor money to spare for the installation of applications and networks, though it is necessary for them to engage in electronic commerce. But suppliers contracted with Hyundai-Kia Motor Company are in a good condition for leaping into electronic commerce. After Hyundai Motor Company acquired Kia Motor Company that went bankrupt in 1997, Kia's suppliers have landed contracts with big buyers, not only Kia Motor Company but also Hyundai Motor Company. Consequently, Hyundai-Kia Motor Company and its suppliers benefit from economies of scale that enlarges the components market. This situation functions as a good chance for them to expand the impact of electronic commerce.

Hyundai-Kia Motor Company took the initiative in engaging in electronic commerce in the Korean automobile industry. Hyundai-Kia Motor Company is buying production materials, such as steel, automobile module components, painting materials and car tires, from suppliers and component assemblers by sharing product material information and stock through KNX information networks. Although there is no immediate expense curtailment effect, the sharing of product related information allows them to reduce the stock operating expenses. And if the communication infrastructure, which can send and receive mega bits of information and high-class quality such an electronic blue print, can be constructed in KNX, the period of new car development will shorten sharply.

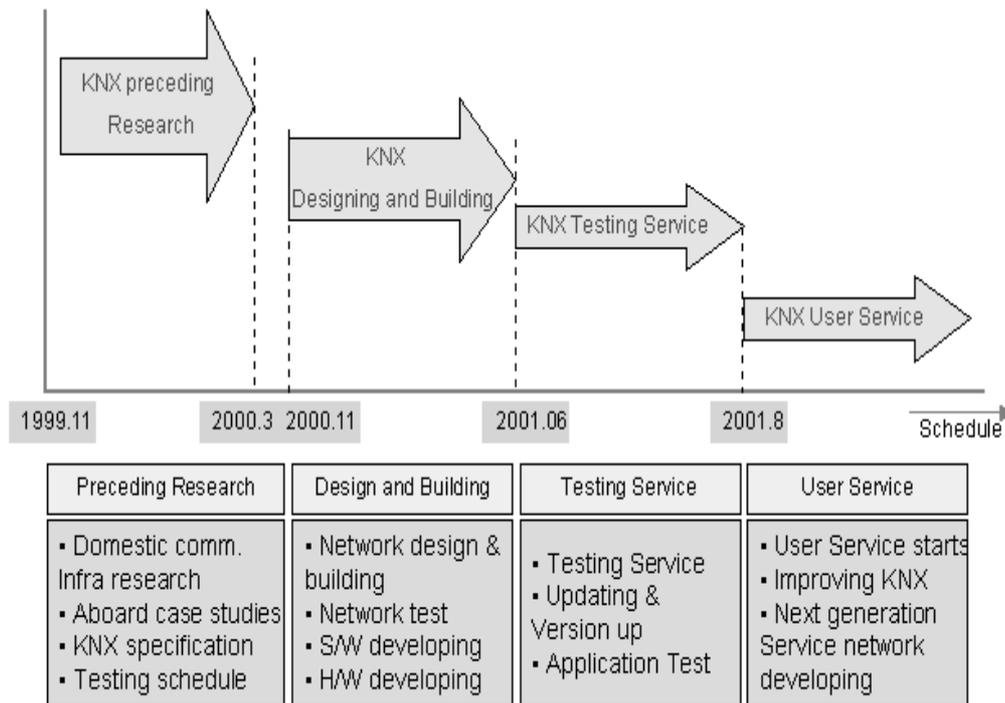
And they have a plan to build a cyber community (the autoever.com) where participants buy and sell MRO goods and facility consuming materials by means of an auction or Dutch auction. Hyundai-Kia Motor Company expects that they can economize 20 percent of the purchase expense. Also the emergence of e-marketplaces such as autoever.com gives small automobile components suppliers a chance for unifying the delivery-purchase of electric computer system entity at an affordable price.

### **1.6.2. KNX (Korea Network eXchange) Project**

The KNX is the Korean ANX (Automotive Network eXchange), which is an automotive industrial standard network launched in November 1998. In Korea, KNX project is a system

that integrates network systems that were operated separately by each firm. The Ministry of Commerce Industry and Energy as well as the Korean “Big Three” (Hyundai-Kia, Daewoo, and Samsung) were initial promoters of the project. In the near future, KNX will become an automobile business network which combines secured transmission of the private network and convenience of the Internet. It will also become a user-oriented industrial network that guarantees a service-level agreement authenticating the quality of telecommunication service defined in the KNX specification. KNX will provide a better service than either the Internet or Extranet in guaranteed bandwidths, encryption (VPN), cost, network operation, flexibility (set up, changes, scalability) and application support activity.

The KNX project is planned as follows.



[Figure 3.7 KNX Project Schedule]

The KNX project team (the Ministry of Commerce, Industry and Energy, and the Korean Big Three) started the project in November 2000. The team had finished the preceding researches like research on the Korean communication infrastructure and foreign case studies (ANX and GNX) until March of 2000. Designing and implementation of KNX will be completed by June of 2001. In July 2001, testing services of KNX will be finished and the user services will start in September 2001.

The KNX project is estimated as the most successful project among the industrial information infrastructure construction projects that the Ministry of Commerce, Industry and Energy has pursued. However, there are some problems to solve in order to be successful with the KNX project. As the system development and standardization progress further, there is a lot of possibility where the relationship of enterprises for gain and loss will collide. Because the

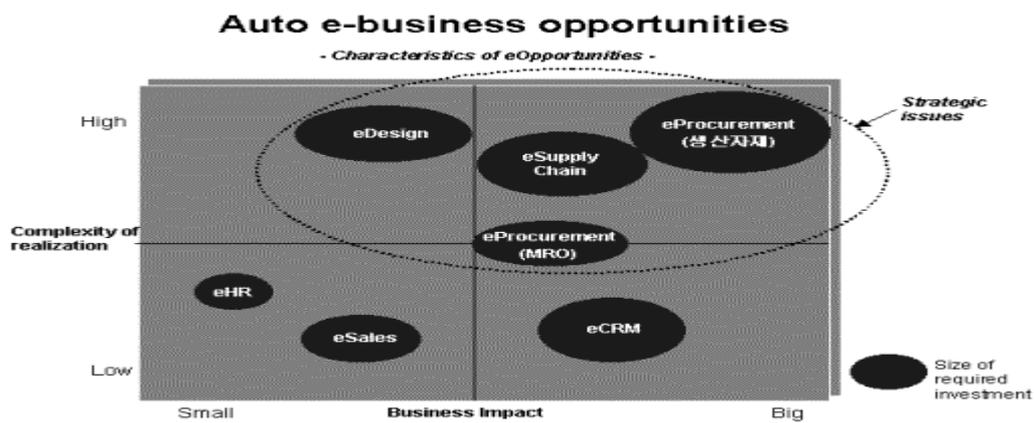
final car manufacturing company has strong interrelations with sub suppliers in developing new car components, there are a lot of internal cooperation and specified component modules in each model, which occupy 90 percent of whole car parts. There are serious difficulties in standardization of data, application, and electronic documents. Consequently, positive project propulsion and information sharing between participants are so important that regulation regarding the gain and loss relationship between project participants is necessary.

KNX is a significant project concerned with electronic commerce in the Korean automobile industry. The reason why automobile enterprises promote the KNX project together is that it will provide competitive advantages for the Korean automobile industry through implementing information super highway and building an electronic common market. KNX will keep supply chain management simple and lead to an industrial cyber community as a result of unified network. KNX will furnish efficiency of business process and information transference and lessen the transaction cost to firms using qualified information network. This impact will help the firms concentrate on core businesses.

### 1.6.3. The Impact on the Market Structure

#### Business Model

Diffusion of electronic commerce will expedite structural reorganization of the automobile industry. The structure of the value chain will change. The ways in which revenues are generated and transactions are entered will change. By doing e-business, proactive firms, which are final car manufacturing companies, will be able to attain cost curtailment of business matters by real time information sharing and making database in the Internet. The cost curtailment and the innovation of product process will lead to discounted car prices and improved quality of cars that will give a practical benefit to the consumers. Automobile component companies will escape from the vertically subordinate relationship to final manufacturing firms and have competitive capability to compete independently with other domestic and foreign companies.



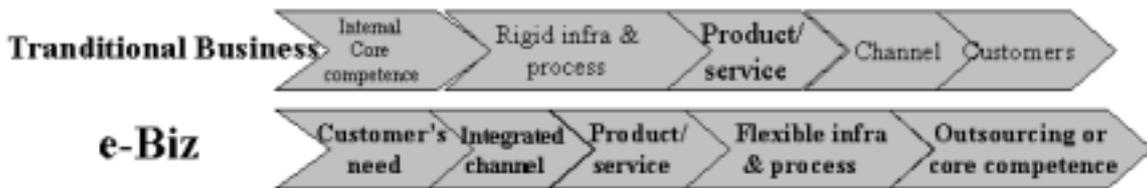
[Figure 3-8 Characteristics of eOpportunities]

There are four types of electronic commerce model shown in the above figure. The E-Design business model provides exchange service of electronic document and blue print between enterprises. E-procurement acts as an auction or Dutch auction market which deals with MRO goods. This e-marketplace changes supply chain of companies. The most important and useful e-marketplace among four e-business models is the e-procurement model for product materials. This electronic commerce decreases the prime cost and increases efficiency of

production supporting business. Also it leads to the reorganization of industrial structure as each company concentrates on core competence. However, e-procurement for product materials is not easy to provide service, at least until now, because the structure of the Korean automobile industry is very unstable due to the bankruptcy of Daewoo Motor Company and the merge of Samsung Motor Company into Renault Motor Company, and because automobile suppliers are too small and subordinate in regard to the final car manufacturing firms to actively drive the projects forward.

**Scenario: The Value Chain Changes**

There will be a lot of changes in the traditional value chain if the Korean automobile industry brings in electronic commerce. E-business will satisfy customers' need and provide customized products and services for customers by executing more efficient and flexible product process that is derived from integrated channels. The firm's business can be divided into two sections, namely an outsourcing part and a core competence part. After doing away with unprofitable business operations, the firm can concentrate on its core business.



[Figure 3-9 Traditional Business and E-business Value Chain]

The firm's core competence in the traditional value chain has high inefficiency due to complicated transaction protocol and infrastructure. But e-business changes everything. The customers' needs are applied to the production process directly through integrated channels. Those changes can be realized by flexible infrastructure and active involvement of the whole market participants. Flexible, fast moving customer-forced business will give consumers diversified, customized, and distinguished goods. It also means that a company gets an added value provided by reduction in both product cost and transaction expense, while consumers have great satisfaction.

Business to business electronic commerce in the Korean automobile industry has a great potential to change everything. It can bring about positive impacts on all of consumers, final car manufacturing companies and their sub-suppliers. Therefore, the whole industrial factors must cooperate for the success of electronic commerce.

## 2. The Electronics Industry

### 2.1. Introduction and Background

The purpose of this chapter is to describe the market structure of Korea's electronics industry and assess the impact of electronic commerce (or e-commerce) on this industry. The traditional value chain and the dynamics of the industry are also discussed.

As regards a brief historical survey of this sector, the electronics industry in Korea was characterized as the "strategic export industry" in the sixth 5-year Economic Development Plan (1987-1991) and as such was given a strong government support for the production of consumer electronics as well as the development of indigenous technology. The plan proved successful, and now the electronics industry, which fuels in part Korea's export-oriented economy, is the fourth largest in the world.

[Table 3-4 Korea Electronics Outlook] <sup>1</sup>

	Unit	'99(P)		'2000(P)	
			Growth Rate(%)		Growth Rate(%)
Export	M\$	51470	33.1	61100	18.7
Domestic	Billion Won	53983	27.0	60405	11.9
Production	Billion Won	78643	20.5	86462	10.0
Import	M\$	30920	38.2	38424	24.3

The electronics industry in Korea is considered very important, because the proportion of electronics goods in terms of production and export is the greatest of the total domestic industries. For example, the total export market for electronics goods in 1999 was expected 51,470 M\$ and its growth rate was 33.1%.

Aggressive government support policy toward the electronics industry has become an essential factor for determining the competitive advantage of Korea's electronics industry, and this can be described as an "external environment" M. Porter emphasized in his book *Competitive Advantage*.

One of the features in the domestic electronics industry is that most manufacturers have concentrated on consumer electronics, e.g., home appliances, but that since the 1980s they have begun to turn their efforts toward the semiconductors and toward the information telecommunication sector.

Concerning the reasons for choice of this sector, several factors can be described along with the national environment in which the chosen sector, the electronics industry, operates.

First, the transaction characteristics of the electronics industry have a great potential to have profound impacts on the activities of domestic companies. The production process in the electronics industry depends heavily on the production and assembling procedure of

<sup>1</sup> EIAK (Electronics Industry Association of Korea) 2000  
2000 Korea Industry Outlook

components. So the purchase and procurement of components accounts for about 70 percent of the total procedure. Actually, the final manufacturers of electronics goods (Core Groups) are a few conglomerates in Korea, and they have maintained their own transaction system network, so called “closed VAN (Value-added Network).” For the most part, many production tiers (secondary groups) are small and medium-sized companies, which rely heavily on the conglomerates (buyer side of components). Consequently, each production tier has formed closed relationship in the transaction practices of its own.

Second, the government is taking aggressive steps to vitalize electronic business (e-business) among traditional manufacturing business, setting up a special fund to promote related projects as well as establishing a digital belt, linking 13,500 companies in 21 industrial complexes across the country by the year 2003. Especially, the government-supported CALS/EC policies selected the electronics industry as one of nine domestic industries to enhance the activities of B2B electronic commerce. These government support policies are playing significant roles in encouraging B2B transactions on the Internet, especially in the case of the domestic situation.

## **2.2. Value Chain Analysis**

### **2.2.1 Product and Transaction Characteristics**

#### ***Product Characteristics***

As far as product features of electronic goods are concerned, they largely belong to physical products. The electronics industry is composed of various kinds of goods, and it is very difficult to identify the boundary of the industry, because the sphere of intersection among industries is getting larger.

There are several general characteristics of production goods in the electronics industry. First, the electronics market is characterized as having a rapid speed of high technology and short life cycle. The development of the Internet and electronic transaction increase the importance of standards. In particular, electronic components are the most dynamic and fastest-growing segment in the Korean electronics market. Second, rapid innovation and standardization of technology lead to a continuous pressure on price-cutting. Third, the electronics industry is one of capital-intensive markets, requiring large investment. Lastly, the digitization of electronics goods is progressing along with the rapid development of ICT (Information & Communication Technology), e.g., Internet home appliances, and high tech telecommunication tools.

#### ***Transaction Characteristics***

First of all, in the marketplaces of the electronics industry, there is a great deal of routines on the price of the product rather than negotiation. Business transaction follows constant process between buyer and seller.

The electronics industry is located in quadrant 1 (below), which means that possibilities for making changes to the market structure in the short time are not limited with e-commerce. Because the transaction structure<sup>2</sup> is largely composed of routines, it is comparatively easy to standardize them through the Internet or EDI. These transactions occur in structures, the form and function of which is determined largely by the relationship of buyers and sellers to the value

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<sup>2</sup> The *transaction structure* approach focuses on how and why specific groups of traders exchange goods and services in specific ways, and how they interact with evolution in the technological mediation of commercial relationships.

of goods and services. Also, market players engaging in transaction are subject to fixed forms of business practices, and this is especially so in Korea. These forms can affect negatively with the implementation of electronic commerce between companies, because they are operated in closed network, not like an “open architecture” of the Internet.

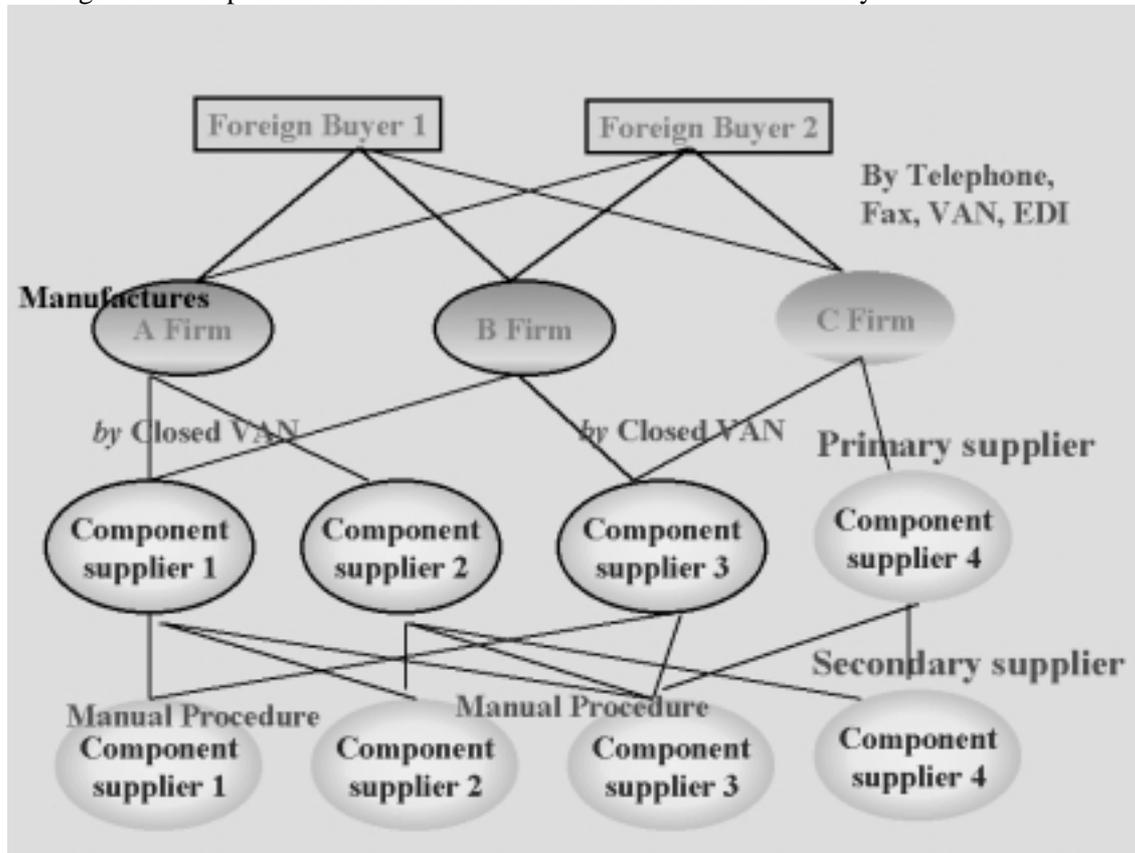
		Product features	
Transaction features	Routines	1	2
	Negotiation	3	4

[Figure 3-10 The Product and Transaction Characteristics of Electronics Industry]

### 2.2.2. Value Chain Characteristics

This sub-section deals with characteristics of the value chain for the Korean electronics industry, including production tiers and supply chain relations for each tier and featuring marketplaces in which goods and services are exchanged between tiers.

