

# Information Technology and Changes in Firm Activities : A Case of the Service Industry in the United States\*

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Telecommunication and information technology have been conceived as crucial as well as revolutionary elements for recent and future social and economic development, and their development have led to a spatial reorganization and locational change of economic activities. Information technology has resulted in important changes in the organization structure and location of firm. This study draws attention to the understanding of the relationship between the diffusion of information technology and changes in firm activities with the special reference to the service industry of the United States. Information technology has had a significant impact on the growth and changes of the service industry of the United States through changes in the organizational and employment structure, market structure, and locational changes. The impact of information technology on location changes of the service industry shows two opposite patterns, concentration and decentralization. Among these patterns, the location change in the service industry of the United States reveals predominantly the decentralization tendency such as suburbanization and transfer to lower ranking cities rather than concentration. In case of Korea, however, it is anticipated that the rapid development of information technology may lead to the concentration of the service industry in Seoul and Capital region.

**Key Words:** information technology, computer networks, locational change, concentration, decentralization, service industry.

## 1. Introduction

The rapid development of telecommunication and computer technologies has led to the common use of such terms as Information Society, Postindustrial Society, Third

Wave, and Information Technology. Among these, the term most widely used is information technology, and refers to the integration of computers and telecommunications. The introduction of "information technology" (IT) to process and transport data and information has proceeded at exceptional rates for more than three decades (Kellerman, 1993, p. 4).

The introduction and diffusion of IT is

\* This paper was supported by the overseas research program (1993) of the Yonam Foundation.

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widely regarded as the key to bringing about major changes in social and economic growth and development (Castells, 1985; Giaoutzi and Nijkamp, 1988; Goddard and Gillespie, 1986; Hepworth and Ducatel, 1992; Hill, 1984). In particular, the development of telecommunications and IT have been conceived of as crucial, and revolutionary elements for current and future social and economic development. The impact of telecommunications and IT on social and economic sectors has, therefore, attracted much attention in several academic disciplines, including economics, sociology, geography, and communication, and has recently become a major topic in both scholarly and popular literature (Jowett and Rothwell, 1986; Gibson and Jackson, 1987; Comaine, 1988; Salvaggio, 1989; Brotchie *et al.*, 1991; Clarke and Cameron, 1991). IT, a term generally used to jointly describe telecommunication and computers, is defined as a group of technical and organizational innovations characterized by production techniques and organizational procedures which exploit modern communication systems to co-ordinate all of a firm's activities (Antonelli, 1990, p. 32).

The impact of IT on social and economic development and change is wide, influencing a very broad spectrum of economic activities directly and indirectly: private enterprises and public administration, industry and service, hardware and software, and production and consumption. Diffusion of IT has also had significant and given positive effects on total factor productivity, leading to the changes in firms' organization and location as well.

While IT has affected social and economic changes and development in general, it has also been an impact influence on firms' activities through cost reductions in product, administration, communication, and transportation in particular. Thus IT can be defined as a set of latent technical and organizational innovation characterized by

more communication-intensive techniques of production and governance of transactions (Antonelli, 1988, pp. 1-2). Recently, much attention has been focused on business or producer services as being both the sector most affected by IT, as well as the sector with the greatest influence on its system.

The diffusion of IT has led to the generation of enormous growth and change especially in the service industry among economic sectors, since computer network applications such as teleworking, telebanking, and teleshopping have become capable of transmitting large volume of information over great distances (Healey and Ilbery, 1990, p. 117). Furthermore, it has had an important influence on the organizational structure and locational pattern of service activities.

In these contexts, this research focuses on the understanding of the relationship between the diffusion of IT and changes in firm activities, in particular, in the service industry in the United States. This paper consists of three sections: (a) a review of the theoretical background on the relationship between the development of IT and changes in firm activities; (b) an examination of the impact of IT on the service industry, and the retail and wholesale sectors in the United States in particular; (c) a discussion of the locational trends appearing in Korea reflecting the experience of the United States.

## 2. Information Technology and Changes in Firm Activities

The improvement of telecommunication and IT has produced various social and economic changes, including the increase of economic productivity and growth, and has generated new sectors of economic activity, revolutionizing the structure of management and organization and the nature of competition in a variety of industries.

In particular, the introduction of IT allows the transformation of locational behavior and organizational structure, overcoming the need for spatial contiguity in all economic activities. Many scholars have become concerned with the impact of IT on the spatial distribution and locational change of economic activities (Burn and Leinbach, 1991; Ernste and Jaegar, 1989; Hepworth, 1989; Hepworth and Ducatel, 1992; Kellerman, 1984, 1993). To provide a comprehensive understanding of the relationship between information technology and changes in firm activities, this section reviews the impact of IT on locational changes and firm computer networks.

### 1) Locational Change of Firm Activities

The diffusion and adoption of IT have resulted in a location change for many economic activities in the business and service sectors. Many scholars interested in industrial location have argued that the development of telecommunication and the adoption of IT increase locational footlooseness for firms, thus making it more likely that they will change their locations. The central question is whether IT reinforces the spatial concentration or decentralization of economic activities in urban and regional contexts (Goddard *et al.*, 1985; Kellerman, 1993; Miles, 1991).

