Discusses the Korean conglomerate Samsung in the context of world and regional business and economics. Presents a case study and rationale for the growth of Samsung, tracing its history and progress to the present day. Discusses particularly the experience of Samsung, which has the highest overseas production ratio of any Korean firm.

In 1993, the three major Korean producers, Samsung, Goldstar and Daewoo, announced their intention to increase their overseas production ratio from an average of 20 per cent in 1993 to 60 per cent by 2000 (Korea Economic Daily, 1993). This paper will focus on the experience of Samsung, which has the highest overseas production ratio of the three[2].

The paper is arranged chronologically, focusing both on the forces driving Samsung to develop offshore production networks and on the struggle to adapt the nature of its networks to its technological capabilities.

Korean electronics firms have been aggressively involved in learning and knowledge accumulation over the past two decades. Their consumer products, including color television sets (CTVs), video cassette recorders (VCRs), and microwave ovens, were able to remain competitive in the low-end segment of world markets until the late 1980s, generating the cash flow needed to support development of more advanced technologies. In recent years, however, Korean firms are meeting increased competition, particularly from Japanese producers that have recovered from Japanese producers' recover from the supplier dependency that characterized their Japanese counterparts' development of design and marketing capabilities.

Increased overseas production has been a major component of Korea's strategic response. Korean production networks in Asia now extend beyond the ASEAN region to China and India. The ratio of overseas production to total production has increased sharply in recent years, from 19 to 27 per cent for CTVs and from 16 to 17 per cent for VCRs during the period 1992-1994. However, those of their major overseas producers7. Ha was even faster, from 67 per cent to 86 per cent for CTVs and from 71 to 71 per cent per cent for VCRs during the same period (see Table I), keeping competition intense in the cost-driven struggle for lower-end markets.

Perhaps a better comparison would be with another newly industrialized Asian country. Outward foreign direct investment (FDI) by Korean electronics firms lagged behind their Taiwanese rivals. The cumulative FDI by the Korean producers7. Ha was amount to US $0.85 billion (EIAK, 1993), while for the latter it was US $1.05 billion[1].

In 1993, the three major Korean producers, Samsung, Goldstar and Daewoo, announced their intention to increase their overseas production ratio from an average of 20 per cent in 1993 to 60 per cent by 2000 (Korea Economic Daily, 1993). This paper will focus on the experience of Samsung, which has the highest overseas production ratio of the three[2].

The paper is arranged chronologically, focusing both on the forces driving Samsung to develop offshore production networks and on the struggle to adapt the nature of its networks to its technological capabilities.

Particular attention will be placed on the networks connecting its offshore affiliates in East Asia. The firms involved are all part of the Samsung Group, a highly diversified conglomerate. The core electronics producer is Samsung Electronics Co. (SEC) and its affiliated firms are Samsung Electronics Devices Co. (SED), Samsung Electronics Devices Co. (SEM) and Samsung Electronics Devices Co. (SC). The sources for this study are primarily internal Samsung publications, including monthly bulletins relating to international production, technological development, and organisational processes, as well as interviews that were conducted at Samsung in Seoul during November 1994. The organisation of Samsung's international production networks in ASEAN were also reviewed during July 1995.

The first section examines the 1970s, following Samsung's entry into the electronics sector. The focus was on the development of mass production capability and, in particular, linkages were used to acquire product designs and marketing outlets, allowing Samsung to concentrate its resources on the development of mass production capability. The second section looks at the Samsung's OEM business in the 1980s. Because the majority of the group's resources were channelled into the highly demanding production of advanced semiconductors, OEM was inevitable. While the OEM strategy was successful, it appears to have retarded the development of design and marketing capabilities for its mass-production goods, leaving the group dependent on foreign sources of product design and distribution. The decade also saw the company's initial foray into international production to cope with trade pressure in its major markets, and explores how the group's internal organisation was poorly adapted to the needs of overseas operations and to the task of organisational learning.

The third section considers Samsung in the 1990s. Samsung has been pursuing rapid expansion of offshore production, and improvement of R&D capabilities.

Table I provides an overview of the profile of the group in each decade.
The fourth section examines Samsung’s Asian production networks in detail. Initial investments were for consumer goods for both export and local markets. The networks were promptly integrated backwards and linked to the networks of other producers in the region. A final section provides a brief summary of the findings about Samsung’s production networks, along with an analysis of the directions in which the firm must go if it is to remain competitive in a rapidly changing environment.

Samsung in the 1970s – from textiles to televisions

Samsung was first incorporated in 1938 by Lee Bung-Chull, and its main business line was trade. The trading function has continued to be important, first with imports, and later exports, starting in the mid-1970s. Samsung had become one of Korea’s top ten firms by 1950.