The figure 3-11 expresses the transaction structure of electronics industry.



[Figure 3-11 The Transaction Structure of Electronics Industry<sup>3</sup>]

#### 1) Production Tiers and Supply Chain Relations

The transaction process is characterized as domestic buyers (final manufacturers), being linked with many component suppliers under the vertically integrated value chain. In traditional business, firms have formed multi-divisional relationship, like parent-subsidary types. So, in

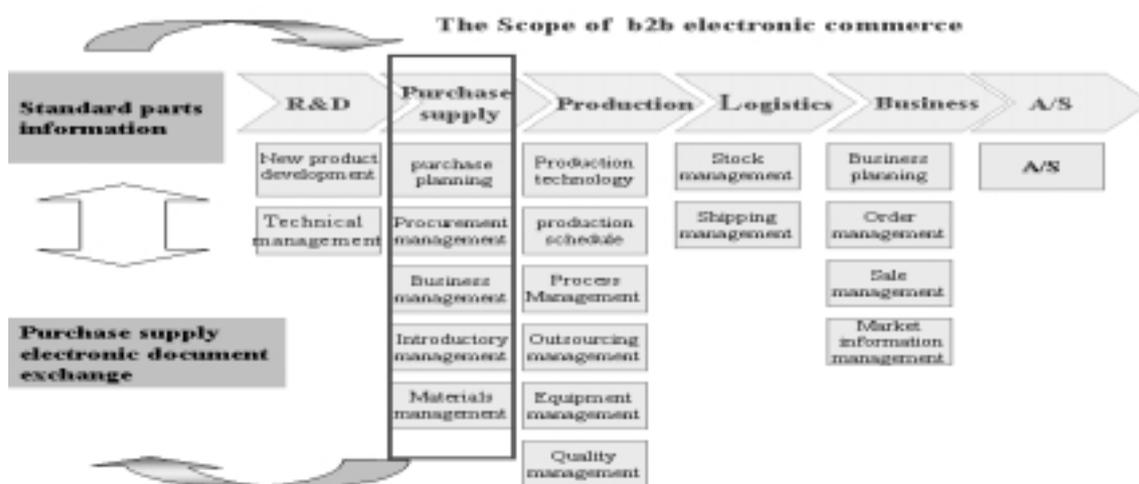
<sup>3</sup> ‘Internet age and the change of value chain in the electronics industry’, EIAK, 2000

general a few manufacturers make purchase components from sub-production tiers through vertical transaction structure, and they sell their final goods to foreign buyers. Naturally it is almost impossible for venture companies to succeed in entering the market to win contracts.

Also, the system related to component procurement differs from conglomerates (buyer side), so these networks are operated separately. Viewing from the small sized companies, they cannot afford to establish their own automated transaction system, for they are subject to conglomerates' supervision through closed VAN and EDI. For example, Samsung Electronics, one of the leading manufacturing companies in the electronics industry, has operated a closed EDI system called "Glonet" to maintain relationships among many production tiers.

As for electronics components, most of them are imported because local production and technology is limited. Domestic core manufacturers like Samsung, Hyundai, LG, and Daewoo depend heavily on components from abroad for final production (Actually the dependency rate on imported components is high, approximately totaling 70-80 percent in the total amount of production). So, they have to import industrial and electronic components that cannot be obtained locally in order to manufacture Korean brands. In this context, time reduction in production process, such as order placing from foreign suppliers, becomes most important in promoting transaction efficiency.

## 2) Features of Workflow in the Electronics Industry



[Figure 3-12 The Workflow In The Electronics Industry<sup>4</sup>]

The core functions involve R&D, purchasing, procurement, production, logistics, business affairs, and A/S. These functions refer to the whole workflow operated in the electronics industry. Especially in the case of applying the B2B electronic commerce to actual business process, the procurement and purchase sector can achieve the highest efficiency in the total process. It will result in cutting cost and increasing productivity for the company. That is because this sector (procurement and purchase of components) necessitates information sharing of standardized components between manufacturers and component suppliers (SMEs), so the standardization of components (products) and transaction procedure in the procurement and purchasing part is in progress to realize this. Recently the electronics industry is making efforts to reshape its business strategy to focus on the B2B electronic commerce toward the standardization of component information and transaction processes. However, the business-to-

<sup>4</sup> The project for standardization of components in electronics industry, EIAK, 2000.10

business (B2B) exchange still has a long way to go to fulfill its promise of fast, efficient, and cheap business deals.

## **2.3. Dynamics and Trends**

### **2.3.1. Current Situation of B2B Electronic Commerce in the Electronics Industry**

The development of ICT (Information & Communication Technology) is expected to be a driving force in enhancing the profitability of business transaction. The coming of ICT creates all kinds of new possibilities for making agreements, and generating and exchanging new types of information.

Although in the electronics industry, the use of ICT is becoming more and more common and the Internet is now considered to embody the future of electronic commerce, most business-to-business applications are still mounted on non-Internet platforms.

Electronic Data Interchange (EDI) remains the most common B2B platform. Since most conglomerates (manufacturers of final goods) have constructed EDI system of their own, some advantages cannot be overlooked. First, it should be noted that the speed of information exchange in the chain is crucial to all players in the chain. ICT applications can help speed up the turnaround time of flows of information. Second, the use of the telephone, fax and paper (letters) can be very labor-intensive, compounding communications costs. Exchanging information electronically through networks, e.g., electronically sending a message containing data on an order, can save a lot of time.

There are, on the other hand, some limits in that EDI operates in essentially a “closed” network paradigm, with access normally being restricted to interested specific groups. In the electronics industry of Korea, “closed” EDI networks have gotten embedded in the business and management practices.

However, beyond closed EDI network, business-to-business electronic commerce can have very different effects on different actors in various supply chains. One is that a few leading manufacturers (Samsung, Hyundai, LG, and Daewoo) in the domestic electronics sector are pushing for the introduction of SCM (Supply Chain Management) electronic system, including e-procurement system. This movement is very meaningful in terms of strengthening inter-organizational system beyond traditional unitary forms of company (vertical structure), because as mentioned before, the interdependence between the different links of market players (among various production tiers) is quite considerable in the electronics industry. In the process of facilitating transaction efficiency, technology can be used to shape business structures and practices in ways that favor the commercial interests of some actors over others.

### **2.3.2. The Emergence of E-marketplaces**

The establishment of e-marketplaces can be considered an emerging trend in the domestic electronics industry. “Electropia” is the best example as an e-marketplace of B2B electronic commerce. It consists of Samsung Electronics, LG, Hyundai and Daewoo and is strongly patronized by the Ministry of Commerce, Industry and Energy (MOCIE).

MOCIE has decided to select 9 industries, including the electronics industry, in order to activate B2B electronic commerce, and according to CALS/EC policy, the ministry also planned to establish a blueprint for standardizing the e-commerce sector, including electronic catalogue, document and services, by 2003. Trial operation of B2B electronic commerce is currently underway for selected industries. The establishment of the digital network is expected to

strengthen informatization and electronic commerce among actors in the electronics industry. These three functions are being operated at Electropia.

- The establishment of information database of standardized components
- The electronic exchange system of procurement and purchase
- Electronic auctioning and public buying system

Beside Electropia, core manufactures are establishing their own electronic marketplace system, e.g., 'e-Hitex.com' at Samsung Electronics and 'e2open.com' at LG Electronics.

#### **2.4. Position of Proactive Firms In The Value Chain**

The rapid development of ICT results in changes in business structure: In the electronics industry, traditional leading companies have advanced into Internet-related businesses, including B2C and B2B, and have also made efforts to revamp their organization, management and distribution channels to fit them into the digital environment. As a result, venture businesses carried by a traditional company have been increasing and alliances as well as M&As have been promoted between large companies and venture companies. Proactive firms refer to core groups (conglomerates) and they want to bring innovative effects on key transaction points in each relevant marketplace. In the case of the procurement sector in the electronics industry, electronic processes are used for automatic order handling and shipment arranging. Also the replacement of paper documentation with digital bills required for timely ordering of imported components is expected to be an essential part of vitalizing B2B transactions on the Internet. They expect this to eliminate inefficient and complex steps, speed up the turnaround time between links and shorten the lead time.

The application of ICT to any transaction point in any of these zones can be considered an innovation to the extent that it represents significant technical change in relation to some specific aspects of doing business. Also, under a strong government support and industry expectations of streamlined procurement and trading process, electronics industries are racing to establish vertical B2B portals or sites specializing in specific fields or promoting the efficiency at key transaction points. These are collectively called Electropia, which is also an e-marketplace for four core companies. In addition, core manufactures are establishing their own electronic marketplace systems, including 'e-Hitex.com' at Samsung Electronics and 'e2open.com' at LG Electronics. For instance, LG Electronics recently launched a global e-commerce joint venture with nine other industry giants, including IBM and Toshiba Corp, to deal in electronics, telecom and computer components. Called e2open, the new firm provide an online marketplace for member companies and their customers to buy and sell components used in consumer electronics, computers and telecommunications, all of which are expected to help companies cut costs and streamline the purchasing process. Other partners are Japan's Matsushita Electric Industrial Co. Ltd., Hitachi Ltd., Canadian telecom giant Nortel Networks Corp., U.S. electronics parts manufacturer Solectron Corp., and U.S. hard disc maker Seagate Technology Inc. Taiwan's Acer, one of the world's three largest PC makers is the latest participant to join the partnership.

As for the expected innovative effect, the marketplace services provide easy and reliable access to information for buyers to get the lowest costs, while sellers have access to expanded markets. In other words, the B2B system linkage with the eight major long-term customers will bring maximized profits to companies through a supply-demand balance on coordination of production volume and precise prospects for prices. But in some sense, companies were hesitant to bring the business online, in favor of their existing offline channels. Because most conglomerates have maintained their own closed transaction systems under vertically integrated

structure, most companies are hesitant to share information each other. Therefore, it is difficult to change their closed network paradigm to an open system in a short time. So, these online transactions still remain limited scopes of business. In the electronics industry, one of modest successes was achieved in the Maintenance, Repair and Operation (MRO) marketplace, which distributes office materials and offers maintenance services online. The online transactions are more common, because some technological devices are already standardized. In short, the current electronic commerce in the electronics industry will change from the past “closed” business network paradigm to an open commerce networking.

**2.5. Case Studies**

**2.5.1. Set of Samples**

**1) The Set of Population in the Korean Electronics Industry**

There are four core-manufacturing corporations (Samsung, Hyundai, LG, and Daewoo) in the Korean electronics industry that are initiatively participating in the B2B E-marketplace, Electropia, which is in the process of propelling from the Ministry of Commerce, Industry and Energy (MOCIE). And thus, we selected the Secondary group from the cooperative enterprises that are registered in the Electronics Industry Association of Korea (EIAK). The core group, which is in a favorable position to engage in electronic commerce, comprises of manufacturing enterprises in the Korean electronics industry.

The population is composed of four enterprises.

Population of Core Group			
Samsung Electronics	Hyundai Electronics	LG Electronics	Daewoo Electronics

The secondary group consists of small and medium size enterprises (SMEs) that are in an initial phase of electronic commerce and have B2B transactions with a firm of the core group. All the companies surveyed in this research are registered as members of the Electronics Industry Association of Korea (EIAK). Moreover, the total number of companies in the secondary group is 1380.

**2) Decision on Samples**

Samsung, LG, and Daewoo were selected from the core group. These three companies hold a sizable market share in the domestic electronics market and thus serve as representatives of the Korean electronics industry. That is why these three companies were selected as samples of the core group. We visited these three companies to conduct interviews and questionnaires.

We selected the sample of the secondary groups from parts manufacturing companies that have main transactions with the three core manufacturing companies. The sample enterprises of the secondary group are four companies: Daewoo Electronics Parts Company, Samyoung Electronics, KEC Electronics, and WooYoung Electronics. We found out that these four companies are actively making transactions with the three core groups through electronic commerce and decided that they are suitable for our investigation into the impact of electronic commerce on the Korean electronics industry. The survey of companies selected for the secondary group was mainly conducted through telephone interviews.

The next is to show the enterprise roster of the core group and the secondary group selected

in the sample.

	Name of Company	Position in the Value chain
Core Group	Samsung	Semi-conductor, Home appliances producer, seller
	L G	Home appliances and Computer manufacturer (PC)
	Daewoo	Home appliances producer, seller
Secondary Group	Wooyoung	Subordinate parts enterprise
	Samyoung	Subordinate parts enterprise
	KEC	Semi-conductor, Electromagnetic parts enterprise
	Daewoo Electronic Parts	Home appliance, Subordinate parts enterprise

The above table shows core groups and secondary groups which are contained in the research object. The case of Samsung, Daewoo and LG as the core group is to show the effects of the innovation which are caused by introduction of B2B electronic commerce based on interviews and questionnaires.

## 2.5.2 Case Studies

### 1) Core Group

#### a. Samsung Electronics

#### 1. Basic Information of the Company

##### *Position of the Firm in the Value Chain*

Samsung Electronics, one of the representative conglomerates in Korea, is an independent firm that produces semi-conductor devices and electronic devices. Revenues in 1999 were 3,750million dollars domestically and 4,090 million dollars worldwide. The company has 3,500 employees nationally and 7,000 employees overseas. Samsung Electronics has 21 affiliates, including IPO (International Procurement Office), in ten countries. The number of suppliers and customers is over 1000. The number of intermediaries such as wholesalers, retailers and agents, as both purchasers and sellers, is 20. The distribution of the total number of suppliers is 70 percent for small and medium size companies, 22 percent for large enterprises and 8 percent for very large enterprises. The distribution of the total number of customers is 47 percent for large enterprises, 35 percent for very large enterprises, 20 percent for small and medium sized enterprises, 2 percent for public sector bodies and approximately 1 percent for very small enterprises. As for the distribution of suppliers and customers based abroad, the percentage of customers based abroad is 25 to 50 percent and the percentage of suppliers based abroad is 50 to 75 percent. The rate of entry and exit in the market rarely exists among major suppliers and competitors, although major customers and intermediaries enter and exit the market sometimes. Major suppliers and competitors exert moderate influence on market structure and conditions,

while major customers have huge influences on the market. Major intermediaries, on the other hand, tend to have little influence on the market.

### ***Business Profile of the Firm***

The relevant characteristics of products at Samsung Electronics can be categorized into Semiconductor memory (DRAM) and home appliances. Samsung uses Glonets, which is a sort of B2B network system that allows the exchange of documents between suppliers and customers. This is the relevant characteristic of the transaction structure of Samsung Electronics. As for the business structure of the firm, it uses three types of EDI, namely the web, the Internet, and VAN to accomplish customs procedures. The company thus uses e-catalogs as a production factor.

### **Technology Profile of the Firm**

#### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by Samsung are linked with the World Wide Web (WWW), which is being used for advertising, catalogues and stock lists, and information services. E-mail is also available for information services and ordering. Catalogues also use EDI. Such technologies are used to communicate with customers nationally and worldwide concerning the Internet environment and infrastructure of customers. What was changed in business activities with customers is thus that catalogues/stock lists, negotiation, ordering and delivery changed from EDI to e-mail. The main reason for change is that the company wants to obtain accurate information and realize efficiency in time and cost. Moreover, it initiated e-Hitex.com to strengthen product support rather than transaction preparation related to transaction activities.

#### ***Business Activities with Suppliers***

Types of computer-mediated network or application which are used to conduct or support business is similar to business activities with customers. EDI and the World Wide Web conduct information services, negotiation, ordering, billing and payment, and delivery more efficiently. Delivery and ordering are also conducted by Internet EDI. The choice of technology related to the type of suppliers is selected by the latter's infrastructure and transaction of information. Therefore, the Internet and EDI are used for middle and large enterprises, while the World Wide Web is used for small enterprises. What were changed in the business activities with suppliers are that information service was changed from EDI to the World Wide Web, while ordering was changed from EDI and E-mail to Internet EDI and the World Wide Web. In addition, delivery was changed from EDI to Internet EDI and the World Wide Web. The main reason for such changes is to enhance efficiency by preventing errors and increasing the speed of process. Samsung is using Glonets, which plays a crucial role as a Hub system to support transactions and productions. EDI translator is also used by Web EDI server and File to File.

## **2. Interview Responses**

### ***Motivation***

The expectations of the firm regarding the impact of electronic commerce on the transaction process are cost reduction, error-freeness and speed enhancement. The expectations on core business functions are for far-reaching efficiency in the management of catalogues/stock lists. By adopting electronic commerce, the company expects to trim down the lead-time, cut paper waste through paperless documentation and reduce cost on ordering. Standardization of invoice document is expected to be used between oversea subsidiaries and domestic affiliates. The expectation of the firm regarding the impact of electronic commerce is thus process standardization, reduced lead-time and standardization of document formats. Customer

procedure and lead-time in the delivery process are expected to be reduced. The expectation of the firm regarding the impact of electronic commerce on the business environment in the value chain is acquiring higher quality materials at low prices effortlessly. In this way, the company can sell its products at a competitive price.

### **Obstacles and advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that low telecommunication costs were a factor in the success of the electronic commerce initiative. However, poor network reliability has impeded the successful implementation of the electronic commerce initiative.

#### ***Regulatory Factors***

The company answered that the required levels of security encouraged electronic commerce and that systems generated trust and encouraged electronic commerce. However, legal structures were not in place and this discouraged electronic commerce. Sufficient protection, on the other hand, encouraged electronic commerce.

#### ***Internal Factors***

The company answered that although the existing in-house technologies were insufficient to support electronic commerce, the existing staff training and skill levels were sufficient for electronic commerce. It also said that investment cost could easily be justified.

#### ***External Factors Relating to Relations with Other Enterprises***

The company said that human factors encouraged the use of electronic commerce and that brand image was an asset in establishing the electronic commerce profile of the firm. However, the availability of a variety of transaction systems discouraged electronic commerce, while electronic commerce threatened to destabilize the existing commercial relations.

#### ***Strategic Factors Relating to Competitiveness***

The company said that electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers. Electronic commerce thus facilitated intermediation and management of business relationships.

#### ***Government Policy in General***

The company said that financial support for R&D was sufficient to encourage the firm to engage in electronic commerce. However, taxation measures, awareness raising and demonstration programs, education system, training programs and government provision of online electronic services were not available or insufficient to support the firm. The company also mentioned that electronic commerce is led by private sectors not by government.

### **3. Impacts.**

Initially, the impact of electronic commerce is manifested in more efficient catalogues and stock lists. Also, the company can provide high quality and large quantity of information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible expansion of oversea markets through the use of e-catalogs. CRM (Customer Relationship Management) also could be enhanced. Gains in employment are hiring efficiency. The company could earn approximately 225 million dollars after adopting electronic commerce.