The impact of IT on new spatial location patterns of industries is two-fold. On one hand, it increases the spatial mobility of the industry and lowers the cost of transmission between firm units. On the other hand, large-scale office automation, particularly in data entry and back office operations, restructures the occupational profile, increasing the need for skilled clerical labor (Castells, 1989, p. 160). These impacts appear to be the major factors in firms' locational changes in both the production and business sectors.

In location theory, transport cost is one of the critical factors in the industrial loca-

tion decision. The development of telecommunication and IT tends to decrease transport cost by reducing the friction of distance. Following this, the industrial activities would increase the spatial extent of production activities, and possibly decentralize at the regional scale. Accordingly, a group of economic geographers suggest that the application of IT in firms would reduce the importance of agglomeration economies, which was in part caused by distance barriers.

Niles, Carlson, Gray and Hanneman (1976) summarized the evolutionary process of firm organization along with locational change with respect to the impact of IT both in concentration, the current stage of most information using industries, and in decentralization, the relocation of units such as production and marketing. Their study highlights the impacts of IT on the spatial changes resulting from changing firm location, but the impact of IT on the locational change of production activities has two opposite patterns: it facilitates the dispersion of location, on one hand, and it integrates the activities of the production process, on the other hand.

The decentralization thesis has been supported by several studies done in different national and regional contexts. In case of Italy, Antonelli (1979; 1988; 1990) argued that the diffusion of IT causes a differentiation and specialization of the production system within a firm. The division of production activities in a firm also tends to increase locational decentralization. Fothergill and Gudgin's study (1979; 1983) in Britain suggests that industrial dispersion to rural areas is a reflection of IT adoption in firms. Goddard and Gillespie (1986) and Hepworth (1989) argued that new independent firms in the UK have a tendency to relocate from the existing industrial regions to peripheral regions with the aid of IT. On a somewhat different scale, Castells (1985; 1989) suggested that the

development of IT has led to the recent emergence of a new space of production and new high-tech centers in southern regions of the United States. Hall (1988) explained that decreasing job opportunities in metropolitan areas of the United States are a result of relocation of manufacturing and service industry to peripheral regions with the development of IT. Particularly, he concludes that the information-processing industries have decentralized from the old manufacturing belt to the rural middle and the sunbelt areas, at least in the United States.

As opposed to production activities, locational changes in office work and business activities reveals distinctive locational characteristics. The major impacts of IT on the business and office activities are first concentrated on office automation, strong linkage between headquarters and branches, and the decrease of labor demands and costs. Following these changes, the most important impact of IT is the locational change, in particular the decentralization of the office, within metropolitan areas and in the urban system at large. There are several factors related to locational change of business and office activities. Telecommunications and IT are not a direct cause, but provide a critical opportunity to change their location.

Along with the possible effect of telecommunication and IT in office location change, Goddard and Pye (1977), Goddard and Morris (1979), and Daniels (1984; 1985) provided empirical examinations of office location change with the development of telecommunications and IT in case studies. Brooker-Gross (1980) and Kellerman (1984) examined the decentralization of office location from CBD in the metropolitan areas of the United States. Dowall and Salkin (1986) pointed out the decentralized location or relocation of office activities with the increase of internal linkage between multilocal corporate

activities. Noyelle and Stanback (1984) showed the regional decentralization of service and information activities.

In particular, Kutay (1986) suggested a six-stage process of office decentralization in a case study of Pittsburgh, and explained that the development of IT accelerates the decentralization of office activities from downtown to the suburbs. This is especially true for firms that use more sophisticated telecommunications and IT (Kutay, 1986, p. 247). Opposed to these trends are some firms which emphasize the need for spatial linkages and face to face contacts, and which show a tendency to cluster in concentrated areas.

Hepworth (1987) and Marshall (1984) also pointed out that IT leads to both centralized and decentralized patterns of economic activities. While there is considerable debate about the influence of IT on the spatial movement of economic activities, leading either to centralization or decentralization, it is obvious that the diffusion of IT has an important influence on the locational change of production and business activities beyond the question on centralization or decentralization. In sum, the diffusion of IT and the development of telecommunication are closely related to locational changes of firms' activities.

## 2) Organizational Change and the Adoption of Computer Networks

Another typical impact of IT on firm activities is the adoption of computer networks, and the associated changes in organization structure that result from this networks. Productivity gains generated by innovations in IT are known to arise from the synergistic effects of combining and using computer and telecommunications resources in the form of computer networks. For example, teleconferencing, electronic mail, and distributional processing are all practical applications of computer networks (Hepworth, 1986a, pp. 213-214).

Computer networks which increase the linkage between several sites and accessibility of stored information, can be viewed as a major firm innovation related to production, distribution, and management activities (Hepworth, 1987, p. 157). Networks change the economies of multilocal firms by lowering the costs of producing and distributing information services. The typical example of computer networks are wide area networks (WANs) used by large and multilocal firms and local area networks (LANs) used within an office building, or an industrial district.

