The Four Largest South Korean Business Groups and Foreign Technology: Acquisition of Technology and Foreign Direct Investment

MARCUS HAGEMEISTER

ABSTRACT *This paper deals with the acquisition of foreign technology and with foreign direct investment by the four largest South Korean business groups. Major conclusions are: (1) the groups successfully acquired foreign, state-of-the-art technology for large-scale production of lower and middle market segment products within a very broad range of industries; (2) the most important current problems for the groups (lack of own high-technology and low equity and profit rates) are genuine results of the same strategy, which led to the successful acquisition of foreign non-high-end technology; (3) although all four groups undertook foreign direct investment of considerable scale, these investments were mainly restricted to a few geographic areas and product groups, and it is far too early to speak of a real 'globalization' of group operations.*

Keywords: South Korea, technology transfer, foreign direct investment, industrial organization, development policy, Daewoo, Hyundai, LG, Samsung.

Introduction

This paper deals with the acquisition of foreign technology by the four largest South Korean business groups: the chaebol Daewoo, Hyundai, LG (up until 1994 Lucky-Goldstar) and Samsung.[1] The first part briefly describes the development of the four chaebol and their position within the Korean economy.[2] The acquisition of foreign technology itself—choice of technology and suppliers, plant construction, start-up and optimization of production—is then discussed. Emphasis will be on the general features of the acquisition process, which have remained relatively unchanged since the beginning of massive technology imports in the late 1960s. The third part of the article evaluates the recent state of technology acquisition by the four chaebol. Four units of measure (foreign direct investment, technological cooperations, productivity and own-brand sales) will be used. Conclusions and prospects are presented at the end of the paper.

The first two parts of this article are based on an earlier paper by the author.[3] The third part consists mainly of new material. As the author had no direct access to the chaebol, all information was assembled from a variety of printed materials. Three kinds of sources have been used: company brochures, scientific publications and the economic press; *Business Week* and German *Handelsblatt* from February 1994 up to December 1997 and *The Economist* from September 1995 up to December 1997.[4] Pertinent information

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Table 1. Chaebol sales in $US billions and as a percentage of Korean GDP (*GNP)

	1965	1970	1975	1980	1984	1988	1992	1994	1996
Daewoo			0.2			15.2	25.4	40.0	45.0
Hyundai			0.5			27.8		63.0	80.0
LG			0.9		9.2	22.8		48.0	55.0
Samsung	0.0	0.1	0.7	3.6		31.0	48.5	63.0	71.0
Four Chaebol			2.3			96.8		214.0	251.0
Korean GDP	2.9	8.6	21.1	57.6	89.0	194.6	304.9	386.7	484.8
Daewoo			1.1%			7.8%	8.3%	10.3%	9.3%
Hyundai			2.3%			14.3%		16.3%	16.5%
LG			4.1%		10.3%	11.7%	*11.0%	12.4%	11.3%
Samsung	0.9%	1.3%	3.5%	6.3%		15.9%	15.9%	16.3%	14.7%
Four Chaebol			10.9%			49.7%		55.3%	51.8%
Top 10			17.9%	*48.1%	*67.4%	65.7%			
Top30 #Top46			#33.8%					*75.0%	

was put into databases to keep track of the wide range of group activities and to check the data of different sources against other data.

Development of the Four Chaebol until 1997

In general, the term chaebol is used for large South Korean business groups that conduct business in many, technologically unrelated industries; are centrally owned and controlled by the founder family; and are financed to a large extent through external credit, provided mainly via the government-controlled, official Korean banking system. These three major characteristics represent an initial definition of the four chaebol. The following provides a brief discussion of the growth and production programs as well as the organizational and ownership structure of the four groups.

Today the four chaebol are by far the largest Korean business groups and dominate one of the fastest growing economies of recent decades.[5] Their combined sales reached about 50% of the GDP in the late 1980s (Table 1[6]). If listed correctly, all four business groups would have been in the Top 50 of the Fortune Global 500 since 1994. In 1987, for tactical reasons, some chaebol stopped providing group data and listed only their largest companies;[7] on the last three Fortune lists for the years 1994–96, Daewoo—the smallest of the four chaebol—is always listed as the largest Korean company at number 52, 34 and 24, respectively.[8]

Developments in the production programs of the four chaebol are given in Table 2, which illustrates major similarities and differences. Notable is the difference between the founding of Daewoo in 1967 and the beginnings of the other chaebol in the 1940s. Since Hyundai's operations did not reach a significant scale until after the Korean War, the beginning of the four chaebol can be divided into three groups: Samsung and LG (pre-Korean War 1940s); Hyundai (post-Korean War 1950s); and Daewoo (late 1960s).

Although all chaebol originally started as trading firms, there were differences. In the case of Samsung and Daewoo, these firms developed directly into strong central trading companies. For LG and Hyundai, trading activities represented only the first business activities—during which first capital was accumulated—while central group firms emerged out of industrial operations: chemicals and consumer electronics in the case of LG, and construction in the case of Hyundai. Thus, LG clearly has the longest and most continuous manufacturing tradition with chemicals/petrochemicals and electronics.

Table 2. Timetable: development of chaebol production, 1938–1997

	First activities	First industrial projects	Main industries today	Future/strategic industries[a]
Daewoo	Trade (e '67)	Textiles (e '68) Machinery (a '73) Electronics (e '74)	Machinery Automobiles Shipbuilding Electronics Construction Trade	Finance Aerospace? Resources?
Hyundai	Trade/Auto repair/ Transport (in 40s) Construction (e '47)	Cement (e '64) Automobiles (e '67)	Machinery Automobiles Shipbuilding Electronics Construction Trade	Chemicals? Petrochemicals? Finance? Resources? Aerospace? Steel?
LG	Trade (under Japanese government = before '45)	Cosmetics (e '47) Radios (e '58) Cables (e '62)	Chemicals Petrochemicals Electronics Trade	Machinery Automobiles? Shipbuilding? Finance? Resources?
Samsung	Trade (e '38)	Sugar (e '53) Wool (e '54) Fertilizer (e '64) B/w TV (e '69)	Machinery Shipbuilding Electronics Finance Trade	Automobiles Aerospace Chemicals Petrochemicals Resources?

