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Organisational Change, Learning and the Usage of Space: the Case of Samsung Electronics Company

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기업의 조직변화와 학습의 공간성: 삼성전자의 사례

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Abstract : This paper aims to explore organisational change and learning involving spatial processes and outcomes. In particular, it focuses on the context specific nature of corporate learning and organisational change that can be found in the case of a large Korean firm facing radical economic change. Drawing on the case study of a large Korean firm, the Samsung Electronics Company, three main claims can be followed. First, territorial sources of learning influence the way in which the firm makes use of space/place. Second, corporate learning practices, however, are not based merely on specific localised sources or geographical proximity but on bringing together the local and the global sources by harnessing the properties of relational proximities. It reveals that firms are concerned less on specialising specific local knowledge than promoting organisational knowledge and competences by integrating a variety of knowledge distributed in and out of the boundaries of the firm. Finally, to learn and innovate in a continual basis, firms would attempt to combine codified knowledge with tacit knowledge.
Key words : knowledge, learning, proximity, organisational change, Samsung Electronics Company

요약 : 본 논문은 경제 환경변화의 맥락에서 발생하는 조직 변화와 학습과정 및 이러한 조직적 프로세스에 내포된 공간성에 대한 고찰이다. 이러한 문제제기는 급격한 경제변화에 직면한 한국의 대기업 조직에서 나타나는 기업학습과 조직변화의 맥락적 특수성에 기초한 경험연구에 기초하여 논의한다. 삼성전자에 대한 사례연구를 통해, 본 논문에서는 다음의 세가지 이론적 논점을 밝힌다. 첫째, 학습의 지리적 원천들은 기업조직의 공간 활용에 영향을 미친다. 둘째, 그러나 기업 학습 관행들은 단순히 국지적 근원이나 지리적 근접성에만 기초하기 보다는 관계적 근접성을 토대로 제한된 장소의 범위를 초월하여 조직 내외에 존재하는 다양한 지리적 근원을 활용함으로써 조직의 지식과 역량을 강화시키는데 초점을 둔다. 마지막으로, 기업들은 암묵적 지식뿐만 아니라 명시적 지식을 통합함으로 학습과 혁신을 달성하고자 노력한다.
주요어 : 지식, 학습, 근접성, 조직변화, 삼성전자

1. Introduction

In the last decade, there has been considerable academic attention to the importance of learning and innovation in securing corporate and regional competitiveness and adaptability (Amin and Cohendet, 1999; Hodgson, 1999; Prahalad and Hamel, 1990). The emerging literature accentuates the capabilities of firms to harness the assets of knowledge embodied in and out of the boundary of organisation. This recognition leads to interests in the role of codified and tacit knowledge as the fundamental part of the processes of learning and innovation. It sees that while codified knowledge can be transferred easily with the help of the development of ICTs (Information and Communication Technologies), tacit knowledge nested in embodied skills, abilities and practices is context dependent, spatially sticky and socially accessible only through physical interaction (Morgan, 2001). This is to argue the way in which tacit knowledge is localised and can be accessed through geographical proximity.

In response to this line of argument, there are some questions to be raised: the way in which

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the firm uses space and place in order to learn and adapt; what kind of knowledge for what kind of learning?. These questions can be crucial to conceptualising the relationship between learning and geography, but remain underexplored. Reflecting these questions, this paper seeks to explore organisational change and learning, involving spatial processes and outcomes, in the face of radical economic change. In an empirical side, it places emphasis on the context specific nature of corporate learning and organisational change which can be found in the case of a large Korean firm facing radical economic change.

As empirical evidence to make clear the above argument, this paper draws on the case study of the Samsung Electronics Company (hereafter, SEC). The reason for selecting the company is that SEC, as one of the largest firms in Korea as well as a multi divisional and multi-locational firm across the country and the globe, is assumed to experience significant organisational and geographical changes since the economic crisis. In doing this, the empirical material is based on in depth, sometimes repetitive, interviews with managers of the management planning teams, the R&D teams and the production teams and secondary sources including corporate documents and a number of news articles.

This paper focuses on the domain of R&D, as this appears to reflect the dynamic process of organisational change and learning and significant implications for spatialities of learning. The following section deals with the dynamic change of domestic level R&D organisation in the face of the crisis and its implications for space and learning. In section 3, it examines the role of the purpose-specific organisational space designed to promote the efficiency and learning capability of the task force activities. Section 4 is concerned with the increasing globalisation of corporate R&D activities, representing efforts for SEC to learn external sources of technology and knowledge outside of the home base. In the last part of the main body, I explore the recent move of SEC to make connections with other companies in response to radical change, with the aim of technological learning and the expansion of market share.

2. Theoretical framework: knowledge, learning and space/place

In economic geography and economics, interest in the role of learning, knowledge and innovation as a pathway to both corporate and regional economic success has increased dramatically over the past several years. The key argument claimed between them is to see place and region as a key source of knowledge and learning that lead to corporate competitiveness and success. The triad concepts of knowledge, learning and innovation are closely associated with one another.

