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PROJECT EXECUTION CAPABILITY, ORGANIZATIONAL KNOW-HOW, AND CONGLOMERATE CORPORATE GROWTH IN LATE INDUSTRIALIZATION

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1. Introduction

In many successful late-industrializing countries in the twentieth century that are historically, culturally, and geographically distinct, business groups with operating units in technologically unrelated industries have acted as the microeconomic agent of industrial growth. This was the case in prewar Japan and continues to be the case in postwar Argentina, Brazil, India, Malaysia, Mexico, South Africa, South Korea, Taiwan, Thailand, and Turkey. Why this business form has characterized countries industrializing "late" --- a process of borrowing foreign technology in the absence of any proprietary products or processes in the marketplace ---, and why it succeeded in the early phases of catching-up whereas the advanced-country conglomerate has had an undistinguished performance, are the issues explored in this paper.

A seminal work by Nathaniel Leff (1978; 1979) emphasizes that business groups evolved in response to the acute market imperfections in products, finance, and information associated with underdevelopment. While acknowledging the significance of market imperfections as the background to the emergence of groups, we go one step further and use internal resource-base theories of the firm (Penrose, 1959; Nelson and Winter, 1982) to explore the significance of organizational knowledge and resulting increasing returns in the group form which, even in mature markets and especially in late industrialization, constitute a sustainable source of competitiveness. The operational premise of internal

resource utilization approaches to diversification is that firms can exploit assets such as specialized capital equipment, technological and organizational know-how, and goodwill owing to economies of scope of sharable inputs and transaction cost-economies (Williamson, 1975; Teece, 1980, 1982; Baumol, Panzer, and Willig, 1982; Levy and Harber, 1986). They can utilize these resources more efficiently for internal diversification than external sale or lease because such resources cannot necessarily realize their full value on the market. In the case of late industrialization, however, this internal resource-based diversification does not initially come from the production process (as is assumed in Teece, 1982) because of a technology constraint. Rather, it originates in foreign technology acquisition which, thus, becomes a necessary condition for corporate success. In the best diversified business groups, the capability to acquire foreign technology is transformed into organizational know-how that provides a key resource in the effectiveness of corporate growth through diversification.

In the first two parts of the paper we briefly survey diversified industrial groups in historical contexts and then across a broad array of late-industrializing countries. Then we consider the historical specificity of diversified business groups in late industrialization by discussing three questions: Why wasn't diversification prevalent among firms attempting to catch-up in earlier historical periods? Why was the strategy of leading late-industrializing firms one of

diversification rather than specialization? Why was their chosen diversification path one involving technologically-unrelated industries? We next present our core argument about the transformation of technology acquisition into a competitive asset, and then illustrate our points with evidence from South Korea, where big diversified industrial groups in mid-tech industries have gained an especially large share of world output. Finally, we analyze why the behavior of the late-industrializing group differs from that of the American conglomerate.

2. Overview: Historical Paradigms of Technology Acquisition

Owing to the coalescence of an international technology market at the time of late-industrialization, any cash-rich firm theoretically could borrow foreign technology and instantly establish itself as an oligopolistic domestic player in a capital-intensive, "mid-tech" industry (Amsden, 1989). This potential to employ foreign technology was unavailable to earlier firms attempting to catch up at a time when world technology markets were still ill-defined (witness, say, Britain's strict prohibition of textile technology exports during the First Industrial Revolution, which forced Samuel Slater to memorize British know-how in order to establish his American textile mill, compared with the RCA Corporation in the 1950s, which "remained prepared to license its technology to almost anyone who asked and would pay the fee" (Sobel, 1986, p. 152)).

Despite the availability of foreign technology, however, large firms in the particular historical context of late-industrialization could no longer grow through a progression similar to the Chandlerian pattern followed by big business dating from the Second Industrial Revolution: first specializing in producing a narrow product line based on proprietary technology, and then diversifying into related industries (Chandler, 1977; 1990). This is because those very large industrial enterprises that arose in the late nineteenth century in the United States and Germany (and to a lesser degree other European countries) achieved Schumpeterian technological and organizational breakthroughs which, in turn, resulted in the formation of international oligopolies, both in product markets and in technology generation (Hikino and Amsden, 1994). Latecomers, therefore, faced entry and growth barriers based on first-mover advantages in many of the new, capital-intensive industries (Chandler, 1990, ch. 2). As long as the incumbents continued to generate radically new products and processes within their technology trajectories and dominate global markets, challengers were defensively forced to adjust their growth strategies within the competitive rules and regulations set by these oligopolistic players.

Latecomers could borrow foreign technology and utilize low factor costs such as wages and possibly subsidized credit to enter the bottom, soft segments of oligopolistic markets. But until they themselves became major innovators, they could

not expand into higher segments, and, thus, their overall potential to expand in these sectors was limited. Instead, latecomers were forced to grow through diversification. In the absence of proprietary technology to exploit in related industries, and in the presence of potentially high profit rates in "pre-modernized" start-up industries, their pattern of diversification tended to be opportunistic and technologically unrelated.

When initially expanding, the most successful business groups experienced a large number of technology acquisition transactions, first in borrowing foreign technology to establish and expand plants in their "flagship" or original industry, and then in importing technology to diversify, or enter new industries. The greater the number of technology acquisition transactions they engaged in, the greater their potential to unpackage technology imports and acquire (internalize) the skills involved in such projects. Moreover, the greater their experience, the greater their ability to routinize this function and free up human resources for other tasks. Step-by-step, rather than in a great Schumpeterian leap, the best business groups in late-industrialization mobilized project execution skills in-house. These were generic skills, originating from foreign technology acquisition, applicable to many industries, and diffused among industry-level subsidiaries within an organized internal labor market fostered by deliberate group-level training and coordination. The mobilization of

"fungible" skills in project execution through internalization served as a shared resource (Teece, 1982), which enabled diversification to occur at lower cost (and greater speed) than if such skills were bought for each diversification transaction in the market. In turn, skills related to project execution tended to have a positive spillover on acquiring plant-level production capability, another aspect of technology acquisition.

Although project execution skills may become a shared asset for the group, they remain too tacit to become a public good, as in the case of, say, the patent of a specialized firm. Therefore, project execution skills may be assumed to be perishable: unless they are used, they are lost. Their perishability is especially likely if managers or engineers who embody such skills are not given an opportunity to use them. Unlike physical assets, human assets may individually or collectively exit from the firm. Project execution skills may then become marketable: people who embody them try to capture their market value by spinning off a venture after they exit, for instance, thereby increasing competition for the incumbent.

Sharable human capabilities at the group level also involve functions other than expansion-induced project execution, such as transactions related to dealing with a developmental state. The shared resource involving project execution, however, is among the most important and tends to be subject to increasing returns if the group succeeds in

diversifying further. This is because the "remembering-by-doing" of technology acquisition is itself constantly changing, analogous to the learning-by-doing related to changing product composition of the specialized economy theorized by Lucas (1988) and Stokey (1988).

3. Divergence and Convergence Among Diversifiers

Big businesses from late-industrializing countries have dramatically increased their share of world output relative to those from advanced economies (see Table 1). Of the world's 500 largest industrial enterprises, Japan expanded its share from 31 in 1962 to 128 in 1992. Excluding Japan, the share of late industrializers rose during this period from two to 33. Of those 33, as many as 12 were from South Korea (which is why we use South Korean evidence later to illustrate our points). /1

By comparison with big business in developed market economies, big business in late industrialization is characterized by a relatively large proportion of: (a) foreign-owned firms (although foreign-owned firms are also prevalent in an advanced economy such as Canada); (b) state-owned enterprises; and (c) diversified business groups. The predominance of large foreign-owned firms in the "South" tends to be greatest in Latin America. In 1987, four out of Mexico's ten largest companies were estimated to be foreign-owned (depending on how state companies are defined), all in the automobile industry. The comparable number of foreign-

owned firms for Brazil was three (all in petroleum). By contrast, neither Taiwan nor South Korea had any foreign-owned firms among its top ten business enterprises (Gereffi, 1990).

With respect to ownership and business structure among only indigenous, locally-owned enterprises, Table 2 reveals sharp differences between advanced and late-industrializing economies. Among the biggest 70 companies from advanced economies, only six were state-owned. All the rest (ranked in terms of sales in 1987) were located in Chandlerian scale-intensive industries such as chemicals, electrical machinery, and transportation equipment, and most of them were administered by salaried managers. By contrast, of the top 70 industrial enterprises from late-industrializing economies, as many as 39 were state-owned, clustered mostly in resource-related, scale-intensive industries such as petroleum (28 companies out of the total) and primary metals (which includes iron and steel).