Hepworth (1986b; 1987) examined the use of computer networks leading to spatial reorganization of both manufacturing production and office activities in the case of Canadian firms. Computer networks enhance head office control over dispersed operations, and distributed processing technology induces firms to decentralize management decision-making. Williams and Taylor (1991) found that the expansion of networks between firms leads to increases in information flow, and changes the structure of production, organization, business, and market territory. Antonelli (1988) suggests the important impact of computer networks on changes in firm activities through the several case studies in Italy. Fornengo (1988), and Rullani and Zanfei (1988) also examined the relationship between computer networks and changes in firm activities in case studies of the textile and clothing, and automotive industries in Italy. Brenal, Stuller and Sung (1991) suggested that information networks in manufacturing and retailing lead to changes in location and organizational structure, in a case study in rural areas of the United States.

In sum, computer networks have become a basic component of the technological and organizational infrastructure of firms. Particularly, Antonelli (1988) called this computer network system in a firm as a "net-

work firm". As an organizational innovation in a firm, the networks encourage changes in firm organization, in particular, in production and governance functions. Computer networks affect firm activities such as procurement, manufacturing management, marketing, monitoring, management of electronic quasiintegration relations, and the organizational structure of firms (Antonelli, 1988, pp. 13-22).

As regards the organizational structure of firms, networks of firm leads to an increase in the degree of centralization in a firm. However, while the headquarter function is increased, the individual sectoral activities such as trading, financing, advertising, marketing, and R & D are more specialized in the computer networks. Therefore, it enables organizational innovation for achieving economies of scale and increasing locational flexibility in firm activities (Hepworth, 1989, pp. 93-123).

In light of these characteristics, the adoption of computer networks in firms seems to become a major source of competitive advantage. The networks within either large scale companies or small and medium scale companies, has considerable influence on the change of firm activities, along with the increase of locational flexibility and integration between firm organizations.

### **3. Information technology and the Service Industry in the United States : An Illustration**

During the last few decades, the service industry has developed more rapidly than any other area of economic activity in the United States. As the most rapidly growing sector in terms of employment, the service industry makes a major contribution to the specialization and differentiation of the economic landscape. One of the factors related to these changes is the development and application of IT, prompting service sector restructuring. IT has had a significant

impact on the growth and change of the service industry through changes in the organizational and employment structure, market structure, and locational changes (Daniels, 1991a; 1991b).

Particularly among the industrial sectors in the United States, the service industry has been the first to adopt IT and the first to experience the impact of IT. Today, the service industry in the United States is rapidly undergoing restructuring with the impact of IT (Beyers, 1991; Duchin, 1988; Dunning, 1989; Kutscher, 1988; Kirn, 1987). To understand a comprehensive picture of the impact of IT on the service industry, this section examines the overall characteristics of application and impact of IT, illustrating the case of the service industry in the United States.

#### 1) Growth and Change of the Service Industry : Overview

The American economy has added 20 million jobs over the past decade, and the expansion has been almost 25 percent. Most of this employment growth has come from the service industry. In the United States, the service industry now accounts for about 74 percent of the value added in gross domestic product (GDP) and about 76 percent of total employment (National Research Council, 1994, p. 1). The service industry has emerged as the most important sector among all economic activities.

The Use and adoption of IT has had a significant impact on management structure and productivity of service industries, and has lead to productivity growth and the transformation of business activities (Roach, 1988; Frenzel, 1992). To understand the impact of IT on productivity growth in the service industry, we first examine the characteristics of growth between economic sectors using the data from the Bureau of Labor Statistics (BLS).

Table 1 shows the results. The business sector is divided into goods producing

activities and service producing activities. While both sectors show steady growth over the period from 1973 to 1989, major growth sectors are nonelectrical machinery, communication, manufacturing, utilities, non-durable goods, farming, and retail and wholesale. In particular, the largest productivity growth over this period has occurred in both nonelectrical machinery and in communication related to information technology such as the computer industry, the information technology based industry, and telecommunication services.

Two distinctive characteristics can be gleaned from Table 1. First, the overall growth of productivity in the business sector has been led by the service industry. Second, service sectors related to IT and telecommunication have influenced greatly the growth of the service industry. That is, IT and telecommunication contribute to the productivity growth of the service industry. However it is difficult to estimate the precise impact of IT on the changes in the service industries. To explore the impact of IT explicitly on the growth and change of service industries, the impact of IT on an individual service industry is examined in the next section.