Knowledge is a fundamental part of conceptualising the process and mechanism of learning and innovation. While knowledge has always played an underlying role in driving capitalist economic development, the recognition of its role and importance appears to be growing (Hudson, 1999). As asserted by Foray and Lundvall (1996), we have entered a new historical era, called the knowledge based or learning economy, where the economy is more strongly and more directly rooted in the production, distribution and use of knowledge than ever before. Knowledge is divided into two distinctive forms; codified and tacit. While codified or formal knowledge involves scientific and other forms of knowledge, scripted or formalised in the form of patents, books, papers, tapes, and so on, tacit or non codified knowledge involves specific skills and know how, which are not transferable beyond the context in which they are produced and embedded. It is argued that the increasing use of ICTs makes it easier to take advantage of codified knowledge, and yet a considerable amount of knowledge remains in a tacit form that is difficult to transfer to elsewhere. The main reason for this is that tacit knowledge can be acquired by and large through experience, direct observation, imitation and interaction (Hodgson, 1999).

In line with this view, commentators, especially economic geographers, stress that tacit knowledge tends to be localised in a specific place and locality owing to spatial stickiness of tacit knowledge and that thus geographical proximity becomes key to sustaining learning through access to and the acquisition of such tacit knowledge (see, for example, Florida, 1995; Maskell and Malmberg, 1999a, 1999b; Maskell *et al.*, 1998; Lorenzen, 2001). In addition, they tend to ascribe different geographies to particular types of learning. That is, locality as a source of non-transferable tacit knowledge rooted in face-to-face and experiential assets, while global networks as sources of codified knowledge rooted in science and technology (Amin, 2001).

However, there is the danger that the dichotomy between tacit knowledge as the local and codified knowledge as the non-local may miss something critical in understanding the nature of corporate learning. There is a growing recognition between geographers that the geographical literature on learning tends to over-stress the advantage of localised learning in firm competitiveness, the power of geographical proximity in learning and the role of tacit knowledge on learning and innovation (see, for example, Allen, 2000, 2001; Amin, 2001, 2002; Amin and Cohendet, 1999; Blanc and Sierra, 1999; Bunnell and Coe, 2001; Cohendet *et al.*, 1999; Howells, 2000; Lee, 2001; Oinas, 2000).

It should be noted that this is not to argue that space and place do not play any role in sustaining corporate learning and competitiveness, nor localised learning and geographical proximity are not important. As a matter of fact, firms would attempt to use their complex geographies in and out of the boundaries of organisation in order to sustain organisational change, learning and adaptation. This is to recognise the power of relational proximities and distances which defy the simple reduction of learning to geographies of place and space, as innovation and learning by firms can be based not only in localised clusters but also distant networks and communities linked through various ties of people and firms, travel and sophisticated communications (Lee, 2001).

Throughout the following sections, I will show that the process and mechanism of corporate learning and organisational change and, most importantly, their spatialities appear to be influenced by the contextual specificities, which can be firm specific, place specific or environment specific.

3. Spatial reorganisation of domestic R&D activities and learning

In spite of facing the Korean financial crisis, SEC has continued making investments in R&D so as not to fall behind in international competition. By doing this, the company wants to master digital technology standards, as well as to lead the next generation of semiconductor technologies and markets. In the context of a rapidly changing technological paradigm, coping with time competition between firms seems to be critical for continuous adaptation (Best, 1990). The concept of time competition emphasises time-to-market speed and the effective use of market specificity. For the company, like its many competitors, these aspects are important tasks of

R&D activities. Over the last few years, the company has attempted to reorganise R&D organisations or establish new R&D organisations in order to cope with increasing technology competition. These tendencies may reflect strategic responses to rapidly changing markets and technologies. This section focuses on the dynamic change of domestic level R&D organisation in the face of the crisis and its implications for space and learning.

Basically, the company uses a three-layered R&D system, including the Group-wide R&D centre, Business divisional central labs and Product specific labs. Group-wide R&D Centre (SAIT) is committed to basic and applied research related to future technology on a long term basis and its work areas are usually beyond the boundary of individual firms. Business divisional central labs are concerned with business division specific R&D activities. Their main aims are to develop emerging new technologies and technologically converged products as well as search prospective business or products. Meanwhile, product specific labs are closely associated with the development of new products and technologies.

Its R&D system represents a unique spatial form. All domestic R&D units are clustered in the capital region centred on the city of Suwon (Seoul and Kyung-Ki Province) (see Figure 1). Central R&D centres are operated by the business division and play a central role in developing business-specific technologies. Apart from laboratories at the main semiconductor production complex in Kiheung, all other divisional laboratories are located in the Suwon production complex. Subsequently, each sub-business unit has a product specific laboratory. The product specific laboratory takes responsibility for developing brand new models and improving a product quality. In this sense, the product specific laboratory necessitates frequent interaction and communication with manufacturing related teams. However, not all product-specific laboratories are close to the manufacturing plants. If a factory making a specific product is in the capital region, associated laboratories tend to be close to the production site. But, factories located in non-capital regions have to link with laboratories in the capital region, mostly within the Suwon production complex. However, there are less numerous.