The importance of the diversified group structure among indigenous private enterprises from the "South" compared with the "North" is also evident in Table 2. Out of the 31 largest private industrial enterprises from the South, as many as 26 were diversified groups. By contrast, out of the 64 largest private industrial enterprises from the North, none was a widely diversified group or conglomerate.

Table 3 gives a further breakdown of the largest 31 late-industrializing private enterprises. Whatever the

region, the structure of the great majority of them is the diversified group. Only five out of the largest 31 private late-industrializing companies were specialized, three in chemicals and food. Almost all were owned and controlled by families, but had managerial hierarchies.

In terms of the industry distribution of the 200 largest operating units from late-industrializing countries (including the subsidiaries of state-owned firms but excluding those of foreign multinationals), 42 were in petroleum-related industries. Another 29 were in "high-tech", although typically in the labor-intensive, bottom-end of high-tech sectors. As many as 60 were in mid-tech industries (Hikino and Amsden, 1994). It is largely companies in mid-tech industries (as well as companies attempting to move out of the lower segments of high-tech sectors) that confronted technological barriers to global expansion in the early 1990s.

Diversified business groups in late industrialization emerge from different backgrounds. Thus, from many distinct historical patterns and roots there is a convergence towards a similar unrelated diversification strategy and group structure, with diversification and convergence accelerating after World War II. Even within a region, the origins of industrial groups are diverse, as the following brief survey suggests. /2

In the case of Asia, the generalists who established South Korea's chaebol arose out of the rentseeking and

business opportunities surrounding American foreign aid allocation in the 1950s (Amsden, 1989; 1994). For instance, the Samsung group (ranked second in Table 3) had an indifferent start in overseas trading in 1938 but revived in 1953 with the establishment of a subsidiary in a typical import-substitution and capital-intensive industry, sugar refining. The Hyundai group (ranked first in Table 3) started as an automobile repair shop and then prospered as a construction firm during the Korean and later Vietnam wars. As in Japan, the chaebol benefited from government incentives. The Daewoo group, with a ranking of four in Table 3, was unusual in growing largely through acquisition, mainly of ailing government-owned factories at bargain prices (Jones and SaKong, 1980; Kim, 1987; Aguilar, 1985b).

In Taiwan, state-owned enterprises and relatively small diversified industrial groups have been more prevalent than in either Japan or Korea. Whereas in 1987 only one of ten top Korean firms was state-owned, the comparable figure for Taiwan was four (depending on how a public enterprise is defined) (Gereffi, 1990). A typical small diversified business in Taiwan is the Aurora group, with 12 strategic business units but only 4,000 employees and total sales (in 1990) of merely $370 million (Wu, 1992).

Nevertheless, large private enterprise has hardly been absent in Taiwan: in the early 1970s, Taiwan had a larger share than Korea of manufacturing output accounted for by firms with over 500 workers (Amsden, 1991); among the

"South's" top 200 operating units in 1985, as many as 18 were from Taiwan, the same number as from Brazil (Hikino and Amsden, 1994). As indicated in Table 3, one of Taiwan's most diversified groups (Formosa Plastics) and one of its most successful specialized firms (Tatung), ranked 14th and 24th among the South's largest private companies. Taiwan's Far Eastern Group, originally based in textiles and forced to diversify due to bleak market prospects, was cited by the McKinsey consulting firm as one of East Asia's leading diversified companies (Chu and MacMurray, 1993).

Taiwan's diversified groups would probably be larger were it not for government opposition to the emergence of private economic concentration (ethnic differences once divided the Taiwanese business community and the Mainlander government). According to a history of Formosa Plastics, the government refused its request to diversify into ethylene production because it conflicted with the investment planning of state-owned China Petroleum Company (Taniura, 1989). In 1993 permission was denied to Formosa Plastic's proposal for a major investment in China. On the other hand, where big business has arisen in Taiwan, the government has played a key role, as in Korea. In Formosa Plastics's case: "we cannot by any means ignore the forward-looking attitudes taken by those [government bureaucrats] who lent support to the [founder's] enterprise" (Taniura, 1989, p. 69).

In Hong Kong, British merchant houses were active in the creation of groups, such as Swire Pacific and Jardine

Matheson (ranked 16th and 18th respectively in Table 3). The Hutchison-Whampoa group (ranked 27th) was also established by a British trading house, with subsidiaries spanning petroleum and telecommunications (in Britain). A 40% controlling interest was ultimately acquired by the Cheung Kong property company, which began a process of transferring management from expatriates to ethnic Chinese, with a new strategy to expand in China.

Diversified industrial groups have been prominent throughout southeast Asia. In Malaysia, most groups emerged out of the plantation and mining operations of British "agency houses," or merchant banks, such as Sime Darby and Harrisons & Crossfield, which were subsequently either nationalized or brought under government control (Saruwatori, 1991). The latter was the case of Sime Darby, which ranks 28th in Table 3. Unique among Malaysia's business groups is OCBC, whose name and influence "are synonymous with that of Morgan or Rockefeller" in the United States (Lim, 1981, p. 91). OCBC's activities span banking, insurance, tin mining and smelting, rubber plantations, trading, hotels, properties, investments, manufacturing (from engineering to brewing), and management services. Its size is unknown, however, because it is privately held by overseas Chinese entrepreneurs.

Big business in Indonesia has included state-owned enterprises and groups with Chinese, pribumi (indigenous), and military/bureaucratic origins. Of the top ten groups,

nine are Chinese-managed. Many have diversified into the automotive industry (from dealerships to car assembly and parts manufacture) as well as forestry and wood-based industries. A common trait of most Indonesian groups is involvement in finance and commodity distribution, banking, insurance and foreign trade. "This indicates the importance of merchant and usurer capital in the creation of these groups" (Kano, 1989, p. 151). Salim, one of the largest Chinese-owned groups, went from trading agricultural commodities to investments in import-substitution, and from export promotion to global diversification (Schwarz, 1991).

In Thailand, while traditional business groups arose out of rice milling and commercial banking, a new elite emerged in the 1960s in tandem with import substitution. Manufacturing became the new groups' core activity. In 1979 each Thai industrial group on average owned and controlled 16 affiliates (Suehiro, 1985). The CP group and Siam Motor groups each held as many as over 50 firms, with manufacturing activities ranging from textiles, to automobiles, to food processing (they do not appear in Table 3 because they do not provide consolidated sales figures).

Similarly in Turkey, big industrial groups emerged out of import substitution industrialization, dependent initially on government support. As in Korea, such groups lacked internal sources of finance and relied heavily on debt to finance their expansion. Turkey's biggest groups --- Koc (ranked eighth in Table 3), which produces industrial

products as well as consumer goods, and its rival Sabanci (ranked tenth in Table 3), which produces textiles, tires, and cement, among 50 or so other products, established numerous tie-ups with foreign firms (as in Thailand). Beginning in the 1970s there was a scramble to establish general trading companies in Turkey along the lines of the sogo-shosha of Japan (see Onis, 1993; Cho, 1987, discusses the attempt to form general trading companies by groups in Brazil, Korea, Taiwan, Thailand, and Turkey). The largest Turkish trading company was ENKA Marketing, with exports of roughly 5 percent of GNP in 1983, established by Turkey's fourth largest group with over 40 affiliated companies in trade, construction, and manufacturing (textile products, foodstuffs and chemicals) (Cho, 1987).

In India the dominant form of corporate control by the middle of the nineteenth century was the managing agency system, originally established by British adventurers (shareholders had to wait for a return on their investment while the agent/promoter was assured of a return in the form of a managing agent's commission). "The managing agency system was ideally suited to the Hindu joint family system in India," and provided the basis for the formation of modern diversified industrial groups (Herdeck and Piramal, 1985, p. 6). India's two major business groups, Tata and Birla (ranked seventh and fifteenth in Table 3), date to the late nineteenth century. The Tata group's founder was born in 1839 and, after a start in cotton textiles, established

India's first steel mill. The group now has subsidiaries in textiles, steel, engineering, chemicals, consumer goods, electronics, hotels, and trade (Nanda and Austin, 1992; McDonald, 1993). The Birla group was founded by a Marwaris family (the Marwaris are a Hindu community originally from Rajasthan, traditionally engaged in trade and money-lending). In 70 years the Birla group evolved into a producer of aluminum, textiles, chemicals, automobiles, jute, cement, tea, textile machinery, light engineering and other products. No fewer than 30 of the Birla group's 175 companies are listed among the top 250 corporations in India's private sector (Herkeck and Piramal, 1985; Encarnation, 1989).