Note: Numbers in parentheses indicate starting date (e = established; a = acquired).

[a] Only additional industries are listed. Despite government pressures and chaebol paying lip service to restricting themselves to core activities, there is no sign of any withdrawal from recent major industries.

They are still the most important industries in the 1990s. All other chaebol established their first industrial plant in an area that today is only of minor importance. Recently the four chaebol have been moving toward a similar structure of core industrial activities: construction, electronics, automobiles/trucks, chemicals/petrochemicals and machinery. The groups, however, possessed different strengths up until the mid-1980s. Since then, each chaebol has been trying to fill the gaps in the aforementioned range of industries. One group after another has been entering new industries without abandoning existing ones.

With regard to the ownership structure of the four chaebol, two points are important: (1) they had and still have low equity ratios; and (2) there are about three layers of holding firms. The chaebol started their growth with a small equity base:

> ... we simply present a typical scenario of chaebol growth via credit access in the 1960s. Suppose one privately held company 'luckily' gets government approval for an industrial project. It will typically be financed by one-fifth equity and four-fifths foreign and domestic loans. So the project starts with a meager equity base but with substantial external debt and other government-provided privileges (notably tax advantages). The privately held firm may then grow rapidly if the project becomes successful. The firm then starts a new line of business with the profits accumulated from the first venture. Of course, once again the firm will not usually put up much equity but will rely heavily on external debt. The extension of this process leads to

Table 3. 'Founder' (and group companies) shares, 1982 and 1991

	Chaebol	Daewoo	Hyundai	LG	Samsung
1982	33% (>50%)[a]	42%	>21%[b]	21%	33%
1991	47%	50%	68%	38%	53%

Note: Figures for 1982 refer to the share of the 'founder family' in listed companies. Forty-one chaebol were covered. Figures for 1991 originate from a report of the Korean government and refer to the shares of 'founder family and group firms'. These figures include listed as well as non-listed companies from 61 chaebol.

[a] In parentheses, Korea Development Institute estimate for 'family stock ownership', if non-listed companies are included.

[b] No share is given for Hyundai, but the figure for LG is 'by far the lowest of all the ten major groups'.

Sources: Tamio Hattori, 'Japanese zaibatsu and Korean chaebol', in K. H. Chung and H. C. Lee (eds.), *Korean Managerial Dynamics*, Praeger, New York, Westport & London, 1989, pp. 80, 87–90 (for 1982); Takao Taniura, 'The Lucky-Goldstar group in the Republic of Korea', *The Developing Economies*, 16, 4, 1993, pp. 465–84, p. 476 (for 1991); OECD, *op. cit.*, p. 59.

> a group of firms, or chaebol ... Even for the ... prosperous firms in the group, the financial structure remains weak.[9]

At the end of 1992 the equity ratio for the five largest chaebol was still only 23%.[10] Low equity ratios allowed the founder (and his family) to control much of the equity and at the same time to expand business in great leaps. In 1982 and 1991 the 'founder' still owned—directly and indirectly—about 50% of the group shares.[11] Figures in Table 3 seem to indicate an increasing 'founder' share, but probably the opposite is true, because figures for 1982 include only shares in listed companies, which are lower than shares in other group companies. This fact is only indicated by the estimated figure for 1982.

On the one hand, the controlling power of the 'founder' share is fostered by a government policy which makes it very difficult for other persons or groups—and especially foreigners—to acquire larger shares of Korean companies. On the other hand, the government tries to restrict 'founder' share and influence.[12] In general, the existing 'founder' share still seems to guarantee control of major group decisions.

The general description of the ownership structure development for Korean chaebol as presented by Hattori seems appropriate for the four chaebol.[13] Hattori argues that the groups started with companies owned by the 'founder'. With the acquisition and establishment of new companies, the central trading company came to own many shares in other group companies. Later, an additional holding (foundation) was established through the transfer of ownership shares. If activities reached considerable scale within one industry, the respective major firm acted as a holding for other companies within the industry (Figure 1).

Figure 1 presents the actual organizational structure of the four chaebol today.[14] Each group consists of five major organizational subunits plus a holding company. The holding company has no influence on the organization of current group operations. In each major industry the four chaebol have one (sometimes two) firm(s) of paramount importance. Generally several smaller companies exist in addition to this major firm. For the coordination of group operations within one industry the number of legal entities seems of minor importance. All firms could be viewed *de facto* as divisions of the major firm. The decision whether to establish a new production area as a formal division or separate entity mainly depends on the financial possibilities (including risk reduction) and technology transfer for the project.

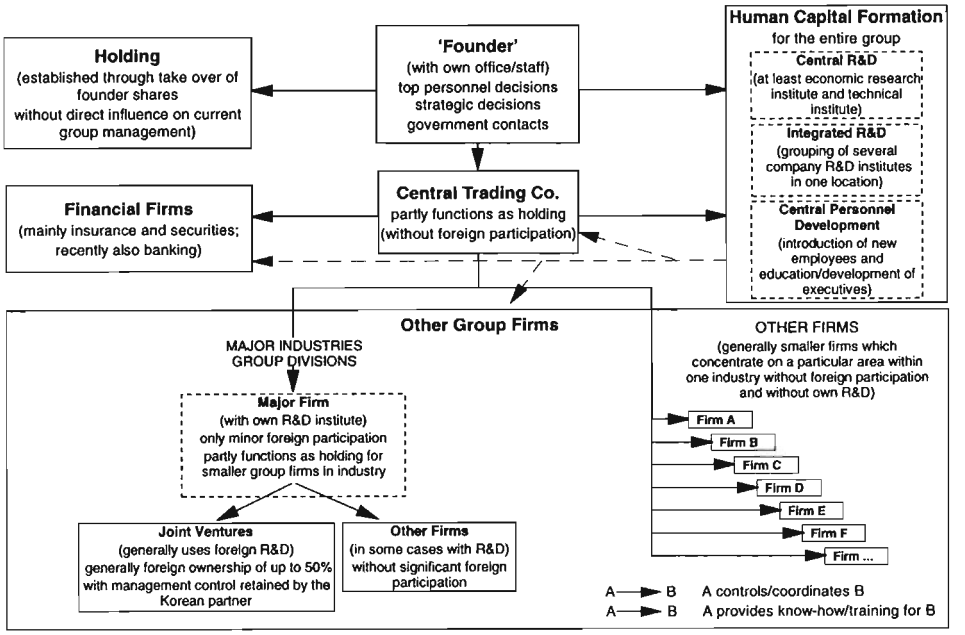

Figure 1. Actual, recent organizational structure of the four chaebol.