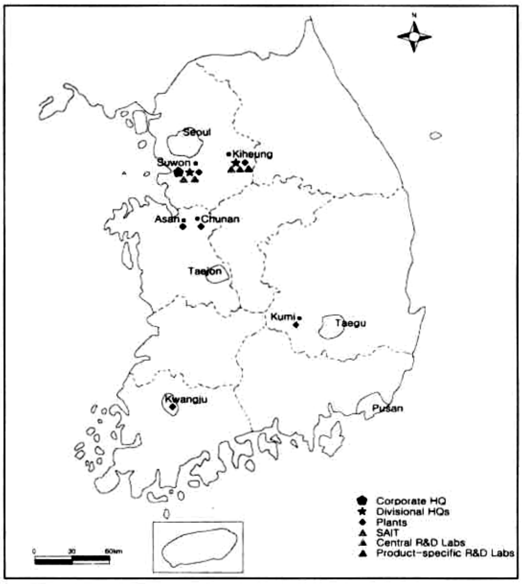

Figure 1. Spatial distribution of SEC sub-organisational units

Interestingly, it is identified that there is a strong tendency of co-presence between R&D units and between R&D and manufacturing units. As revealed by Kang (1996) and interviews with SEC managers[1)], the company has regarded that the clustering of R&D and production facilities would provide it with some advantages. First, the co-location of R&D laboratories specialising in specific products is likely to improve the potential of interactive learning between people and teams involved in different areas of technology and organisation. The importance of interaction between different R&D teams has become crucial in the context of an increasing technological convergence between varied product domains. Second, the increasing complexity of labour process, ranging from the development of product and design to manufacturing, may require more frequent interactions and communications among people and teams engaged in different fields of expertise. It is assumed that the greater relational and geographical proximity between people or teams, the easier the interaction and communication between them and the higher the potential of interactive communication and learning. In particular, both the co-presence of central laboratories and product-specific laboratories and the co-location of laboratories related to the development and production of a specific product and manufacturing plants can be effective for coping with a shortened product life cycle. Perhaps the higher the complexity of the technology and production process, the more involved are the teams and the more frequent is the interaction and communication between them.

The exceptions are the factories that produce telecommunication equipment and some less value added home appliances, as mentioned above, which are distant from the main production and R&D complex in the capital region. Factories in these business units do not retain R&D function, or even core managerial functions like strategic planning and marketing. Normally, they have only the manufacturing technology team. However, they also need frequent face-to-face contacts with R&D teams when a brand new product reaches the stage of both testing reliability and manufacturability and in the setting up of the manufacturing line for mass production. In this case, R&D staff members may spend many days in the plant to work with the manufacturing technology and manufacturing teams.[2)]

There are some difficulties associated with the spatial separation of conception and manufacturing. According to interview[3)], the deterioration of the potential for learning and innovation is not much concerned than difficulties in communication and coordination. However, the company does not necessarily consider the transfer of R&D to manufacturing plants distant from the capital region. From SEC's point of view, the benefits, offered by the operation of R&D units in the capital region and the co location of different sorts of R&D units, would be greater than the gains from moving R&D units to remote manufacturing units.

As far as innovation is concerned, the company considers the capital region as offering the better sources of innovation and learning than elsewhere in Korea. In addition, the geographical clustering of in house R&D laboratories is assumed to offer more positive effects for technological learning and innovation, not least in a radical way. According to Tidd *et al.* (1997), who discuss some advantages of the geographic concentration of strategic R&D for launching major new products and processes, such clustering helps to deal with unforeseen problems more effectively, since geographical proximity may allow quick, adaptive decisions as well as the integration of tacit knowledge through close personal contacts. A senior engineer of TV lab in Suwon supports this view:

> Perhaps, the co-presence of multi-tiered R&D laboratories as well as between R&D and core manufacturing units tends not just to increase efficiency in communication and coordination by making formal contact and interaction between people and teams easy. It is also more likely to give workers who belong to different teams an increased chance of informal personal contacts (08/09/2000).

Managers interviewed argue that such co-location may influence more or less the mobilisation of resources and the creation and sharing of intangible assets.[4] The company is seeking to further intensify the clustering of R&D laboratories. All of the R&D laboratories which are dispersed around the capital region, including Seoul, will be moved to the R&D complex within the Suwon production complex by the end of 2001. In addition, R&D laboratories recently established are all aggregated within each of the main production complexes in Suwon and Kiheung. For instance, in 2001 the company founded the TFT-LCD R&D centre within the Kiheung semiconductor complex. The aim is to bring together in a specific place the people and teams involved in the research and development of TFT-LCD. This is not only to promote efficiencies in the process of R&D but also to mobilise decentralised technological capabilities. The company understands that such clustering may not only contribute to mobilising sets of spatially decentralised knowledge among individual R&D teams but also improve the speed of new product development.