Samsung’s entry into the electronics industry had four important features which continued to characterise Samsung’s electronics activities into the 1980s: an emphasis on mass production, reliance on foreign technology, a follow-the-leader strategy, and government support. First, its electronics business was significantly influenced by the two manufacturing activities of textiles and sugars. Both industries required a large scale of operation, and Samsung developed know-how through learning-by-doing for more than a decade before it entered the electronics industry.

Secondly, its business started with imported foreign technology, having a close relationship with Japanese electronics firms. Having been educated in Japan, Lee Byung Chull was able to establish informal contacts. Originally Samsung had considered cooperation with American firms, but it finally chose Sanyo and NEC as joint venture partners because of the language difficulties inherent in learning-about American technology (SEC, 1989). Thirdly, Samsung entered the Korean electronics industry as a market follower. Another Korean firm, Goldstar Electrical had started assembling vacuum tube radios for a US firm in 1959 and had built up export capabilities for ten years before Samsung entered the industry. Finally, Samsung enjoyed government support for its expansion into electronics. In 1968, the Korean government introduced the Electronics Industry Promotion Law, marking the beginning of official support for the industry[3].

Samsung’s initial strategy was nothing more (or less) than the mimicking of its Japanese rivals. Its aim was to become a vertically integrated electronics firm: “[...from materials to components to end-products, including consumer and industrial electronics” (SEC, 1989)[4].

Given its lack of previous experience in electronics, Samsung had no choice but to be simultaneously involved in learning a number of different technologies. To accomplish this, it turned to foreign sources of technology in management, production and marketing. It created several joint venture companies with foreign technology suppliers such as

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Table I
Overseas production ratio of the Korean and Japanese electronics industries (percentages)

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>CTV</td>
<td>Korea: na</td>
<td>19</td>
<td>20</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Japan: 63</td>
<td>67</td>
<td>72</td>
<td>86 a</td>
<td>na</td>
</tr>
<tr>
<td>VCR</td>
<td>Korea: na</td>
<td>16</td>
<td>na</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Japan: 29</td>
<td>36</td>
<td>48</td>
<td>71 b</td>
<td>na</td>
</tr>
</tbody>
</table>

Note: Overseas production ratio in the table is the ratio of the unit quantity produced overseas divided by the total unit quantity produced overseas and in the home country.

a The figure of Sharp’s overseas production ratio.
b The figure of Sanyo’s overseas production ratio.


Table II
Samsung’s technological capabilities and features of international production

<table>
<thead>
<tr>
<th></th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key activities</td>
<td>Conglomerate diversification</td>
<td>Entry into DRAM market</td>
<td>Organizational reform, internationalization</td>
</tr>
<tr>
<td>Main sources of capabilities</td>
<td>J/V partners, original equipment manufacturer (OEM) buyers and overseas training</td>
<td>OEM buyers, foreign licensing, reverse engineering</td>
<td>Acquisitions, strategic alliances in-house R&amp;D</td>
</tr>
<tr>
<td>Level of technological capabilities</td>
<td>Capabilities in mass production (TVs)</td>
<td>Broader product range (VCR, MWO, DRAM, components), but very weak in ability to introduce a major change of product</td>
<td>Continued weakness in product development</td>
</tr>
<tr>
<td>International production and scope of interaction</td>
<td>US and EC for low-end markets (limited success). Centralised intra-firm interaction</td>
<td>International production of low-end items in peripheral regions. Moving toward decentralised intra- and inter-firm interaction</td>
<td></td>
</tr>
</tbody>
</table>
as NEC, Sanyo, Corning Glass Works and other companies.

SEC expanded and improved its assembling capability, producing nearly 10 million black and white TV sets by the end of the 1970s, by which time Samsung was exporting a considerable volume of television sets to the USA, its only significant overseas market. On the strength of its mass-production capability and the Korean government's support for exports, SEC was able to seize a fairly high share of the US market (although far less than its Japanese counterparts), particularly in low-end products.

Most sales were through OEM channels. OEM buyers provided Samsung with product design, quality control and engineering support, leaving Samsung to increase its manufacturing capability through the intensive training of employees, particularly shop-level technicians. But even as its product engineering and assembly capabilities improved, the Samsung group's development of market knowledge was stymied by its internal organisation, further stunting the creation of original product designs.

Yet, intra-firm interaction between the US-based sales affiliate and Korea-based production site was not effective. SEC was not able to recombine knowledge of the US market with that accumulated in Korea. In short, there was no organisational support for links between production and international marketing.

Despite the organisational difficulties it experienced, Samsung made considerable progress during its first decade in the electronics business. But the next decade would see Samsung's electronics operation reach new levels of sophistication.

### Samsung in the 1980s – OEM trap

The 1980s saw Samsung expanding and diversifying. Table III shows how the company's revenues were expanded first by the addition of microwave ovens, then VCRs, and later by successive generations of memory chips. We will begin the review of this critical period in the firm's history with OEM business before returning to the history of its product divisions, which are, in fact, the source of Samsung's international production networks in Asia.