Acquisition of Technology I: The Process

In a discussion of the process involved in the acquisition of production technology (choice of technology and supplier, construction, start-up and scaling-up of production), it would seem appropriate to use the external environment and the economic goals of the Korean government in the early 1960s as a starting point. In 1962, after a decade of corruption and slow growth following the end of the Korean war, a new government put economic growth and reorganizing industry in a structure similar to that of developed countries on top of its agenda.[15] The decision was made to create privately owned pools of resources under domestic control. The aim was to facilitate state-of-the-art mass production in industries completely new to the country. All this had to be achieved in a nation with few financial, natural and human/technical resources. In the end, the solution to the problem was to rely on companies with little equity—owned by Koreans—and considerable outside capital—financed through foreign debt. In any case, a domestic, private majority capital owner had to assume direct responsibility for the company. The government determined the area of production and provided the outside capital—either directly in the form of foreign lending by the state or indirectly by guaranteeing supplier credits.

The basis for such a policy was established when the Park government arrested leading businessmen and confiscated their wealth in the early 1960s. Eventually, a deal was made: wealth was returned to the businessmen, who in turn were obliged to use it as controlling equity in new industrial projects.[16] Hyundai, LG and Samsung all carried out their first industrial projects promoted by the government. Only successful realization of the projects opened up opportunities for further growth.[17] The policy was one of 'picking winners'.

The most important privilege granted to promoted projects was the allocation of subsidized credit through the nationalized banking system.[18] The government deliber-

ately changed the expectations of potential resource suppliers towards certain kinds of production.[19] The state carried the interest differential by building up foreign debt. Access to foreign credit itself ultimately depended on the ability to meet the resulting debt obligations. The government accounted for this by institutionalizing a general export promotion policy and by setting export quotas for promoted industrial projects.[20] The high levels of protection given to the promoted industries were also of great significance.[21]

Under the conditions specific to Korea, the 'picking winners' model was an attractive and successful pattern for financing, even though it led to two major problems for the Korean economy: low equity ratios and a distorted financial system. It was successful because the Korean government wanted large-scale production. This meant, at least in the beginning, only one or two plants per industry. In a standard competitive model, over a period of time all less efficient producers are driven out of the market. However, with only one or two large resource pools—for which the alternative uses are far less productive—the disappearance of a less efficient producer represents at least a minor disaster. For this reason, the government looked for entrepreneurs who would use resources with relative efficiency, though they would have few or no domestic competitors.[22] If an entrepreneur was not able to do so, the government transferred the resources (by transferring the majority equity) to another entrepreneur.[23] In general, the four chaebol represent the largest 'winners' over the last three decades. They are the business groups that have received the most financial resources for different industrial projects from the government-controlled banks. This allocation ultimately depended on the ability of the owner to guarantee fast construction and production at full capacity—irrespective of the industry.

All technology was acquired from the leading industrial nations. In addition to the respective company, the state also participated in negotiations with potential suppliers of technology. With regard to the choice of a specific technology, the Koreans met with an astonishing experience:

> The ... stages ... of ... surveying alternative techniques and alternative suppliers, and choosing the best combination ... provided those studying the process of incorporation with their most surprising results—that the choice of technology is of negligible consequence and that the choice of supplier is of grave consequence. Early in the enquiry it became apparent that in Korea the choice of technique had been pre-empted. Long before the manufacturing techniques were imported, the Korean government had decided to industrialise by producing in substantial volumes a wide range of modern, sophisticated goods in large-scale plants employing the most advanced technology ... the Korean government discovered that there were usually several alternative suppliers of advanced manufacturing techniques differing in their design and operating characteristics but almost identical in the inputs they consumed and the outputs they produced.[24]

In consideration of this finding the government developed a priority list, given in Table 4, for negotiations with foreign technology suppliers.[25]

Within the whole organizational process the purchase of technology is probably the transaction which offers the most room for maneuver. This is a consequence of the nature of the product—it is for the most part knowledge. Compared to the resources needed to produce knowledge, the resources needed for its transfer are few (variable unit costs are a very small fraction of total costs). Technology is not as easy to define and deliver as, for example, an input product or a machine. For this reason, the main room for maneuver is often not found in the area of monetary prices but rather in transfer

Table 4. Priority list of the Korean government for negotiations with foreign suppliers of technology

1. Financing (foreign credit [preferred] as well as foreign investment)	ESSENTIAL
Maximum plant output (prior to profit maximization)	
2. Government control of input and output prices	DESIRED, BUT IN
Uniform treatment of foreign participants	EXTENT NEGOTIABLE
Full acquisition of technical know-how by Koreans	
Automatic access to subsequent technical improvements	
3. Access to later innovations	DESIRED, BUT
Government control over internal administration of firms operating in Korea	CONCEDED IF
Acquisition of financial and marketing knowledge by Koreans	NECESSARY
Localization of capital goods purchasing	
Majority ownership by Koreans	
4. Competition in newly-established industry (= several producers)	CONVENIENT, IF
Export permission to other countries	AVAILABLE
Foreigners remain temporarily in leading technical and financial positions	

Source: From Enos and Park, *op. cit.*, pp. 233–4.

conditions.[26] By adhering to the government priority list, the chaebol actually received maximum property rights for their financial resources. Different suppliers at comparable monetary prices were willing to make different concessions.