Furthermore, it is expected that clustering will promote the ability for R&D teams to interact and communicate in different but complementary areas of technology in terms of technological convergence. In the electronics industry, product development based on technological convergence is increasing. For example, the cutting-edge mobile telecom equipment industry may need to bring together varied technologies such as telecommunications, semiconductors and LCD, although in the past it was considered that such technologies had little to do with one another.

However, it should be noted that, despite the recognition of the company on co-location, this is not necessarily to assert that geographical proximity and co-presence between organisational units, especially between R&D units and between R&D and manufacturing, induce automatically the increase of 'learning-by-interacting' and a positive outcome in a direct way. The co-location strategy is part of strategic attempts for SEC not only to promote organisational knowledge and competences but also to accelerate the efficiency of organisational learning.

4. Task-force activities and learning

In 1998, the company established a new R&D centre, called the Value Innovation Programme Centre (hereafter the VIP Centre), to manage ad hoc short-term R&D projects. Of course, it was located within the Suwon complex. The VIP Centre provides an exclusive space for the sorts of task-force teams performing projects which require boundary spanning co-working activities on a short-term basis. Those project teams are largely in charge of the tasks associated with new product development, remodelling of established products and problem-solving.

Thus, many projects undertaken for developing new products and remodelling existing products are carried out in this centre. In particular, the VIP Centre is seen to be an appropriative space to develop digitally converged products which bring together varied technologies, including consumer electronics, semiconductors and telecommunications (e.g. MP3 and video mobile phones). The reason for this is that such product development projects may call for experts beyond the boundary of an individual R&D team. An engineer of the telecommuni- cation lab in Suwon:

> An urgent need has emerged to develop products jointly by gathering staff members involved in a project in an independent space. It is very important to cope with time competition in the context of the shortened

product life cycle, continuous depreciation in price, and fragmented and rapidly changing customer demand (21/09/2000).

On this site, members of a task-force team carry out all the tasks associated with the project. Until finalising the project, members of the team work in the project room within the centre, instead of being based in workplace in the organisation they formally belong to. Each project team usually has freedom and autonomy in its activity. It invites both internal and external experts for discussion to resolve a certain problem if needed. All the members of the project usually work together all the time and spend most of their time in the same place. Quite often, they even sleep in the centre. They can have a drink, exercise and enjoy entertainment. Everything can be done in this centre.

For the company, the VIP Centre plays an important role as a specific organisational place where a one stop service to promote the efficiency of a research project is provided. The company reports that the VIP Centre, since being founded in 1998, has made a critical contribution to innovations in products and processes and the reduction of development time span (*Korea Electronics Times*, 25 July 1999). For example, the company allowed a task-force team in charge of the development of an innovative PC monitor to carry out the project. The team was composed of 25 experts, many of whom belonged to different teams and departments. The development of the new product was completed one and a half months earlier than the estimated period of time for the existing way of doing projects. In addition, since the team lowered over 20% of the number of parts used for assembly, a 30% cost-saving effect on sourcing parts followed.

What is significant is that the purpose-specific physical space, the VIP Centre, plays a crucial role in promoting relational/organisational proximity with the support of geographical proximity.[5)] A project team is composed of members who have different expertise and belong to different teams, with the advantage of cognitive distance or variety, possibly clashing with relational/organisational distance (see, for more details, Lee, 2001). However, in the course of working together in an independent space, members of the team tend to show attributes that are common in informal groups, like communities of practice. These are things established in a group through intensive processes of joint practices, open ways of communication and mutual efforts to understand each other. In addition, the VIP Centre is designed as an exclusive place for only the performance of task-force activities and is likely to give many chances to share common interests and knowledge between members of various task-force teams. In this respect, the operation of a purpose-specific organisational space can be regarded as a critical way to sustain and promote organisational learning and innovation. In particular, in the case of firms that show inflexible and hierarchical corporate culture such as SEC, such a space can be more an effective means to derive learning and innovation, not least in a radical way.

In sum, it has been identified that the company has been trying to build physical and organisational milieu relevant to cope with radical transformations in markets and technologies. In particular, a strategy using the advantages of proximities can be considered to be one of the significant ways to sustain efficiencies and synergies in R&D activities as well as in organisational processes centred upon R&D.

5. Globalisation of corporate R&D activities

As mentioned in the previous section, the company has continued to strive to construct technological competences, not only to keep its leading position in businesses such as memory chips, TFT-LCD and wireless telecommunications, but also to secure its competitive position in businesses such as the emerging digital electronics technology and non-memory chips. Much of this has come from centralised locations within Korea, but it is also involving R&D activities beyond the home base boundary.