The service industry occupies the highest proportion in the amount of the gross product originating in the United States economy (GPO), both in terms of investment in IT, and the value of IT capital stock in comparison with other industries. The use and investment of IT are present mainly within the service industry, and nearly all service industries make substantial use of IT. Particularly, while the amount of GPO is higher in financial, insurance, real estate, business, personal, professional services, and retail, the amount of investment in IT and the value of IT capital stock show relatively high rates in communication and financial, insurance, and real estate (FIRE) areas. Thus, there is a difference in the use of IT between individual sectors

**Table 1.** Growth Trend of Gross Domestic Product in Major Economic Sectors of the United States, 1973 to 1989

Sector	Average Annual Rates of Growth(% per year)		
	1973-79	1979-89	1973-89
Business	0.63	1.35	1.08
Goods producing	0.71	2.31	1.71
Farming	0.11	3.22	2.04
Mining	-5.56	2.13	-0.82
Construction	-2.02	-0.71	-1.20
Manufacturing	1.80	3.33	2.75
Durable goods <sup>1</sup>	1.55	2.35	2.05
Nonelectrical machinery <sup>2</sup>	1.06	9.10	6.01
Nondurable goods	2.37	2.37	2.37
Service producing	0.58	0.84	0.74
Transportation	0.15	0.95	0.65
Communication <sup>3</sup>	4.27	4.84	4.63
Utilities <sup>4</sup>	2.66	2.35	2.46
Wholesale	-1.21	2.65	1.18
Retail	0.14	1.72	1.13
FIRE <sup>5</sup>	0.36	0.05	0.17
Services <sup>6</sup>	0.84	0.01	0.32

<sup>1</sup> excludes nonelectrical machinery.

<sup>2</sup> nonelectrical machinery hours from Bureau of Labor Statistics.

<sup>3</sup> includes telephone, telegraph, and broadcasting.

<sup>4</sup> includes electric, gas, and sanitary services.

<sup>5</sup> finance, insurance, and real estate.

<sup>6</sup> includes health care and delivery, business services, legal services, hotels, and recreations.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1991, *Survey of Current Business*.

**Table 2.** Six Selected Service Industries Compared to All U.S. Industry and All United States Service Industries, 1989 (billions of 1982 dollars)

	GPO <sup>1</sup> (A)	Investment in IT (B)	B/A (%)	Value of IT Capital Stock
Mining	127.2	1.2	0.9	8.8
Construction	179.0	0.7	0.3	3.2
Manufacturing	929.0	24.3	2.6	78.0
All services <sup>2</sup>	2375.3	102.3	4.3	456.1
Transportation	156.3	5.5	3.5	20.6
Communications	109.4	17.6	16.1	124.7
Utilities	136.6	6.3	4.6	26.0
Wholesale	304.7	11.6	3.8	54.0
Retail	412.0	10.6	2.6	44.8
FIRE <sup>3</sup>	604.0	33.7	5.6	123.2
BPPS <sup>4</sup>	652.3	16.9	2.6	62.8
All industry	3610.5	128.4	3.6	513.3

<sup>1</sup> GPO means the gross product originating in the U.S. economy, and GPO of an industry is a value-added measure of that industry's contribution to the gross domestic product.

<sup>2</sup> non-goods producing industries.

<sup>3</sup> financial, insurance, real estate.

<sup>4</sup> business, personal, professional services.

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis, 1991, *Survey of Current Business*.

within the service industry (see Table 2).

In order to examine the relationship between the change of firm activities and the use of IT in individual service industries, the retail and wholesale sectors are selected from among the five service sectors (i.e., telecommunication, retail trade, wholesale trade, banking and insurance) because they show higher amount of GPO than the rest.

## 2) Information Technology and the Retail and Wholesale Sectors

While the development of IT has affected the growth and change of service industries, the retail and wholesale sectors have received the greatest impact of IT among several service industries. Since 1980, the retail and wholesale sectors have grown rapidly; GPO has been increased to \$412 billion and \$304.7 billion in 1989 respectively; revenues have increased to \$628.3 billion and \$400.8 billion. In particular, the annual investment on IT in 1989 has been increased about 2.6 times the amount invested in 1980, and ITCS was about 2.5 times to the amount in 1980 (see Table 3).

As shown in Table 3, retail and wholesale

sectors have large capital investment for the adoption of IT. These investments were made mainly by large firms, which now depend on IT for planning and control of inventories, merchandising, and management. Consequently, IT provided important contributions to the growth of these industries, and brought strong competitive force for firms.

The use of IT affects the activities of the retail and wholesale sectors in several aspects. Firstly, IT helps manage information which then can be coupled with strategic planning to optimize the efficiency of a business. Many retailers thus can have better information about their sales and inventories than before the adoption of IT. By enabling better and faster matching of inventories and consumer needs, IT can reduce the need for retail markdown, a major cost in retailing (National Research Council, 1994, p. 72).

Secondly, IT increases the connection between retailers and manufacturers, suppliers, and wholesalers through electronic data interchange and support systems. The typical example of this system is "electronic

**Table 3.** Growth and Change of Use of IT in five Service Industries, 1980-1989  
(billions of 1982 dollars)

Division	Year	GPO <sup>1)</sup>	Revenue	AIIT <sup>2)</sup>	ITCS <sup>3)</sup>
Telecommunications	1980	71.4	87.7	22.7	115.8
	1989	98.8	100.6	13.8	113.7
Retail trade	1980	281.7	446.5	4.6	10.0
	1989	412.0	628.3	10.6	44.8
Wholesale trade	1980	200.1	310.3	4.0	10.4
	1989	304.7	400.8	11.6	54.0
Banking	1980	61.9	90.5	1.6	4.4
	1989	71.4	99.8	13.8	35.1
Insurance	1980	38.7	67.8	0.6	1.3
	1989	36.7	77.5	6.2	17.9

<sup>1)</sup> see Table 2.