Turning to Latin America, the diversified industrial group tends to be sandwiched in between foreign firms (sometimes allied in groups with local firms) and state-owned enterprises. Scattered evidence also indicates that diversification may not be quite as technologically unrelated as in Asia. In Mexico: "Of the 121 major groups, all were substantially diversified, even though they usually remained identified with a core product" (Camp, 1989: 174). Some of Mexico's biggest groups (such as Vitro, with a nucleus in glass) date from the first wave of modern Mexican industrialization in the 1890s to 1930s (Haber, 1989). An alliance among various firms, however, began to accelerate in the mid-1960s. Mexico's largest group (Industrial Alfa, which ranked 23rd in Table 3), was established in 1974 by inheriting a number of iron and paper companies when the (now

extinct) Cuauhtemoc-HYLSA group split into two (Hoshino, 1990). The largest 100 Mexican firms in 1981 were roughly estimated to account for 59 percent of GNP and 73 percent of capital (Castaneda, 1982, p. 87). The subsidiaries of the largest groups were, as in Asia, predominantly in manufacturing. The top 50 Mexican groups were estimated in 1983 to have a total of 739 companies, 439 of which were in industry (Cordero, Santin, and Tirado, 1983).

In the case of Brazil, almost two-thirds of its biggest domestic enterprises were established before World War I (Queiroz, 1962; 1965). As for the origins of Brazil's local groups, "whether established by immigrants or families long rooted in Brazil, one of the common features of the largest Brazilian economic groups is that they moved into industry via commerce" (Evans, 1979, p. 108). By the early 1970s about half the firms among the top 100 companies were state-owned (the comparable share for the top 50 companies was even higher, roughly two-thirds), but among private firms in the top 100, about 35 were in groups (13 in private domestic groups and 22 in private foreign groups). Seven local groups, five of them highly diversified in manufacturing, were the central core of private domestic industry (Evans, pp. 152-158). The only Brazilian firm to appear in Table 3 is Copersucar, which is a cooperative in food and chemicals.

Argentina's groups also evolved in two distinct periods, the first (1860-1930) associated with agro-exports, and the second (1930-1960) with import-substitution. Bunge Y Born,

one of the largest groups, was founded by Belgian expatriates as a trading company in the first wave (Ines Barbero, 1994). Emblematic of the second phase of expansion was S.I.A.M, founded by an Italian immigrant, Torcuato di Tella, who believed as early as 1910 that while imported machines were more efficient than any produced in Argentina, a domestic model superior to either could be developed (Cochran and Reina, 1962). In 1986 the top 15 Argentine groups represented 22% of firms quoted on the Buenos Aires Stock Exchange and were among the top five producers in 30 industries (Sguiglia, 1988).

South Africa's largest business group, the Anglo-American Corporation, was formed in 1917 and has interests in an estimated 1,300 South African companies (it is now officially registered in Bermuda). It has a 34% share in De Beers Consolidated (ranked 13th in Table 3), which is involved in the distribution of some 80% of the world's rough-diamond production (Pallister, Stewart and Lepper, 1987). Barlow Rand limited (ranked fifth in Table 3), also established early in the twentieth century, started as South Africa's sales agent for Caterpillar Company (an American manufacturer of heavy equipment). This company is unique among late-industrializing groups in that it became controlled by salaried managers and its shares are publicly held and dispersed. By 1990 the group's operations involved 144,000 employees and included mining, the manufacture of cement, paint, electronics and engineering, heavy equipment,

building and construction supplies, packaging and paper, appliances, sugar, food, and textiles.

Thus, industrial groups in late industrialization have diverse origins, depending on the country: some have emerged out of industry, others from mining, banking and trade; some started with an staple export orientation dating from the nineteenth century, others began in the twentieth century with government support amidst import substitution (in Chile's case, groups were strengthened by market liberalization in the 1970s (Dahse, 1979)). Groups in late industrialization also differ according to their relation with foreign capital, and, therefore, the practical means to acquire foreign technology. Some groups, such as many Korean _chaebol_, thanks to their business strategies and/or government policies, refuse the equity participation of foreign enterprises. Others, such as Mexico's _los grupos_, aggressively seek opportunities of joint ventures. Due in part to the relatively short history of these firms, and partly owing to the underdevelopment of stock markets (and, therefore, a market for corporate control), most groups are still family controlled. Nevertheless, what is striking is that despite diverse backgrounds, industrial groups with holdings in technologically unrelated industries, particularly manufacturing, have spearheaded late industrial development.

4. Why Historical Period Matters

The historical specificity of twentieth century late industrialization holds the clue to why industrial groups did not evolve in earlier episodes of catching up, why big business in late industrialization initially became diversified rather than specialized, and why diversification took the form of technological unrelatedness.

(a) The Novelty of Twentieth Century Diversification

There is little evidence that eighteenth or nineteenth century firms in countries attempting to catch-up with the world technological frontier used a strategy of diversification as a way to expand. Textile firms in France or Germany, for instance, remained specialized in textiles throughout the period of the First Industrial Revolution (Landes, 1962). Pennsylvania iron manufacturers in the nineteenth century integrated only into coal production and railroads (Temin, 1972). Why, then, did diversification became a strategy of firms in countries attempting to catch up in the twentieth century but not earlier?

The answer, we suspect, lies in the changing nature of technology and in the deepening of international technology markets over time.

Obviously for a firm to diversify into different industries it requires different industry-specific know-how. The more technologically unrelated its targeted set of industries is, the more differentiated is the knowledge it requires. Postwar diversification by a single firm into

technologically unrelated industries was facilitated by the increasing codification of technology and interrelatedly, by the widening opportunities to buy foreign technology from advanced-country suppliers.

While no technology is ever completely documented, with all of its characteristics being fully specified and thoroughly understood (Dosi, 1988; Nelson, 1987; Rosenberg, 1976), the formation of university and industrial laboratories in Europe and the United States in the late nineteenth and early twentieth centuries subjected production technologies to greater scientific investigation and explication (for the detailed case of Du Pont with its MIT connections, see Hounshell and Smith, 1988). This codification facilitated technology transfer from one firm to another. In turn, the length of the commercial product cycle became shorter, thereby increasing the supply of technologies which enterprises were willing to sell. Simultaneously, technological revolutions in communications and transportation made the logistics of international transfer easier.

Technology flows, measured as (a) total world receipts of royalties and fees (say, for foreign licenses), (b) developed countries' exports of capital goods, and (c) technical assistance to developing countries, rose from roughly $27 billion in 1962, to $92.2 billion in 1972, to $356 billion in 1982. This is a 13-fold increase compared with only a 3-fold increase in the unit value index of all

manufactures exported by developed countries over the same time period. Royalties and fees alone, although much smaller in total value than developed countries' capital goods exports, tripled in value in the single decade between 1972 and 1982 (UNCTAD, 1987, p. 88).

(b) Diversification Vs. Specialization

Still, the availability of technology is only a permissive factor in the rise of diversified industrial groups. What remains to be shown is why firms made the strategic choice to diversify rather than specialize. By the late 19th century diversification had become a common generic strategy of all large industrial enterprises in modern economies. What varied was the nature and degree to which enterprises diversified away from their "flagship" or major initial industry.

In the case of leading multidivisional firms from advanced countries, the basis of diversification was their proprietary core technology, which they exploited in related industries (Chandler, 1977; 1990). In the case of Siemens, a German electrical giant, it used its core technology of electrical generation and transmission to diversify before the First World War into telephone and telegraph equipment, storage batteries, electro-chemicals and fertilizers, and electrical locomotives and railroad equipment (Weiher and Goetzeler, 1977). In the case of DuPont, a leading American producer of chemicals, it utilized its core technology of

organic chemicals in explosives to branch out into artificial leather, paints, dyestuffs, films, and rayon (Hounshell and Smith, 1988).

Leading firms in more "backward" European countries --- catching up beginning in the nineteenth century --- followed a similar basic pattern. In the case of Nuovo Pignone, the Italian high-tech engineering group, it was established as a foundry in 1846 and invented the world's first very high-pressure reciprocating compressor for ammonia production in 1920. By the 1990s Nuovo Pignone was still specializing in the production of compressors and gas turbines (although shortly before, it had become part of the state-owned ENI energy and chemicals concern) (Roverato, 1991). The biggest manufacturers in Sweden today also originated in proprietary technological breakthroughs during the Second Industrial Revolution: the basis of L.M. Ericsson (founded in 1876) was the telephone; that of Alfa Laval (1879), the separator; that of ASEA (1890), electrical equipment; and that of SKF (1907), precision bearings. In spite of their sheer size, these companies' product lines are still relatively focused, and their growth strategy and corporate structure have been those of multidivisional enterprises rather than those diversified industrial groups. Not all firms involved in a catching-up exercise, therefore, take the route of the postwar late industrializer and diversify broadly into technologically unrelated industries.