Once a technology supplier was selected, needed inputs were determined. All imports had to be purchased at world market prices. But domestic producers do not necessarily pay world market prices; generally they will pay higher prices for inputs because of taxes and quotas. In promoted industries in Korea (where the four chaebol mainly operated) the situation was different. Most imports were freed from quotas and import taxes and were financed by subsidized credit. This meant that input prices depended on the specific use of the input; that is, the kind of production (industry), the formal goal (maximum output) and even the final markets (export targets, price controls). 'Investment and trade policies became intimately bound.'[27] Indeed, with the signing of the initial contract the government guaranteed supply of all material inputs at comparably low prices. This was also true for domestic inputs.[28] In addition to explicit purchases of technology the implicit transfer of technology, included in specifications of foreign buyers and/or OEM contracts, was also important.[29]

With regard to the major domestic input, labor, the four chaebol offered the most attractive, modern workplaces as well as the best pay and best prospects for promotion: they were the premium Korean employers.[30] Generally, employees were hired directly from university or school. Production-related knowledge was then taught in-house.[31] Competition in recruiting the best graduates was mainly restricted to the chaebol.[32]

As a rule, the exchange of financial resources against production inputs was very far from an ideal competitive market model. A chosen company for a promoted project—that is to say, a chaebol—had the task of rapid plant erection and full capacity production, but it did not have to compete with other domestic producers for inputs on equal terms. Foreign exchange was available only to promoted industries and export production, and domestic inputs were either produced by the chaebol themselves or controlled by the government. In general, with regard to inputs, only 'fair' competition existed for qualified workers, and this kind of competition was mainly restricted to the chaebol.

How were the inputs organized to make things work? The decision to establish a new plant as a new division or separate company depended mainly on the degree of foreign

participation. Generally, a new legal entity (joint venture) was established if access to technology was subject to the condition of foreign ownership and/or to the condition of foreign management participation.[33] It also depended on the degree of uncertainty/risk. Often new plants started as independent companies and were integrated after the production process was successful and under control.

However, as already mentioned, the legal form of a new plant has been of minor importance for the actual organizational structure. Initially, all four chaebol grew primarily through the addition of new plants with little or no direct technological relationship to existing production areas. Major technical and organizational structures were predetermined by the technology supplier. In any case, plant management concentrated on the use and acquisition of foreign technology or production. Strategic decisions remained at the group level. Early on this was exclusively in the hands of the 'founder'. Later, with growing chaebol activities and government incentives, the central trading company took over many responsibilities in the areas of purchasing, financing, and sales. This was possible because the chaebol mainly operated in standardized mass production in low- and middle-product markets for which no special marketing know-how and services were needed. Furthermore, as the chaebol expanded within some core industries, the respective major firm coordinated activities within this area. Educational institutes have contributed mainly to group integration by selecting new employees and introducing them to the group culture, while production specific know-how is transferred later 'on-the-job'. R&D institute work has been closely related to production, and focus has been upon the acquisition and modification of foreign technology. This is certainly true for company R&D institutes, but applies as well to the central institutes at another level.

How does this organizational structure function? Which management style characterizes the chaebol? The answer is simple: top-down decisions dominate.[34] At first glance it is difficult to understand how it is possible to manage in tight top-down fashion if persons at the top are not well informed about the production they are supervising. Again, the explanation is related to the conditions specific to Korea. Since almost all production relies on proven foreign technology, concrete goals can be set and controlled without knowing exactly how to achieve them. In particular, design capacities for plants are known. The government makes the grants and financing of a project subject to the maximum possible output. The whole chain of control works like this: the government and the 'founder' control projects mainly by monitoring plant output and exports; plant managers monitor inputs and outputs of organizational and/or technical subunits on the basis of detailed presets obtained from the technology supplier; foremen check the achievement of their workers according to the instructions/schooling they received from the supplier of the technology.

> Neophytes that they were, Korean managers could never hope to manage in a tight, 'Taylorist', top-down fashion, at least not initially, *because no one at the top knew enough about the process to do so.* Under these conditions, it was imperative to rely on motivated workers, even if these workers possessed little more than formal schooling, to exercise the most fundamental skill of all—intelligence. In all of the new capital-intensive industries—continuous-process and especially fabrication-assembly operations and job shops of jumbo proportions—production workers were motivated with relatively high wage rates, first to get the product out of the door, and later to improve quality[35] [original emphasis].

The seeming contradiction is resolved in a tight hierarchical setting with the monitoring of targets and 'autonomous' work by motivated subordinates.

Acquisition of Technology II: The Achievements

This section of the paper focuses on the technological achievements of the chaebol. First of all, productivity of Korean plants will be discussed. This is a relatively direct measure of the scope of the acquisition of technology. Three indirect measures follow: foreign direct investment (FDI) by the four chaebol; technology imports/co-operations (including FDI by foreign companies in Korea); and own-brand sales.

In general, Korean plants started with lower productivity than that of comparable plants in industrial nations, and then made fast progress toward that level. Although a comprehensive comparison and explanation of the international productivity level shown by the chaebol is beyond the scope of this paper, the following remarks should permit an initial, brief assessment. The chaebol used standard state-of-the-art technology. State-of-the-art indicates that the technology—at design capacity and prevailing world prices—is the most efficient technology available. With regard to a given technology, an improvement in the productivity of variable inputs (labor, parts, etc.) depends mainly on the number of products produced (learning curve). For large-scale modern plants, which are heavy investments, high production volumes are essential to recover investment (fixed) costs. In this context, the length of the construction period is also a consideration. Obviously the volume of production (used capacity) is of critical importance for overall productivity. As maximum plant output topped the government's priority list, no chaebol could grow larger without paying attention to this factor. Measures taken contributed to faster acquisition of technology and subsequently to productivity growth. Enos and Park stress the importance of the initial contract:

> ... *swift* absorption of the technology has desirable effects, both on output and on employment, and swiftness comes at the outset from negotiating favourable terms with the foreign suppliers. ... a major determinant of the ability of a developing country to absorb an imported technology is the preferences of its government, as reflected in the terms that it imposes upon the foreign suppliers [and domestic producers; MH]. If these terms are output- and employment-oriented, the country's ability to absorb the technology will be enhanced; if these terms are profit- and publicity-oriented, the country's ability will be reduced[36] [original emphasis].

As the Korean education system produced a large pool of well-educated labor which the chaebol were able to tap, and as the government secured the availability of other domestic and foreign inputs, the major constraint to output maximization was applied by demand.[37] Where new technological developments made installed production lines in part obsolete and as a result cut demand, productivity gains were low, and there was no chance of running down the learning curve.[38] With regard to construction periods, the Koreans are respected for international record times in the completion of plants[39]: 'The chaebol soon became the most progressive firms ... Entering new industries at minimum cost and at lightning speed raised the firm's ability to compete in many markets.'[40] Generally speaking, with regard to the productivity of Korean producers—and especially the chaebol—the points above seem to indicate that they have done fairly well for companies in a late industrializing country.