Some organisational changes in overseas R&D units have occurred, although the economic downturn in Korea and Asia was severe and has not recovered yet (see Table 1).[6] There is, however, a tendency for these changes to fluctuate according to the economic situation. After the crisis, the company immediately closed down two overseas design laboratories, a US semiconductors laboratory and an Osaka laboratory in Japan, as a means of streamlining overseas subsidiaries. The company integrated the function of the Osaka laboratory into the Tokyo laboratory. Originally, the company had three overseas design centres. Of the design

Table 1. SEC overseas R&D laboratories

Name	*Location*	*Research areas*	*Estab.*
San Jose Media Lab	California, USA	Previously Semiconductor lab (1998 closed) Developing Media technology, notably digital TV	1983-1998 2000 reopened
Dallas Telecom Lab	Texas, USA	Developing telecommunications technology Developing North American market specific products	1997
US Product Innovation Lab	New Jersey, USA	Developing new technology on digital consumer electronics and telecom and analysing on local technological trends	1998
Yokohama Lab	Yokohama, Japan	Originally consumer electronics lab Developing key parts of digital consumer electronics	1983 1997 reformed
Sendai Lab	Sendai, Japan	Developing core technology of optical disk drive	1995
China Lab	Beijing, China	Developing mobile telecom technology for Chinese market	2000
Europe Lab	London, UK	Developing European market specific mobile phone Developing software used in display products	1994
Russia Lab	Moscow, Russia	Developing software related to telecommunications Technology outsourcing	1993
India Lab	Bangalore, India	Developing software related to telecommunication system, home network and printer	1996
Israel Lab	Tel Aviv, Israel	Monitoring technological trends Developing telecom equipments and related software	1997
US Design Lab	San Francisco, USA	Searching new product concept Developing product design associated with mobile phone and home multimedia	2000 reopened
Europe Design Lab	London, UK	Monitoring European product design trends Basic research for developing market specific product design	2000
Japan Design Lab	Yokohama, Japan	Tracking product design trends of Japanese makers Developing market specific product design	-

Source : Samsung Electronics Company.

laboratories closed, one was a European design laboratory in London, UK and another was a US design laboratory in San Francisco, USA. Thus, the Japanese design laboratory came to be the sole overseas design laboratory. The Japanese design laboratory had played a key role in monitoring the product design trends of Japanese makers as well as in learning and utilising continuously national-specific competences and know-how related to product design. Major export commodities of SEC are not just market-specific household appliances, such as washing machines, air conditioners and refrigerators, but also non-market-specific electronic parts such as semiconductors and TFT-LCD. In other words, high-tech products and electronic parts do not require much local adaptation to respond to local demand and tastes, as claimed by Tidd *et al.* (1997), and therefore the company decided to rationalise overseas R&D operations.

Since then, market conditions have been getting better and the company has made a strategic decision to strengthen overseas market share in consumer electronics and telecommunications, such as digital media, mobile handsets and household appliances, in order to diversify the product portfolio for export. In line with this, in December of 2000, the company reopened overseas design centres that were closed down in 1998. The aim was both to monitor changing local market-trends and to develop new product items and design concepts. In more detail, the San Francisco design centre aimed at researching new product concepts as well as developing market specific product designs, notably associated with mobile handsets and home multimedia. London's European design centre sought to monitor European product design trends and perform basic research needed for developing market specific product designs.

The company has been trying also to diversify both R&D area and geographical scale. In particular, overseas R&D laboratories have either been founded or reorganised in order to focus on local adaptation in response to local-specific markets and local specific sources of knowledge and technology. The company established a software development centre in Bangalore of India, in 1996, with the aim of performing research on the development of software used in telecommunications, home networks and printer systems. The company has a plan to signifi- cantly expand its size and function, increasing laboratory staff from 120 to 800 by 2002. The reasons are not complex. It is accepted that India has a great number of highly qualified but relatively cheap engineers and scientists. In addition, it is known that Bangalore is rapidly emerging as an Asian version of Silicon Valley. In operating the Bangalore R&D centre, the company hopes to capitalise on this regional advantage in the form of plenty of human resources and the circulation of local and extra-local knowledge by virtue of Indian social networks. Together, the company plans to utilise the centre as a technological node to penetrate the large Indian market, which is expected to grow explosively in the near future.

Secondly, in 2000 the company reopened the Silicon Valley based R&D laboratory, which was closed down in 1998. The R&D laboratory was originally established in 1983 to develop semiconductors technology in San Jose, California. The company learnt semiconductors-related technology from this laboratory at the start of entering the semiconductor market. To operate the San Jose based semiconductors laboratory, the company hired over 30 scientists and engineers with the help of personal networks among US based Korean scientists.[7] Most of them were ethnic Koreans who had expertise through experiences in the leading US semiconductor companies after gaining PhD degrees in the US. From the beginning, the company did not want to simply learn to imitate semiconductor technology. Rather, the company made great efforts to accumulate and secure an absorptive capacity to develop semiconductor technology by itself.