The difference in the behavior of European and late-

industrializing companies appears to be functionally related to the existence or nonexistence of an original, proprietary technology to exploit. The former, with pioneering products and processes, could diversify around a single technology family. The latter, without one, could not.

If the late-industrializing firm is specialized in producing a "low-tech" product with a highly labor-intensive production technology not subject to economies of scale (say, apparel), then even if it exports all its output, and even if its domestic wage costs do not rise, it can still expect to be undersold in international markets (given technology diffusion) unless it is producing in the world's lowest wage country. Barring its being located in such a country, and notwithstanding investing in incremental productivity improvements, the specialized apparel producer can expect only a finite profit-making time horizon in a world with rapid technology diffusion in labor-intensive goods. (If the economy in which the firm is operating is also growing, and domestic wages are rising, the firm's profit-making time horizon will be even shorter.) Thus, to continue to expand, the apparel producer either has to relocate in a lower wage country or diversify.

If the late-industrializing firm is specialized in producing a capital-intensive "mid-tech" product subject to scale economies, then it can also expect to reach a growth barrier (if only temporary), but one imposed by firms from developed rather than underdeveloped countries. Even if the

firm establishes a production facility of optimal scale, and even if it invests in incremental productivity and quality improvements, it can still expect to be out-competed in world markets by its technology suppliers (unless they stop or slow the pace of their own innovating). The firm in question might have grown rapidly in its early phase of foreign technology acquisition by selling in a protected domestic market or even in a "soft" export market segment. It might also grow rapidly again in the future if it can innovate on a world-scale. But in the interim, the firm faces a slow march down its learning curve, and diversification is a possible way to maintain its early growth momentum.

(c) Technologically Unrelated Diversification

Finally, it needs to be shown why the late-industrializing firm chooses to diversify so broadly, into industries that are technologically unrelated. Tables 4 and 5 illustrate the breadth of unrelated diversification in the extreme case of the two largest late-industrializing business groups, Hyundai and Samsung respectively (by the 1990s, the rank order of these two groups had reversed). Although Samsung started its career mainly in labor-intensive industries, it rapidly branched out into capital-intensive production and services. The opposite was true of Hyundai, which began mostly in heavy industry and then branched out into light-manufacturing and services. There has thus been convergence in the business composition of both groups as

each has diversified widely. This is a typical game of oligopolistic rivalry, named the "complete set principle" for Japanese postwar groups (Miyazaki, 1980).

Given access to foreign technology, unrelated diversification is a phenomenon related to economic underdevelopment and unequal profit rates across industries. In the case of a developed economy, it may be defined as having rates of profit tending towards equality within and among sectors (agriculture, industry, and services) (Kaldor, 1966). If multidivisional enterprises from advanced economies choose to diversify, then they tend to enter related industries (vertically or horizontally) in order to minimize transactions costs, which are of overriding concern under conditions of inter-industry profit equalization (Williamson, 1975).

By contrast, countries just starting industrialization usually have widely different inter-industry profit rates, with low, or undefined rates in "pre-modern" industries (awaiting transformation by foreign technology). Diversification decisions, therefore, tend to be driven not by minimizing transactions costs but by prospects of appropriating the exceptional profits available in pre-modern industries --- whether or not these industries are related to a firm's initial business focus. Of course, as Leff (1978; 1979) notes, diversification in developing countries is often motivated by the unavailability of inputs and other market imperfections that induce vertical integration and

related diversification (for the case of the Lucky-Goldstar group in Korea, see Aguilar, 1985a). On the other side of the coin, conglomerates in advanced countries also buy and sell firms in unrelated industries in anticipation of capital gains, as discussed later. Nevertheless, the lure of profits to late-industrializing firms in pre-modernized industries is both seductive in and of itself and, in practice, made more enticing still by the promotional policies of governments. Therefore, the drive in late industrialization towards unrelated diversification has tended to predominate over the drive towards related diversification dictated by considerations of minimizing transactions cost (although, as we shall see, compared to specialized firms, entry by diversified groups into pre-modern, start-up industries may be transaction-cost saving).

5. Turning Technology Acquisition Into a Competitive Asset

Every firm must have access to three types of technological capabilities: a project execution capability, a production capability, and an innovation capability (Westphal, Kim and Dahlman, 1985; Bell and Pavitt, 1993). Project execution capability refers to the skills required to establish or expand operating and other corporate facilities, including undertaking preinvestment feasibility studies, project management, project engineering (basic and detailed), procurement, construction, and start-up of operations. Production capability refers to the skills required to

operate the facilities once they are established. Innovation capability refers to the skills associated with basic and applied research and related engineering, or creating major new products and processes.

Every firm also faces a "make-or-buy" decision concerning which technological elements to buy from outside and which to make in-house (the decision to develop a capability in-house we refer to as "internalization" and "import substitution" when discussing the economy as a whole). In what follows, we analyze the make-or-buy technology acquisition decision in the context of late industrialization and restrict out attention to project execution). The late-industrializing firm typically cannot enter a start-up industry by means of acquisition (buying an existing firm) because either firms do not exist at all in start-up industries or those that do exist and are attractive to buy are not for sale (markets for corporate control typically do not exist in the early phases of such countries' development). /3 Thus, to diversify, late-industrializing enterprises must be good at executing projects related to organic expansion.

In the extreme, a late-industrializing firm can either internalize all or none of the sub-elements of a project execution capability. We assume in what follows that basic engineering is still beyond its reach and, therefore, that it always buys its designs (product or process) from overseas in executing new projects. With respect to sourcing every

sub-element from outside, or buying a "turn-key" transfer, in the short run a turn-key transfer may be the only option for an inexperienced late-industrializing firm. In the long run, internalization may be better because it saves the costs inherent in oligopolistic technology markets. Turnkey transfers especially tend to be expensive because they are hard to monitor financially. Moreover, it is difficult for a firm to buy exactly what it needs. Due to intra-firm information availability, internalization facilitates customization (Arrow, 1975). Internalization also creates learning opportunities which, if successfully exploited, result in a competitive asset that is critical for diversifying efficiently.

This asset --- the capability to establish or expand plants with in-house technological skills (even if unpackaging foreign technology acquisition and internalization are only partial) --- appreciates in value through a deliberate process of learning-by-doing and then "remembering-by-doing" (Nelson and Winter, 1982). The greater the number or frequency of projects the firm undertakes itself, the greater the knowledge acquired about project execution. Other things equal, the frequency of project execution is greater in diversified industrial groups than in single product firms. Therefore, the diversified industrial group has greater opportunities than the single product firm to routinize this function and acquire a competitive asset in the generic form of project execution

skills which it can use for its own expansion within and across industries, and possibly even sell on the market to other firms.

The advantages of the diversified group over the single product firm in acquiring technology to enter a "new" (for the country) start-up industry exist whether the decision taken is to "make" or "buy" technology, although if the "make" (internalization) choice succeeds, the advantages grow wider due to learning-by-doing. Suppose the decision of both the group and the specialist firm is to enter a start-up industry with a turnkey transfer. Then if there is learning-by-doing associated with the transactions involved in identifying and negotiating a turn-key --- no matter what the industry ---, then the group will be more experienced even at this task than the specialist.

Now suppose both the group and the specialist decide to enter a start-up industry by unpackaging foreign technology acquisition and using selected project execution skills from in-house. If such skills have already been internalized, then the cost of such skills can also be expected to be lower. They are lower than the costs of the specialist for reasons related to: (a) learning-by-doing, which increases efficiency and is greater the larger the number of project executions; (b) utilizing capacity, which improves because the group can pro-rate the fixed, once-and-for-all, initial cost of acquiring a generic project execution sub-element over more projects; and (c) saving transactions cost, by

having the human resources in-house necessary for project execution (detailed engineering, procurement, supervision, construction, and so forth). The firm then need not incur the search costs and time delays associated with finding the right persons for these tasks on the market. Since a "first-mover" advantage may be critical in a start-up industry, the entry time factor is significant.