Often an indirect look at some actions related to an issue provides the observer with more accurate information than detailed announcements or ideas of people sought directly. In nearly any company publication provided by the groups or any interview with chaebol managers in business magazines, the same story will be given over and over again: By the year 2000 (or at least 2010) we will be among the top 10, perhaps top five companies of the world (world-class company, industry leader) with our own technology within this and that industry.[41] In the following text, three indirect activities/measures

will be used to evaluate how these statements (or wishes) compare with recent actions by the groups, and to assess the extent of technology acquisition by the chaebol: (1) FDI by the four chaebol; (2) technology imports and technological co-operation with firms from other countries; and (3) the percentage of own-brand sales by the chaebol.

Table 5 gives an overview of foreign direct investments by the four chaebol. Although (and because) every group has sales and trading operations all around the world, these activities are excluded. Technological know-how is more closely related to the operation of plants (and 'direct' services) than to services which are related mainly to the distribution of products produced by other group firms. Although the material represented in Table 5 is not comprehensive, (with some background knowledge) major tendencies can be detected. Asia (excluding Japan) and East Europe (including the CIS) are the most important regions for foreign production activities by the four chaebol. Globalization of production is most advanced within the field of consumer electronics, though even in this area production activities in the 'triad' (Western Europe, North America and Japan) are often more related to market access for a restricted number of non-high-end products and the scanning of markets and technologies than to more efficient production of plants under Korean control.[42] Because Korea lacks natural resources of any importance, it would seem that today the chaebol consider it important to be involved (in general the Koreans participate as 'junior' partners) in the development of natural resources worldwide. FDIs in R&D firms and facilities are restricted to the regions within the triad (with the notable exception of attempts to gain access to Russian know-how and research potential) and the fields of machinery/vehicles and electronics.[43]

With regard to technology transfers (such as license contracts, co-operations and joint ventures) there is one very important, plain and not very surprising fact: all technologies have come from the leading industrial nations, with Japan the most important technology supplier, followed by the US and European countries.[44] From whom could the chaebol have obtained state-of-the-art mass production technologies if not from the leading industrial nations of the triad? Ever since the 1960s it has been a continual repeat of the same story. Your group wants to enter a totally new kind of production? Well, buy the whole technology from someone who knows (that is, triad firms) at the best terms available, and see the whole thing through as fast as possible with maximum support conditions available from all governments/official bodies involved. You want to upgrade your existent product portfolio? Well, co-operate with, or buy, someone who knows.[45] In general, the 'strength' of the Koreans can be detected from the kind of agreements made. Production joint ventures (especially within Korea) with foreign partners indicate a weak position,[46] while license agreements, technological co-operation and joint developments indicate a strong (technological and marketing) position for the chaebol.[47] Original equipment manufacturing (OEM) falls somewhere in-between.

Table 6 presents information on FDI and technology transfers for one product: color TVs. The table demonstrates that even for products where the chaebol are major global producers,[48] foreign production in industrialized countries plays a minor role and serves primarily to satisfy trade goals. This is depicted most clearly from production data for America, where both groups with production in the United States later moved their production to Mexico.[49]

A final look at the ratios for own-brand sales of consumer electronics in the early 1990s also confirms that the four chaebol—even in an industry where they account for a large part (sometimes over 50%) of world production and have many foreign plants—still rely to a great extent on the technological and marketing know-how of other firms (Table 7). Even in the 1990s about 50% of consumer electronics products were

Table 5. Foreign direct investment by the four chaebol up until 1997 by industry and region (excluding sales, distribution and trade)

Industry	Japan	America (North)	Europe (West)	Asia (excl. Japan)	Europe (East/CIS)	America (Latin)	Australia	Africa
Light Industries								
Textiles/apparel			S	**D**S	D	DS		D
Construction	D	D	S	**D**S	D		D	D
Other				D	D			D
Heavy Industries								
Chemicals/petrochemicals			D	DLS	DL			
Iron/steel/other metals				DH	DS	H	H	
Automobiles/trucks		Hhs	d	DH	**D**			
Machinery			DSs	DLS	D			
Shipbuilding		H			d			
Aerospace		D						
Electronics								
Consumer electronics	dls	**L**ls	**D**dLlSs	**DLS**	**D**LlS	DLS		LS
Telecommunications				D	DL	S		
Computers/microelectronics.	dls	**DHlS**	Ss	$D_{(PC\text{-}monitors)}$				
Services								
Entertainment/tourism		S		D	D			D
Real Estate		SD		D				
Finance		SDH	DHS	DH	DL			
Other services		HS	H	D				
Natural Resources								
Natural resources		DHS		DHS	DS	DH	DHS	DH

Note: D = Daewoo, H = Hyundai, L = LG-group, S = Samsung. Lower case (d, h, l, s) = research & development (R&D). Bold type = major investments.

Table 6. Foreign and worldwide production[a] of color television sets by Daewoo, LG and Samsung and technology suppliers (by region)

CHAEBOL	Tech Suppliers, OEM & Acquisitions	America	Europe	Asia (excl. Japan)	Worldwide
DAEWOO	'96: OEM of medium-size models for NEC (J) '97: production for JVC (J) possible for non-high end CTVs '97: tried unsuccessfully to take over Thomson Multimedia (F)	'96: 2,000,000 Mexico '96: 1,000,000 Mexico	'93: 400,000 France '96: 450,000 France '96: 600,000 France '94: 200,000 Poland '95: 400,000 Poland '96: (600,000) Poland '96: 400,000 Poland	'94: 200,000 Vietnam '96: ? Myanmar '96: ? India '94: 100,000 Pakistan '96: 70,000 Pakistan '96: 90,000 Uzbekistan '96: 100,000 Kazachstan	'94: 4,500,000 incl. 1,500,000 foreign '96: 8,000,000 2000: (10,000,000)
LG	'66: 1. b/w TV Hitachi (J) Since '91: cooperation with Zenith Electronics (US) '95: takeover of Zenith	'82: 1,000,000 US '83: (1,000,000) US '88: 450,000 Mexico	'86: 150,000 Germany '87: (1,000,000) Germany '93: 100,000 Germany '90: 200,000 Turkey	'95: ? China '88: 100,000 Thailand '90: 150,000 Indonesia	'92: 6,000,000 '96: 10,250,000
SAMSUNG	'96: production start with technology from Sanyo (J) '92: HDTV tech-sharing agreement with General Instrument (US)	'84: (1,000,000) US '96: 1,500,000 Mexico	'95: 200,000 Hungary '95: 250,000 Hungary '96: 200,000 Hungary '97: (400,000) Hungary '88: (400,000) UK '95: 300,000 UK '96: 1,000,000 UK '89: (120,000) Spain '96: 150,000 Spain[b] '97: 300,000 Spain[b] '82: 200,0000 Portugal	'92: 80,000? China '97: (1,200,000) China '97: 1,200,000 China '92: ? Thailand	'96: 9,000,000