#### **b. LG Electronics**

## **1. Basic Information of the Company**

LG Electronics, also one of the representative conglomerates in Korea, is an independent firm that produces electronic system and solution, PC and electric devices. Revenues in 1999 were 2,500 million dollars domestically and 1,167 million dollars worldwide. The company has 26,000 employees nationally and 8,000 employees overseas. LG Electronics has 64 affiliates in 21 countries. The number of suppliers and customers is over 1000. The number of intermediaries such as wholesalers, retailers and agents, as both purchasers and sellers, is 20. The distribution of the total number of suppliers is 25 percent for small and medium size companies, 65 percent for large enterprises and only 10 percent for very large enterprises. The distribution of the total number of customers is 37 percent for large enterprises, 35 percent for very large enterprises, 18 percent for Small and medium sized enterprises, 5 percent for public sector bodies and approximately 5 percent for very small enterprises. As for the distribution of suppliers and customers based abroad, the percentage of customers based abroad is 25 to 50 percent and the percentage of suppliers based abroad is 50 to 75 percent. The rate of entry and exit in the market rarely exists among the major suppliers and competitors, although major customers and intermediaries enter and exit the market sometimes. Major suppliers and competitors exert moderate influence in market structure and conditions, while major customers have huge influences on the market. Major intermediaries, on the other hand, tend to have little influence on the market.

### ***Business Profile of the Firm***

The relevant characteristics of products at LG Electronics can be categorized into Digital TV, home appliances, including the refrigerator, CRT and LCD and total solution provider. LG uses the e-Hitex which is a B2B network system that allows the exchange of documents between suppliers and customers. This is the relevant characteristic of the transaction structure of LG Electronics. The business structure of the firm can be described as being in the display device industry as well as in OEM-applied PC and home appliances. The revenue ratio between the domestic market and the overseas market is 7:3. So, the domestic proportion is bigger than that of overseas. The company purchases 70 percent of raw materials domestically and purchase the rest from abroad. They are heavily dependent on raw materials. They expect that such overseas dependency on raw materials is getting more intense following globalization.

### **Technology Profile of the Firm**

#### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by LG are linked with the World Wide Web (WWW), EDI and e-mail, which are being used for advertising, catalogues and stock lists, and information services. Extranet is also used for information services and ordering. Catalogues, ordering, billing/payment and finance also use EDI. Such technologies are used to communicate with customers nationally and worldwide concerning the Internet environment and infrastructure of customers. What was changed in the business activities with customers is thus that catalogues/stock lists, negotiation, ordering and delivery changed from the present method to Internet EDI and the World Wide Web. The main reason for change is that the company wants to obtain accurate information and realize efficiency in time and cost. Moreover, the company wants to make internal process integration.

#### ***Business Activities with Suppliers***

Types of computer-mediated network or application which are used to conduct or support business is similar to business activities with customers. EDI, e-mail and Extranet conduct catalogues/stock lists, information services, negotiation, ordering, billing and payment, and delivery more efficiently. Catalogues/stock lists, information services and ordering are also conducted through the World Wide Web. The choice of technology related to the type of

suppliers is selected by the latter's infrastructure and transaction of information. Therefore, Extranet and EDI are usually used, but the company is trying to extend to the Internet environment. The company installed the Internet Backbone system for affiliated companies that are suffering from financial difficulty to help them achieve e-transformation. What were changed in the business activities with suppliers are thus that most of the services, such as catalogues/stock lists, information services, negotiation, ordering, billing/payment, finance and delivery, were changed from the present system to Internet EDI to the World Wide Web. The main reason for such changes is to enhance efficiency by preventing errors and increasing the speed of process. LG is using the e-Hitex Hub system to support transactions and productions. The system manages information provision and information flows.

## **2. Interview Responses**

### ***Motivation***

The expectations of the firm regarding the impact of electronic commerce on the transaction process are management cost reduction, paperless-ness, error-freeness, work efficiency and transaction transparency. The expectations on core business functions are for efficiency of information in the management of catalogues/stock lists and for decreased lead-time. The firm also said that it would be possible for customers to provide their feedback on its products. By adopting electronic commerce, the company also expects to trim down on paper waste and reduce cost on ordering. Standardization of invoice document is expected to be used between oversea subsidiaries and domestic affiliates. Moreover, the company expects to meet the customers' need. The company predicted that knowledge-based management could be possible. The expectation of LG Electronics regarding the impact of electronic commerce is thus the internal process renovation. The company also predicted that it could achieve e-transformation through business process management. In addition, it expected differentiation and diversification through production renovation. The expectation of LG regarding the impact of electronic commerce on the business environment in the value chain is reconstruction of value chain through e-business.

### **Obstacles and Advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that high telecommunication costs inhibited the success of the electronic commerce initiative. However, network reliability and network flexibility have neither positive nor negative effect.

#### ***Regulatory Factors***

The company answered that transaction security, authentication and certification encouraged the vitalization of electronic commerce. However, legal structures and protection of intellectual property were not in place, which discouraged electronic commerce.

#### ***Internal Factors***

The company answered that even though management attitude is insufficient to support electronic commerce, the available technology, skills and training and costs of engaging in electronic commerce were sufficient for electronic commerce.

#### ***External Factors Relating to Relations with Other Enterprises***

The company answered that human resource factors and competition between transaction systems encouraged the use of electronic commerce. On the other hand, brand image has no influence in establishing the electronic commerce profile of the firm.

### ***Strategic Factors Relating to Competitiveness***

The company said that electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers. Electronic commerce thus facilitated intermediation and management of business relationships.

### ***Government Policy in General***

The company said that awareness raising and demonstration programs contributed to the success of electronic commerce in the sector. However, it responded negatively to taxation measures, financial support for R&D, education system, training programs and government provision of online electronic services.

### **3. Impacts.**

Initially, the impact of electronic commerce is manifested in more efficient catalogues and stock lists. Also, the company can provide high quality and large quantity of information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible expansion of oversea markets through the use of e-catalogs. Differentiation and diversity are also possible through production innovation. Relationship enhancement could also be achieved by e-transformation on the value chain. CRM (Customer relationship Management) through the Web also could be enhanced. The company said that it is too early to measure the effect on turnover, employment and profitability.

### **c. Daewoo Electronics**

#### **1. Basic Information of the Company**

Daewoo Electronics, which is famous for home appliances in the domestic market, is an independent firm that produces home appliances and electronic devices. Revenues in 1999 were 2,410 million dollars domestically and 316 million dollars worldwide. The company has 1,000 employees nationally and 100 employees overseas. Daewoo has 50 overseas affiliates, including IPOs (International Procurement Office), in 21 countries. The number of suppliers and customers is over 1000. The number of intermediaries such as wholesalers, retailers and agents, as both purchasers and sellers, is 20. The distribution of the total number of suppliers is 65 percent for small and medium size companies, 25 percent for large enterprises and only 10 percent for very large enterprises. The distribution of the total number of customers is 45 percent for large enterprises, 35 percent for very large enterprises, and 20 percent for small and medium sized enterprises. As for the distribution of suppliers and customers based abroad, the percentage of customers based abroad is 25 to 50 percent, while the percentage of suppliers based abroad is 50 to 75 percent. The rate of entry and exit in the market rarely exists among the major suppliers and competitors. It is also true that all the players in the market, namely major customers, suppliers, competitors and intermediaries do enter and exit the market sometimes.

#### ***Business Profile of the Firm***

The dominant characteristics of Daewoo Electronics can be categorized into home appliances and industrial electronic devices. The business structure of the firm can be described as using EDI transaction and maintaining its own transaction network.

#### **Technology Profile of the Firm**

##### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by Daewoo are linked with the World Wide Web and e-mail, which are being used for advertising, catalogues/stock

lists, and information services. Extranet is also used for information services, catalogues and ordering. EDI is also used for ordering. Such technologies are used to communicate with customers nationally and worldwide concerning the Internet environment and infrastructure of customers. What was changed in the business activities with customers is thus that catalogues/stock lists, negotiation and information services changed from Internet EDI to EDI. Billing/payment, finance and delivery also changed from other method to EDI. The main reason for change is that the company is acknowledging the necessity of B2B commerce in the current business environment. Moreover, customers demanded digitalized method like electronic commerce. Daewoo introduced its own web server to support transaction preparation and completion with customers.

### ***Business Activities with Suppliers***

Types of computer-mediated network or application which are used to conduct or support business is similar to business activities with customers. E-mail is used to conduct catalogues/stock lists, information services and negotiation. Other method is used for billing and payment, finance and delivery. The choice of technology related to the type of suppliers is selected by the latter's infrastructure and transaction of information. Daewoo usually chooses SCM (supply chain management). What was changed in the business activities with suppliers is thus that catalogues/stock lists, information services and advertising changed from the present method to the World Wide Web. Negotiation, ordering, billing/payment, finance and delivery were changed from other method to EDI. The main reason for such changes is that the company found about the necessity of B2B e-commerce. Moreover, customers demanded digitalized method like electronic commerce. Daewoo introduced its own web server to support transaction preparation and completion with customers. It wants to manage information provision and information flows.

## **2. Interview Responses**

### ***Motivation***

The expectations of the firm regarding the impact of electronic commerce on the transaction process are management cost reduction, lead-time reduction, error-freeness and work efficiency. The expectations on core business functions are cost-reduction in advertising and efficiency of information in the management of catalogues/stock lists. The company also said that it would be possible for consumers to give feedbacks on its products. Acquiring accurate information on stock management, realizing JIT (Just-In Time) effect, and reduction of the lead-time are also considered important. By adopting electronic commerce, the company also expects to reduce cost on ordering. Standardization of invoice document is expected to be used between oversea subsidiaries and domestic affiliates. Moreover, the company expects to meet the customers' need. The expectation of Daewoo Electronics regarding the impact of electronic commerce is thus the internal process renovation. The company also predicted that it could achieve customer satisfaction, product diversity and differentiation through product renovation. It also expected time reduction and revenue expansion. The expectation of Daewoo regarding the impact of electronic commerce on the business environment in the value chain is achieving customers' trust and loyalty. Lastly, the company expected to eliminate waste of time and reduction of loss.

### **Obstacles and Advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that all of the factors such as costs, network reliability and network flexibility were sufficient to encourage and enable firms to engage in electric commerce.

### ***Regulatory Factors***

The company answered that all of the factors including transaction security, authentication and certification, legal structures and protection of intellectual property were in place and that these discouraged electronic commerce.

### ***Internal Factors***

The company answered that even though available technology, management attitude and skills and training are insufficient to support electronic commerce, the cost in engaging in electronic commerce was sufficient for electronic commerce.

### ***External Factors Relating to Relations with Other Enterprises***

The company answered that human resource factors, brand image of their own and competition between transaction systems encouraged the implementation of electronic commerce. On the other hand, the existing commercial structure was not effective in establishing the electronic commerce profile of the firm.

### ***Strategic Factors Relating to Competitiveness***

The company said that electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers. Electronic commerce thus facilitated intermediation. Meanwhile, electronic commerce made it more difficult to manage business relationships.

### ***Government Policy in General***

The company said that awareness raising and demonstration programs contributed to the success of electronic commerce in the sector. However, it responded negatively to taxation measures, financial support for R&D, education system, training programs and government provision of online electronic services.

## **3. Impacts.**

Initially, the impact of electronic commerce is manifested in more efficient catalogues and stock lists, especially in relation to time, price and relationship with suppliers. Also, the company can provide high quality and large quantity of information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible expansion of overseas markets through the use of e-catalogs. Differentiation and diversity are also possible through production innovation. Relationship enhancement could also be achieved by e-transformation on the value chain. The company said that it could save money by reducing raw material costs.

## **2) Secondary Group**

### **a. Wooyoung Electronics**

#### **1. Basic Information of the Company**

##### ***Position of Firm in the Value Chain***

Wooyoung Electronics is an independent firm that produces connectors, backlight units and CIS (contact image sensor). Revenues in 1999 were 20,834 thousand dollars domestically and 25,000 thousand dollars worldwide. The company has 600 employees nationally and 900 employees overseas. Wooyoung has 3 overseas affiliates, including IPOs (International Procurement Office), in one country. The number of suppliers is less than 100 and that of customers is between 100 and 1000. The distribution of the total number of suppliers is over 70

percent for small and medium size companies and approximately 30 percent for large enterprises. The distribution of the total number of customers is 50 percent for very large enterprises. The company is thus a typical parts supplier in the value chain. This company provides parts after assembling every part. The rate of entry and exit in the market rarely exists among the major suppliers and competitors. Major customers and intermediaries sometimes existed. Major suppliers and competitors exert moderate influence in market structure and conditions, while major customers have huge influences on the market. Major intermediaries, on the other hand, tend to have little influence on the market.

### ***Business Profile of the Firm***

The relevant characteristics of Wooyoung Electronics can be categorized into the connector which has the certificate of standard (UL, CAS, IEC, TUV), the backlight unit which has the up-to-date technology in the world and PC Monitors. The company has strong technology independency in the relevant characteristics of the products. This company is just following the international trade condition in the transaction structure. Wooyoung is thus in the process of benchmarking and it is actively performing market research in the business structure of the firm. The company heavily depends on overseas for raw materials.

### **Technology profile of the firm**

#### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by Wooyoung are linked with e-mail, which is being used for advertising, catalogues/stock lists, and information services. The World Wide Web is also used for catalogues. The company also used Glonet, which is the network system operated by Samsung, when it makes transactions with very large companies. Therefore, the use of EDI is extensive. Wooyoung still uses offline channels when dealing with small and medium size companies, which is why the company expects tremendous impact after adopting electronic commerce. It is going to use WWW when it deals with customers in regard to advertising, ordering and information services. The company plans to leap into a B2B e-marketplace in the future. It wants to use the e-marketplace as means of expanding into a new market while maintaining the present offline channels.

#### ***Business Activities with Suppliers***

Types of computer-mediated network or applications used to conduct or support business are similar to business activities with customers. E-mail is used to conduct catalogues/stock lists, negotiation, ordering, billing and payment, and delivery. And the types of service for each sector are described below.

Very large companies (domestic) – Condition within its work scope.

Very large corporate (oversea) – Decide purchase condition according to its present method.

Small and medium sized company (domestic) – Typical trade condition according to its work process

Small and medium size company (overseas) – Typical trade regulation

They are using open type EDI and Web-based technology while conducting business activities with suppliers. This is a kind of SCM (Supply Chain Management).

## **2. Interview Responses**

### ***Motivation***

The expectations of the firm regarding the impact of electronic commerce on the transaction process are transparency and trust in the process of maintaining transaction

relationship and completion. The company also expects cost reduction, errorlessness and efficiency in providing high quality service to customers. Acquiring transaction transparency in terms of ordering is also expected. To enhance corporate competitiveness, the company expected that it could analyze information more easily as well as systematically through electronic commerce. The expectations on core business functions are for efficiency in the catalogues/stock lists and for decreased lead-time. The expectations of the firm regarding the impact of electronic commerce are thus process standardization, reduced lead-time and standardization of document formats. Procedure and lead-time in the delivery process is expected to be reduced, and the company expected efficient human resource management, organization and general management.

### **Obstacles and Advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that low telecommunication costs were an essential factor in the success of the electronic commerce initiative. And network reliability could lead to the success of the electronic commerce initiative, while network flexibility enhanced the interoperable communication. As a result, costs, network reliability and flexibility encouraged firms to engage in electronic commerce.

#### ***Regulatory Factors***

The company gave positive answers on transaction security, authentication and certification, legal structures and protection of intellectual property. Foremost, the increasing use of electronic commerce is needed to lead private sector's coordination.

#### ***Internal Factors***

The company said that even though the existing in-house technologies were insufficient to support electronic commerce, the existing staff training and skill levels were sufficient for electronic commerce. It also said that investment cost could easily be justified.

#### ***External Factors Relating to Relations with Other Enterprises***

The company answered that the use of electronic commerce and brand image were assets in establishing the electronic commerce profile of the firm. Moreover, the availability of a variety of transaction systems also did not discourage electronic commerce.

#### ***Strategic Factors Relating to Competitiveness***

The company said that although B2B electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers, it enhanced points of contact with customers. Electronic commerce thus facilitated intermediation and management of business relationships.

#### ***Government Policy in General***

The company said that financial support for R&D, awareness raising, demonstration programs and taxation measures were sufficient to encourage the firm to engage in electronic commerce. It also pointed out that investment expansion is needed to boost electronic commerce.

### **3. Impacts**

Initially, the impact of electronic commerce is manifested in greater efficiency in the management of catalogues and stock lists. This way, the company can provide high quality information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible

expansion of overseas markets through the use of e-catalogs. Specialization could be led by electronic commerce and suppliers could provide more information through outsourcing. The impacts of turnover are low costs and high efficiency.

## **b. Samyoung Electronics**

### **1. Basic Information of the Company**

#### ***Position of the Firm in the Value Chain***

Samyoung Electronics Corporate is an independent firm that produces electronic parts devices and AI electrolysis condenser. The company established a Joint Venture Company with Japan NCC corporate. The domestic revenues in 1999 were 67,000 thousand dollars, while those of the overseas were 183,000 thousand dollars. The company has 1,200 employees nationally and 1,800 employees worldwide. Samyoung has 3 affiliates abroad, including IPO (international procurement office), in three countries, including the United States and China. The number of suppliers is less than 100 and customers are between 100 and 1000. The number of suppliers through intermediaries is between just 5 and 10 and the number of customers through intermediaries is less than 5. The distribution of the total number of suppliers is over 33 percent for small and medium size companies, 33 percent for very large enterprises, and 33 percent for large enterprises. The distribution of the total number of customers is 50 percent for very large enterprises and 40 percent for large enterprises. The company is thus a typical components supplier in the value chain. This company provides parts after assembling every part necessary for final production. The company is heavily dependent on very large enterprises. The rate of entry and exit in the market rarely exists among major suppliers and competitors. The rate of entry and exit in the market existed sometimes for major customers and intermediaries. Major suppliers and competitors exert moderate influence on market structure and conditions, while major customers have huge influences on the market. Major intermediaries, on the other hand, tend to have little influence on the market.

#### ***Business Profile of the Firm***

First of all, the relevant characteristics of products at Samyoung Electronics can be categorized into electronic devices (TV, PC, MT, VCR, DVD-P, MODEM etc.) which consist of electronic circuit and condenser. The business structure of the firm is heavily dependent on large enterprises as well as very large enterprises. That is why the company is using the EDI system under very large enterprises. The company is trying to support its business activities such as information capture, market research and information support to maintain a profitable relationship with very large companies. The firm's dependency on raw materials is very high.

#### **Technology Profile of the Firm**

##### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by Samyoung are linked with EDI, e-mail and the World Wide Web, which are being used for advertising, catalogues and stock lists, and information services. At present, the company uses electronic commerce for capturing market information and analyzing the market. Most of the times, Samyoung still uses offline channels while dealing with small and medium sized companies. That is why it has high expectations for adopting electronic commerce with sub-production tiers. The company wants to participate in an e-marketplace as means of expanding into a new market while maintaining the current off-line channels of business.