These points are illustrated in Figure I. In the "flagship" or existing industry A of Firm 1 (the firm that diversifies), if sequential plant expansions in A are all accomplished by means of turnkey technology transfers, this same transaction will be subject to learning-by-doing (up to a point) owing to repetition, and the firm will move down learning curve TKT. If, on the other hand, the decision is made to internalize all or selected elements of technology acquisition with respect to project execution, then Firm 1 moves down learning curve INT, depicting learning associated with internalization. Internalization involves educational opportunity costs, so for early plant expansions in A, learning curve INT lies above learning curve TKT. If, however, internalization succeeds and potential learning-by-doing is captured, then INT falls below TKT. Just as learning to produce new products is subject to increasing returns, so too learning to establish new plants is subject to increasing returns, so learning curve INT does not level off the way learning curve TKT does.

Next, as firm 1 with prior experience in project

execution enters a new start-up industry, B, it is able to do so faster and with lower direct labor requirements than a virgin, single-product firm (F2) for the three reasons noted above. The diversifying firm's initial direct labor requirements and time requirements are smaller owing to lower search costs, pure learning-by-doing, and the fact that the fixed education costs already incurred for internalization are being spread over a rising number of transactions. Note, however, that the technical requirements of industry B may be such that firm 1's time and resource requirements may be no different from what they were in industry A; simply its advantage is relative to that of the specialized firm.

It may be worth adding that internalization of project execution capabilities tends to have spillovers to the other two major types of technology acquisition we already mentioned: production and innovation capabilities. When technology acquisition is unpackaged and internalized, the firm gets a clearer idea of the characteristics of the plant that it is establishing (expanding). With such "hands on" understanding, operating the plant becomes easier, and introducing new improvements into the plant's design becomes more simple as well (see Amsden, 1989, chs. 11 and 12). As a consequence of developing production capabilities, the most successful groups have tended, at the operating level, to diversify their product lines in related ways, while at the group level engaging in unrelated diversification in terms of industries (Jung, 1987 and Cho, 1989 for the Korean case).

A project execution asset is subject to another type of increasing return when the nature of technology acquisition changes. If the firm succeeds in moving from low-, to mid-, to high-technology production, the practical availability of basic design technology on the market declines. The firm must invest more in developing its own technology and simultaneously, must switch from a mode of buying disembodied skills from foreign technical assistants to one of buying high-tech foreign firms themselves. Thus, due to its constantly changing character, the project execution function related to the establishment and expansion of plants holds the potential for earning increasing returns.

We turn now to demonstrating how project execution capabilities were converted into a competitive asset by some of South Korea's largest diversified industrial groups.

6. Managing the Creation of Project Execution Capability: South Korea /4

In the period of intense industrialization that began after the Korean War, the maiden, large-scale investment projects of virtually all major Korean companies were established by means of turnkey technology transfers (Kim, 1993). Turnkeys were especially pronounced in the continuous process industries such as soap, cement, and petrochemicals, characterized by high capital requirements and little opportunity for reverse engineering (Enos and Park, 1988).

Nevertheless, the Korean companies that went on to

become industrial leaders (numerous companies failed in the 1960s and 1970s) almost immediately began investing in the internalization of as many elements as possible of imported production and project execution capabilities. Partly they did so out of a long historical tradition. One of Korea's most articulate Westernizers, Yu Kil Chun, exhorted his country to invest in learning and indigenize foreign know-how as early as 1895:

> Don't simply employ engineers from foreign countries. Rather than that, it is important to have the people of Korea learn the proper skills so that they can then carry on the work on their own. The potential of human beings is limitless while machinery breaks down. If a country becomes skilled in a particular knowledge, it will be able to transfer this knowledge to future generations (cited in Eckert, 1993).

Additional reasons for internalization of project execution capabilities beginning in the 1960s related to market imperfections and other costs, and corporate growth strategies that were self-consciously long-term in perspective. That Korea's big business groups conceived of themselves as stable, long run players is evident from the case of Samsung. Reborn in 1951 after an indifferent start in 1938, Samsung founded the Cheil Sugar Company in 1953 and then the Cheil Wool Textile Company only one year later (the woolen textile industry was subject at the time to less

domestic competition than the cotton textile industry, which was Korea's leading sector). Even at the very onset of operations and amidst acute postwar dislocations, Cheil Wool showed a belief in its ability to survive and planned for the long term. In addition to buying technical assistance from its machinery supplier, Samsung independently hired an experienced Japanese textiles engineer as adviser, who drew up a master 30 year engineering plan that Cheil Wool ultimately accomplished 20 years hence.

In the case of the world's largest shipyard established in 1972 by the Hyundai group, learning was driven by the imperative to reduce throughput time in order to meet delivery schedules. To gain firmer control over its process, to ensure more timely delivery of both inputs and outputs, to reduce costs, and to achieve parity with Japanese shipyards on all fronts, the shipbuilding division of Hyundai Heavy Industries decided to develop even basic design capability in-house and to produce its own engines and core electrical equipment. Hyundai's shipyard had been sourcing its engines from Japan, which built marine engines under license from a handful of longstanding European firms. But Japanese engine manufacturers charged higher prices to foreign shipbuilders than to Japanese ones (Cho and Porter, 1986).

In the case of POSCO (Pohang Iron and Steel Company), a specialized state-owned enterprise and possibly the world's lowest cost steel producer by the 1990s, its planned capacity expansion was so large that it came on stream in four phases.

The declining reliance on external engineering services for sequential capacity additions is indicated by the fact that foreign engineering services decreased from $6.13/ton in Phase I to $0.11/ton in Phase IV, despite the fact that capacity additions were about equal (or at least substantial) in all four phases. POSCO was able to accomplish this internalization owing to heavy investments in human resources complementary with an initial turnkey technology transfer (mainly from Shin Nippon Steel Company of Japan). The single most distinct feature of this participation was POSCO's dispatch of a large number of engineers and front-line supervisors for overseas training even before plant operations had begun. It is indeterminate whether or not POSCO's large investments in human resources were "efficient" in the sense of being immediately cost-effective. There was never any doubt, however, that POSCO intended eventually to internalize foreign technology acquisition, which it subsequently used to establish another integrated steel facility and then to diversify into ceramics and other high-tech industrial materials.

Whatever the influence of short-run cost considerations in make-or-buy decisions, clearly Korea's big business groups internalized project execution capabilities only step-by-step, rather than in a great leap. In the case of the Hyundai group's cement making subsidiary, for instance, the sequential internalization of project execution capabilities is indicated in Table 6. In its initial plant project,

Hyundai's technology supplier undertook all tasks except construction. In its second plant expansion ten years later, Hyundai participated in all tasks except basic engineering. Similarly in POSCO, on the basis of participating in plant erections and in operating mills established in Phase I, POSCO acquired capabilities to undertake preliminary engineering planning, preparation of procurement specifications for auxiliary facilities (power transmission and distribution systems), and other tasks in Phase II.

Not only did the internalization of project execution skills ultimately lower fixed investment costs for successful enterprises. It also improved industry-specific production capabilities. The acquisition of basic design skills helped Hyundai reduce throughput time in building ships. The same manager in POSCO who participated in the foreign technology transfer of a particular facility --- say, a blast furnace ---, was appointed operating manager of that same facility because the more intimate a manager's familiarity with the architecture and capital equipment of a plant, the greater the manager's ability to produce efficiently in that plant.

The generic project execution (and even production) capabilities acquired in one subsidiary were diffused throughout a business group by means of deliberate investments in human resources and coordination. In the case of Hyundai, whose flagship industry was construction, it used its cement plant as a laboratory to train its construction managers before assigning them to new manufacturing

affiliates in other industries. Trainees gained experience in inventory management, quality and process control, capacity planning, and so forth, thus spreading basic middle and lower managerial production-related skills throughout the Hyundai organization. Diversification into a new industry by the Hyundai group was typically undertaken by a task force, formed at the group level and comprising qualified managers, engineers, and even supervisors recruited from existing companies within the group. Managers from Hyundai's construction arm, for example, were transferred to its shipbuilding arm to aid in initial project management. Later, engineers from its shipbuilding arm, who had a knowledge of anticorrosion, were loaned to its automobile affiliate where a new paint operation was coming on stream. The first president of Hyundai Motors was a former president of Hyundai Cement.

In the case of the Samsung group, it was one of the first chaebol to build a group-wide training system soon after establishing its first manufacturing affiliate (in 1953). All new managers were recruited and trained at the group level. They were then dispatched, at the company's discretion, to affiliates. Inter-affiliate communication was facilitated by the closeness of graduates of the same training class. Given its stature, Samsung began to attract the top university graduates for its middle management posts (another advantage of the group form of business in late industrialization), and professional management diffused to

all parts of the company. Policies towards technology acquisition were articulated at the group level such that project execution norms evolved, an example being the hiring of third-party consultants to check on the efficiency of technology transfers.