One of the major reasons for this is that Samsung's leaders were afraid that some core staff would leave to jobs giving better pay and rewards (Kang, J., 1996). To cope with such a possibility, the company sent 32 young and enthusiastic engineers selected in domestic laboratory to the San Jose semiconductors laboratory with the aim of learning basic principles and applied technology related to semiconductors beyond simply learning to imitate.[8] Their training was based on learning by direct investigation, face-to-face instructions and discussions with local staff in the laboratory, and recursive feedback sessions among domestic staff every night for a year. Throughout this course of training, trainees were able to gain a great deal of tacit knowledge embodied in individuals and codified knowledge, such as research notes. These sets of knowledge became the base of absorptive capacity and a source of technological competences. After they returned to the domestic workplace, the company formally established a domestic semiconductor laboratory centred upon engineers trained in the US laboratory. On the basis of technological competences built via these efforts, in 1998 the company became the first to succeed in mass production of 16Mb DRAM and is now the largest manufacturer of DRAMs and the fourth-largest maker of all kinds of semiconductors. This past experience gives some important clues for understanding how the company has learned technological knowledge.

According to interviews[9], although the company still gives priority to the accumulation of core technological competences on a domestic basis, it has been also trying to utilise corporate-wide international technological competences.[10] In this sense, the company has introduced programmes for knowledge exchange and interactive learning between domestic lab based engineers and foreign lab based ones. Recently, domestic laboratories have attempted joint activities for knowledge exchange and mutual learning with overseas laboratories, not least both US-based and Japan-based laboratories, which possess technological competences in ICTs, semiconductors and digital technologies. Based on this corporate historical context, the company closed down the San Jose based semiconductor laboratory after the financial crisis. The company recognised that technological competences of the domestic laboratories were competitive enough to lead the technology. Instead, in 2000 the company established the San Francisco R&D laboratory which is in charge of the development of Digital TV-related technology and US market-specific products. To secure a competitive advantage in the Digital TV technology market, the company strategically formed a multilateral global R&D network, covering central places in technologies and markets, including Korea, Japan (Yokohama), Europe (London, UK) and North America (San Francisco) (*Korea Daily Business*, 9 September 1999).

Third, the company opened another US based laboratory, called the US Product Innovation Lab, in New Jersey in 1998. This laboratory is dedicated to the development of new technologies in digital consumer electronics and telecommunications and an analysis of local technological trends. Additionally, the laboratory plays an important role in both searching for US high tech firms to collaborate with and in hiring qualified graduates with Masters or PhD degrees in management and engineering from top-ranked US universities.

Finally, the company opened a Beijing laboratory in late 2000, aiming to develop market-specific mobile phone and telecommunication equipment for capturing an explosively growing Chinese mobile telecommunication market. The current project of the laboratory is to develop mobile telecommunication technology, which is expected to be the Chinese standard. Though the laboratory started with 60 engineers, the company plans to make it a large mobile communication laboratory with more than 300 engineers by 2003. In short, these responses illustrate that the company has made huge efforts to learn from external sources of technology and knowledge, not only for local adaptation to local specific markets but also for access to local specific sources of knowledge and technology. It has been identified that the forms of R&D organisation in the company have been constructed or reconstructed by combining a corporate context and an extra corporate context. The contexts and factors can be understood in terms of dynamic local and global market situations, technological changes, corporate strategies and competences, and geographical sources of knowledge and competences.

6. Inter-firm alliances

This section attempts to understand the recent

Table 2. Major inter-firm alliances (1998~2000)

Partner	*Form*	*Area*	*Goals*	*Date*
Intel	Strategic alliance	Digital Still Camera	Joint product development	1998
Microsoft	Strategic alliance	PC parts	Technological cooperation on and joint development of PC parts	1998
Toshiba	Strategic alliance	VCR	Mutual supply of VCR parts Joint development of key parts	1998
Brooks	Joint venture	Semiconductor equipments	Operating a joint venture firm that produces equipments for semiconductor manufacturing process automation	1999
Compaq	Strategic alliance	Alpha chip	Long-term supply contract Technological cooperation	1999
Dell	Strategic alliance	TFT LCD	Samsung → long-term supply to Dell Dell → capital investment in SEC	1999
Micron, Intel, NEC, Infinion, Hyundai	Strategic alliance	Next generation DRAM	Joint product development Sharing technological knowledge	2000
Thompson CSF	Joint venture (50:50)	Defence equipments	Combining Samsung's defence equipment production operation and Thompson's technological and marketing capabilities	2000
Microsoft	Strategic alliance	Mobile phones	Developing Internet mobile phones Combining SEC's hardware technology and MS's software technology	2000
Toshiba, Optrex	Strategic alliance	LCD chips	Joint development and marketing of LCD chips	2000
Intel	Strategic alliance	Rambus DRAM	Samsung → long-term supply to Intel Intel → capital investment in SEC	2001