<sup>2)</sup> annual investment in Information Technology.

<sup>3)</sup> information technology capital stock.

Sources: U.S. Dept. of Commerce, Bureau of Economic Analysis, 1980, 1981, *Survey of Current Business*.

point-of-sale system" (EPOS), often used to link retail stores and wholesale vendors through an electronic data interchange system, allowing nearly paperless and highly automatic ordering. In some instances, this system allows orders to be shipped from wholesalers directly to retail stores, bypassing warehouses. For example, Kmart and Wal-Mart, the typical retail chain corporations in the United States, are using this system which links over 2,000 vendors directly (Brenal *et al.*, 1991, pp. 18-60).

In addition, the large-scale evolution of this system and its integration into centralized networks have become important elements in the emergence of the giants in retail industry. For example, by using standardized ordering practices and inventory control procedures, and drawing on the expertise of the entire corporation regarding sales and operations techniques, a new branch of a retailer like McDonalds can be opened more economically than a store of comparable size that lacks an existing support infrastructure. The result of this trend has been a division in the number of companies as a function of size (National Research Council, 1994, pp. 73-74).

Thirdly, IT has an influence on extending the activities of a business. A retail store may sell the consumer information captured in its marketing database to other organizations. One example is telemarketing which relied first on telephones. Combining telephones and computer system, it is now wholly depending on IT for collecting information about existing consumers and new prospects, for disseminating information through promotional efforts, and for conducting various other sales-related activities (Bencin and Donald, 1989; Heldman, 1993, 1994).

Consequently, with the increase of the information economy, retail and wholesale sectors are experiencing the reduction of transaction and coordination costs, changes in management and organizational struc-

ture, and the expansion of market territory and chain stores. Particularly, EPOS affects the physical distribution of retailers (Wrigley, 1988). The rapid diffusion of EPOS, including the demand and organizational changes, seems to facilitate the suburbanization of retail trade companies. Finally, the use of IT in retail and wholesale trade sectors has been an important influence upon its growth and restructuring.

### 3) Application and Effect of Information Technology in the Service Industry

IT in firms generally operates several functions, such as production development, manufacturing, distribution, sales, service, finance and accounting, and administration (Frenzel, 1992, p.7). The major reasons for using IT in the service industry are the following: expanding market share or avoiding catastrophic losses, creating greater flexibility and adaptability for future business environments, improving the quality and stability of internal environments, and improving the quality of products and firm interactions with customers (Guile and James, 1988; Quint *et al.*, 1987; Yoffie, 1994). Thus, most firms have adopted IT, and also are likely to adopt new IT. This section examines and reviews recent characteristics of IT application and its effect on the service industry in the United States.

The application of IT in firms facilitates changes of location and organizational structure. Advances in IT have ultimately affected the location patterns of producer services and retailing; producer services have recently been relocating to the South and West with the development of IT. At the intraurban scale, the location of the service industry is diffusing to the suburbs. Therefore, the location of service industries is affected by the application of IT (Noyelle and Stanback, 1984; Daniels, 1985).

The application of IT in the service industry has functions in the management in-

infrastructure related to communication and data handling. In an individual firm's management infrastructure, IT has certain functions such as information storage, retrieval, communication, processing, and distributing. This building of the infrastructure leads to the increasing linkage between departments within a firm, and increasing response to market changes through rapid information handling and communication processes. Consequently, firms experience the advantages of the economies of scale through the rationalization of management activities. The recent report of the National Research Council (1994) shows that 67 percent of companies interviewed use this infrastructure system.

The application of IT involves the expansion of network firm. The adoption of a computer network within or between firms and branches makes the flow of information related to firm activities more rapid. Most service firms desire to quickly obtain information on consumer behavior, the market situation, the production process, and activities of the related firms (Elbert, 1992; Landsbergen, 1992). To meet these increasing needs, firms rely on computer networks. Examples of a typical firm network used in service industries are electronic mail, LANs, WANs, integrated network service (INS), and mobile computer systems. In recent years, many firms have been using an electronic data interchange (EDI) system which connects companies to their suppliers, buyers, banks, and their branch or chain stores (Frenzel, 1992, pp. 176-178). Therefore, it is expected that the networks will continue to spread rapidly among firms.

The application of IT provides a cost reduction effect for firms. Within firms, IT such as telematics makes changes in markets and administrative organization or hierarchy. Firms then achieve substantial cost reduction in two dimensions: one is the reduction of business activity costs by saving and avoiding the costs arising from repetitive

transactions such as excessive capital float, paper processing, and check handling; another is the reduction of organization costs through restructuring inadequate organization and distribution systems. The typical examples are the Chase Manhattan Bank in New York, Wal-mart in northwest Arkansas, Electronic Marketing Resource Group (EMRG) in Kentucky and Nebraska, and Cabela in Nebraska, all of which experienced cost reduction effects with the adoption of IT (Brenal *et al.*, 1991).