Not just in Samsung but in other Korean groups, the established practice became one of initiating new entrants not only into the particular subsidiary to which they were assigned but also into the group as a whole (Janelli, 1993; for Daewoo, see Steers, Shin and Ungson, 1989; for a small conglomerate specialized in defense-related industries, see Kim, 1992). This kind of group training and identity-building are almost unheard of in the American conglomerate. In Korea, they have facilitated the group-level sharing of technological capabilities assimilated within an industry.

However great the unrelatedness of diversification by the chaebol (Tables 4 and 5 indicated the scope of diversification in Hyundai and Samsung respectively), no industry was ever established in Korea even in the early 1990s for which foreign technology was unavailable. Nevertheless, as Korean business advanced in technological complexity, foreign technology became increasingly difficult to access, as in the case of POSCO's second integrated steel facility (Japanese steel makers refused altogether to sell POSCO technology), or in the case of Samsung's electronics and semiconductor investments (foreign companies supplied technology to Samsung but at high prices, with royalty

payments placing a heavy burden on profits). Therefore, big business in Korea increased its expenditures on in-house R&D and changed the form in which it acquired technology from abroad. Increasingly, foreign technology was acquired either by buying financially-troubled foreign high-tech firms (in, for instance, Silicon Valley) or by locating Korean R&D laboratories overseas, in close proximity to technology leaders. In the case of Samsung, for instance, it established the Samsung Advanced Institute of Technology in October 1987 to undertake basic research in semiconductors. Then it opened an Advanced Media Laboratory in September 1989 in New Jersey, near AT&T Technologies' Lab. Next it opened an R&D branch in September 1990 in Osaka, near the Matsushita Corporation.

Thus, the substance of generic, group-wide project execution capability changed from sourcing technology from foreign suppliers to establishing R&D facilities, buying foreign high-tech firms, and locating "listening posts" overseas. Due to these changes, there was further scope for learning associated with the sharable asset of project execution capability, thereby sustaining increasing returns.

7. Conglomerates: Differing Styles of Advanced Economies and Latecomers

In terms of their basic strategy and structure, there is a resemblance between diversified business groups in late-industrializing countries and conglomerates in the United

States (and to a lesser extent Britain) that emerged in the 1950s. Both faced difficult circumstances in terms of stunted growth potential in their flagship industries. Many American conglomerates came from sectors such as public utilities, transportation, textiles, mining, and food, whose technological trajectories had been exhausted (at least temporarily), and/or whose product markets were experiencing slow growth (for the U.S.: Rumelt, 1974 and 1982 and Ravenscraft and Scherer, 1987; for the U.K.: Singh, 1971 and 1975; for the latest theoretical overview, Clarke, 1987). As long as firms in these dead-end industries enjoyed free cash flow from prior investments, many looked for new investment opportunities through industry diversification. In a different economic environment, late-industrializing firms also confronted growth barriers, as discussed above. Either their domestic markets were small relative to their corporate growth potential, or the sustainability of their products (both low-and mid-tech) in international markets was not well-founded in the short run. Their absence of proprietary technology further meant that they could not diversify into <u>related</u> product lines.

To overcome demand and technology constraints, American conglomerates and late-industrializing groups both aggressively diversified their investment portfolios into a wide range of technologically unrelated industries within a short duration of time. The resulting corporate structures from this diversification strategy were sprawling collections

of individual operating units or subsidiaries administered by corporate headquarters. For instance, Gulf & Western, at its height of conglomerate growth in 1969, operated 37 divisions spanning automobile parts and life insurance, precision equipment and movie production (Berg, 1973). In 1983, Lucky-Goldstar, one of the "Big Four" Korean chaebol (ranked third in Table 3), had 42 operating subsidiaries ranging from electronics to oil refinery, from cosmetics to securities dealing (Aguilar, 1985a).

Despite a similarity in basic strategy and structure, the economic performance of the two types of conglomerate firms was markedly different. As Tables 1, 2, and 3 indicate, many diversified groups, particularly Korean chaebol (and Japanese zaibatsu, keiretsu, and kigyo shudan before them), grew to become stable players in international markets in a wide range of products. On the other hand, American conglomerates had to regain their economic health by decreasing their number of operating industries and by increasing the degree of business-relatedness within their firm (Williams, Paez, and Snaders, 1988; Lichtenberg, 1992). American conglomerates have survived by retrenching, divesting, and de-conglomerating themselves.

Two basic factors caused the performance differences of American conglomerates and successful late-industrializing business groups. One relates to exogenous market imperfections and the other to the potential governance and multiproduct externalities internal to the firm.

First, to the extent that countries starting to industrialize in the 1960s and even 1970s operated with highly imperfect markets (for products, finance, and information), the internalization of markets through conglomerate behavior, unjustified in the American case given more mature markets, could bring real economic gains for both the firm and country (this is the gist of arguments by Leff, 1978 and 1979). For instance, among the major possible reasons for diversification is risk reduction, a motive which finds little theoretical support in the United States on the ground that, assuming a perfect stock market, all possible gains of risk reduction can be realized equivalently or better by shareholders themselves holding diversified market portfolios (Levy and Sarnat, 1970). To the extent that capital markets in late industrializing countries are underdeveloped (or over-regulated), in the absence of diversified stockholding, risk pooling by the firm itself through product and industry diversification are theoretically warranted, and give the diversified firm an edge over the specialized firm in terms of steadier earnings growth.

Second, a major source of the performance difference between conglomerates in advanced economies and late industrialization relates to the functional areas of learned capabilities and the resulting nature of sharable knowledge. In the United States, where a market for corporate control was well-established, conglomerate growth mainly took the

form of expansion through acquisition. Growth through acquisition was much less frequent in late industrialization, and when it did occur, usually took the form of firms buying ailing companies (often state-owned or state-financed) with the aim of turning-them around, whereas in the United States, acquisition was typically of enterprises with above-average profit rates (Ravenscroft and Scherer, 1987). Diversification through acquisition rather than organic growth in the United States was regarded as more efficient and less risky (particularly for those enterprises with no proprietary technology) since it involved the acquisition of market-tested physical assets and human capabilities. Furthermore, entry was achieved without initially having to compete for market share. As long as American conglomerates repeated this type of acquisitive transaction, their learned knowledge became concentrated in the financial expertise for corporate control: finding appropriate companies to buy that were suitable for their future growth, and possibly locating buyers for divisions that were found to be unsuitable for their portfolios.

While the top management of American conglomerates continuously exploited and nurtured their capabilities in financial transactions, their operating units could also develop their own production capabilities independently and separately. These capabilities could, in theory, create sharable knowledge for future related diversification. Contrary to popular notion, top management involved their

operating units in the pursuit of efficiency and technology-related goals (Nangia, 1972). Nevertheless, given that top management's skills were largely financial, its way of evaluating and developing the potential of operating units was financially-determined. Corporate offices remained relatively small and dominated by financial functions (Berg, 1973). The small pool of human resources at the corporate office, given the number of acquisition transactions which some of the conglomerate firms undertook, inevitably resulted in an overload for decision-makers. This Penrosian dynamic constraint further forced corporate offices to concentrate on the financial control of operating units. Accordingly, individual operating units remained separate, independent entities, with little contact among themselves. Each retained its pre-acquisition practices and procedures concerning purchasing, research and development, marketing, and even accounting. An effective and coherent internal labor market never materialized, which prohibited the conglomerate from capturing possible sharable knowledge in technology and organization. The only altered functions pertained to external finance, borrowing, and auditing (Boyle and Jaynes, 1972; Winslow, 1973).

Thus, there were no spillovers related to technological learning which, in the case of successful conglomerates from late-industrializing countries, proved a competitive asset against specialized firms. By comparison with specialized firms and multidivisional enterprises in advanced countries,

with core proprietary technologies in specific industries, the American conglomerate developed no distinguishing set of competitive capabilities. Not surprisingly, its economic performance remained mediocre (Mueller, 1977; Hay and Morris, 1991, ch. 14).