The OEM trap and international production

Samsung Electronics focused on the integrated circuit operation during much of the 1980s, and thus other divisions and affiliates had few strategic options except that of exploiting the company's previously-developed strength in production. Except for short-term investments generating immediate cash, other investments were strictly controlled by the Chairman's Secretariat. Relatively little effort was spent on product development or strategic marketing, and Samsung's emphasis remained on the mass production of relatively low-end products.

The development of product design capabilities was undermined by the company's major commitment to integrated circuits. Of course, SEC had a minor change capability that required an ability for doing "reverse engineering", but was very weak in major change capability (see Bloom (1992), Ernst (1994a) and Hobday (1995) for details of the Korean electronics' weaknesses in design and product development). As a result, it continued to use foreign sources of technology even for its main export products[5], which were seen mainly as a means of generating cash to support the IC project.

Nevertheless, Samsung slowly built an institutional infrastructure to increase its internal technological capability. Three directions were pursued. First, the company expanded Korea-based R&D centres involved in the assimilation and adaptation of acquired foreign technology. It was acknowledged that the original objective was to set up an integrated R&D organisation. The Samsung Advanced Institute of Technology (SAIT) was created to interlink several affiliates, but, at least initially, it was unable to transcend the demand for projects which were commercially exploitable in the short term (Koh, 1992).

Second, Samsung established foreign-based R&D centres which could provide it with new technologies, up-to-date information, and training for Korean R&D personnel. These were used mainly for integrated circuits and, starting in the late 1980s, for computer-related technologies[6]. The third form of effort was continued collaboration between SEC and its affiliated components suppliers.

The ability to use R&D to build new capabilities was constrained by accounting perspectives. Research projects were held to extremely short-term objectives, preventing the development of know-how beyond what was needed for simple adaptation to mass production requirements. Table IV shows a typical example of how the company evaluated the impact of R&D on sales and profits, placing a strong emphasis on immediate sales growth.

Another victim of Samsung's concentration on OEM business may have been its international marketing capabilities, which remained weak. Samsung started distribution of its own-brand products making minor
changes from models it had built from designs provided by the US and Japanese customers, but success was limited. SEC gradually established a network of foreign sales affiliates. It would typically set up a foreign branch office, and then the office turned into a sales subsidiary when it had accumulated a certain degree of foreign market knowledge. However, the hierarchically integrated organisation structure restricted the interaction of its own foreign sales channels with Korea-based production sites, limiting feedback from customers to factories. Accordingly, OEM channels remained dominant in the company’s sales (Table V).

Samsung maintained close relationships with OEM buyers such as JC Penney, Sears Roebuck, GTE, Toshiba, IBM, Hewlett-Packard, RCA, and Crown Corporation. However, its clients were generally not providing Samsung with leading-edge product design, and Samsung did little to upgrade its internal capabilities in this area, confining itself to low-end market segments.

In the early 1980s, the US market was by far the most important for Samsung, but by the end of the decade it had greatly increased the geographic diversity of its distribution channels, particularly in Europe and Southeast Asia (see Table VI).

In the early 1980s, CTVs imported from Japan, Korea and Taiwan became a controversial trade issue in the US and Europe (Bellance, 1987), and Korean firms faced anti-
Youngsoo Kim  
Technological capabilities and Samsung Electronics' international production network in East Asia  
Management Decision 36/8 [1998] 517-527

In order to protect its access to the US market (Jun, 1987), SEC set up an affiliate producing CTVs in the USA in 1984 (two years after its domestic rival, Goldstar, had made a similar move[8]), transferring production capability accumulated at home.

The experience proved unsuccessful and the firm started to divest from the USA in 1989 and shift to Mexico as part of a low-cost strategy. There were two main reasons for the retreat: the US production organisation failed both to develop high-end products for the American market and to link with local component suppliers, continuing to rely on components from its Korean factories.

In general, the US affiliate failed to upgrade overall capabilities in strategic marketing. There was no effective interaction between the marketing and production departments. This case is totally different from that of its Japanese rivals who had superior technological capabilities; they succeeded in providing high-end products and linked well with local component suppliers, continuing to rely on components from its Korean factories.

In the 1990s, Samsung faced new competitive requirements. The consumer electronics goods produced by Japanese overseas affiliates started to penetrate into the low-end global market where Korean firms had predominated (although not under their own names) until the late 1980s. Here was a strong challenge for Samsung. The Japanese brands competing in the ASEAN region were cheaper than the products made in Korea. In the case of microwave ovens, the cost of the Sanyo product, manufactured in Southeast Asia for the OEM market, was 13 per cent cheaper than that made in Korea.