Note: [a] Production as well as capacities. Planned figures in parentheses.

[b] TVCRs = Combination of CTV and VCR. The year is followed by the amount of production/capacity and country. Hyundai has no relevant production of CTVs, and there is no production of importance in Africa (though Samsung produces in South Africa).

Source: Information was collected from about 25 sources. The most important are PR Dept. of Goldstar Co., *Goldstar*, Seoul, 1993., pp. 9, 33–40; Daewoo Corporate Culture Dept., *News from Daewoo, May 1994*, Seoul, 1994, pp. 6–9; J. R. Chaponniere, *op cit.*, pp. 113–15; *Business Week*, 16 September 1996, p. 33; and Daewoo Grup, *op. cit.*, pp. 47–8, 71–88. All other information was taken from company publications or the business press. Varying information are all given.

Table 7. Some own-brand sales ratios (OBS) for the four chaebol (consumer electronics, 1990–96)

Year	Company	Products	OBS	Note
'90	S Group	CTVs	35%	65% of exports under OEM; date ca.
'92	D Electronics	Consumer electronics	25%	
'92	S Electronics	CTVs	60%	40% for others; possibly only related to EU
'93	D Electronics	Consumer electronics	35%	
'93	D Electronics	Refrigerators	32%	
'93	D Electronics	Washing machines	40%	
'93	D Electronics	CTVs	39%	
'93	D Electronics	MWOs	28%	
'93	D Electronics	VCRs	34%	
'94	D Electronics	Consumer electronics	50%	Planned
'94	D Electronics	Refrigerators	43%	Planned
'94	D Electronics	Washing machines	60%	Planned
'94	D Electronics	CTVs	67%	Planned
'94	D Electronics	MWOs	46%	Planned
'94	D Electronics	VCRs	50%	Planned
'94	S Electronics	All Co. Products	65%	60–70%
'94	Goldstar Co.	Consumer electronics	50%	Ca. 50% of German production for others
'96	LG Electronics	All Co. Products	50%	Date of source

D = Daewoo, S = Samsung

Source: Daewoo Corporate Culture Dept., May 1994, *op. cit.*, p. 6: Denise Chai, 'Is Samsung running ahead of its capabilities?', *Asiamoney*, December 1993/January 1994, p. 59; LG Electronics, 'Sponsorship statement. LG Electronics: Positioned for future growth', *Asiamoney*, May 1996, p. 47; *Handelsblatt*, 27 May 1994, p. 18; *Handelsblatt*, 18 April 1995, p. 9.

distributed under the name of other companies. All of this should not detract from the impressive achievements of the four chaebol. It just serves to make comprehensible how these astonishing leaps forward in product and technology portfolios have been possible.

Conclusions and Prospects

This paper has dealt with the acquisition of foreign technology and foreign direct investment by the four largest South Korean business groups: the chaebol Daewoo, Hyundai, LG (up until 1994 Lucky-Goldstar) and Samsung. The four chaebol successfully acquired state-of-the-art technology for large-scale production of lower- and middle-market segment products within a very broad range of industries.[50] As these technologies were often completely new to the respective chaebol, or even to the country, speed and scope of the acquisition were indeed some kind of 'Asian miracle'. The 'miracle' can be explained by the strategies of the Koreans and the framework in which it was realized, and it can be demonstrated that the achievements came at some cost. In fact, the most important recent problems of the chaebol, namely lack of their own high-technology, extreme diversification, nontransparent interdependencies between group companies, as well as low equity and profit rates, are genuine results of the very strategy which led to the successful acquisition of technology. Although all four groups undertook foreign direct investment at a considerable scale, these investments were mainly restricted to a few geographic areas and product groups, and it is far too early to speak of a real globalization of group operations.

Prospects today appear more dismal than they did in the last three decades. The main reasons for this seem to be neither a lack of awareness of the major problems—

nearly every business article and scientific publication within the last few years has paid attention to them—nor even the problems themselves. The main reason is probably that the groups and the Korean government are unable to act in new and difficult ways to solve the problems. It seems to be very hard to abandon strategies that have proven successful in the past.