By contrast, successful diversified groups from late-industrializing countries tried to capture as many externalities as possible by establishing a coordination mechanism in the corporate office. By the 1980s, for instance, all the major chaebol had a functionally-departmentalized planning and coordination office (kijosie) whose size was substantially larger and more balanced than its counterpart in American conglomerate (Chang and Choi, 1988; Lee, 1990). Once a group developed project execution capabilities in one industry in the process of borrowing foreign technology, therefore, top management could utilize them in two ways, as we tried to demonstrate in the case of Korea. /5 First, it transferred such "fungible" capabilities from industry to industry in order to lower entry costs. Given constant changes in both the process of foreign technology acquisition and subsequent investment projects, these capabilities were exposed to further learning opportunities such that increasing returns from learning-by-doing could be captured (Stokey, 1988). Second, project execution capabilities had potential positive spillovers to learning industry-specific production skills. By definition, the engineering component in executing investment projects

requires knowledge of the manufacturing process for which the plant is being designed. The more manufacturing managers understand their plant through participating in its erection, the greater their ability to fine-tune operations. Successful diversified groups actively and deliberately exploited these types of accumulated sharable inputs by strategically transferring engineering personnel from subsidiary to subsidiary within the group and facilitating general and specialized training programs at the group level. This allowed the group to exploit learned project-related capabilities to the full extent.

8. Conclusion

We have analyzed the phenomenon of diversified industrial groups emerging in a wide array of historically and culturally distinct late-industrializing countries, ranging from the chaebol (and, in principle, the zaibatsu) in East Asia to los grupos in Latin America. We rely for our analysis on resource-base theories of corporate growth and the historical specificity of twentieth century "late industrialization", a transformation based on pure learning or borrowing already-commercialized foreign technology in well-articulated international markets.

Through a learning process associated with internalizing the elements of foreign technology acquisition, especially related to establishing or expanding a plant facility (attainment of basic and detailed engineering, equipment

procurement, supervision, construction, and start-up), the business group could acquire a generic asset that enabled it to diversify into start-up industries relatively quickly and at low cost. Subsequently, sharable technical knowledge could accumulate through foreign technology absorption that could have a positive spillover on production capabilities, constituting another competitive asset in the market (we illustrate our argument briefly with evidence from South Korea, where the group form of business among late-industrializers has been most advanced).

Using this as the core of our argument, we can explain why firms attempting to catch-up in previous industrializations did not diversify, why big business in late industrialization initially became diversified rather than specialized, and why diversification involved technologically unrelated industries.

We contrast the diversified group of late industrialization and the conglomerate of advanced economies to the extent that a market for corporate control allowed the latter to diversify through acquisition, whereas the absence of such a market in the early phase of late industrialization required organic, internal growth, facilitated by the sharable asset of project execution capability. These contrasting growth paths resulted in different types of competitive assets: finance-focused for the conglomerate and technology-related for the diversified business group.

This provides a framework for further comparisons of

conglomerate behavior and performance in different countries and historical settings. Heretofore when business groups were examined, it was usually in the context of the Japanese zaibatsu and keiretsu. This paper shows that Japanese groups historically exhibited many of the same characteristics that distinguish the diversified business groups discussed above. This is because Japan historically represents the "first mover" in the late industrialization paradigm (Amsden, 1989).

Given our argument that foreign technology absorption provides the foundation in late industrialization for the creation of group-wide organizational know-how with respect to project execution (and interrelatedly, production), we would expect that business groups that do not create and internally diffuse such knowhow --- possibly owing to foreign tie-ins or other factors --- would perform less competitively than groups that do create and diffuse it.

Already our framework allows us to interpret why the evolutionary sequence of business structures in advanced economies and late industrialization is different. In the Williamsonian evolution (1975 and 1985, ch. 11), the organizational sequence in advanced economies is from the U-Form (unitary structure) of business organization, to the M-Form (multidivisional structure), and then to the conglomerate form. By contrast, the conglomerate form of business organization has tended to come first in late industrialization. To the extent that business groups can exploit multi-product externalities, they may slowly move

toward being multidivisional.

Footnotes

1. Space precludes discussion of the business groups from sociological or anthropological viewpoints. For a convenient set of references on East Asia, see Whitley (1992); for a sophisticated account of one Korean case, see Janelli (1993).

2. The phenomenal development of Japan's corporate groups (the prewar zaibatsu and postwar kigyo shudan and keiretsu), needs more than a brief summary, which is why we have not included mention of them. Among the voluminous literature available on this subject, what is particularly useful includes: for the established zaibatsu groups, Hirschmeier and Yui (1981), Wray (1984), Okochi and Yasuoka (1984), Kobayashi (1985), Yonekura (1985), Mishima (1989), Morikawa (1992); for the new zaibatsu groups emerging in the 1920s and 1930s, Shimotani (1984), Saito (1985), Cusumano (1989), Molony (1990), and Shimotani (1991); and, for the postwar kigyo shudan and keiretsu, Miyazaki (1980), Sato (1980), Aoki (1984), Sato and Hoshino (1984), Futatsugi (1986), Sheard (1986), Aoki (1990), Shimotani (1991), Fruin (1992), Imai (1992), Gerlach (1992), Miyajima (1994) and Okumura (forthcoming).

3. Korean firms began diversifying in the 1950s, but only in the 1980s did they sometimes expand by means of acquisition (Kim, 1987). Before then, if they expanded through acquisition, it usually involved a government-related transaction, as discussed in Section 6.

4. Unless otherwise specified, all information in this section is from Amsden (1989; 1994).

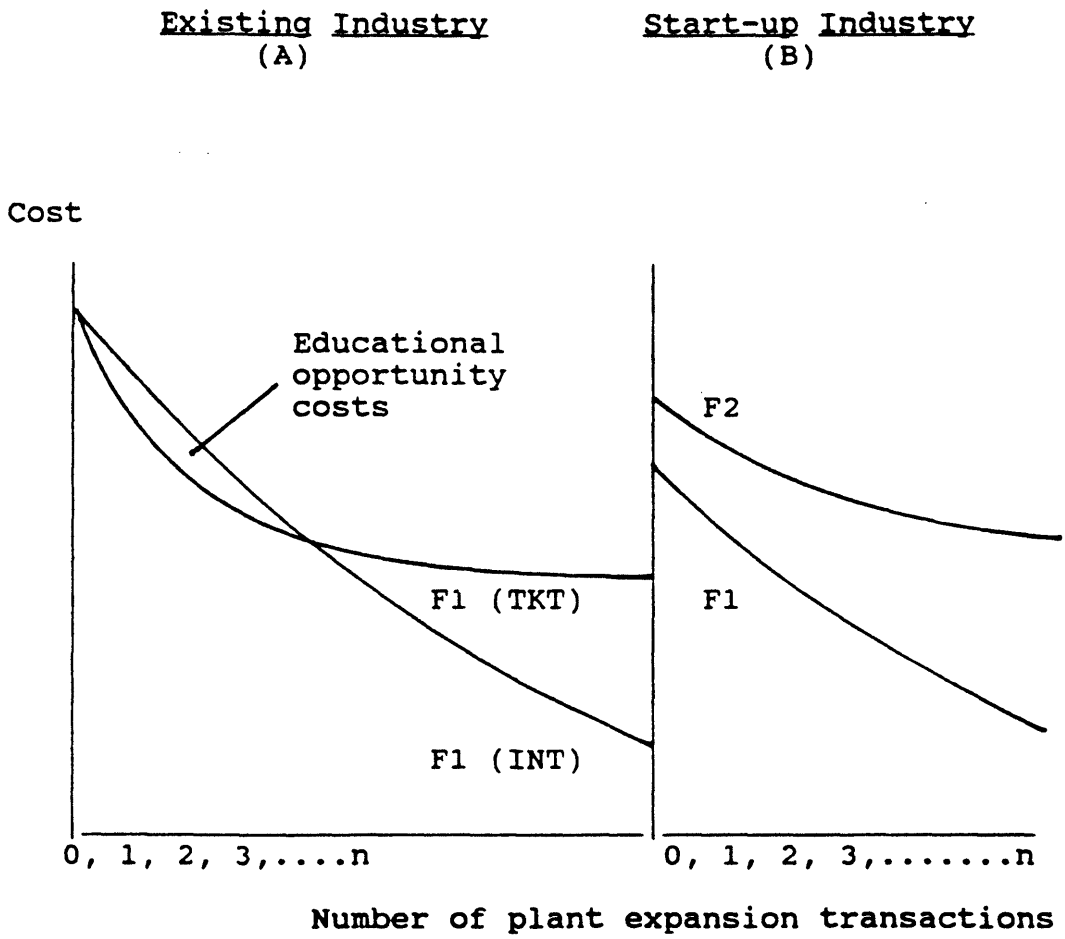
5. The government of successful late industrializers eventually lessened the administrative overload of groups' top management with respect to resource allocation, when it provided subsidies to promote specific industries and thereby clearly signaled which industries the groups should enter (Amsden, 1989, chs. 3 and 4).