### ***Business Activities with Suppliers***

Types of computer-mediated network or application which are used to conduct or support business is similar to business activities with customers. E-mail is used to conduct information services, negotiation, ordering, billing and payment, and delivery. The company said that electronic commerce is still at an infant stage, so it still uses the conventional off-line channel. It expects more open structure in the near future in providing advertising, information service, billing/payment and financial service.

## **2. Interview Responses**

### ***Motivation***

The expectation of the firm regarding the impact of electronic commerce on the transaction process is acquiring transparency and stability in the process of maintaining transaction relationship and completion. The company also expects cost reduction, errorless-ness and efficiency. Efficient stock management and sales channel expansion are also expected. To enhance corporate competitiveness, the company expected that it could analyze information more easily as well as systematically through electronic commerce. The expectations on core business functions are for efficiency in the catalogues/stock lists and for reduced lead-time. The expectations of the firm regarding the impact of electronic commerce are process standardization, reduced lead-time and standardization of document formats. Lastly, the company expected customized production and production differentiation, saying that it is possible to separate the market through information classification.

### **Obstacles and advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that lower telecommunication costs were a factor in the success of the B2B electronic commerce initiative and that network reliability could lead to the success of the electronic commerce initiative. The company thought that the reliability is most important for success.

#### ***Regulatory Factors***

Samyong made relatively positive responses on transaction security, authentication and certification, legal structures and protection of intellectual property. The company pointed out that the government's continuing endeavor is absolutely needed to receive benefits from B2B electronic commerce.

#### ***Internal Factors***

The answers regarding internal factors are the same as those of Wooyoung Electronics. Even though the existing in-house technologies were insufficient to support electronic commerce, the existing staff training and skill levels were sufficient for electronic commerce. Investment cost on e-commerce could easily be justified.

#### ***External Factors Relating to Relations with Other Enterprises***

The company answered that human factors encouraged the use of electronic commerce and that brand image was an asset in establishing the electronic commerce profile of the firm. It said that brand image and present commercial relationship factors are playing key roles to boost electronic commerce.

#### ***Strategic Factors Relating to Competitiveness***

The company answered that electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers. Electronic commerce also facilitated intermediation and management of business relationships.

### ***Government Policy In General***

The company answered that financial support for R&D, awareness raising, demonstration programs and taxation measures were sufficient to encourage the firm to engage in electronic commerce. It also indicated that investment expansion is needed to boost electronic commerce. The company informed that the standard of electronic parts are important to lead success of electronic commerce.

### **3. Impacts**

Initially, the impact of electronic commerce is manifested in greater efficiency in the management of catalogues and stock lists. This way, the company can provide high quality information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible expansion of oversea markets through the use of e-catalogs. Specialization could be led by electronic commerce and suppliers could provide opened information through outsourcing. The impacts of turnover, employment and profitability are hard to measure because the company is in the process of engaging in electronic commerce. As the company pointed out, because the development of electronic commerce is still in its infancy, it is too early to measure the impacts. But it is certain that the impact of electronic commerce will be noticeable enough in the near future.

### **c. KEC Electronics**

#### **1. Basic Information of the Company**

KEC electronics corporate is a medium-sized company producing electronic component devices and semi-conductors. The company has 15 subsidiaries oversea, including the U.S, Japan, China, and Singapore. KEC is repositioning itself to the production of semi-conductor and core electronic components. The number of suppliers and customers is between 100 and 1000. The distribution of the total number of suppliers is 30 percent for small and medium size companies, and about 70 percent for large enterprises. The distribution of the total number of customers is 50 percent for very large enterprises. In this sense, this company is not just a typical components supplier in the value chain. This company depends relatively little on conglomerates, because it has competency in providing and developing electronic goods. The rate of entry and exit in the market exists among the major suppliers and competitors. Major suppliers and competitors exert moderate influence on market structure and conditions, while major customers have huge influences on the transaction process.

#### ***Business profile of the Firm***

The relevant characteristics of products can be categorized into semi-conductors. Semi-conductors and related components such as SSTR, POWER TR, and BIPOLAR IC are the firm's core products. KEC has a great degree of technology independency compared to other production tiers. This company is investing large sums of money on R&D, making efforts on the development of new electronic goods. The business structure is divided along the lines of planning, strategies, action plan, and implementation. The introduction of and applying B2B electronic commerce to transaction structure is currently in the process.

#### **Technology Profile of the Firm**

##### ***Business activities with customers***

Types of computer-mediated network or application that are used by KEC are linked with EDI. The use of EDI is quite extensive. The company is supposed to use E-mail through the Web when it deals with customers on advertising, ordering, logistics and various information

services. Also the company is not sure about making transactions through a B2B e-marketplace in the future. Besides they are going to take advantages of other applications.

### ***Business Activities with Suppliers***

Types of computer-mediated network or application used to conduct or support business vary from the capacity of production volume. In the case of a few conglomerates, including Samsung Electronics and LG electronics, they have maintained their own transaction systems. SMEs, on the other hand, depend heavily on conglomerates in terms of negotiation, ordering, billing and payment. Their dependent relationship is going to develop opened EDI or Web. In other words, they are using open type EDI and Web-based technology while conducting business activities with various production tiers.

## **2. Interview Responses**

### ***Motivation***

The expectation of the firm regarding the impact of electronic commerce on the transaction process is transparency of business transaction, especially in the process of maintaining transaction relationship and completion. As mentioned before, most companies have similar motivation for introducing B2B e-commerce. The company also expects cost reduction, errorlessness, reduction of inefficiency, and a high degree of satisfaction from suppliers. To enhance corporate competitiveness, the company expected that it could analyze information more easily through electronic commerce. The expectations of the firm regarding the impact of electronic commerce are process standardization, reduced lead-time and standardization of document formats. Procedure and lead-time in the delivery process is expected to become more efficient.

### **Obstacles and advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that lowered telecommunication costs were a critical factor for the success of the electronic commerce initiative, because the information-based transaction via the Internet is getting more important. To promote it, network reliability should be guaranteed. In this sense, network reliability and flexibility encourage firms to engage actively in electronic commerce.

#### ***Regulatory Factors***

The company responded somewhat negatively on transaction security, authentication and certification, legal structures and protection of intellectual property. The propulsion of electronic commerce is needed to lead the private sector's coordination with government policy.

#### ***Internal Factors***

The company answered that although in-house technologies were enough to support the implementation of electronic commerce, the CEO's will is not strong enough for the introduction of B2B e-commerce.

#### ***External Factors Relating to Relations with Other Enterprises***

The company answered that human factors encouraged the use of electronic commerce and that brand image was an asset in establishing the electronic commerce profile of the firm. Moreover, the availability of a variety of transaction systems did not discourage electronic commerce.

### ***Strategic Factors Relating to Competitiveness***

The company did not mention specifically the strategic factors relating to competitiveness of electronic commerce, but agreed with the point that brand assets and traditional relations facilitate business relationships.

### ***Government Policy in General***

The company said that financial support for R&D, awareness raising and demonstration programs, and taxation measures were sufficient to encourage the firm to engage in electronic commerce. It was also pointed out that more specific and practical action programs are needed to promote the maturity of electronic commerce.

### **3. Impacts**

The innovation effect of electronic commerce is expected to be quite similar to the expected effects mentioned above. In core competencies, the company can easily provide highly customized goods and services. Especially in order-processing, it could achieve cost-cutting, errorless transactions after adopting electronic commerce. As for the business environment, suppliers could form strong information community through B2B electronic commerce, creating supply network.

### **d. Daewoo Electronics Parts Corporate**

#### **1. Basic Information of the Company**

##### ***Position of the Firm in the Value Chain***

Daewoo Electronics Parts Corporate, which is a subsidiary of Daewoo Electronics, is an independent firm that produces electronic devices. Revenues of the company in 1999 were 67,000 thousand dollars nationally and 183,000 thousand dollars overseas. The company has 1,000 employees nationally and 100 employees worldwide. Daewoo has five overseas affiliates, including IPOs (International Procurement Office), in four countries. The number of suppliers and customers is between 100 and 1000. The number of intermediaries such as wholesalers, retailers and agents, as both purchasers and sellers, is less than five. The distribution of the total number of suppliers is 95 percent for small and medium size companies and the rest 5 percent for large enterprises. The distribution of the total number of customers is 20 percent for large enterprises, and 80 percent for very large enterprises. As for the percentage of suppliers and customers that are based abroad, it is 20 percent. The rate of entry and exit in the market rarely exists among the major suppliers and competitors. All of the market players, however, which are major customers, suppliers, competitors and intermediaries, do enter and exit the market sometimes.

##### ***Business Profile of the Firm***

The relevant characteristics of Daewoo electronics can be categorized into home appliances and industrial electronic devices. The business structure of the firm can be described as using EDI transaction.

#### **Technology Profile of the Firm**

##### ***Business Activities with Customers***

Types of computer-mediated network or application that are used by Daewoo are linked with the World Wide Web and e-mail, which are used for advertising, catalogues and stock lists and information services. Extranet is also used for information services, catalogues and ordering. Ordering also uses EDI. Such technologies are used to communicate with domestic

and worldwide customers concerning the Internet environment and infrastructure of customers. What was changed in the business activities with customers is that catalogues/stock lists, negotiation and information services changed from Internet EDI to EDI. Billing/payment, finance and delivery also changed from other method to EDI. The main reason for change is that the company is acknowledging the necessity of B2B commerce in the current business environment. Moreover, customers demanded digitalized method like electronic commerce. The company introduced its own web server to support transaction preparation and completion with customers.

### ***Business Activities with Suppliers***

Types of computer-mediated network or application which are used to conduct or support business is similar to business activities with customers. E-mail is used to conduct catalogues/stock lists, information services and negotiation. Other method is used for billing and payment, finance and delivery. The choice of technology related to the type of suppliers is selected by the latter's infrastructure and transaction of information. The company usually chooses SCM (supply chain management). What was changed in the business activities with suppliers is thus that catalogues/stock lists, information services and advertising changed from the present method to the World Wide Web. Negotiation, ordering, billing/payment, finance and delivery were changed from other method to EDI. The main reason for such changes is that the company found about the necessity of B2B e-commerce. Moreover, customers demanded digitalized method like electronic commerce. Daewoo introduced its own web server to support transaction preparation and completion with customers. It wants to manage the information acquisition and information flow.

## **2. Interview Responses**

### ***Motivation***

The expectations of the firm regarding the impact of electronic commerce on the transaction process are management cost reduction, lead-time reduction, error-freeness and work efficiency. The expectations on core business functions are cost-reduction in advertising and efficiency of information in the management of catalogues/stock lists. The company also said that it would be possible for consumers to provide high information on its products. Acquiring accurate information on stock management, realizing JIT (Just In Time) effect, and reduction of the lead-time are also considered important. By adopting electronic commerce, the company also expects to reduce cost on ordering. Standardization of invoice document is used between oversea subsidiaries and domestic affiliates. Moreover, the company expects to meet the customers' need. The expectation of the company regarding the impact of electronic commerce is thus the internal process renovation. The company also predicted that it could achieve customer satisfaction, product diversity and differentiation through product renovation. It also expected time reduction and revenue expansion. The expectation of the company regarding the impact of electronic commerce on the business environment in the value chain is achieving customers' trust and loyalty. Lastly, the company expected to eliminate waste of time and reduction of loss.

### **Obstacles and advantages**

#### ***Factors Relating to the Telecommunications Infrastructure***

The company answered that all of the factors such as costs, network reliability and network flexibility were sufficient to encourage and enable the firm to engage in electronic commerce.

#### ***Regulatory Factors***

The company answered that all of the factors including transaction security, authentication and certification, legal structures and protection of intellectual property were in place and that

they discouraged electronic commerce.

**Internal Factors**

The company answered that even though available technology, management attitude and skills and training are insufficient to support electronic commerce, the cost of engaging in electronic commerce was sufficient for engaging in electronic commerce.

**External Factors Relating to Relations with Other Enterprises**

The company answered that human factors, brand image and competition between transaction systems encouraged the use of electronic commerce. On the other hand, the existing commercial structures were not much effective in establishing the electronic commerce profile of the firm.

**Strategic Factors Relating to Competitiveness**

The company said that electronic commerce discouraged lock-in strategies and decreased the cost of reaching new customers and suppliers. Electronic commerce also facilitated intermediation. Meanwhile, electronic commerce made it more difficult to manage business relationships.

**Government Policy in General**

The company said that awareness raising and demonstration programs contributed to the success of electronic commerce in the sector. However, it answered negatively on taxation measures, financial support for R&D, education system, training programs and government provision of online electronic services.

**3. Impacts**

Initially, the impact of electronic commerce is manifested in more efficient catalogues and stock lists, especially in relation to time, price and relationship with suppliers. Also, the company can provide high quality and large quantity of information at the same time. It can also cut costs and errors by adopting electronic commerce. The actual impact of electronic commerce on general business process can be felt in the possible expansion of oversea markets through the use of e-catalogs. Differentiation and diversity are also possible through production innovation. Relationship enhancement could also be achieved by e-transformation on the value chain. The company said that it could save money by reducing raw material costs.

**2.5.3 Market Form Analysis of the Electronics Industry<sup>5</sup>**

**1) Core Group**

Electronic Commerce Innovations		
Transaction Preparation	Transaction Completion	Production Support

<sup>5</sup> This approach focuses on examining technical changes in *transaction structures* and how this relates to the evolution of electronically-mediated business relationships in the rapidly developing Internet environment

		advertising	catalogues	info services	Negotiation	Orders	Billing & payment	Finance	delivery	transaction info capture	information management	market analysis	market development
Product innovations	Diversification		O	O			O		O				
	Differentiation			O					O				
	Customization		O	O						O			
	Bundling												
Process innovations	Design												
	Logistics			O		O							
	Production lines			O		O							
	co-ordination and integration			O		O	O						
Relational innovations	Geographical expansion								O				
	Market segmentation			O									
	Trust				O								
	Loyalty												

As we can see in the above table, we found out that extensive innovation was achieved through B2B electronic commerce. For example, the transaction preparation phase shows a considerable transaction innovation through catalogues. In particular, purchasing effect could be accomplished by offering a variety of products, meeting the customers' needs, and introducing catalogues in advance. The most prominent innovation in electronic commerce is information provision service. It is innovation because it is possible for sellers to inform buyers about the price and product information before the latter purchase products. It also enables consumers to compare prices and product differentiation. As for service, customers' demands could be met because this innovation could make certain products according to the customer's preference. It is also helpful in the case of logistics, since the system can track product shipment and delivery process. This kind of system informs the location of customers' product. It brings out yet another significant process innovation in negotiation. Since negotiation is accomplished by transparency, the two parties could trust each other. That can be said to be another innovation through B2B electronic commerce.

We can witness the most impressive process innovation in the ordering process. First of all, after being able to conduct JIT (Just In Time), it became possible for manufacturers to cut costs in regard to stock management expenses and logistic management. JIT optimizes production line and it allows companies to minimize spending. Also, the paperless effect was accomplished because EDI and the Internet were used instead of paper documents. SCM and CRM provide more concrete relationships among cooperative companies because of reduced switching costs. The on-line purchase was possible through payment/requisition and settlement system. Using

the identical form allows cost reduction through the use of standard invoice document between domestic manufacturers and international procurement offices. Innovation also occurred in the area of magnification. The manufacturers could provide product and delivery information both domestically and overseas.

Lastly, the effect in the production resources is not yet clear. Communication with customers becomes more efficient so that suppliers are able to meet the customers' needs after grasping their characteristics. Until now, we saw the effect and impact of the renovation on core groups through B2B electronic commerce. It is certain that the effect of electronic commerce is positive, even though it is premature to measure the effect in the Korean electronics industry.

## 2) Secondary Group

		Electronic Commerce Innovations											
		Transaction Preparation				Transaction Completion				Production Support			
		advertising	catalogues	info services	Negotiation	Orders	Billing & payment	Finance	delivery	transaction info capture	information management	market analysis	market development
Product innovations	Diversification			O						O			
	Differentiation	O	O										
	Customization		O	O		O	O		O			O	
	Bundling												
Process innovations	Design	O											
	Logistics												
	Production lines		O										
	co-ordination and integration										O	O	

<b>Relational innovations</b>	<b>Geographical expansion</b>			<b>O</b>									
	<b>Market segmentation</b>			<b>O</b>							<b>O</b>	<b>O</b>	
	<b>Trust</b>				<b>O</b>					<b>O</b>			
	<b>Loyalty</b>												

The above table shows the effect of electronic commerce on the secondary group through product innovations, process innovation and relational innovation. However, we found two obscure results. These two results refer to the fact that electronic commerce is not yet completely implemented into their business and that it is not sufficient in the process of conducting business. Moreover, the result among the secondary group has a wider range of deviation, for it was clearly divided into two groups: engaging in electronic commerce and not engaging in electronic commerce.

In the electronics industry, suppliers belong to the secondary group. The characteristics of innovation are almost the same with those of the core group, such as the innovation of product process, efficiency of stock management, real time management and expansion of sales network.

First of all, we can see renovation in the product process. Since the secondary group's main customers are companies of the core group, it is opened to communication through e-catalogues with its consumers. Therefore, it is possible for the secondary group to provide customized and differentiated catalogues to consumers with more flexible product lines. And this could facilitate smooth connections between the two parties.

Second, the acquisition, management and analysis of information are linked to transaction completion. After being able to conduct JIT (Just In Time), it is possible for manufacturers to cut costs in regard to stock expenses and logistic management. It optimizes production line and enables the minimization of expense.

Lastly, the effect in production resources involves the acquisition, management and analysis of information. Information acquisition and management will play a critical role in the near future. Market development among cooperative companies is made possible through market segmentation after the deployment of ICT (Information & Communications Technology). Moreover, the relationship between the core group and the secondary group is structured more flexible through analyses of relevant product information.

Until now, we observed the impact of B2B electronic commerce on the core group. It is certain that the impact is positive, even though it is premature to directly measure it in the Korean electronic industry. As mentioned earlier, electronic commerce is not completely implemented into most businesses and it is not sufficient to complete business transactions. Moreover, The results among the secondary group have wide ranges of deviation.

### 3) The Core Group and Secondary Group Comparison

We found out several differences between the core group and the secondary group. The innovation of the core group occurred mainly during the transaction preparation and transaction completion phases. On the other hand, innovations of the secondary group particularly occurred during transaction preparation and product support phases. From these results, we see that the secondary group put its efforts to grasp the information of the core group on which standard the core group will adopt and which network the core group will form. As these results show us that the core group is very independent and that the secondary group is closely linked with the core groups in the Korean electronics industry. Moreover, secondary group is extensively using electronic commerce to grasp information and analyze the market management. It can be said that each company wants to realize advantages from the electronic commerce environment after forming a new marketplace. The marketplace could provide opportunities to small and medium size enterprise (SMEs). And thus, the characteristic of interoperability in business is applied. Interoperability in business would minimize the closed transaction practices and form more transparent business environment.