Moves by Japanese and other Korean electronics firms seem to have induced Samsung to adopt a “follow-the-leader” strategy[10]. In the mid-1980s, Japanese companies such as Matsushita, Toshiba, Sony, and Sanyo started to move into Southeast Asia to establish production subsidiaries. For instance, Matsushita's foreign investment projects in Southeast Asia and China numbered five in 1987, four in 1988, three in 1990, four in 1991, three in 1992 and eight in 1993 (Itoh and Shibata, 1994).

The consumer electronics goods produced by Japanese overseas affiliates started to penetrate into the low-end global market where Korean firms had predominated (although not under their own names) until the late 1980s. Here was a strong challenge for Samsung. The Japanese brands competing in the ASEAN region were cheaper than the products made in Korea. In the case of microwave ovens, the cost of the Sanyo product, manufactured in Southeast Asia for the OEM market, was 13 per cent cheaper than that made in Korea.

The same is true for the components. Matsushita started to produce CRTs and tuners in Southeast Asia, and expanded into China (Nihon Keizai Shimbun, 21 Apr 1992). Sony built a color CRT plant in Singapore (Nihon Keizai Shimbun, 27 Nov 1989). Toshiba, Matsushita, and Hitachi also established CRT production in the USA. Similarly, Asahi Glass and Nippon Electric Glass (NEG) set up overseas operations.

It should not be overlooked that Samsung's recent thrust into offshore production was enabled by its successful accumulation of technological capabilities which could now be transferred. Nearly all of Samsung's foreign affiliates are engaged in the production of standardised products, utilising mass production capability transferred from Korea. It has been able to build on its initial forays into foreign production.

However, Samsung's centralised structure has limited the transfer of technological capabilities to overseas affiliates, even as they face new competitive requirements. Samsung's affiliates have been forced to interact with a growing variety of economic actors, including those within the group. Hence, each organisation in the network requires a greater autonomy to avoid bureaucratic paralysis in the network as a whole. In early 1995, shortly after a wave of administrative consolidation had swept over its Korea-based operations, Samsung extended the concept to its offshore production networks by designating five regional headquarters around the world[11]. Of the five, two were in Asia. Their locations - Singapore and Beijing - were

Challenges and response

The 1990s have presented Samsung with a number of challenges requiring adaptive strategies. One of the key strategic shifts has been an increasingly aggressive globalisation of production.

Globalisation of production and centralized organisation

Samsung's earliest overseas production efforts were a Portuguese joint venture operation started in 1982, a US subsidiary established in 1984, and a subsidiary set up in Mexico in 1988. They had competence in the production of CTV sets and many core components. By the end of 1988 it also had 12 sales subsidiaries outside Korea.

Following unsatisfactory results with US production, Samsung focused more intensely on establishing low-cost manufacturing plants in Mexico, peripheral Europe, and Southeast Asia. Several factors stimulated this move. One of the important motivations for Samsung's international production may have come from the strategies of its rivals.
the relative separateness of the two offshore production networks that had been created by Samsung in the region.

SEC’s in-house R&D operations have also continued to be centralized. The hierarchical integration has failed to provide researchers and engineers with satisfactory R&D circumstances. According to company surveys (reported in Koh, 1992, p. 36), Samsung engineers complained most about: an unsatisfactory R&D working environment (54 per cent); being overloaded with projects (30 per cent); insufficient time for the feasibility study of future projects (27 per cent); and being overwhelmed with documentation and paperwork requirements (26 per cent).

Many of the organisational problems that hindered the development of effective product innovation in the past continue to plague SEC. Koh (1992) reported that production departments are seldom involved in the early stages of new projects, that projects were chosen by the corporation on the basis of their expected short-term impact on individual strategic business units, projects reflecting a longer-term outlook were likely to be suppressed by marketers or by the Subs themselves, and that communication was poor among marketing and engineering departments and the company’s R&D center (Koh, 1992, pp. 36-7).

Perhaps to decentralise some of its innovative activities away from this inauspicious environment, SEC went overseas, establishing foreign design centers in order to upgrade its product development capability. The centers have been established in each of Samsung’s main market regions to help develop products better suited to local needs, following a pattern already well established by its Japanese rivals[12].

The first such center was established in the consumer electronics bastion of Osaka in 1991 with five employees for audio and video products. The following year, a center was set up in Frankfurt, Germany, for the development of products to be distributed in Europe. In 1994 SEC set up Samsung Design America in the USA for consumer electronics products for the US market in cooperation with a local design corporation, IDEO (US). In early 1995, SEC established a product planning post in Southeast Asia for the development of regionally marketable product models. Its activity has currently been limited to collection of market information with only three Korean personnel.

Table VII shows evidence suggesting that Samsung’s regional focus began to pay off rapidly in its European market.

SEC’s market development activities were confined to the USA and Europe. It is not surprising that recognition of the Samsung brand name in Asia is relatively weak.