Notes and References

1. In the following, the terms 'Korea' and 'Korean' refer to the Republic of Korea or South Korea.
2. Daewoo, Hyundai, LG and Samsung are referred to as the four chaebol. Since April 1993 the top 30 conglomerates are defined as chaebol by the Korean government and are subjected to special rules (OECD, *Korea: OECD Economic Survey. May 1994*, OECD, Paris, 1994, p. 171, n. 21).
3. Marcus Lippold, *South Korean Business Giants: Organizing Foreign Technology for Economic Development. Daewoo, Hyundai, LG and Samsung* (Berichte aus dem weltwirtschaftlichen Colloquium der Universität Bremen, No. 44), Universität Bremen, Bremen, 1996. I would like to thank John L. Enos for proposing this new version and Cheryl Weise and Anette von Ahsen for checking it. Furthermore, comments by the two referees helped to eliminate some deficiencies of the paper.
4. More detailed references are included in Lippold, *op. cit.* See also John Ravenhill, *The Political Economy of East Asia 2. China, Korea and Taiwan*, Vol. 1, Elgar, Aldershot, 1995; Alice H. Amsden, *Asia's Next Giant. South Korea and Late Industrialization*, Oxford University Press, Oxford, 1989; John L. Enos and W.-H. Park, *The Adoption and Diffusion of Imported Technology. The Case of Korea*, Croom Helm, London, 1988; Roger L. Janelli, *Making Capitalism: The Social and Cultural Construction of a South Korean Conglomerate*, Stanford University Press, Stanford, 1993; Leroy P. Jones and Il Sakong, *Government, Business, and Entrepreneurship in Economic Development: The Korean Case. Studies in the Modernization of the Republic of Korea: 1945–1975*, Council on East Asian Studies, Harvard University Press, Cambridge, MA, 1980; Richard Luedde-Neurath, 'State intervention and export-oriented development in South Korea', in Gordon White (ed.), *Development States in East Asia*, Macmillan, London, 1988, pp. 68–112; UNIDO, *The Engineering Industry in the Republic of Korea. A Success Story in a Critical Perspective*, 1986; and Larry E. Westphal, 'Industrial policy in an export-propelled economy: Lessons from South Korea's experience', *Journal of Economic Perspectives*, 4, 3, 1990, pp. 41–59. In addition, The World Bank, *The East Asian Miracle. Economic Growth and Public Policy*, Oxford University Press, Oxford, 1993; and two related papers in *The World Bank Research Observer*, 11, 2, 1996—Joseph E. Stiglitz, 'Some lessons from the East Asian miracle', pp. 151–77 and Jospeh E. Stiglitz and Marilou Uy, 'Financial markets, public policy, and the East Asian miracle', pp. 249–76—discuss similarities and differences among the eight Asian economies (Hong Kong, Indonesia, Japan, South Korea, Malaysia, Singapore, Taiwan and Thailand).
5. Average real GDP growth rate over the last 30 years in Korea was about 8%.
6. Original data taken from Sang-Hun Choe, *Der Stellenwert der Mischkonzerne (Chaebols) im koreanischen Industrialisierungsprozeß. Dargestellt am Beispiel des Werdegangs und der Strukturmerkmale Samsungs* (in German), Dissertation, Universität Hamburg, 1994, p. 118; Amsden, *op. cit.*, pp. 116, 126; Wolfram Högel, *Modell Korea? Evolution und Erosion des Koreanischen Entwicklungskonzepts. Die Steuerungsfunktion eines unternehmerisch handelnden Staates in ihrer Auswirkung auf die Branchenstruktur* (in German), Peter Lang, Frankfurt a.M., 1992, p. 288; Daewoo, *News from Daewoo. April 1993*, Daewoo Corporate Culture Dept., Seoul, 1993, p. 5; Jones and Sakong, *op. cit.*, pp. 262, 350–62; Goldstar, *Goldstar Welcomes You*, n.d. (c. 1993), p. 6; Samsung, *1992 Annual Report*, Sulzbach, Seoul and Ridgefield Park, NJ, 1993, p. 65; Matthew Montagu-Pollock, 'The Chaebol adapt', *Asiamoney*, May 1995, Supplement, p. 19; *Business Week*, 13 March 1995, p. 25; *Economist*, 18 October 1997, p. 84. The *International Financial Statistics Yearbooks* of the IMF were used for exchange rates (to convert original data in won) and GDP data.
7. Janelli, *op. cit.*, pp. 126–7.
8. *Fortune*, 7 August 1995, 5 August 1996 and 4 August 1997. Obviously financial statements must be read with caution (see, e.g. *Economist*, 13 December 1997, p. 67).
9. Jones and Sakong, *op. cit.*, pp. 273–4.

10. Daewoo, *News from Daewoo. April 1994,* Daewoo Corporate Culture Dept., Seoul, 1994, p. 8.
11. In the following, the term 'founder' always refers to the original founder (or his successor) and his family. The term without inverted commas refers to the founder personally.
12. Montagu-Pollock, *op. cit.,* pp. 19–23; OECD, *op. cit.,* pp. 60–3.
13. Hattori, *op. cit.*
14. The term actual indicates that the presented structure is based on (my own perception of) real existence and behavior of group companies or institutes—not on official charts or announcements.
15. Jones and Sakong, *op. cit.,* and Edward S. Mason *et al., The Economic and Social Modernization of the Republic of Korea. Studies in the Modernization of the Republic of Korea, 1945–1975,* Council on East Asian Studies, Harvard University Press, Cambridge, MA & London, 1980, together give a fairly complete picture of the story.
16. Jones and Sakong, *op. cit.,* pp. 281–2.
17. Taniura, *op. cit.*, p. 468.
18. 'Throughout the industrialisation period and even after privatisation [of banks, since the mid-1980s], over 50 per cent of bank loans fell into the category of policy loans; that is, designated loans for targeted industries or for particular activities such as exporting or R&D.' Ha-Joon Chang and Richard Kozul-Wright, 'Organising development: Comparing the national systems of entrepreneurship in Sweden and South Korea', *Journal of Development Studies,* 30, 3, 1994, p. 881. See also Jung-En Woo, *Race to the Swift: State and Finance in Korean Industrialization,* Columbia University Press, New York, 1991, especially Chapter 6.
19. 'Proponents of the market view place unconditional faith in the capital market profit rate in making decisions about how much should be invested in which projects. They believe that because this rate is determined by market forces it is inviolate. Yet there is nothing sacred about it. It reflects the sociopsychic view of financeers about what rate of return they require in order to accept risk.' Amsden, *op. cit.*, p. 322.
20. See Westphal, *op. cit.*
21. The measures used included not only visible tariffs and quotas, but nearly everything from administrative chicanery to 'buy Korean' campaigns to the denial of access to foreign exchange for importers (Luedde-Neurath, *op. cit.*). The combination of policy for promoting specific industries with the general export promotion policy is discussed by Westphal, *op. cit.*
22. 'Economists devote much time to getting resources to the right *industry,* whereas getting them to the right *individual* may be [at least, if there are great deviations from the 'ideal' competitive model] far more important.' Jones and Sakong, *op. cit.*, p. 305 original emphasis).
23. Daewoo—the youngest of the four chaebol—developed in this way. Daewoo, April 1994, *op. cit.*, p. 4; Jones and Sakong, *op. cit.*, p. 364.
24. Enos and Park, *op. cit.,* pp. 232–3.
25. As the government, directly or indirectly, secured most of the financing, it could always enforce its priorities. With time, the chaebol anticipated these priorities in their actions. This common approach to negotiations ensured that all potential suppliers had to guarantee certain standards to all possible Korean producers. This fostered negotiating power on the Korean side.
26. Indeed, transfer conditions differ greatly within one method (e.g. capital goods import, turnkey project, licensing/consulting, joint venture): 'More important than the differences in the methods of transferring technology is the maneuvering possible within each method ... some foreign partners and suppliers will do *much more* than others in transferring their technology to developing countries.' Carl J. Dahlman, Bruce Ross-Larson and Larry E. Westphal, *Managing Technological Development. Lessons from the Newly Industrializing Countries,* World Bank Staff Working Papers, No. 717, World Bank, Washington DC, 1985, pp. 33–4 (emphasis added). Often first Korean projects were turnkey projects (*ibid.,* p. 22).
27. Amsden, *op. cit.,* p. 74.
28. In the case of capital goods—which were relatively low-priced in Korea (Colin I. Bradford, Jr, 'Trade and structural change: NICs and next tier NICs as transitional economies', *World Development,* 15, 3, 1987, pp. 306–10)—this caused one inconsistency in the government's industrial promotion policy: low prices hindered the domestic production of capital goods. Since the mid-1970s the government has tended to give preference to domestic producers of capital goods