## 2.6 Conclusion

### 2.6.1 Introduction

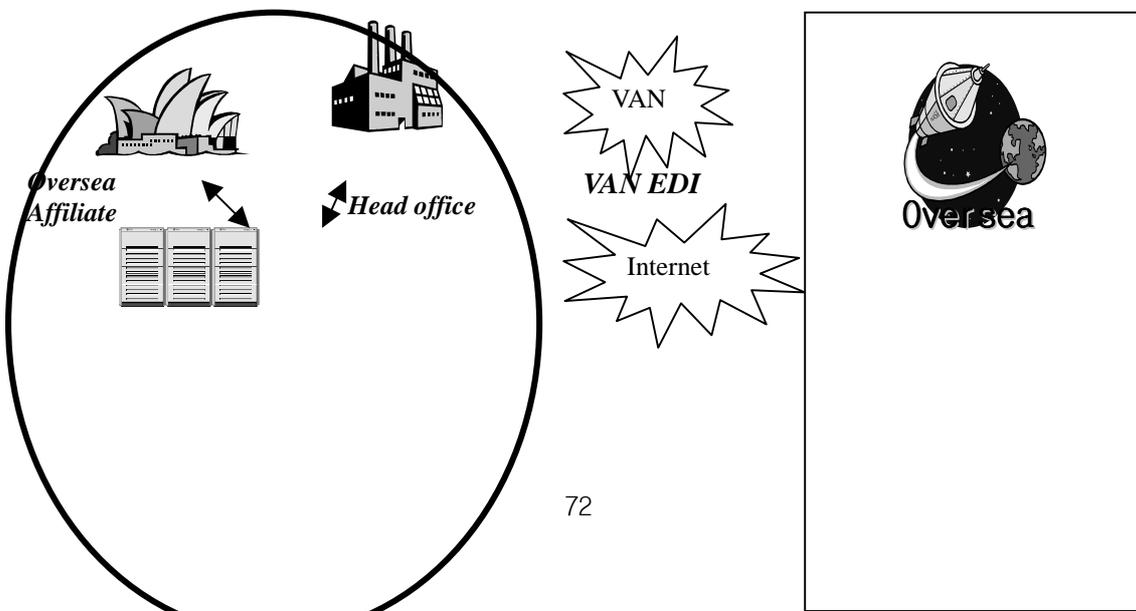
This research investigated the changes in company activities after adopting B2B electronic commerce in the Korean electronics industry. We saw what were changed in the electronics industry in terms of the value chain and observed which business model will apply in the current process territory.

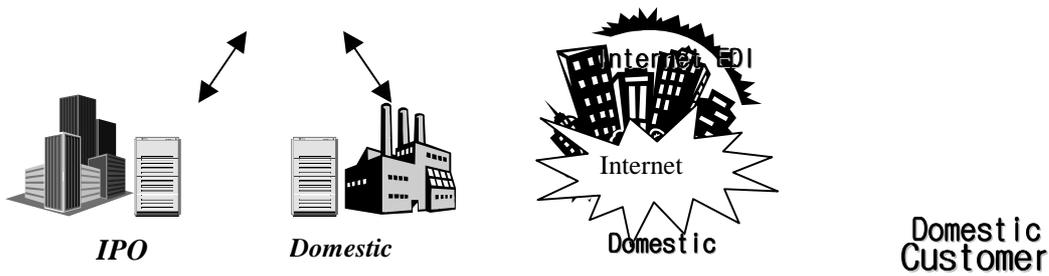
However, we find from the result that the Korean electronics industry has not yet fully engaged in electronic commerce. Therefore, we will wrap up this chapter with predictions on market structure and value chain of the electronics industry in the future.

### 2.6.2 Dissolution of the Value Chain

Domestic manufacturing companies and overseas corporations (supply enterprise) with change toward horizontal relationship

In the case of the electronics industry, the introduction effect of electronic commerce is that the overall cost could shrink through a minimization of the logistic lead-time. It could be possible to change the vertically controlled process to a horizontal process through VAN, the Internet, EDI, and Extranet. Through these information and communication technologies, the purchase system structure becomes more flexible for not only domestic affiliates but also overseas affiliates.





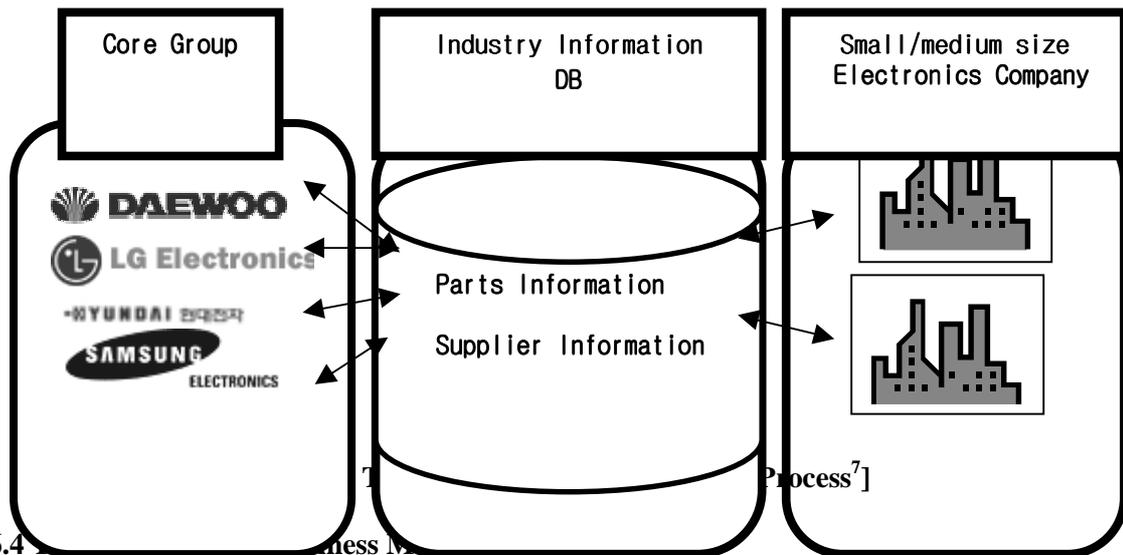
[Figure 3-13<sup>6</sup> Purchase System Block Diagram]

### 2.6.3 Value Chain Integration of the Electronics Industry

From here on, we want to point out the integration process in the value chain of this industry. Next figure shows us the movement of the standard of the electronics industry among small and medium size parts manufacturing companies. It also shows us the linkage of parts information and EDI processes with the purchase procurement system. It is said that it is easy to standardize industry information in the electronics industry, because parts procurement and purchasing commands an overwhelming majority in the Korean electronics industry.

If it is possible to standardize the parts supply and parts procurement system, the effort to build a standard is occurring not only in the core group but also the secondary group. Therefore, the Korean electronics industry mainly focuses on the parts standard between the core and secondary groups like activities in 'Elecproia'.

#### Integrated Process of Value Chain of Electronic Industry: The parts DB joint propulsion process caused by parts standard



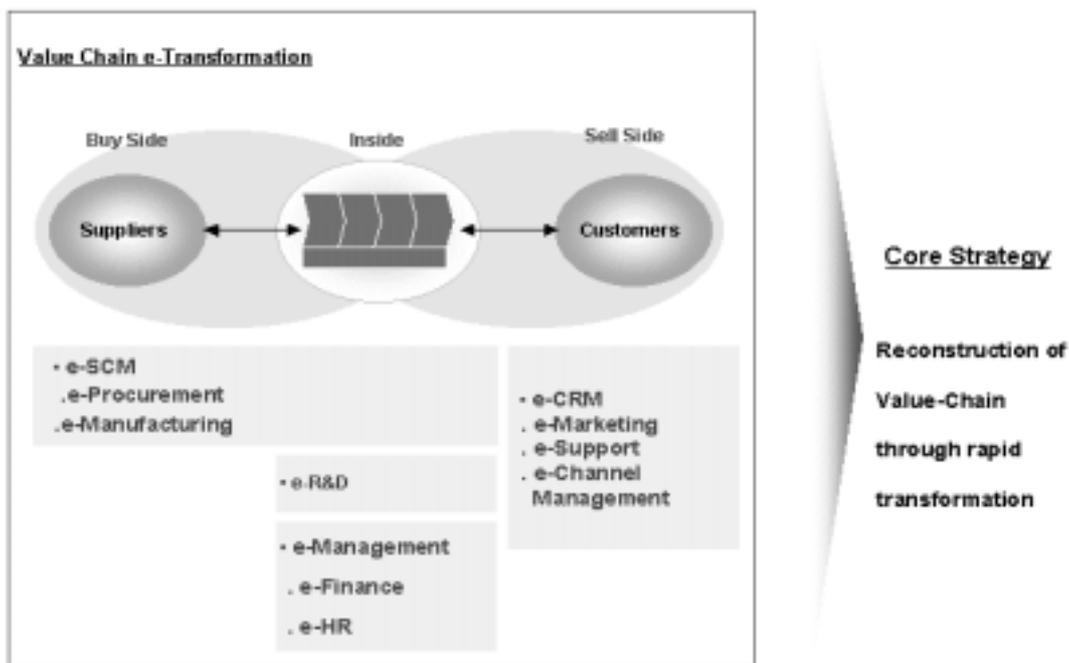
2.6.4 Business Model

CALS/EC demonstration, Electropia, 2000, 5

<sup>7</sup> The seminar Report by EIAK(Electronics Industry Association of Korea). 2000

B2B electronic commerce in the Korean electronics industry has an influence on the distribution of products and services and on business processes. It largely affects the enterprise according to the structure of value chain and characteristics of each industry. B2B electronic commerce diminished the production and distribution through the newly developed business model. The impact of electronic commerce on changes in the business model is as follows.

- ◆ Effect of expense curtailment, which is caused by shortening the transactions process
- ◆ Demand-driven formation of the business model
- ◆ Security of stability and efficiency, which are based to the standardization of the parts
- ◆ Current closed transaction practice will be changed after forming e-marketplace



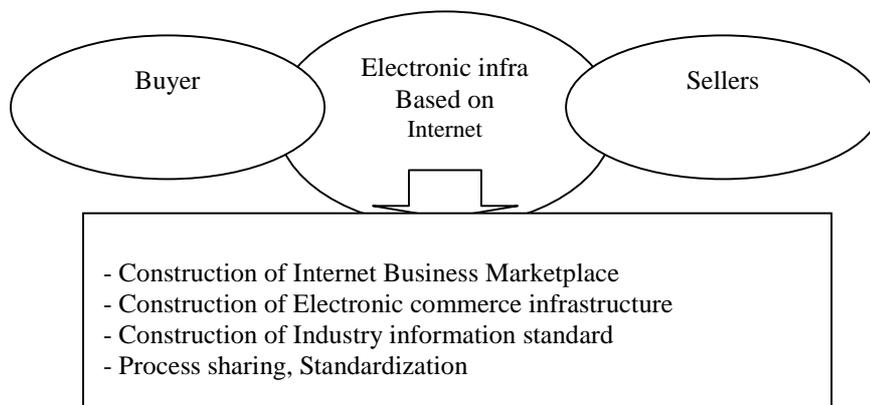
[Figure 3-15 Value Chain Integration Model in the Electronics Industry<sup>8</sup>]

We can observe from the above figure that business efficiency maximizes the whole territory of value chain through the use of the Internet. In particular, a lead time development could be reduced through information sharing between the core group and cooperative companies in the electronics industry. Moreover, considerable parts of transaction process could trim down the labor cost and management cost through electronic devices like the Internet. Generally, it brings about many other positive effects such as lower unit process time.

We will briefly explain the connectivity of B2B e-commerce with e-marketplaces. The characteristic of the present transaction structure is that each company was connected with other cooperative companies. It has durability. Unlike the present transaction structure, which is closed and static structure, the transaction structure of e-marketplaces allows for open-door transaction environment and many-to-many transaction environment. It provides companies with dynamic and momentary transaction opportunities. At the same time, it plays a threatening role of forcing companies to have a transparent transaction. Therefore, in order to form and

<sup>8</sup> LG Electronics, 2000.10

vitalize the marketplace through electronic commerce, common standards are necessary.



As the above figure shows, the electronics industry structure is transforming toward open-purchase supply system and this open-purchase supply method is making small and medium size companies more transparent in their relation with cooperative companies and giving them more opportunities. The joint-use system and standard process also provide opportunities to make more flexible cooperation among cooperative firms and competitive firms. At this point, we should not lose sight of several problems, such as the formation and expansion of e-marketplaces, linked with the current Korean electronic industry situation.

First of all, the size of the domestic electronics industry market is limited compared to American and European markets. For instance, DELL Computers, which is the largest online company in the U.S., has hundreds of parts suppliers and buyers throughout the U.S. It thus has flexible relationships with the production line and cooperative companies. Moreover, the relationship among cooperative companies is not defined by a vertical relationship but by a horizontal and collaborative relationship. In Korea, on the other hand, there is no such manufacturing companies which have strong bargaining power to deal effectively with Korean electronic conglomerates. Companies with a bargaining power to negotiate with conglomerate do not exist because the domestic market is quite small. It is highly possible that the current marketplace in the Korean electronic industry is becoming a closed marketplace because of dominated market situation by conglomerates.

Another disputed point in the Korean marketplace is related to the domestic business environment. To change the whole business activity through a marketplace based on electronic commerce needs two critical factors: the introduction of information technology and the standard of process. Information technology aspect is related to network system to exchange the information and digitalized materials. Standard aspect is aimed to generate information transferability between different devices.

From these aspects, we can observe the market transformation from vertical value chain integration to horizontal and open value chain integration. Therefore, to become a global player, the competition to acquire standardization power is getting more intense.

Consequently, electronic commerce prompts the Korean electronics industry to change transaction structure from a closed one to more open one. Especially, it is certain that B2B electronic commerce gives the Korean electronics industry more opportunities for growth. Transactions between parts suppliers and cooperative companies are so frequent that the construction and sharing of DB on parts need to develop more efficiently. Moreover, we can

predict that the role of e-procurement in e-marketplaces is becoming pivotal in constructing new B2B electronic commerce because the Korean electronics industry is heavily dependent on overseas business (approximately 70 to 80 percent of business involves overseas transactions).

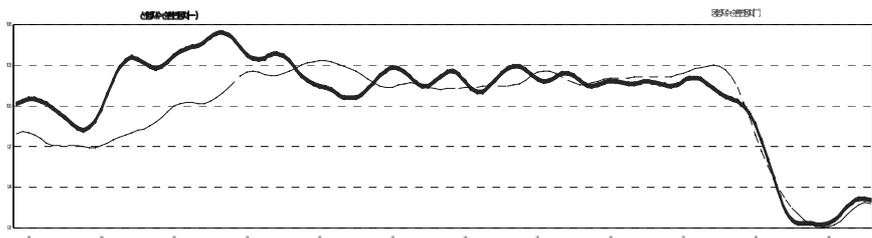
From the factors described above, each company should select a harmonious strategy with the present transaction process and information technology. These days, many domestic companies are trying to cooperate and form alliances with other companies. It is another positive reason to adopt an open transaction supply system and electronic commerce. Electronic commerce will spread to the overall economy and society in the near future.

The value of this research is that it is the first attempt to investigate a given industry in each country. This kind of endeavor should be continued to fully understand the impact of electronic commerce.

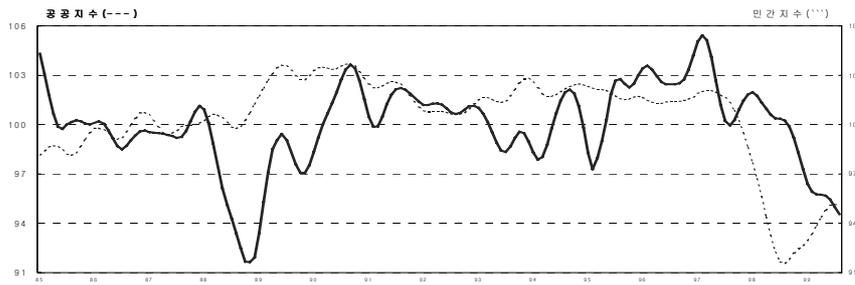
### 3. The Construction Industry

#### 3.1 Introduction and Background

The slowdown of the construction industry will continue because of the economic downturn in Korea and reduced investment in all aspects of the construction industry, such as civil housing, public services, the real estate market, etc. The preceding index (see figure 3-16), which shows the economic outlook for next year, shows a precipitous drop in economic performance after July 1997 and this situation is continuing. The public and civil sector index (see figure 3-17) is also continuing to fall due to the reduced demand for civil and public services.



[Figure 3-16 Preceding Index of the Construction Industry]  
(Korea Association, 1999)



[Figure 3-17 Private and Public Index of the Construction Industry]  
(Korea Construction Association, 1999)

A remarkable fact in the midst of all this is that the private sector's investments have actually increased since 1999, and this has contributed to a recovery from the stagnation of the construction industry. Until recently, however, the private sector's investments that supported the construction industry's rebound turned started to drop.

( unit: percent)

	'96	'97	'98	'99	Rate of increase and decrease
Public sector	35.8	41.0	56.7	54.7	2.0
Private sector	60.9	55.6	37.0	42.4	5.4
Others	3.3	3.4	6.3	3.0	3.3

[Figure 3-18 Relative Importance of the Ordering Hosts (public, private) Each Year]  
(Korea Construction Association, 1999)

At present, there are about 43,000 construction companies in Korea and their types of business are diverse. The number and the component ratio of the companies in the construction industry are as follows (Figure 3-19).

Categories	number of companies per types of business			
	1995(year)	component ratio (percent)	1996(year)	Component ratio (percent)
Total construction industry	39,533	100	43,432	100
General construction industry	2,727	6.95	3,501	7.0
Specialized construction industry	12,302	31.1	14,182	32.7

Equipment industry	2,453	6.2	2,649	6.1
Others	1,214	3.1	12,808	29.5

[Figure 3-19 Number and Component Ratio of Construction Companies by Types of Business]

In general, the construction process is achieved through the relationship between specialized construction companies, material-support companies, labor and service-support companies and general construction companies. Recession in the Korean construction industry is continuing, and no effective solution has been found yet. This project will focus on the condition of business-to-business electronic commerce in the construction industry and examine the prospects of business-to-business e-commerce and the value chain changes in the construction industry.