### Samsung’s production networks in Asia

#### Overview

Asia has been an important destination for Samsung’s direct investment for a number of reasons. In addition to the company’s interest in recovering cost competitiveness by utilizing the low-cost resources available in Southeast Asia, it was also pursuing some of the major customers for its components as well as some of the world’s most dynamic markets.

Tables VIII to X show how Samsung’s networks in Asia spread rapidly since 1989, when it opened a TV assembly plant in Thailand for low-end products. Samsung’s production in Asia ranges from end-products to components, and has spread from ASEAN to China, Vietnam and India. Currently, the regional network has two central nodes located in Singapore and Beijing.

A Singapore-based purchasing office was established in 1991 to speed up the internationalisation of production, in part by being a supplier of low-cost parts for Korea-based production sites. Ironically, the purchasing office has directly bought components from Korea-based components suppliers because it is cheaper than going through SEC headquarters in Korea. The office has grown dramatically since its creation and was eventually able to satisfy Singapore’s requirements for the preferential tax treatment granted to regional headquarters.

The vertically integrated operations in China were set up more quickly than those in Southeast Asia, possibly reflecting the firm’s increased confidence in overseas production. Since 1994, Samsung has announced the creation of other integrated production complexes in its strategic markets[13].

To date, interaction between Samsung’s two Asian sub-networks has been mostly limited to CRTs sent from Malaysia to a China CTV affiliate and Chinese-made VCR components sent to a Thai affiliate. This is because two sub-networks were originally designed to serve two largely separate Asian markets. The key intermediary is the Singapore-based purchasing office, which purchases and distributes a huge amount of components among the Samsung affiliates and those of their Japanese counterparts in the regions[14].

However, the most important intra-firm transactions are still highly centralised, occurring between the affiliates and the Korea-based product division, or between the affiliates and the Korea-based global
marketing division (in charge of export arrangements).

The separateness of the two sub-networks may prove a competitive disadvantage. Japanese producers in the region usually divide their product mix geographically according to the subsidiary’s technological capability, facilitating the achievement of scale economies. By comparison, Samsung’s production networks in Asia are still at a primitive stage, incorporating certain redundancies.

The weakness of Samsung’s performance in the consumer goods sector meant that it found itself with excess capacity in its overseas plants. In practice, this has meant that the offshore plants are underutilized – in spite of their vocation to improve cost-competitiveness – because Samsung’s employee evaluation system is oriented to performance at the plant level, making employees resistant to transferring production overseas when no activity would fill the void at the Korean plant.

This has been much less of a concern in the case of plants producing components, which have been able to sell the majority of their output to other firms operating in the region, particularly Japanese affiliates. Samsung’s Asian networks have thus been able to build on the company’s past history of OEM relationships with Japanese companies. For example, two component-producing subsidiaries – SEM-Thailand and SED-Malaysia – supply more than 80 per cent of their output to Japanese companies.

In fact, Samsung’s Asian television production network has been deeply enmeshed virtually from its inception with those established earlier by Japanese firms. For example, not only does the CRT producer SED-Malaysia sell the bulk of its output to nearby Japanese affiliates of Sanyo, Matsushita, Sharp, and Funai, it also sources about a third of its total components from mostly Japanese suppliers such as NEG and Asahi[15]. Clearly, the establishment of offshore production has led to complex interdependence between Samsung and its Japanese competitors.

### Table VII
Local market share of Samsung brand products (percentage)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave ovens</td>
<td>Spain</td>
<td>4.5</td>
<td>11.1</td>
</tr>
<tr>
<td>Microwave ovens</td>
<td>Netherlands</td>
<td>16.0</td>
<td>24.2</td>
</tr>
<tr>
<td>Facsimile machines</td>
<td>UK</td>
<td>15.0</td>
<td>21.0</td>
</tr>
<tr>
<td>VCRs</td>
<td>Spain</td>
<td>10.7</td>
<td>16.6</td>
</tr>
<tr>
<td>Cordless phones</td>
<td>Sweden</td>
<td>20.0</td>
<td>23.0</td>
</tr>
</tbody>
</table>

Source: The author’s interviews with SEC in Korea during November 1994

### Table VIII
Evolution of Samsung’s international production networks in Asia

<table>
<thead>
<tr>
<th>Year</th>
<th>Thailand</th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>China</th>
<th>Vietnam</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>CTV</td>
<td>REF</td>
<td>REF</td>
<td>IPO</td>
<td>Audio</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VCR</td>
<td>VCR</td>
<td>CRT</td>
<td>products</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Audio</td>
<td>Audio</td>
<td>(SED)</td>
<td>components</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MWO</td>
<td>MWO</td>
<td>IPO</td>
<td>keyboards</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>CRT</td>
<td>CRT</td>
<td>IPO</td>
<td>(SEM)</td>
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<td>(SC)</td>
<td>(SC)</td>
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<td></td>
<td>VCR</td>
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<td></td>
<td></td>
<td></td>
<td>components</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tuners, VCR</td>
<td>heads, motors</td>
<td>CTV</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(SEM)</td>
<td></td>
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</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RHQ</td>
<td>CTV</td>
</tr>
<tr>
<td>1991</td>
<td></td>
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<tr>
<td>1992</td>
<td></td>
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<tr>
<td>1993</td>
<td></td>
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<tr>
<td>1994</td>
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<tr>
<td>1995</td>
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</tbody>
</table>