Source : based on SEC Annual Report (1999, 2000); *Korea Electronics Times; Korea Daily Business* (1 January 1998~30 April 2001).

move of SEC to make connections with other companies in response to radical change. Before the early 1990s, SEC lacked independent technological capabilities. Major technologies had largely been imported through vertical inter-firm contracts, such as technology licensing, joint ventures and OEM (Original Equipment Manufacturing). Technology licensing and joint ventures had been important means for the company to learn and gain advanced technologies and knowledge from leading companies, particularly Japanese counterparts. In addition, OEM contracts with major players had played a crucial role in expanding economies of scale as an indirect way of exporting their products as well as learning know how and knowledge in a wide range of production and technology. It is not surprising that, in this period of time, it had been difficult for the company to have horizontal cooperative agreements with leading firms, since the company had less competitive resources and competences in technology and markets, with the exception of the advantage of labour costs.

As the company has continued to grow and strengthen its competitiveness since the 1990s, relatively horizontal and cooperative inter-firm agreements have steadily increased in some business sectors, such as semiconductors. Furthermore, an increasing competition for market and technology and a global shift towards strategic alliances between major players (Dicken, 1998) made the company seek to take part in such a new business environment. In addition, the company has been gaining international competitiveness since the early 1990s with the help of the success of its semiconductor business. This means that the company was ready to form equal horizontal cooperative relationships with leading players by constructing competitive competences (Kim, 1997).

Table 2 shows the major inter-firm alliances between SEC and counterparts since 1998. First, the company has constructed long term supplier-buyer partnerships with leading companies in the computer industry, such as Dell (1999, 2001), Intel (1999) and Compaq (1999). As mentioned, SEC is one of the top players in semiconductors - notably memory chips - and TFT-LCD. Counterparts want a partner capable of supplying key parts necessary for making their products on a long-term, stable basis. Meanwhile, Samsung wants to ensure long-term-based buyers to cope with market turbulence and uncertainty. In addition, the company wants buyers to be able to contribute to its facility investment, because capital goods such as semiconductors and TFT-LCD require continuous and large-scale investment to cope with a shortened product life cycle and a rapidly growing market competition. SEC has sought interactive learning and exchange of complementary assets with its counterparts.

Inter-firm alliances based on a long-term partnership may require stronger ties and reciprocal trust between partners than other forms of alliance, such as technological partnerships, because they immediately affect corporate profitability. However, this is not to argue that market-based forms of inter-firm alliance are more relevant to sustain inter-firm learning than untraded alliances but that inter-firm networks based on untraded interdependencies are more sustainable *vice versa*. Although inter-firm alliances are based initially on a market contract, if they build social capital such as reciprocity and trust over time, they are likely to develop collaborative relationships, such as dynamic learning.

Second, there is an increasing tendency for SEC to take part in multi-company collaborative alliance groups, encompassing competitors and non-competing firms, in order to cope with an accelerated trend towards digital convergence. This includes domains of technology such as

ICTs, computer, multimedia and semiconductors. The boundary between industries has been blurred, and individual firms do not have all the competences and assets needed for coping with the emerging technologies and markets. It is thus very important for SEC to enter multi-firm alliance 'champion' groups, because one of SEC's core business strategies is to secure its competitiveness via 'digital convergence'.

Another critical reason for the formation of strategic alliances between market and technology leader companies is to dominate global competition for industry standards in the emerging technology, such as digital broadcasting and home network. This 'co-win' strategy between alliance group companies is becoming a vital element for surviving and adapting to a new competition environment. In this sense, the company has continued to seek cooperative relationships with major ICT companies such as Sun Microsystems, Microsoft and Intel. Samsung wants to learn and acquire 'software' technology, while ICT firms want to secure 'hardware' technology.

Third, in a similar context, in June 2000 the company agreed to develop jointly core technologies for the next generation DRAM in association with market leading competitors, including Hyundai (Korea), Intel, Micron (US), NEC (Japan) and Infinion (Germany). In fact, this type of alliance among technology and market leader firms has often been found in the semiconductor industry. For example, as the required scale of R&D investment in semiconductor production rose, Japanese and US -based firms increasingly formed joint ventures in the 1990s to spread the costs and risks of developing new generations of integrated circuits (Hudson, 2001: 207). They wanted to reduce the uncertainties and risks of R&D. More fundamentally, such an exclusive association between leading memory chip makers aims at more and more solidifying a monopolistic power of upper class firms. They want market followers to drop in the market by developing new products in advance.