### 3.2 Value Chain and Analysis

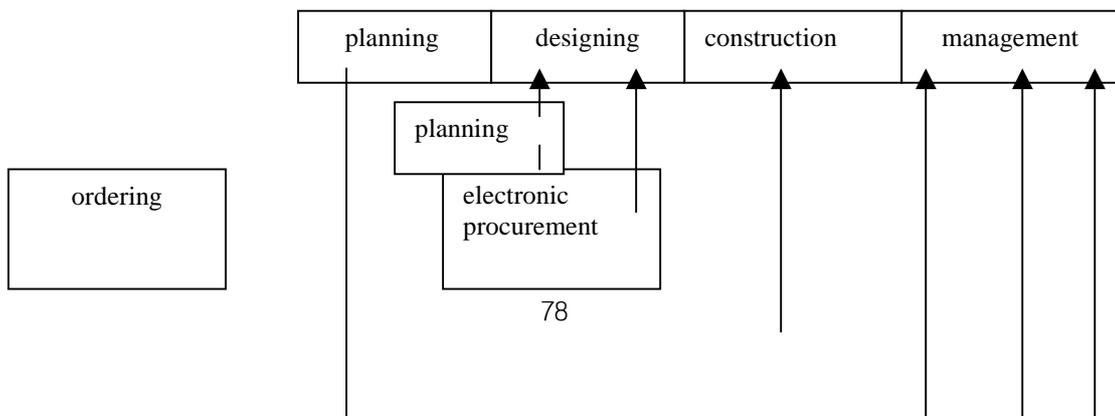
#### 3.2.1 Product and Transaction Characteristics

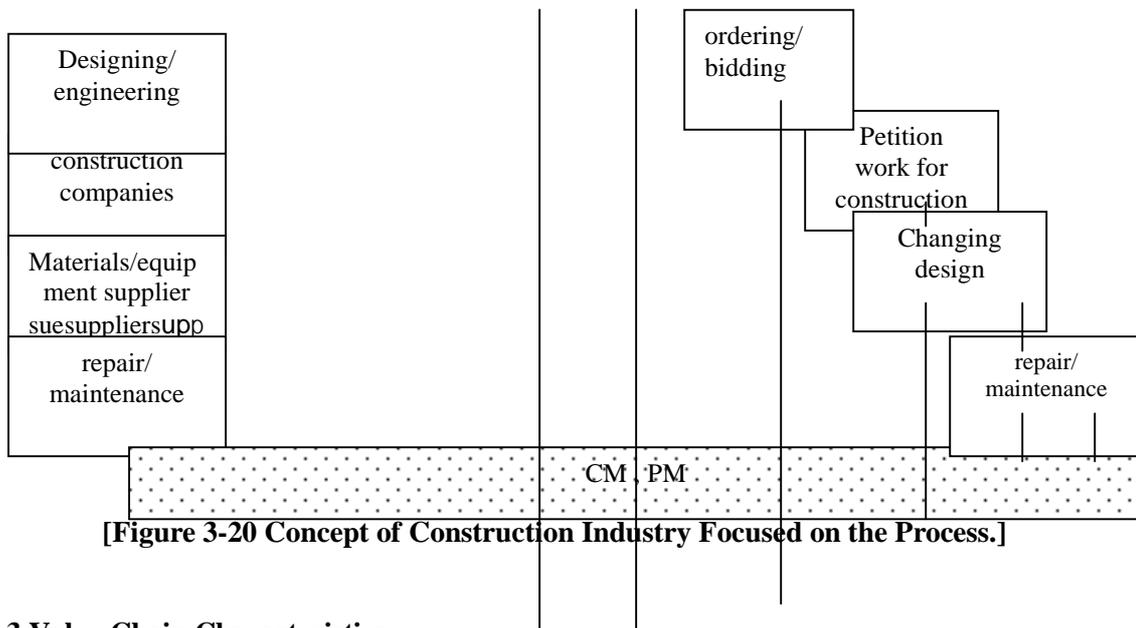
There are too many entry barriers in the construction industry market. These entry barriers include economies of scale, switching costs of the consumers, product discrimination and accessibility to distribution channels. Large companies seize the distribution channel and the barriers are set high for new entrants. The switching cost of the construction industry is higher than that of other industries. To switch the supplier during the construction period generates much risk.

Lastly, customers of general construction companies are private companies or public institutions, and customers of specialized construction companies are general construction companies. In the construction industry, supply rises only when demand exists.

Figure 3-20 describes the concept of construction industry focused on the process. In the process of designing, general construction companies complete designs by themselves rather than referring them to architecture and engineering companies. In the process of construction work, general construction companies work with specialized construction companies or labor and service-support companies. And in the process of purchasing, general construction companies work together with material/equipment-support companies. But the most important thing is that the purchasing process is a direct process for general construction companies and they control several subcontract companies during construction processes.

The general process of construction is that consumers (individuals, government or civil organizations) plan, general construction companies get orders, material-support and specialized companies construct, and at last construction is finished for the consumer.



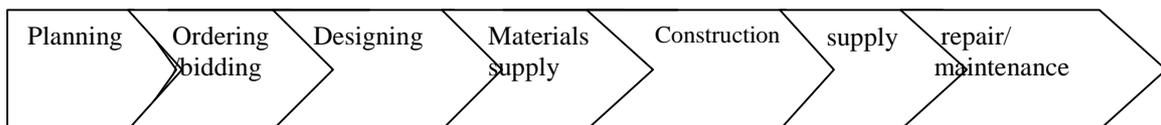


[Figure 3-20 Concept of Construction Industry Focused on the Process.]

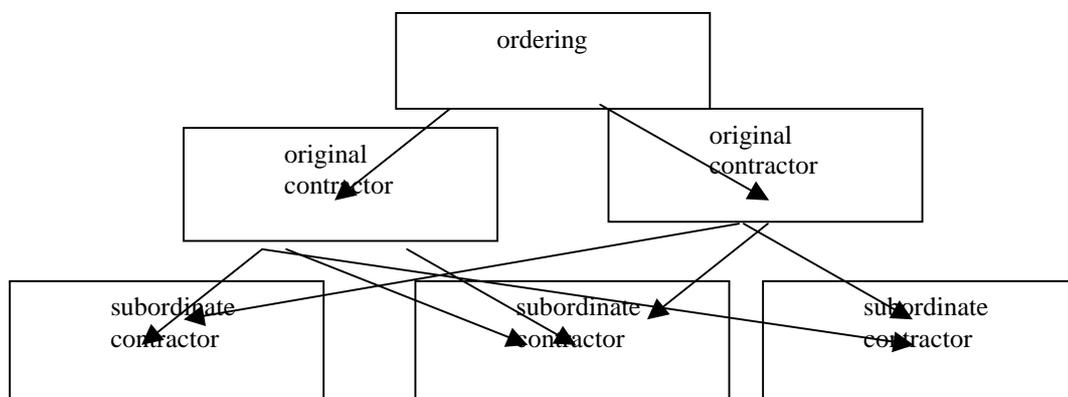
### 3.3 Value Chain Characteristics

#### 3.3.1 Factors of the Value Chain

The value chain of the construction industry can be illustrated through the construction process, because the process begins with the consumers' planning and ordering. The process is as follows (figure 3-21)



#### 3.3.2 Transaction Relationships



[Figure 3-22 Transaction Relationships in the Construction Industry]

As we can see from figure3-21, the transaction relationship is very complicated. It results

from high switching costs, which means that costs of changing construction equipments and materials suppliers are very high and therefore original contractors are locked into subordinate contractors and the purchasing strategy of original contractors are complicated.

### 3.4 Dynamics and Trends

#### 3.4.1 Electronic Commerce Strategy by the Government- Focused on CALS

In order to establish the information infra and improve information standardization, the government is endorsing CALS since the mid 90s. CALS in the construction industry means information for planning, ordering, designing, and repairing, which are exchanged through networks, and subcontract companies and material-support companies share information. The government is planning to establish CALS through three stages until 2005: the embodiment of the transaction with electronic data, followed by digitalization of circulation and then by management of public services through CALS. By using CALS, the construction industry can achieve quickness, transparency, cost reduction and durability in information.

The Effects of CALS are as follows.

- Due to the reduced information asymmetry, ordering companies, construction work companies, etc. are more specialized.
- Through information sharing, contracts are more equally established.
- Change of ordering process brings specialization and competitiveness.
- Change of demand due to information and communication facilities.

Comparison between CALS and E-commerce is as follows

	<b>CALS</b>	<b>Electronic Commerce (EC)</b>
Subject	Government, companies	Government, companies, individuals
Application of business	All processes--planning, designing, production, procurement and management	Transaction activities--advertising, sale, delivery, billing and payment
Scale of Application	Companies, industry	Market (numerous suppliers and customers)
Core technology	Information sharing, system connection and integrating technologies	Internet based application technology
Embodiment type	CE, IETM CITIS,	Electronic bookstore, electronic payment, authentication, electronic data interchange (EDI)

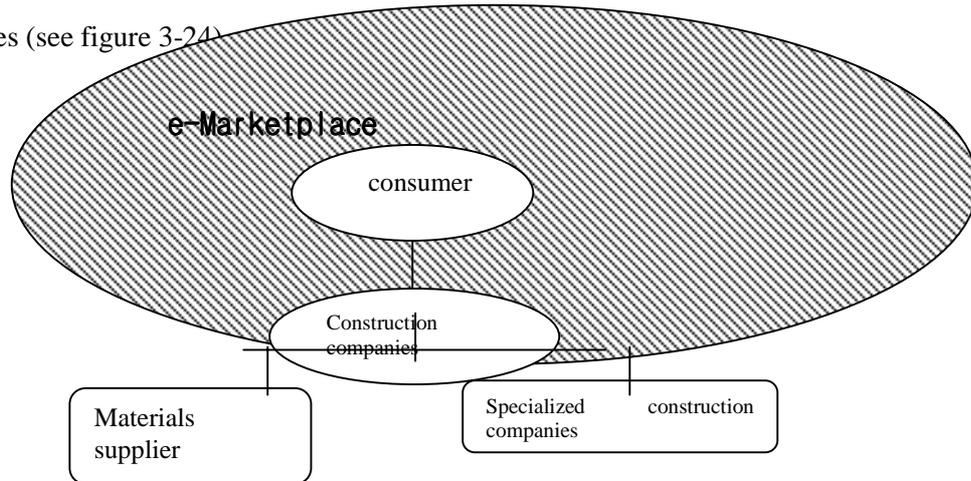
[Figure 3-23 Difference between CALS and EC]

#### 3.4.2 E-Marketplace

Large companies comprise the core group in business-to-business electronic commerce and e-marketplaces are operated by these large companies.

But it is very difficult to find an e-marketplace between core companies because of the recession of the construction industry and the business environment that pursues its own profit only. Thus, almost all e-marketplaces in the construction industry came from the main construction companies, linking their mechanical equipment companies and material-support

companies (see figure 3-24)



[Figure 3-24 E-marketplace in the Business-to-Business Construction Industry]

[Table 3-5 Examples of E-marketplaces in the Korean Construction Industry]

e-Marketplaces	Host company	Opening Date
Buildersnet	Conbu construction company, Interpark dot company	June 1, 2000
Metplaza COSMOS	Samsung construction company	Nov1, 1999
Daerim e-pro	Daerim construction company	August1, 2000

As mentioned in the table, Samsung, Daerim and Ssangyong construction companies are operating e-marketplaces actively, and other examples are built1, partet21, and Corn21.

### 3.5 Case Studies

#### 3.5.1 Sampling

Companies of the core group are leading companies in business-to-business electronic commerce in the construction industry. Compared to the core group, companies in the secondary group lag behind in business-to-business electronic commerce. After defining each group, three core group and four secondary group companies were selected as samples. Those selected companies were questioned and interviewed to get accurate information.

[Table 3-6 Selected Companies and Their Position in the Value Chain]

<b>Korean Construction Industry</b>	<b>Case company</b>	<b>Position in the value chain</b>
<b>Core Group (3)</b>	Samsung Engineering&Construction Co.	General Construction Company
	Daerim Engineering&Construction Co.	General Construction Company
	Ssangyong Engineering&Construction Co.	General Construction Company
<b>Secondary Group (4)</b>	Taeyoung Engineering& Construction Co.	General Construction Company
	Mooyoung Architecture Engineers Co.	Architecture& Engineers Company
	Doosan Engineering& Construction Co.	General Construction Company
	Kumkwang Engineering& Construction Co.	General Construction Company

### 3.5.2 Case Studies

#### 1) Core Group

##### a. Samsung

Samsung is one of the representative construction companies in Korea. Customers of Samsung Construction Company include public and private institutions, construction owners, building providers and leaseholders. The main business-to-business transaction involves selecting special construction companies (sub-contractors) and purchasing materials. Samsung runs COSMOS as a purchasing system and Matplaza as a sub-contractor management system.

##### **Position in the Value Chain**

Samsung plays a role as a general construction company (construction manager) in ordering, execution, repair and maintenance in the construction life cycle. Planning, designing, and supply are all included. Samsung, which is provided with materials by material suppliers, manages execution processes by entrusting them to sub-contractors. Although sub-contractors are responsible for their specialized constructions, Samsung has its own purchasing system to reduce cost made by unilateral purchases of sub-contractors. The economic activities of Samsung can be positioned between the ordering and the execution of construction companies, trading with material suppliers and sub-contractors. Orders are processed within the commercial framework of deals between individual clients, sub-contractors and material suppliers.

The distribution of main suppliers by size is 90 percent for SMEs, and 10 percent for medium size companies. The distribution of main customers by size is 40 percent for public institutions 30 percent for conglomerates, 20 percent for medium size companies, and 10 percent for SMEs. The financial difficulties of large construction companies like Hyundai Construction Company are, therefore, directly related to the crisis of the SMEs. Although Samsung is a large company with more than 1,000 business points, intermediaries are less than 20 and only 10 in purchasing prospective. That is because most purchases in the construction industry are directly ordered and directly supplied.

### ***Business profile of the Company***

Samsung is a construction service provider that receives orders from clients, selects sub-contractors and material suppliers, and manages these cooperators. Types of orders can be divided into bidding orders and proposed orders. Samsung mainly uses a web-based purchasing system to purchase materials and has its own sub-contractor management system.

### ***Technology Profile***

Nearly all customers of Samsung use Internet EDI for ordering, billing and finance. Videotex is used for advertising, while e-mail and Extranet are used for negotiations. But Samsung still uses traditional communication tools such as telephone and fax for its transaction with both suppliers and customers. For trading with suppliers, the company uses Internet EDI, Extranet and to some extent, WWW. Samsung is encouraging its suppliers to adopt the system environment of Samsung in order to achieve more efficiency. But Internet EDI used for catalogues and negotiation is regarded as insufficient, and the company is trying to improve the system.

### **Interview Response**

#### ***Motivations***

Samsung Construction Company became engaged in electronic commerce to reduce transaction costs, improve efficiency, achieve transparent transaction and improve speed of transaction processes. In ordering and supply advertisement, electronic commerce contributed to efficiency and reduced duplication of stock lists. Since various methods can be used, accuracy and quickness can be achieved in negotiation, ordering, and billing processes based on the customers' or suppliers' requests.

#### ***Obstacles & Advantages***

In Samsung Construction Company, factors that aided and facilitated its efforts to achieve electronic commerce goals are discussed below.

#### ***External Factors Pertaining to Relations with Other Enterprises***

Interaction between individuals encouraged the use of electronic commerce. And the availability of a variety of transaction systems also supported the electronic commerce initiative. Brand image contributed to the electronic commerce initiative and electronic commerce is a new opportunity to strengthen traditional transaction relationships.

#### ***Strategic Factors Relating to Competitiveness***

Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce facilitated the management of business relationships.

#### ***Internal Factors***

The existing in-house technologies are sufficient to support electronic commerce, and the existing staff training and skill levels are also sufficient for electronic commerce. Managers want to introduce electronic commerce and they are actively pursuing that initiative. Initial investment cost could easily be justified.

### **Factors that Impeded Progress in Achieving Electronic Commerce**

#### ***Telecommunications Infrastructure***

Appropriate telecom costs facilitated the success of the electronic commerce initiative. But

poor network reliability has impeded the success of the electronic commerce initiative. The competition between telecom operators was appropriate to encourage electronic commerce.

### ***Regulatory Factors***

Security, law, and intellectual property rights are still insufficient for electronic commerce. But in payment authentication, trust encourages electronic commerce. Sufficient protection is needed in electronic commerce.

### ***Government Policy***

The lack of tax exemption or break and insufficient financial support for R&D did not encourage the company to engage in electronic commerce. But the company is looking forward to the government's CALS project.

### ***Impacts***

After introducing electronic commerce, Samsung acquired positive results in advertising, negotiation and market analysis. In the transaction completion process, electronic commerce contributed to diversification, customization and differentiation. Samsung applies electronic commerce to ordering, billing and payment, and delivery. It is expected that the primary electronic commerce innovation will be linked to process innovation for better design and logistics, cooperation, trust and loyalty. In product supply, speed and accuracy have been improved and labor could be redistributed.

There have been significant impacts on all production processes. Process innovation, improved speed, and better market analysis were all possible due to electronic commerce.

## **b. Daerim**

Daerim is one of the most recognized general construction companies in Korea. The customers of Daerim are public or private institutions and individual customers interested in buying apartments. The main business-to-business transaction is achieved through purchasing processes. The company has its own supply system, e-procurement.

### **Position in the Value Chain**

Daerim plays a role as a general construction company in ordering, execution, construction and repair and maintenance. Its position in the value chain is just like that of Samsung. The economic activities of Daerim can be positioned between the ordering and the execution of construction companies, trading with material suppliers and sub-contractors. Orders are processed within the commercial framework of deals between individual clients, sub-contractors and material suppliers.

The distribution of main suppliers by size is 50 percent for SMEs, 20 percent for medium size companies, 5 percent for small companies, and 24 percent for large companies. The distribution of main customers by size is 68 percent for public institutions, 1 percent for conglomerates, and 1 percent for medium size companies. Unlike Samsung, the customers' of Daerim are mostly public institutions and individuals who are interested in buying apartments. Individual consumers consist 30 percent of the total, meaning that the company plays extensive roles in supply, and repair and maintenance processes. Although Daerim is a large company with more than 1,000 business points, intermediaries are less than 5. That is because Daerim sells apartments to customers directly.

### ***Business Profile of the Company***

Daerim is a construction service provider that receives orders from clients, selects sub-contractors and material suppliers, and manages these cooperators. It contains the whole life cycle of construction processes. Therefore its dependence on specialized construction companies is lower than that of Samsung.

### ***Technology Profile***

Nearly all the customers of Daerim use Internet EDI for ordering, billing and finance. Videotex is used for advertising, while e-mail and Extranet are used for negotiations. But Daerim rarely uses EDI, e-mail or Extranet for catalogues. It is using various applications in order to select the right technology regarding the customer's preferences, product characteristics, climate, cultural and political differences. For trading with suppliers, the company is using various tools as well as traditional ways in order to facilitate suppliers' convenience. Daerim is encouraging its suppliers to adopt Daerim's own material procurement system by establishing server and firewalls.