Note: REF = refrigerators, W/ M = washing machines, FBT = flyback transformers, DY = deflection yokes, CRT = cathode ray tubes, CPT = color picture tubes, MWO = microwave ovens, IPO = international procurement office, RHQ = regional headquarters

All affiliates established by SEC except as indicated

Source: The author’s interview and Samsung internal publications (various years)
It was the presence of its Japanese customers that permitted Samsung to reduce the risk inherent in starting capital-intensive production overseas. For example, having already become a successful supplier of CRTs to Japanese CTV producers, SED could be reasonably certain that its Malaysian affiliate could meet demanding Japanese quality assurance requirements (SEM, 1990, p. 238). SED-Malaysia fills a specific role in the regional division of labor of Japanese firms; by providing 14-inch CRTs, it permits the component subsidiaries of Japanese producers to specialise in larger, higher-value added picture tubes.

Samsung's production presence in Asia is increasingly connected to marketing objectives. To that end, the firm has established ties with mainland and overseas Chinese partners, typically as a prerequisite for market entry, in addition to establishing its own distribution channels. Its local joint ventures are thus the mirror of those it established in Korea in the 1970s with Japanese partners, trading production know-how for market access - only now the know-how is Samsung's.

### Table IX

<table>
<thead>
<tr>
<th>Country</th>
<th>Affiliate name</th>
<th>Products, establishment date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>SEM-Thailand</td>
<td>CTVs, VCRs and washing machines, 1988</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Samsung Maspion Indonesia</td>
<td>Refrigerators, 1989</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Samsung Electron Devices</td>
<td>CTVs, 1991</td>
</tr>
<tr>
<td>Malaysia</td>
<td>SEM-Thailand</td>
<td>CRT components, 1990</td>
</tr>
<tr>
<td></td>
<td>Samsung Metrodata Electronics</td>
<td>VCRs and audio products, 1991</td>
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<td></td>
<td>Samsung Electronics Malaysia</td>
<td>Microwave ovens, 1991</td>
</tr>
<tr>
<td></td>
<td>Samsung Corning (Malaysia)</td>
<td>CRT glass bulbs, 1992</td>
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</tbody>
</table>

### Table X

<table>
<thead>
<tr>
<th>Region</th>
<th>Affiliate name</th>
<th>Products, establishment date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tianjin</td>
<td>Samsung Corning Tianjin</td>
<td>Rotary transformers, 1992</td>
</tr>
<tr>
<td></td>
<td>Tianjin Samsung Electronics</td>
<td>VCRs, VCR decks and VCR drums, 1993</td>
</tr>
<tr>
<td></td>
<td>Tianjin Samsung Electro- Mechanics</td>
<td>VCR drum motors, tuners 1993</td>
</tr>
<tr>
<td></td>
<td>Samsung Aerospace Industries Tianjin Tongguang</td>
<td>Cameras, 1994</td>
</tr>
<tr>
<td></td>
<td>Samsung Electronics</td>
<td>CTVs, 1995</td>
</tr>
<tr>
<td>Guangdong</td>
<td>Dongguan Samsung Electro- Mechanics</td>
<td>Speakers, keyboards, etc, 1990</td>
</tr>
<tr>
<td></td>
<td>Huizhou Samsung Electronics</td>
<td>Audio products, 1992</td>
</tr>
<tr>
<td></td>
<td>Suzhou Samsung Electronics</td>
<td>Refrigerators, microwave ovens, washing machines and air-conditioners, 1994</td>
</tr>
</tbody>
</table>

In at least one case, an affiliate established for the local market (in Indonesia) was forced by poor performance to shift to exports. But more generally, sales were able to shift from export to local markets.

So far these locally-oriented operations have achieved local and even regional linkage between production and marketing activities, but design and product development activities still belong to organisations in Korea: "... we continue to move Korea-based manufacturing sites overseas. Instead, leave the concept of design, development, research institutions at home" (Samsung, 1993, p. 145). But this has left a void at affiliates for which the local market is important. For instance, the Indonesian affiliate distributing CTVs to the local market is searching for locally marketable products that differ from the products designed in Korea for global markets.