Business-government relations in late industrialization, however, have not always been productive owing to rent seeking opportunities, as evidenced by the Philippines under the Marcos regime (Koike, 1989). For a theoretical examination of the effectiveness of business-government relations, see Amsden (1992).

Figure I

Project Execution Capability

Diversified (F1) vs. Single Product Firm (F2)



Cost = P(TKT) + P(INT), where TKT is turnkey transfer and INT is internalization (measured as time x number of people).

Table 1

The Distribution of World's 500 Largest Industrial Enterprises, by Country, 1962 and 1992

Country	Year	
	1962	1992
Developed market economies (except Japan) total	462	339
United States	297	161
United Kingdom	55	41
Germany	36	32
France	27	30
Sweden	8	14
Switzerland	6	9
Australia	2	9
Canada	13	8
Netherlands	5	7
Italy	7	6
Norway	0	5
Belgium	3	4
Finland	0	4
Others	2	9
Japan	31	128
Other Late-industrializing countries total	4	33
South Korea	0	12
South Africa	2	4
India	1	3
Turkey	0	3
Others	1	11
Total	497	500

Source: For 1962, adopted and reorganized from John H. Dunning and Robert D. Pearce, The World's Largest Industrial Enterprises, 1962-1983, New York, St. Martin's, 1985. For 1992, compiled from "Fortune's Global 500," Fortune, July 26, 1993.

Note: Enterprises, including private and state-owned, are from market economies only and are ranked by sales. Firms included are manufacturers which often engage in such related activities as mining and distribution. Because of the lack of adequate data, 497 companies are listed for 1962. Because of different disclosure standards, the companies of late industrialization may be underrepresented.

Table 2

Distribution of the 70 Largest Industrial Enterprises in Advanced and Late-Industrializing Economies, 1987

SIC	Industry	Advanced Economies		Late-Industrializing Economies	
		Private	State	Private	State
20	Food	4	0	1	0
21	Tobacco	3	0	0	1
22	Textiles	0	0	1	0
23	Apparel	0	0	0	0
24	Lumber	0	0	0	0
25	Furniture	0	0	0	0
26	Paper	0	0	0	0
27	Printing/Publishing	0	0	0	0
28	Chemicals	7	0	2	1
29	Petroleum	14	2	0	28
30	Rubber	0	0	0	0
31	Leather	0	0	0	0
32	Stone/Clay/Glass	1	0	0	0
33	Primary metals	2	3	0	7
34	Fabricated Metals	0	0	0	0
35	Machinery	1	0	0	0
36	Electrical Machinery	12	0	1	1
37	Transportation Eqt.	19	1	0	0
38	Instruments	1	0	0	0
39	Miscellaneous	0	0	0	0
--	Conglomerate/ Diversified	0	0	26	1
	TOTAL	64	6	31	39

Source: Advanced economies: Compiled from "The 500 Largest Industrial Corporations," Fortune, April 25, 1988; "The Fortune International 500," Fortune, August 1, 1988. Late-industrializing economies: Compiled from "The Fortune International 500," Fortune, August 1, 1988; "South 600," South, August 1988; "Africa 100," South, July 1988; "Latin America 250," South, May 1988; "Asia 150," South June 1988.

Notes: Listed enterprises are independent parent companies only. Domestic and foreign subsidiaries are not counted. Sales figures represent those of entire enterpreses and groups when data are available. Many groups publish non-consolidated financial statesments only, so some groups' size is underrepresented. Industrial category is based on U.S. Standard Industrial Classification.

Table 3

The Largest Private Industrial Enterprises in Late Industrialization, 1987

Rank	Company	Country	Sales (US million Dollars)	Industry	Control
1	Hyundai	Korea	25,243	Diversified	Family
2	Samsung	"	21,053	"	"
3	Lucky Goldstar	"	14,422	"	"
4	Daewoo	"	13,437	"	"
5	Barlow Rand	S. Africa	7,617	"	Prof.*
6	Sunkyong	Korea	6,781	"	Family
7	Tata Group	India	4,866	"	"
8	Koc Holding	Turkey	4,738	"	"
9	Ssangyong	Korea	4,582	"	"
10	Sabanci Group	Turkey	4,582	"	"
11	Korea Explosives	Korea	3,563	"	"
12	Hyosung	"	3,257	"	"
13	De Beers	S. Africa	3,091	"	"
14	Formosa Plastics	Taiwan	2,955	"	"
15	Birla Group	India	2,932	"	"
16	Swire Pacific	Hong Kong	2,585	"	"
17	Koor Industries	Israel	2,571	"	Union+
18	Jardine Matheson	Hong Kong	1,628	"	Family
19	AECI	S. Africa	1,607	Chemicals	"
20	Copersucar	Brazil	1,512	Food	Coop.#
21	Doosan	Korea	1,478	Diversified	Family
22	Sasol	S. Africa	1,417	Chemicals	
23	Alfa	Mexico	1,380	Diversified	Family
24	Tatung	Taiwan	1,248	Electronics	"
25	Modi Group	India	1,070	Diversified	"
26	Reliance Inds.	India	1,015	Textiles	"
27	Hutchison-Whampoa	Hong Kong	994	Diversified	"
28	Sime Darby	Malaysia	950	"	Govt.|
29	RPE Enterprises	India	930	"	Family
30	J.K. Singhania	India	889	"	"
31	Dong-A Construct.	Korea	824	"	"

Source: See Table 2, entry for "Late-industrializing economies."

Notes: *Publicly-owned, professionally managed. +Owned by Israeli trade union federation. #Cooperative. |Malaysian government holds controlling influence.

Many groups publish non-consolidated financial statements only, so some groups' size is under-represented. Listed enterprises are independent parent companies only. Domestic and foreign subsidiaries are not counted. Information on industrial activities and control comes from company directories of appropriate countries.

Table 4

Major Diversifications of Hyundai Group Under Chairman Chung Ju-Yung, 1938-1987

1940	Automobile repair
1947	Construction
1955	Marine and fire insurance
1962	Securities dealing
1967	Automobile assembly (later production)
1968	Real estate
1972	Shipbuilding
1974	Automobile sales
	Engineering
1975	Steel structures and pipes
	Ship repair
	Construction materials
1976	Overseas commercial banking
	Overseas general trading
	Ocean shipping
1977	Precision machinery
1978	(Iron and steel making)
	Electrical engineering
	(Aluminum refining)
	Wooden products and furniture
1983	Electronics
1984	Elevator manufacture
1986	Housing and industrial development

Compiled from Business Korea Yearbook, various years. Parentheses indicate acquisitions. In 1988 Hyundai diversified into investment banking and management, petrochemicals, and industrial robots.

Table 5

Major Diversifications of Samsung Group Under Chairman Lee Byung-Chul, 1938-1987

1938	Overseas trading
1953	Sugar regining
1954	Woolen textile manufacturing
1963	Broadcasting
	(Life insurance)
	(Department store)
1965	Newspaper publishing
	Entertainment
1966	Hospital administration
1967	(Paper manufacturing)
1969	Electronics
1974	Petrochemicals
	Shipbuilding and engineering/machinery
	Overseas general trading
1976	Real estate
1977	(Semiconductors)
	Precision machinery
1978	Telecommunications
	Construction
1982	Sports entertainment
1983	Watchmaking
1984	Medical equipment and supplies
1985	Data processing
1987	Aerospace

Source: Compiled from Business Korea Yearbook, various years.

Note: Parentheses indicate acquisitions. In 1988 Samsung diversified into computers.

Table 6

Hyundai Cement Company's Involvement in Plant Erections: Sequential Internalization

Project Execution Sub-Element	Initial Plant 1964	First Expansion 1968	Second Expansion 1974
Basic engineering	Allis Chalmers	Fuller	Fuller
Detailed eng.	Allis Chalmers	Fuller	Fuller, Hyundai
Procurement	Allis Chalmers	Hyundai	Hyundai
Supervision	Allis Chalmers	Hyundai	Hyundai
Construction	Hyundai	Hyundai	Hyundai
Start-Up	Allis Chalmers	Fuller, Hyundai	Fuller, Hyundai

Source: Alice H. Amsden and Linsu Kim, "The Acquisition of Technological Capability in South Korea," Mimeo, Development Research Department, Productivity Division, World Bank, Washington, D.C., as cited in Amsden (1989, p. 267).

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