### **Interview Response**

#### ***Motivations***

Daerim Construction Company became engaged in electronic commerce to reduce transaction costs, improve efficiency in the transaction processes, achieve transparent transaction and improve the speed of transaction processes. By using various applications, customer satisfaction was improved, accuracy and quickness was achieved in logistics, and trust and specialization was improved in business-to-business transactions.

#### ***Obstacles and Advantages***

Factors that aided and facilitated Daerim Construction Company's efforts to achieve electronic commerce are described below.

#### ***External Factors Pertaining to Relations with Other Enterprises***

Interaction between individuals encouraged the use of electronic commerce. But the availability of a variety of transaction systems has not supported the electronic commerce initiative. Brand image contributed to the electronic commerce initiative and electronic commerce is a new opportunity to strengthen the traditional transaction relationship.

#### ***Strategic Factors Relating to Competitiveness***

Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce facilitated the management of business relationships.

#### ***Internal Factors***

The existing in-house technologies are sufficient to support electronic commerce, but the existing staff training and skill levels are still lacking for electronic commerce. Initial investment cost could easily be justified. Managers are active in electronic commerce.

### **Factors that Impeded Progress in Achieving Electronic Commerce**

#### ***Telecommunications Infrastructure***

Appropriate telecom costs facilitated the success of the electronic commerce initiative. But poor network reliability has impeded the success of the electronic commerce initiative. The

competition between telecom operators was appropriate to encourage electronic commerce.

### ***Regulatory Factors***

Security, law, and intellectual property rights are still insufficient for electronic commerce. But in payment authentication, trust encourages electronic commerce. Sufficient protection is needed in electronic commerce.

### ***Government Policy***

The lack of tax exemption or break and insufficient financial support for R&D did not encourage the company to engage in electronic commerce. But the company is looking forward to the government's CALS project.

### ***Impacts***

After introducing electronic commerce, Daerim acquired positive results in advertising, catalogues and information service. But there has been no impact on negotiation. In the transaction completion process, electronic commerce contributed to ordering, billing & payment, and delivery. In product supply, electronic commerce was useful in acquiring information, but it was not that useful in information management, market analysis and market development. It is expected that the primary electronic commerce innovation will be linked to process innovation for better design and logistics, cooperation, trust and loyalty and to relational innovation of geographical expansion and market segmentation.

## **c. Ssangyong**

### ***Position in the Value Chain***

Ssangyong is one of the most recognized general construction companies in Korea. Ssangyong plays the role as a general construction company in ordering, execution, construction and repair & maintenance. The economic activities of Ssangyong can be positioned between the ordering and the execution of construction companies, trading with both material suppliers and sub-contractors. Orders are processed within the commercial framework of deals between individual clients, sub-contractors and material suppliers.

The distribution of main suppliers by size is 30 percent for SMEs, 40 percent for medium size companies, and 20 percent for large companies. The distribution of main customers by size is 50 percent for public institutions, 20 percent for conglomerates, and 10 percent for medium size companies. Customers comprise mainly of public institutions and conglomerates. Its intermediaries are more than 20.

### ***Business Profile of the Company***

Ssangyong is a construction service provider that receives orders from clients, selects sub-contractors and material suppliers, and manages these cooperators. Types of orders can be divided into bidding orders and proposed orders. Ssangyong mainly uses a web-based purchasing system to purchase materials and has its own sub-contractors management system.

### ***Technology Profile***

Nearly all customers of Ssangyong use Internet EDI for ordering, billing and payment. WWW is used for advertisement and information service. Ssangyong also uses Extranet for catalogues and stock lists. It is using various applications in order to select the right technology regarding the customer's preferences, product characteristics, cultural and political differences. The company is looking forward to change to the WWW environment in trading with suppliers.

But it is also using various tools as well as traditional ways to facilitate suppliers' convenience.

## **Interview Response**

### ***Motivations***

Ssanyong is engaged in electronic commerce to reduce transaction costs, improve efficiency and digitization in transaction processes, achieve transparency and improve the speed of transaction processes. In product innovation, differentiation was achieved and electronic commerce turned out to be efficient in logistics and cooperation. In relational innovation, it was efficient in improving trust.

### **Obstacles & Advantages**

Factors that aided and facilitated Ssanyong Construction Company's efforts to achieve electronic commerce:

### ***External Factors Pertaining to Relations with Other Enterprises***

Interaction between individuals encouraged the use of electronic commerce. But the availability of a variety of transaction systems has not supported the electronic commerce initiative. Brand image contributed to the electronic commerce initiative and electronic commerce is a new opportunity to strengthen traditional transaction relationship.

### ***Strategic Factors Relating to Competitiveness***

Its electronic commerce encourages lock-in strategies and decreases the cost of reaching new customers and/or suppliers. Where required, intermediation services are easy to set up in favorable terms. On balance, its electronic commerce facilitated the management of business relationships.

### ***Government Policy***

Appropriate government policy was sufficient in facilitating electronic commerce. But taxation and automation related to government policy are insufficient. The company is looking forward to the government's CALS project.

## **Factors that Impeded Progress in Achieving Electronic Commerce**

### ***Telecommunications Infrastructure***

High telecom costs discouraged the success of the electronic commerce initiative. But appropriate network reliability facilitated the success of the electronic commerce initiative. The competition between telecom operators was appropriate to encourage electronic commerce.

### ***Regulatory Factors***

Security, law, and intellectual property rights are still insufficient for electronic commerce.

### ***Internal Factors***

The existing in-house technologies are insufficient to support electronic commerce, and the existing staff training and skill levels are still lacking for electronic commerce. Initial investment costs could easily be justified. Managers are not active in electronic commerce.

## **Impact**

Electronic commerce is not applied to transaction preparation and product development. But Ssanyong applies electronic commerce to ordering, billing & payment and delivery. It is thus expected that the primary electronic commerce innovation will be linked to process innovation of better logistics, coordination and integration, product innovation of differentiation

and customization, relational innovation of geographical expansion, market segmentation, trust and loyalty.

## **2) Secondary Group**

### **a. Doosan**

#### **General Information**

##### ***Position of Doosan in the Construction Industry Value Chain***

Doosan is an independent firm and its main product or product area is engineering works and construction, such as building apartments. The number of people employed nationally is 1,000 (there are no overseas employees), and domestic revenue is 76 million dollars. The number of countries in which the firm has subsidiaries is one, while the number of suppliers with which the enterprise does business, either directly or through intermediaries is more than 1,000. The number of customers with which the enterprise does business, either directly or through intermediaries, is between 100 and 1000. The number of intermediaries, such as wholesalers, retailers and agents, is less than 20. The distribution of the suppliers by size is 10 percent for very small enterprises (less than 10 employees), 40 percent for SMEs (10-250 employees), and 50 percent for large enterprises (250-500). As for the distribution of customers by size, SMEs make up 5 percent, public sector bodies 45 percent, individuals 40 percent, and large enterprises 10 percent. The percentage of suppliers and customers based abroad is 25 percent. Major suppliers, customers, competitors, and intermediaries enter and exit the market frequently but they have low influence on the market structure and conditions.

##### ***Business Profile of the Firm***

##### ***Business Activities with Customers***

E-mail is used to conduct or support business activities, including advertising, catalogues and stock lists, information services, billing and payment. This firm switched from e-mail to the Internet and EDI for negotiation, ordering, and billing and payment because the business environment is changed.

##### ***Business Activities with Suppliers***

There are no effects/ factors that are applicable

#### **Interview Responses**

##### ***Motivations***

In respect to transaction completion, this firm expects to be treated fairly in the transaction process, save on delivery costs, and decrease the reaching costs.

##### ***Factors Relating to the Telecommunications Infrastructure***

High telecom costs inhibited the success of the electronic commerce initiative, while network reliability and network flexibility had no effect.

##### ***Regulatory Factors***

The level of transaction security was insufficient to encourage electronic commerce, while legal structure, authentication and certification, and protection of intellectual property had no effect.

### ***Internal Factors***

The existing in-house technologies were insufficient to support electronic commerce, although the existing staff training and skill levels were sufficient for electronic commerce. Investment cost could easily be justified, because management was proactive in developing electronic commerce business plans.

### ***External Factors Pertaining to Relations with Other Enterprises***

Human factors, competition between transaction systems, and brand image had no effect, but electronic commerce encouraged more flexible commercial structure.

### ***Strategic Factors Relating to Competitiveness***

Electronic commerce encouraged lock-in strategies and decreased the cost of reaching new customers and/or suppliers. Intermediation services were easy to set up in favorable terms, and on balance, electronic commerce facilitated the management of business relationships.

### ***Government Policy in General***

Taxation measures, awareness raising and demonstration programs, education system, and training programs had no effect, while financial support for R&D and diffusion or uptake were not insufficient encourage the firm to engage in electronic commerce. Government provision of on-line electronic service was a bad experience, making electronic commerce less attractive to the firm's customers and suppliers alike.

## **b. Taeyoung**

### **General Information**

#### ***Position of Taeyoung in the Construction Industry Value Chain***

For Taeyoung, an independent firm, main products or product area of the enterprise is building apartments. The number of people employed nationally is 600 (there are no people employed world-wide), and the domestic revenue is 417 million dollars. The number of suppliers is more than 10 but less than 100, while the number of customers, either directly or through intermediaries, is less than 1000. The number of intermediaries, such as wholesalers, retailers and agent, is less than 20. The distribution of suppliers by size is 20 percent for very small enterprises and 70 percent for SMEs. As regards the distribution of customers by size, public sector bodies accounts for 70 percent, while individuals take up the rest. In terms of the rate of entry and exit of actors in the market, major customers are rare, while major competitors sometimes enter and exit the market. Major suppliers have high influence on market structure and condition, but the others don't.

### **Business Profile of the Firm**

#### ***Business Activities with Customers***

E-mail is used to conduct or support communication, WWW is used to conduct or supplement advertising, while Extranet is used to conduct or provide support for billing and payment. This firm is supposed to have switched from e-mail to WWW for negotiation, ordering, and billing and payment because the Internet is really useful to transact and is cost effective.

#### ***Business Activities with Suppliers***

EDI is used to conduct or provide support for billing and payment, and this firm is supposed to have switched from e-mail to WWW for billing and payment because using the Internet is ubiquitous and very useful.

## **Interview Responses**

### ***Motivations***

In respect to transaction process, this firm expects that it is fair and that it saves delivery costs.

### ***Factors Relating to the Telecommunications Infrastructure***

Low telecom costs were a factor in the success of the electronic commerce initiative, and telecom network reliability has not been a problem. Telecom operators do not offer a sufficient range of services to encourage and enable the firm to engage in electronic commerce.

### ***Regulatory Factors***

Levels of transaction security were insufficient to encourage electronic commerce and legal structures were not in place, and this discouraged electronic commerce. Authentication and certification systems did not generate trust and discouraged electronic commerce.

### ***Internal Factors***

The existing in-house technologies were insufficient to support electronic commerce, and the existing staff training and skill levels were insufficient for electronic commerce. Management was reluctant to introduce electronic proactive commerce, but investment cost could easily be justified.

### ***External Factors Pertaining to Relations with Other Enterprises***

Human factors encouraged the use of electronic commerce, but other factors, i.e., competition between transaction systems, brand image, and existing commercial structures, had no effect.

### ***Strategic Factors Relating to Competitiveness***

Electronic commerce decreased the cost of reaching new customers and/or suppliers, but intermediation and management of business relationships factors had no effect.

### ***Government Policy in General***

Taxation measures did not encourage the firm to engage in electronic commerce. Government programs misrepresented the dynamics of electronic commerce and raised dubious expectations. Education system did not provide adequately trained personnel to engage in electronic commerce, and training programs were not available or insufficient to support the firm. Financial support for R&D, diffusion or uptake was not insufficient encourage the firm to engage in electronic commerce, and government provision of on-line electronic services was a bad experiences, making electronic commerce less attractive to the firms' customers and suppliers alike.

### **Impact**

In regard to transaction preparation and completion, e-commerce provides innovative measures for information capture and negotiation.

## **c. Gumgwang**

### **General Information**

#### ***Position of Gumgwang in the Construction Industry Value Chain***

Gumgwang is an independent firm whose main product or product area is engineering

work and construction. The number of people employed nationally is 500 (there are no people employed world-wide), and the domestic revenue is 234 million dollars. The number of subsidiaries is one, while the number of suppliers is more than 10 but less than 100. The number of customers, either directly or through intermediaries, is less than 1000, and the number of intermediaries, such as wholesalers, retailers and agents, is less than 20.

### ***Business Profile of the Firm***

This firm's relevant characteristics of products are construction and engineering, and relevant production factor input, e.g., factor dependencies, is laborers who are specialists in the construction industry.

### **Interview Responses**

#### ***Motivations***

In respect to transaction preparation and completion, this firm expects them to be faster and more accurate.

#### ***Factors Relating to the Telecommunications Infrastructure***

Low telecom costs were a factor in the success of the electronic commerce initiative, and telecom network reliability has not been a problem. Telecom operators do not offer a sufficient range of services to encourage and enable the firm to engage in electronic commerce.

#### ***Regulatory Factors***

Levels of transaction security were insufficient to encourage electronic commerce and legal structures were not in place, and this discouraged electronic commerce. Authentication and certification systems did not generate trust and discouraged electronic commerce. Weak protection of intellectual property also discouraged electronic commerce.

#### ***Internal Factors***

The existing in-house technologies were insufficient to support electronic commerce, and the existing staff training and skill levels were also insufficient for electronic commerce. Management was reluctant to introduce electronic proactive commerce, and investment cost could not easily be justified.

#### ***External Factors Pertaining to Relations with Other Enterprises***

Human factors encouraged the use of electronic commerce, but other factors, such as competition between transaction systems, brand image, and the existing commercial structures, had no effect.

#### ***Strategic Factors Relating to Competitiveness***

Electronic commerce discourages lock-in strategies, and increases the cost of reaching new customers and/or suppliers. Intermediation services were easy to set up in favorable terms, and electronic commerce facilitated the management of business relationship.

#### ***Government Policy in General***

Taxation measures did not encourage the firm to engage in electronic commerce. Government programs misrepresented the dynamics of electronic commerce and raised dubious expectations. Education system did not provide adequately trained personnel to engage in electronic commerce, and training programs were not available or insufficient to support the firm. Financial support for R&D, diffusion or uptake was not insufficient to encourage the firm to engage in electronic commerce. And lastly, government provision of on-line electronic

services was a bad experience, making electronic commerce less attractive to the firm's customers and suppliers alike.

### **Impact**

Electronic commerce makes it easier for the firm to capture commodity information and access information services.

### **d. Mooyoung**

#### **General Information**

##### ***Position of Mooyoung in the Construction Industry Value Chain***

Mooyoung is an independent firm whose main product or product area is architecture. The number of people employed nationally is 259 (there are no people employed world-wide), and the domestic revenue is 1.7 million dollars a year. There is no subsidiary and the number of suppliers with which the enterprise does business, either directly or through intermediaries, is more than 10 but less than 100. The number of customers with which the enterprise does business, either directly or through intermediaries, is more than 10 but less than 100, and the number of intermediaries, such as wholesalers, retailers and agents, is more than 20. The distribution of suppliers by size is 30 percent for very small enterprises, 50 percent for SMEs, 10 percent for large enterprises, 10 percent for public sector bodies, and 5 percent for individuals. And for the distribution of customers by size, very small enterprises accounts for 20 percent, SMEs 20 percent, large enterprises 40 percent, public sector bodies 10percent and individuals 10percent. The percentage of suppliers based abroad is more than 25 percent but less than 50percent. The percentage of customers based abroad is <25percent, and as regards the rate of entry and exit in the market, major suppliers and competitors sometimes do enter and exist the market. The influence of major suppliers and customers in the market was moderate, while that of major intermediaries was low.

##### ***Business Profile of the Firm***

The relevant characteristics of products are giving approvals to construction projects and designing construction projects, and relevant characteristic of transaction structure is dependence on opening a tender to the public, while factor dependence is laborers who are specialists in the construction industry.

##### ***Business Activities with Customers***

E-mail and WWW are used to conduct or provide support for advertising. EDI and WWW are used to conduct or provide support for information services, while EDI is used to conduct financial transactions with customers. This firm is supposed to have switched from WWW to E-mail for advertising, catalogs and stock lists, and information services because e-commerce guarantees transaction stability.

#### **Interview Responses**

##### ***Motivations***

The expectations of the firm regarding the effects of electronic commerce on the transaction processes is they will save opportunity costs through the easier access to information. As regards product innovation, the firm expects to achieve diversification and differentiation of commodity. And in regard to relational innovation, the firm is hoping for expansion and segmentation of the market.

#### **Obstacles and Advantages**

Factors relating to the telecommunications infrastructure

High telecom costs were a factor in the success of the electronic commerce initiative, but telecom operators do not offer a sufficient range of services to encourage and enable the firm to engage in electronic commerce.

***Regulatory Factors***

Levels of transaction security were insufficient to encourage electronic commerce and legal structures were not in place, and this discouraged electronic commerce. Authentication and certification systems did not generate trust and discouraged electronic commerce. And weak protection of intellectual property discouraged electronic commerce.

***Internal Factors***

The existing in-house technologies were sufficient to support electronic commerce, and the existing staff training and skill levels were sufficient for electronic commerce. Management was proactive in developing electronic commerce business plans and investment cost could easily be justified.

***External Factors Pertaining to Relations with Other Enterprises***

Difficulty adjusting for human factors discouraged electronic commerce, but the availability of a variety of transaction systems did not discourage electronic commerce. Brand image was an asset in establishing the electronic commerce profile of the firm, and electronic commerce encouraged more flexible commercial structure.

***Strategic Factors Relating to Competitiveness***

Electronic commerce discourages lock-in strategies, and decreases the cost of reaching new customers and/or suppliers. Intermediation services were easy to set up in favorable terms, and electronic commerce facilitated the management of business relationship.

***Government Policy in General***

Financial support for R&D, diffusion or uptake was sufficient encourage the firm to engage in electronic commerce, and awareness raising and demonstration programs contributed to the success of electronic commerce in the sector by raising the industry and public profile of electronic commerce, but taxation measures did not encourage the firm to engage in electronic commerce. Government programs misrepresented the dynamics of electronic commerce and raised dubious expectations. Education system did not provide adequately trained personnel to engage in electronic commerce, and training programs were not available or insufficient to support the firm. Lastly, government provision of on-line electronic services was a bad experience, making electronic commerce less attractive to the firm's customers and suppliers alike.