In early 1995, SEC formed a new product planning post at its Singapore-based regional headquarters. The team was to concentrate on supporting product design and development activities targeted to the Asian regional market. Yet, there is no sign that this team has actively interacted with the group affiliates (or with non-affiliated organisations). Yet SEC is under pressure to carry out product design closer to individual markets as Japanese and European rivals have increasingly done, frequently co-locating product design with offshore production. Recently, a new executive officer who had worked for the department in charge of product development has been assigned to the Indonesian refrigerator affiliate, signalling a possible decentralisation of product development within the region.

The component-producing affiliates are also experiencing product design difficulties. They currently lack the capability to implement minor changes requested by non-affiliated customers in the region, and are forced to forward all requests back to Korea. Samsung is thus unable to compete effectively with numerous other rivals which have already decentralised such capabilities. Thus one of Samsung's continuing challenges is to make the leap from mass to flexible production.

But even as they try to exploit local markets, Samsung's Asian affiliates are part of a global production network, supplying a considerable number of components to Samsung affiliates in Europe and America. Examples include: SEM-Thailand which has supplied parts to SEC in Europe, Brazil and Korea; SED has exported 14-inch CRTs to Mexico; SED-Indonesia has assembled PCBs for a Portugal based VCR plant; and SED-Malaysia...
Youngsoo Kim
Technological capabilities and Samsung Electronics' international production network in East Asia

has been supplying electron-guns for CRTs to SED-Germany, and SED-Mexico.

Much as its Japanese partners did in the 1970s, Samsung has trained the employees in its Asian affiliates, often by sending them to Korea, or by sending Korean trainers to the affiliate. The Korea-based plants play a central role in Samsung's regional technology network. This differs from the practice of Samsung's Japanese rivals in the region, whose training sites are increasingly offshore.

In 1990, 40 technicians from the recently-established refrigerator plant in Indonesia were sent to a Korean factory for three months. One-third of the workers at Samsung's microwave oven plant in Malaysia were also trained in Korea, and Korean technical instructors also trained local workers (SEM M, 1993). A major glass bulb factory in Malaysia sent local technicians to Korea for training both before and after operations started (SC, 1994, p. 315). The heads of production lines at a components plant in Thailand received more than three months training in Korea, and 15 Korean technical instructors were dispatched to train local employees (SEM M, September 1989).

Little is known about the level of local linkages of Samsung's affiliates. One Indonesian affiliate reported local content ratios of 15 per cent for audio components and only 5 per cent for VCRs in 1992, its first year of production. At the Thai and CTV affiliate, the initial level of local content was about 10 per cent. Within several years, the ratio of components sourced from local and nearby regional suppliers had risen above 50 per cent. It was also reported that three Korean components suppliers moved to Malaysia to supply Samsung's microwave oven plant, showing that local content does not necessarily mean linkages to locally-owned firms. The Malaysian CRT plant is also anticipating the arrival of Korean suppliers. Dongguan Samsung Electro-Mechanics, a producer of audio components and computer keyboards in China, procures 80 per cent of its materials from Korea versus 19 per cent in China.

Summary and conclusion
This case study of Samsung reveals a dynamic interaction between firm capabilities and international production networks. In the early stage, when Samsung was building capabilities, foreign linkages were needed for technology and marketing. As the group's capabilities grew, it ventured into international production. However, its capabilities in mass production were inadequate to ensure the success of its initial efforts to bypass trade barriers in its major markets by building offshore production bases there. It was only following a re-orientation of its international production to low-cost operation in peripheral areas that it was able to correctly match its current capabilities with its network structure. Meanwhile, it has re-oriented the nature of its non-production linkages with foreign firms to help foster the development of the design and marketing capabilities it has lacked in the past, frequently through acquisition.

Internationally, the Samsung Group's electronics activities have suffered from an almost complete de-linkage between production (in Asia), marketing (in the USA and EC), and design and development (in Korea) over the two decades after the 1970s. This paper tends to confirm the argument by Kogut and Zander (1993, p. 635) that the key to successful international production is "...to recombine the knowledge acquired at home with the gradual accumulation of learning in the foreign market". Thus Samsung's affiliates in Southeast Asia were gradually able to increase the percentage of output sold in the local market, relying at first mostly on exports. Yet the continued centralisation of product development has slowed the learning process in offshore affiliates.

Given the weakness of product development in the Korean electronics sector, it is possible that centralisation is necessary during the period in which major innovation capabilities are acquired. But we have already seen that this leaves offshore production centers vulnerable as they try to penetrate local markets in competition with rivals who use minor change capability to tailor products for local customers.

The different technology management pattern established by Samsung's Japanese rivals seems to be relevant. The major Japanese consumer electronics firms have decentralised minor product change capabilities at many of their production affiliates in Southeast Asia, increasing the flexibility of their production networks and freeing up engineering resources in Japan for more valuable work.

Foreign direct investment has helped Korean firms maintain their competitiveness in low-end goods, but they have not completely succeeded in the transition to higher-value production back home that is required after a massive relocation of productive resources. They have partly responded by finding new, more complex products to mass-produce, such as advanced flat panel displays. But this merely postpones the transition to market-driven product
development that will be necessary for continued competitiveness.