The application of IT makes it possible to expand new products or opportunities in the service industry. IT as an organizational and technical innovation can enable the creation and delivery of new information based upon service products which are extensions of a company's basic repertoire. IT helps to produce new innovation, and these new products affect firm growth. The Friends and Family program of MCI telephone company is a typical example (National Research Council, 1994, p. 107).

The application of IT provides an improvement in service quality. With the increase of accessibility to buyers, the company can more easily measure the quality of their service, and provide higher quality to their consumers. These characteristics are typical of the application and effect of IT in the service industry of the United States. In conclusion, it is obvious that the development of telecommunication and IT has been an important influence upon the changes in firm activities in the service industry.

#### **4. Discussion : Locational Change of Firm Activities in the Service Industry**

The use of IT in the service industry has transformed the structure of firm organization, location, administration, business, and market strategies, as well as led to the restructuring of the service industry as a

whole. Most of the geographical research has been concerned with the impact of IT on spatial structure, particularly, the locational change of firm activities along with the development of IT (Daniels, 1985; 1991b; Martinelli, 1991; Price and Blair, 1989). Although the development of IT affects locational change of firms in both manufacturing and service industries, there is some debate about whether the impact of IT induces spatial centralization or decentralization of service activities in urban and regional scales.

Kellerman (1993) pointed out that development of IT may potentially involve one of the following three locational patterns in the service industry: a decentralization from major urban centers to peripheral regions; a concentration in major urban centers; or a status quo of no locational change. In the light of Kellerman's classification, this section discusses locational changes in the service industry that are expected to appear in Korea in the near future, and considers the United States as an example of locational change in the service industry.

On the intraurban scale, many studies on location of service industries, in particular, retail, wholesale, and producer services, explain suburbanization patterns with regard to IT. Wrigley (1988) found that the locational pattern of retail and wholesale services show decentralization from downtown to suburban areas with the expansion of firm networks such as EPOS and LANs. Moss and Donau (1986) pointed out that the introduction of IT and the higher rents in the CBD facilitate the decentralization of producer services located in the CBD. Dowell and Salkin (1986) argued that the suburbanization of producer services increases with the advance of functional linkage between several units in large, multifunctional, and multilocational corporations. The findings of suburbanization and decentralization of service activities are

supported by Noyelle and Stanback (1984), Kutay (1986), Edwin (1988), and Drennan (1989).

However, in world cities such as New York and Los Angeles, some services related to international trade such as banking, investment banking, and insurance tend to locate in CBD (Noyelle and Peace, 1991, p. 288). In general, recent case studies of the service industry in the United States emphasize the suburbanization pattern of service activities rather than centralization to CBD, with the exception of some few services.

In regional scale, most of the service industries in the United States have located within major metropolitan areas rather than rural areas. However, the development of IT makes it possible in principle to relocate operations, particularly back offices dealing with data entry and processing, in non-metropolitan or rural areas, and in lower urban hierarchy (Castells, 1989, p. 163). The typical examples of decentralization of back offices since the mid-1980s are producer services firms such as banks, insurance, and credit card companies.

Recently, American Express moved its back office to Salt Lake City, Fort Lauderdale and Phoenix; Citibank moved its Master card and Visa divisions to Tampa and Sioux Falls South Dakota; Hertz moved its data entry division to Oklahoma City, while Avis went to Tulsa; and Eastern Airlines shifted its back office to Miami and North Carolina (Warf, 1991, p. 259). Beyers (1989; 1991), Kirn, Conway and Beyers (1990), Warf (1991), and Howland (1991) also suggested examples of firms that relocated to lower urban hierarchy or rural areas. The major reasons for decentralization to peripheral regions are related to the development of firm computer networks. In contrast, some studies, such as Howland (1991), Kirn (1987), and Beyers (1989), showed that concentration in major metropolitan areas is more dominant than decentralization toward lower urban hierarchy or rural areas.

Considering the overall implications of locational change in the service industry in the United States, locational patterns show two opposite trends in urban and regional scales simultaneously: a decentralization to peripheral regions and suburbanization from downtown, and a concentration in major metropolitan areas. Among these trends, the decentralization tendency of service activities is related with the adoption and development of IT among firms, and may be facilitated through the development of IT. Kutay (1986) pointed out that telecommunication and IT do not directly cause decentralization, but they create the opportunity to make a decentralization decision. The major reasons related with decentralization tendency are introduction of information economy, diffusion of network firm, decentralization of decision-making structure within firm, diseconomies of agglomeration in downtown and major cities, and higher inner-city rents. Therefore, the various new telecommunication services have reduced the importance of agglomeration economies for service activities, and resulted in the suburbanization of agglomeration economies for service activities, and resulted in the suburbanization and relocation to lower ranking cities of business and office activities. However, some service activities such as telecommunication, computer companies and international banking financial services are companies that require core and prestigious locations, or companies whose specialty fits the changing urban economy, and tend toward concentration in CBD or major world cities (Kellerman, 1993, p. 113).