**3.5.3 Analysis and Expectation Impact**

**1) Analysis**

**A. The Core Group**

Electronic Commerce Innovations		
Transaction Preparation	Transaction Completion	Production Support

		advertising	catalogues	info services	Negotiation	Orders	Billing & payment	Finance	delivery	transaction info capture	information management	market analysis	market development
Product innovations	Diversification												
	Differentiation												
	Customization					O	O		O				
	Bundling												
Process innovations	Design	O		O		O							
	Logistics								O				
	Production lines												
	co-ordination and integration	O	O	O	O					O	O	O	
Relational innovations	Geographical expansion	O		O	O								
	Market segmentation	O		O	O								
	Trust					O	O			O	O	O	
	Loyalty					O							

[Figure 3-25 Mapping the Effects of Electronic Commerce: Core Group]

In case of the core group, actual impacts of electronic commerce on business functions related to transaction preparation innovations are advertising, negotiation and information services. The innovation in negotiation means that firms get more suppliers and information, and these factors contribute to advertising, both directly and indirectly.

Actually the impact of electronic commerce on business functions related to transaction completion innovations is found in ordering, billing and payment, and delivery. This innovation also brings in the innovation of relational innovation, such as trust and loyalty for consumers. Lastly, in regard to the impact of electronic commerce on business functions related to production support, there is no significant innovation, although an innovation of market segmentation and transactional information acquisition is possible.

### b. The Secondary Group

In the case of the secondary group, on the other hand, business-to-business electronic commerce means easier search and access to commodity information, which can lead firms to strengthen their competitiveness and increase their market share by producing a specialized commodity. We also find inappropriate replies and gaps among these sample firms because this secondary group is either in a preparation stage or unready in engaging in business-to-business e-commerce.

		Electronic Commerce Innovations											
		Transaction Preparation				Transaction Completion				Production Support			
		advertising	catalogues	info services	negotiation	Orders	Billing & payment	Finance	delivery	transaction info capture	information management	market analysis	market development
Product innovations	Diversification	O	O										
	Differentiation		O										
	Customization												
	Bundling												
Process innovations	Design												
	Logistics												
	Production lines												
	co-ordination and integration												
Relational innovations	Geographical expansion												
	Market segmentation										O		
	Trust		O			O	O			O			
	Loyalty					O							

**[Figure 3-26 Mapping the Effects of Electronic Commerce : Secondary Group]**

This table (Figure 3-26) explains the relation innovation, process innovation and product innovation in the secondary group firms doing B2B e-commerce. First, the primary impact of electronic commerce on business functions related to transaction preparation innovations is that it occurs in large companies with well-prepared organizational infrastructure. Electronic Data Interchange (EDI) brings out coordination and up-to date management innovation, while on-line e-catalogs are used by several firms. In the case of smaller companies and individuals, on-line and off-line systems are used alternately. Therefore, we can see that there are some gaps among the companies of the secondary group.

Second, companies can attain reduction in opportunity costs and fair treatment in transaction completion, which include ordering, payment, financing and delivery.

Lastly, from the production support view, the procurement, management and analysis of information are really crucial for transaction process. By procuring and managing information, small firms will have an equal relationship with larger ones through information sharing.

## 2) Expectation Impact

In this part, we can streamline our viewpoints into four strains. First, we have to consider the side of the marketplace that brings out low cost and high efficiency in construction. Furthermore, several firms try to move actively toward using the Internet in real purchasing and delivery. This makes it possible to save on time and improve the quality of construction materials. It also improves the fairness of purchasing process by introducing new items and ideas, and registering firms which want to transact with other construction firms in the e-commerce system at anytime.

Second, in regard to construction management, we have to consider the Internet space which replaces physical office.

In the construction industry, there are bottlenecks involving many laborers for one project and dispersion of construction spots. For these reasons, the need for e-project management through the Internet is high, and the firms' efficiency and ability in grasping the construction situation every minute and good decision-making abilities are important.

Third, we can expect that this business-to-business e-commerce will provide good opportunities to supplement any inherent weaknesses.

Lastly, the industry saves on transaction, confirmation and approval time, and is able to establish the exchange data system (EDS) that does not need paper.

## **3.6 Conclusion**

### **3.6.1 Change the Relationship between Suppliers and Demanders (Customers)**

According to Malone et al., the introduction of Information Technology (IT) in a business-to-business e-commerce reduces coordination costs of communication and transaction among firms, resulting in a revolutionary change from the single-supplier arrangement to multi-supplier arrangement. From this point, our domestic construction industry is expected to secure multi-supplier arrangement by the introduction of e-commerce, thereby change the relationship between suppliers and demanders. It means that this relationship is moving toward a mid-term stage between hierarchy structure stage and market stage. And another benefit from the introduction of business-to-business e-commerce is a stability of supply because normal construction firms conform to fair purchasing processes that come from multi-supplier arrangements.

### **3.6.2 Change in the Transaction Structure**

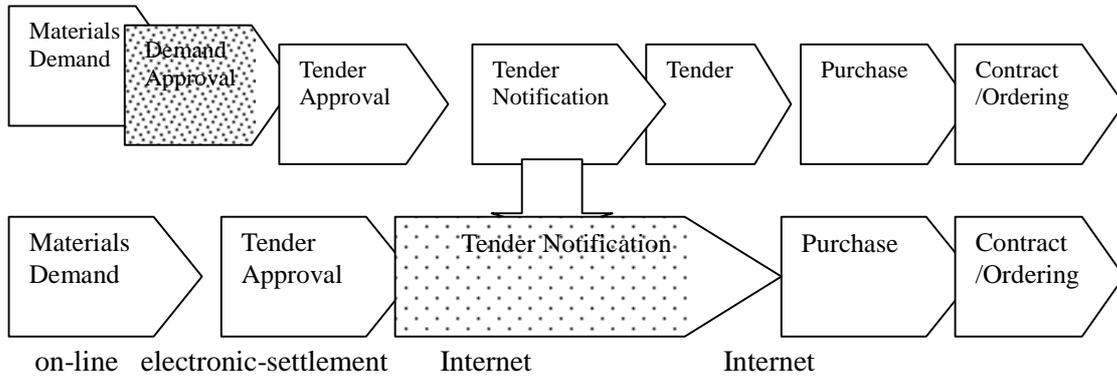
Information Technology (IT) makes it available a more efficient transaction method and a more convenient access to the market information. It also reduces operation costs and contract costs by the sharing of information and by allowing firms to observe one another. Indeed, the influence of business-to-business e-commerce on external adjustment cost and transaction structure can be enormous. This business- to- business e-commerce also provides a vast range of opportunities to suppliers and demanders, and supports different relationship between suppliers and demanders.

### **3.6.3 Mapping Changes in the Construction Industry Value Chain.**

#### **1) Change of the Purchase Process**

As Figure 3-27 shows, the stage of billing admission process is omitted in the purchase flow process and this business-to-business e-commerce contributes to the operating effectiveness, because it makes it possible to deal with several processes that range from the tender notice to the contract/ordering process.

On-line    on-line                    cable/fax    visiting                    visiting

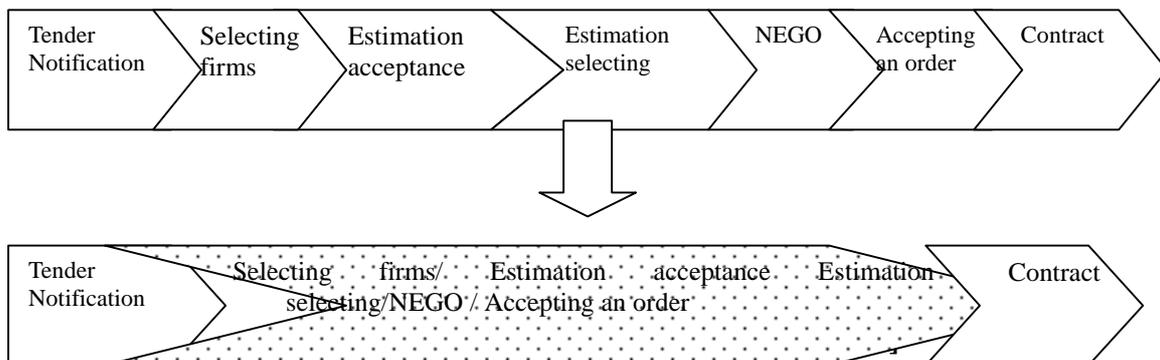


**[Figure 3-27] The Change of Purchase Flow in Electronic Commerce**

Before initiating business to business e-commerce, material-supply circulation was a core factor that raised the original price, because this circulation involves complicated steps, involving transactions from material warehouses to agencies and then workshop spots. However, through business to business e-commerce, firms can take a direct supply and demand course, from the material warehouse to the workshop area.

**2) Change of the Subcontract Plant Selecting Process**

In general, selecting the subcontract firms will be processed as follows: After a normal construction firm orders and expresses desired prices, specialized construction firms get into the process of tendering. But in the selection process of subcontract firms in business-to-business e-commerce, all kinds of factors are integrated into one process system and are changed as the following figure shows.



This table shows the conventional process of selecting subcontractors and the change. In general, conventional process is as follows: Tender notification, selection of firms, estimation acceptance, estimation selection, negotiation, acceptance of orders, and contract. However, the introduction of electronic commerce makes it possible for firms to achieve efficiency. Such a change in the subcontract process implies that firms that are engaging in business-to-business e-commerce are able to make transactions more efficiently and easily. In other words, before the introduction of electronic commerce, the process of selecting subcontractors required very complicated procedures, but in the electronic commerce environment, construction companies are enabled to collaborate more easily with production tiers.

## Chapter 4. The Conclusion

The impacts of business-to-business electronic commerce on the industrial structures of automobile, electronics, and construction are as follows.

Practical impacts of business-to-business electronic commerce

### **The Automobile Industry**

The core group of the Korean automobile industry has innovations in all business factors--the process, product and relation of a firm. The use of e-mail and WWW causes relational innovations such as local expansion of business areas, and trust and royalty of customers. The ICT applications used for information services such as EDI, Internet EDI, e-mail, WWW, and Extranet led to diversifications of products and deduction of both distribution and stock expenses, as firms are able to manage the process information related to stock and distribution. Also, the exchange of electronic blue prints through either EDI or the Internet has an impact on the developing period of a new car. The period is cut from 24 months to 12 months in the case of Hyundai-Kia Motor Company. E-catalogue helps the companies to order product materials more conveniently through the web, and provides them with diverse choices to select other suppliers' products. It is thus process innovations brought on by using e-catalogues. Digitalization of payment and billing systems also increases efficiency.

The secondary group of the Korean automobile industry is in a bad situation as far as electronic commerce is concerned, being unable to engage in e-commerce independently because most of the firms in the secondary group are small and subordinated to the large, final manufacturing car companies, e.g., Hyundai-Kia Motor Company and Daewoo Motor Company. Only a small number of component suppliers use EDI systems for order and payment. They do not use more advanced applications such as Internet EDI, WWW, Extranet, etc. Even though electronic commerce of the secondary group has been insignificant thus far, its impact on the industrial structure is expected to be significant as the companies are trying to invest in the implementation of electronic commerce.

The business between the core group and the secondary group of the Korean automobile industry happens mainly off-line. Therefore, the impact of electronic commerce is minor now. But an expansion of electronic commerce in the business-to-business functions like production support, transaction preparation, and transaction completion and innovation is expected.

### **The Electronics Industry**

There are several differences between the core group and the secondary group. Innovations within the core group transpired mainly in transaction preparation and transaction completion. On the other hand, innovations of the secondary group involved transaction preparation and product support phases. The core group gained innovations through the use e-catalogues in transaction preparation. The secondary group put its efforts to grasp the information of the core group, i.e., on which standard the core groups will make and which network the core group will form. And the core group is very independent, unlike the secondary group which is closely linked with the core groups in the Korean electronics industry. Moreover, the secondary group is extensively using electronic commerce to gain information and analyze the market management. It can be said that each company wants to acquire first-mover advantages in the electronic commerce market by initiating a new marketplace. Marketplaces can provide various opportunities to small and medium size enterprises. Interoperability in business is made

possible through electronic commerce and that would minimize the closed transaction practices and form more transparent business environment.

### **The Construction Industry**

The Korean construction companies are very assertive in engaging in electronic commerce, though they are troubled by the current slump in the construction industry. The core group has innovations in the transaction preparation phase, such as advertisement, negotiation, information service and design etc. Other innovations are apparent in the transaction completion phase, whereby electronic payment and billing system improves the transparency of transaction process and maximizes efficiency due to prompt business management. Sharing market information reinforces the relations among participants so deeply that innovations in market analysis, information capture and management increase. The result implies that electronic commerce in the Korean construction industry brings about cooperation among companies to the point that they need process collaborations between suppliers and buyers. On the other hand, the secondary group of the Korean construction industry comprises companies passive about engaging in electronic commerce. In the case of the secondary group, the interview result is very different from the core group's. And the deviation of the interview is large among the companies of the secondary group. They expect that the market share of the companies will be increased and that profits will grow larger as they engage in electronic commerce. The secondary group has used on-line application in parallel with off-line means until now. In the case of technical construction companies, the office automation is lags behind other kinds of construction companies and they just use the Internet access as a means of electronic commerce to participate in a bid program of large enterprises. They engage in electronic commerce passively due to the requirement of large enterprises.

So far we looked at the practical impact of electronic commerce on three industries of Korea, namely the automobile, electronics and construction. From the results, the Korean electronic commerce in business-to-business section seems to manifest a vertical portal of each industry. It means that they focus on business management innovations and cost reduction through information and service sharing rather than active turnover for maximization of their profit. Although they have some financial troubles nowadays, the formation of vertical e-marketplaces in each industry is processed very actively. Companies that were vertically related will trade components and product materials horizontally, and works necessary export or import will be done on-line. The more companies join in e-marketplace and share varied information, the more efficiency the participants will gain in buying and selling, logistics and stock controlling. Large enterprises, on the other hand, do not want to provide their business information publicly. This is the biggest obstacle in doing business-to-business e-commerce. A successful marketplace requires participants to not only open all kinds of relevant information but also construct qualified contents that can be utilized by buyers and sellers. However, the standardization of databases and factors of materials such as size, volume, and terminology must be finished in advance in the formation phase of e-marketplaces.

Considerations in doing business-to-business electronic commerce

#### ***Grasping the Characteristics of each Industry***

As business-to-business e-commerce grows, e-marketplaces will be expanded as well. But nobody thinks that it can come that easily. The first consideration in forming an e-marketplace in one industry is to know how the marketplace is organized and what the characteristics of the marketplace are. Characteristics of each industry may function as advantages or disadvantages. Generally, the electronics industry, the chemical industry, and public sectors desire to form e-

marketplaces. Products of these industries are easy to standardize compared to those of other industries, and they have high elasticity of product prices due to the homogenous quality of products. And so on-line deals rather than off-line yields much more profits. This leads them to do electronic commerce actively. However, not all industries are suitable for e-marketplaces and electronic commerce because the traditional characters of a given industry cannot be ignored. For instance, in the case of either the Korean automobile industry or the Korean construction industry, each marketplace is not sufficiently large like America's and consequently shows oligopoly market structure in which the activation of e-marketplaces needs time and participants' efforts. In addition, vertical interrelations in these industries act as an obstacle. Consequently the implementation of e-marketplaces in Korea is so different from either American or European e-marketplaces, they must improve toward a form appropriate to each industry's market structure in Korea. We have to keep in mind that there is no successful business without exhaustive analysis about a targeted industry.

### ***Building a Profitable Business Model***

It is very difficult to invent a profitable business model in e-commerce directly concerned with management of e-marketplaces. And it is the biggest pending problem to solve for Korean market makers. The existing e-business model has earned some profits through transaction fees, advertising, membership fees, listing fees, etc. This kind of business model has a problem of not producing maximum profits. And the most important matter in a business model is charging appropriate transaction fees. The main point of the discussion about a successful business model is not that an e-business model is operated by returns such as membership fee and advertisement fee, but that firms operating a e-business model (e-marketplace) provide with systems and services to induce buyers and sellers to deal with goods

### ***Raise the Capability to Lead the Market***

Lately American research institutions predict that tens of thousands e-marketplaces will shrink to hundreds in two to three years. No matter how precise this prediction is, that is not totally non-sense when we see the current circumstances surrounding e-marketplaces. Some market makers have neither specialty on the marketplace nor capability of leading the market. In the future a lot of e-marketplaces will be launched in Korea. But companies which do not have core competences may be weeded out from the market.

If large companies leap into e-marketplace markets, SMEs' marketplaces may either go bankrupt or be merged into large companies. If the goods dealt in the marketplace are heterogeneous, a niche market for small and medium size companies always exists. Accordingly, the characteristics of a market hold the key to the solution of the problem regardless of the scale of e-marketplaces. And a capability leading the market is directly related to a profitable business model. Raising the capability to lead the market is the first homework satisfied in management of e-marketplaces if analyzing the characteristics of an industry is the first duty in building a business model. In order to raise it, a market maker must know which services are prepared and how to apply on-line applications. Just understanding traditional business methods cannot lead to a successful online business. The successful management of e-marketplaces depends on the know-how of on-line and off-line characters.

### ***Establishing Credible Communication***

Compared to traditional commerce, the most difficult barrier to leap into an electronic commerce is a secure and authenticated communication among sellers and buyers. Business without face-to-face contacts can bring about legal disputes because of transaction repudiation, disclosure of secret business information, and fraud. The best merit of e-marketplaces is understood to be that it leads to efficient business activity. But for a credible communication

system, even the foundation of e-marketplaces can be threatened. Therefore, it is absolutely necessary to establish qualified communications so as to ensure sellers and buyers, and to have buoyant business relations with each other. The management of e-marketplaces in regard to gathering member companies is bound to fall on hard times. Advanced e-marketplace managers are trying to promote their e-marketplaces to become a space of both doing business transactions and communicating with their customers. E-marketplaces have to provide fast and safe communication and entice consumers into e-marketplaces where they can do continuous businesses. Companies that participate in e-marketplaces may realize mutual win-win strategies through such communication.

### ***The Practical Application Scheme***

This report will help not only research centers and university research institutions doing research on electronic commerce but also government agencies framing electronic commerce policies as well as companies that are starting or engaged in business-to-business e-commerce.

Research institutions will make use of this report as reference materials of their following e-commerce research, and then they can produce more useful data and materials for future research

Government agencies can reflect on this report's analyses on the shaping and application of EC policy. This research report presents measurements, and the agencies can take use them to improve electronic commerce. Most governments are doing their best to strengthening international competitiveness by means of active engagement in electronic commerce. To achieve this goal and to apply and formulate rational and efficient policies, they need a lot of qualified data and analyses about the present market condition and about both disadvantages and advantages of e-commerce in each industry. This report, therefore, will serve as a good reference material for the government to frame and implement its policies.

Business-to-business electronic commerce is believed to provide a lot of opportunities for many companies. So many companies, regardless of size, rush to business-to-business e-commerce. This report, it is hoped, will serve as a good guide for companies in making sound business plans and strategies.

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