The challenge for Samsung (and for other Korean electronics firms) in the context of its international production network is to successfully develop and transfer adaptive product design know-how to its offshore affiliates. Improvement of the competitive advantage of overseas affiliates is directly dependent on how quickly a firm can create and diffuse required capabilities which properly adapt to changing conditions. Deeper linkages within Samsung's organisational network both in Asia and around the world will be needed to face the next round of competition in the electronics sector.

Notes
1 This is based on the figures published by the Investment Mission, Ministry of Economic Affairs, Republic of China in 1992. It is generally believed that the real figures are far bigger than the ones published because of unreported flows to mainland China.
2 The value of its offshore production in 1994 was US$1,050 million, compared with US$550 million for Goldstar, and US$550 million for Daewoo (Korea Economic Daily, 1994).
3 It is also not surprising that Samsung entered the international DRAM market in 1983 the year when the government again promoted the semi-conductors market policy.
4 Samsung (SEC, 1989) claims that to achieve this, it needed a large industrial complex in which to build several plants. It therefore bought a single block of land of about 1.5 million sq. m, which was larger than Sanyo's electronics complex in Japan in the late 1960s.
5 Examples are: hi-fi VCRs over three years (1987), for which Toshiba sent SEC technical advisers (SEC, 1989); two of the licensing agreements with Sanyo were: for microwave oven technology, over five years (December 1994), for which Sanyo sent technical experts to train SEC's employees (SEC, 1989); In May 1985, SEC made a five year licensing agreement with Matsushita for magnetron production technology, for which Matsushita dispatched technical experts to SEC and SEC sent its technical personnel to Matsushita-Japan to train for five years (SEC, 1989, p. 371); in August 1983 Sony licensed Samsung to produce VHS-VCRs over five years.
6 In 1988 SEC acquired the Micro Fine Corporation of the US to complement technological capability in the computer sector, and set up Samsung Software America (SSA) in Boston. The objective was to acquire advanced software technologies but also to establish a US marketing base for computer exports. In October 1989 SEC established Samsung Information Systems America Inc. (SISA) in San Jose, California, to support export activities and gather further technology for information and telecommunications products (Koh, 1992).
7 The dumping rate was preliminarily charged on three leading electronics firms: 3.87 per cent (Goldstar), 3.05 per cent (Samsung) and 1.77 per cent (Daewoo). Their export growth in three consecutive years from 1983 to 1985 remained without significant change.
8 In 1982 Samsung had implemented a pilot project in Portugal where it established its first overseas production joint venture in cooperation with Portuguese and British partners, in order to gain international production experience (SEC, 1989).
9 See Kinugasa (1982) for the case of the Matsushita's international production strategy in the USA.
10 The concept is developed in Knickerbocker (1973). For FDI of Korean electronics firms, see Jun and Simon (1992).
11 America regional headquarters (HQ), consisting of five sales affiliates, two production affiliates and four branch offices: Europe regional HQ, with eight regional sales affiliates, five production affiliates and five branch offices; China regional HQ, which has two sales affiliates, four production affiliates and four branch offices; Southeast Asia regional HQ, with two sales affiliates, four production affiliates and eight branch offices; and Japan regional HQ, consisting of one sales affiliate and one branch office (SEC, 1995).
12 See Tsuda and Shinada (1995) and Baba and Hatashima (1996) for the recent trend of product development activities by Japanese electronics firms in East Asia.
13 Two examples in Mexico and the UK are: (1) Tijuana integrated electronics complex is building factories in a land area of 600,000 sq. m. This complex is scheduled to be completed in 1996. It will contain a number of production subsidiaries belonging to SEC, SEM, SED, SC and Samsung Aerospace; (2) Wymond industrial complex in the UK, where Samsung plans to invest $US 720 million, is building factories. The complex will cover an area of 760,000 sq. m. It plans to start producing microwave ovens, personal computers, monitors, fax machines, colour CRTs, wireless phones, and DRAMs (SMM, 1994).
14 The purchasing office has been extended to form a link not only between two sub-networks and the Korea-based non-affiliated component suppliers, but also between the Korea-based production sites and a number of non-affiliated economic actors in the region.
15 Source: The author's interviews with Samsung Asian affiliates during July 1995. These relationships suggest that the "opening" of Japanese production networks in Asia since the early 1990s is due at least partly to the emergence of Korean component suppliers in Southeast Asia rather than to the use of locally-based suppliers. For discussion about Japanese electronics firms' international production networks in Asia, see Ernst (1994b).
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Application questions

1. How does this study of Samsung differ from others you have read involving US or European firms in similar industries? Explain the differences, if any.

2. Based on the author’s analysis, what might be next for Samsung?