Many scholars, however, point out that decentralization seems to appear greater than concentration as a spatial effect of the development of telecommunication and IT. These results may provide important illustrations about locational change in the service industry that might be expected to take

place in Korea in the near future. Therefore, discussion here will focus upon forecasting patterns of locational change in the service industry in Korea with reference to the characteristics of the United States.

Recently, the Korean economy has been transforming from an industrial to an informational economy along with the development of telecommunications and IT. Many firms in the manufacturing and service industries have used several IT or IT services, mainly by adopting computer networks in major corporations. Thus the level of informatization by firms is now progressing and spreading steadily within or between firms. However, the level of informatization shows regional differences: the current level of basic telecommunication service and value-added telecommunication service present great regional differences between the Capital regions including Seoul and Kyonggi provinces and the rest of the regions. This regional difference has increased continuously since 1980.

Seoul, Incheon, and Kyonggi provinces show higher levels of informatization compared to the remaining provinces. This result suggests that these regions bring the growth of producer services related to production, storage, exchange, and distribution of information with the development of telecommunications and IT (Lee and Hwang, 1991; Lee, 1992). This trend doesn't seem to be reversed over time.

Most service industries, especially producer services, are located in Seoul, capital city of Korea, due to the agglomeration and urbanization economies as well as other comparative advantages. The service industry has a tendency to utilize and adopt IT earlier than other industries. Further, many firms related to information activities are concentrated mainly in the Capital region. The development of IT and increasing adoption of firm computer networks therefore, may reinforce the concentration of service industries in Seoul.

In Seoul, the location of service industries seems to decentralize from CBD to non-CBD locations or suburbs. There are various direct causes such as higher inner-city rents, the reduction of comparative advantage in CBD, and the expansion of information linkages for decentralization of location from CBD. Furthermore, the growth and expansion of large multilocal service firms through the opening of dispersed branches seem to contribute to a partial decentralization of location. In spite of this trend, however, some service sectors emphasizing the face-to-face contacts might tend to keep their location in CBD or the inner city.

Although service industries can be projected to relocate from downtown to the suburbs in Seoul, it is not likely that major service firms will disperse to rural or peripheral regions in Korea. As mentioned above, the fundamental reasons might be that Seoul shows a higher level of informational-utilization, and a concentration of infrastructure and facilities related to information usage, information networks, and demand. In the light of the current economic advantages, information activities are not likely to disperse soon to peripheral regions in Korea, despite the recent information revolution. Also, the absence of regional policy directed at enhancing the periphery concentration tendency would conform to reinforce the core region's dominance at the expense of peripheral regions (Lee, 1992, p. 259).

In contrast to the experiences of the United States, the development of IT in Korea might actually lead to a greater spatial concentration of service industries toward Seoul. Considering the research results of Hwang (1990), Lee and Hwang (1991), and Lee (1992), locational changes such as the relocation or transfer to other cities, lower in urban hierarchy, is not likely to appear in the service industry in Korea.

In conclusion, it is difficult to forecast

the spatial patterns of locational change likely to be appearing in the service industry of Korea in the near future. However, it is likely that the development of information technology will increase the locational advantages of Seoul, and reinforce the concentration of service activities in Seoul and the Capital region. Therefore, efficient regional informatization policies are required to facilitate the decentralization of service activities to peripheral regions.

## 5. Summary and Concluding Observations

Today, our society is rapidly changing from an industrial to an informational society along with the development of telecommunications and IT. Particularly, the introduction of IT and the information economy have led to the transformation and restructuring of economic activities in terms of locational change and organizational structure. Thus, geographers have become concerned with the role of telecommunications and IT in inducing changes of spatial structure in economic activities. This research focuses on understanding the impact of IT on the several changes that have been taken place in the service industry of the United States.

The development of telecommunications and the diffusion of IT affected locational changes of manufacturing, business, and service activities. In addition, the adoption of computer networks, functioning with the organizational innovation within a firm has an influence on the changes of organizational structure by means of an increase of locational flexibility. These changes appeared most evidently in service activities as opposed to other economic activities.

The service industry has developed most rapidly in the United States during the last few decades. The growth of the service industry is closely related to the adoption and application of IT. In the case of the retail

and wholesale sectors, in particular, the use of IT contributes to the growth of a firm by facilitating a reduction of transaction and coordination costs, changes in management and organization structure, and expansion of market territory and chain stores.

Development of IT also affects the locational changes in the service industry. The spatial implications of locational change show two opposite patterns, concentration and decentralization, on intraurban and regional scales. Although both concentration and decentralization of service activities appear at various geographical levels, the location trend of service industry in the United States predominantly shows the decentralization with the development of IT and the rapid adoption of computer networks.