Fourth, the company has sought to forge cooperative alliances in order to secure the leadership in markets and technologies by sharing firm-specific technological competences. For example, a strategic partnership with Intel for the development of a digital still camera aims to share Samsung's strength in consumer electronics and semiconductors and Intel's strength in micro-processor chips. Similarly, a strategic alliance with Microsoft to jointly develop PC parts and Internet mobile phones combines Samsung's hardware technology and Microsoft's software technology. In contrast, the partnership between Samsung and Toshiba in the VCR business represents a coupling between the two strongest links, intending to strengthen their monopolistic positions as top leaders in the saturated market. A strategic alliance with Toshiba and Optrex for the joint development and marketing of LCD chips used in mobile phones may demonstrate inter-firm division of labour using firm-specific competences between partners. Toshiba is in charge of developing LCD driver IC, while Samsung is developing LCD chips with a built-in memory. Optrex produces modules integrating the chips to supply to mobile handset manufacturers. They expect the partnership to help reduce the cost and period of product development as well as to contribute to the mutual sourcing of core parts between partners on a stable basis (*Korea Daily Business*, 7 April 2000).

In sum, since the crisis, strategic alliances by SEC, likewise other large Korean firms, have been significantly increased. The 1997 financial crisis had a precipitous impact. Corporate financial difficulties, and the government push to restructure the corporate sector, resulting from the financial crisis, have forced the company to find a more radical breakthrough (Yoo, 2000). Strategic alliances are one of the most favourable ways for them to sustain competitiveness under such pressures. It is expected that SEC as well as other Korean firms will focus more and more on horizontal inter-firm agreements with competitors in order to cope with an increasing global competition in technologies and markets.

7. Conclusions

In this paper I have explored the spatialities of organisational change and learning involved in corporate adaptation in the face of radical economic change. Such processes of adaptation appear to reflect the attempts of the firm not only to improve technological competences but also to respond to radically changing situations in market and technology. My case study of SEC has provided some critical implications for a better understanding of the questions on corporate learning and its geographies I raised in the introductory section. First, it is revealed that territorial sources of learning influence the way in which the firm makes use of space. It has been significant for SEC to seek a clustering strategy of R&D in the core organisational spaces. The prime aim for this is to maximise the availability of competences and knowledge by centralising geographies of core competences in organisation. In a similar vein, the absolute clustering process of R&D illustrates clearly the ways in which the company makes use of proximity. However, it is important to note that this process means that the company seeks relational/organisational proximity based on spatial proximity. The company wants to intensify organisational learning capabilities by improving relational/organisational proximity between heterogeneous R&D groups. As a means to do this, the company sought spatial proximity based on the co-location of R&D and production units. The company's concern does not lie in the integration of R&D and manufacturing, but in the geographical integration of R&D units.

Second, in addition to the internal mobilisation of knowledge and modes of intra-firm learning, it is evident that access to external sources of knowledge has been made through the dynamic use of overseas R&D tentacles and inter-firm alliances. This is particularly crucial in the face of increasing environmental turbulence and industry competition. These methods were explained in the context of the firm's knowledge base and competence and the direction of corporate strategy. This implies that firms are not concerned on specialising specific local knowledge, but on promoting organisational knowledge and competences by integrating a variety of knowledge distributed in and out of the boundaries of the firm.

Lastly, an example of task-force teams has shown that learning communities centred on task-force teams play an important role in sustaining both incremental and radical learning. These communities attempt to sustain learning and innovations by combining tacit knowledge embedded in individuals and teams with codified knowledge.

It is difficult to see incremental learning as the acquisition of tacit knowledge and radical learning as the acquisition of formal knowledge. Continuous learning and innovation may need both kinds of knowledge. At the same time, discontinuous learning and innovation may require to combine tacit knowledge and formal knowledge. Whatever the nature of learning, processes of learning represent the process of bringing together tacit knowledge and codified knowledge.

Notes

1) Interviews with a manager of the management team, Consumer Electronics Division (30/09/2000), a manager of the management team, Telecommunication Division (07/10/2000), a manager of Semiconductor lab (20/09/2000) and an engineer of Digital TV lab (08/09/2000).
2) Interview with a manager of the manufacturing team, Telecommunication equipment plant in Kumi (22/09/2000).
3) Interview with a manager of the manufacturing team, Telecommunication equipment plant in Kumi (23/09/2000) and an engineer of the telecom equipment lab (21/09/2000).
4) Interviews with a manager of Semiconductor lab (20/09/2000) and an engineer of Telecom equipment lab (14/10/2000).
5) Interview with an engineer of Telecom equipment lab (21/09/2000; 14/10/2000).
6) This is based on SEC annual reports (1999, 2000) and corporate release materials (1999~2000).
7) This is because American scientists and engineers with enough knowledge to develop semiconductors were mostly unwilling to work in a Korean company that was unknown and had no brand power (Kang, J., 1996).
8) The reason for the company sending 32 engineers was to make 1:1, face to face based learning and investigating possible (*ibid.*).
9) Interviews with a manager of Telecommunication Division (07/10/2000), managers of Semiconductor lab (20/09/2000; 20/09/2000) and an engineer of Telecom Equipment lab (21/09/2000).
10) Pavitt and Patel (1999) show that, in general, TNCs tend to domesticate their key R&D activities and competences.

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