As opposed to the experiences of the United States, however, the development of telecommunications and IT in Korea seems to increase the locational advantages of Seoul, and to reinforce the concentration of service activities in Seoul and the Capital region. Moreover, further development of IT is not likely to decentralize the location of the service industry to peripheral regions. In the light of this tendency, regional differences in the level of informatization may be intensified. This trend would deepen uneven development between the Capital region and the rest of the regions as a result. Consequently, an effective policy for regional informational-utilization needs to promote the growth of the peripheral regions.

Further studies on the geography of the information economy are necessary in order to understand the relationship between the locational change of economic activities, especially manufacturing and service industries, and the development of telecommunication and IT.

This paper was written while the author was a post-doctoral research fellow in the Depart-

ment of Geography at Ohio State University (from July 1993 to July 1994). The author thanks Professor L. A. Brown, S. C. Kwon, now Ph.d. candidate of Department of Geography, Professor D. Landsbergen in School of Public Policy and Management, and the CAST (The Center for Advanced Study in Telecommunications) of Ohio State University for their comments and contributions.

(Received June 24, 1994)

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## 정보기술과 기업활동의 변화 : 미국의 서비스산업을 사례로

이 정 록\*

최근 컴퓨터산업과 정보통신기술의 급속한 발달은 우리의 사회를 고도의 정보사회로 전환시키고 있다. 정보기술의 발달과 수용은 생산 및 경영방식, 소비 및 시장구조를 포함한 다양한 경제활동의 변화에 영향을 미치고 있으며, 특히 기업의 입지와 조직구조의 변화에 중요한 역할을 제공하는 기술 및 조직적 혁신으로 간주되고 있다. 본 연구는 미국의 서비스 산업을 사례로 정보기술의 발달 및 확산이 기업활동의 변화에 미친 영향을 고찰하였다.

미국의 서비스 산업은 지난 10년동안 가장 급속한 성장을 보여, 오늘날 미국경제에서 가장 중요한 역할을 차지하고 있다. 그리고 서비스 산업에 종사하고 있는 기업들은 다른 분야의 기업과는 달리 정보기술을 비교적 빨리 수용하여, 정보기술이 기업의 성장에 미친 긍정적인 과급효과를 경험하고 있다. 도소매업의 경우, 정보기술은 사무활동의 효율화, EPOS시스템을 통한 구매 및 유통방법의 혁신, 체인상점간 기업네트워크를 통한 경영활동의 극대화, 그리고 기업네트워크를 이용한 상점입지의 다변화 등 기업활동의 변화에 커다란 영향을 미쳤다. 전체적으로 볼 때, 미국의 서비스 산업에 대한 정보기술의 영향은 입지 및 조직구조의 변화, 경영 하부구조로서의 역할, 텔레마틱 같은 기업네트워크의 확대, 정보경제의 등장으로 비용의 절감효과, 새로운 상품개발 가능성의 제고, 서비스 질의 향상 등으로 요약된다.

정보기술이 서비스 산업에 미친 영향 중에서 중요한 공간적 특징은 기업활동의 입지변화를 들 수 있다. 정보기술의 발달은 기업입지를 포함한 경제활동의 입지를 분산시키는

나 아니면 오히려 특정지역(대도시)으로의 집중을 심화시키느냐 하는 문제에 대해서는 학자들 간에 논란이 계속되고 있고, 또한 정보기술이 가지고 있는 양면적인 특성으로 간주되고 있는 문제이다. 정보기술은 미국의 서비스 활동의 입지변화에 영향을 미쳤는데, 많은 학자들은 집중화와 분산화의 패턴이 동시에 나타나고 있다고 주장하고 있다. 도시내에서 서비스활동의 입지는 분산화 경향이 지배적으로 나타나고 있지만, 특정 분야는 CBD를 포함한 도시내부로 집중하는 경향도 나타났다. 그리고 국가적 수준에서는 대도시지역에 입지하려는 경향과 함께 중소도시 및 농촌지역으로의 분산화가 동시에 나타났다. 미국에서 서비스 활동의 입지변화에 대한 전체적인 특징은 기존의 입지에서 도시의 주변지역 또는 중소도시로 분산화하는 경향이 우세하게 나타나고 있고, 이러한 경향은 정보기술의 발달에 따라 더욱 확대될 것으로 예상된다.

미국의 서비스 활동의 입지변화를 고려하여 장차 우리나라에서 발생할 서비스 활동 등의 입지변화를 예측해 보면, 서비스의 입지는 서울을 비롯한 수도권으로의 집중이 심화되어, 공간적인 분산화는 거의 나타나지 않을 것으로 예상된다. 특히 수도권과 비수도권 간의 정보통신시설 및 이용, 정보하부구조의 차이는 서비스활동 입지의 공간적 집중을 초래하여 지역간 불균형 발전을 더욱 심화시킬 것으로 예상된다. 따라서 공간적 측면에서 균형적인 지역 정보화 전략의 수립을 위한 심층적인 연구가 요구된다.

**主要語** : 정보기술, 컴퓨터 네트워크, 입지변화, 집중, 분산화, 서비스산업

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