and promoted respective exports. Larry E. Westphal, Yung W. Thee, Linsu Kim and Alice H. Amsden, 'Republic of Korea', *World Development*, 12, 5/6, 1984, pp. 509–10.

29. See Yung Whee Rhee, Bruce Ross-Larson and Garry Pursell, *Korea's Competitive Edge. Managing the Entry into World Markets*, Johns Hopkins University Press, Baltimore, 1984 (esp. pp. 61–3); Michael Hobday, *Innovation in East Asia. The Challenge to Japan*, Elgar, Aldershot, 1995.
30. Janelli, *op. cit.*, p. 151; Amsden, *op. cit.*, p. 151.
31. Janelli, *op. cit.*, p. 140.
32. Chan Sup Chang, 'Human resource management in Korea', in K. H. Chung and H. C. Lee (eds.), *op. cit.*, p. 197.
33. See for example, Taniura, *op. cit.*, p. 482. Russell Mardon, 'The state and the effective control of foreign capital: The case of South Korea', *World Politics*, 43, 1, 1990, pp. 111–38 offers a good description of the use of foreign capital for economic and technological development under domestic ownership and control in Korea.
34. Such terms as 'centralized' and 'hierarchical' abound. Again, Janelli, *op. cit.*, offers the most comprehensive description (especially Chapters 4 and 5).
35. Amsden, *op. cit.*, p. 209.
36. Enos and Park, *op. cit.*, pp. 234, 248.
37. Sanjaya Lall, *Building Industrial Competitiveness in Developing Countries*, OECD, Development Centre Studies, Paris, 1990, pp. 45–51; Linsu Kim, 'Technological transformation of Korean firms,' in K. H. Chung and H. C. Lee (eds.), *op. cit.*, pp. 117–18.
38. Enos and Park, *op. cit.*, pp. 147–75; Brian Levy and Wen-Jeng Kuo, 'The strategic orientations of firms and the performance of Korea and Taiwan in frontier industries: Lessons from comparative case studies of keyboard and personal computer assembly', *World Development*, 19, 4, 1991, p. 369.
39. See, e.g., Chan K. Hahn, 'Korean manufacturing strategy', in K. H. Chung and H. C. Lee (eds.), *op. cit.*, p. 140.
40. Amsden, *op. cit.*, p. 151.
41. See, e.g. LG Electronics, *LG Electronics Brief 1995*, LG Electronics Inc., Seoul, n.d. (c. 1995), p. 23; Samsung Group, Public Affairs Dept., *The Samsung Magazine*, April 1997, Seoul, 1997, p. 25; and Daewoo Group, Corporate PR Team, *Daewoo Fact Book 1996. Daewoo Around the World*, Seoul, 1996, p. 20. Indeed, it is nearly impossible to look into any publication by the chaebol without reading about these things. It must be said, however, that the chaebol still realize and admit that they are not at the world technological frontier (see, e.g. Samsung Group, *Samsung Newsletter January–February 1996*, Seoul, 1996, p. 9).
42. See J. R. Chaponnière, 'The newly industrialising economies of Asia: International investment and transfer of technology', *STI Review*, 9, OECD, Paris, April 1992, pp. 65–131, esp. pp. 112–17; and Mike Hobday, 'East Asian latecomer firms: Learning the technology of electronics', *World Development*, 23, 7, 1995, pp. 1171–93.
43. Recently, the acquisition of Western companies possessing their own know-how is one way the chaebol have tried to gain access to frontier technologies and markets. Hyundai acquired hard disk manufacturer Maxtor and AT&T's semiconductor division, LG acquired Zenith Electronics and Samsung took over German camera manufacturer Rollei and US computer manufacturer AST Research. In addition, Daewoo tried unsuccessfully to acquire Steyr-Daimler-Puch of Austria and Thomson Multimedia, and Samsung considered for some time the acquisition of East German whiteware producer Foron as well as Dutch airplane manufacturer Fokker. These takeovers were not without risk because the firms acquired were generally in a weak state and in desperate need of a partner. The gamble, however, might pay off since the chaebol, in compensation for these risks, paid low prices for company assets, technological know-how and market access.
44. See Enos and Park, *op. cit.*, p. 41, and Amsden, *op. cit.*, p. 233, 263 for official Korean data on approved technology contracts by country and industry (1962–84/81). Most contracts fell into the areas of chemicals/petrochemicals, machinery and electronics. For data on approved licensing in the auto industry, see Joseph H. Stern *et al., Industrialization and the State. The Korean Heavy and Chemical Industry Drive*, Harvard University Press, Cambridge, MA, 1995, p. 159.
45. These words indicate that some chaebol FDIs considered in Table 5 should be more appropriately considered as a source of technology and not as having superior production capabilities.

46. However, as Korean technological knowledge grew, the Koreans often tried to force out the foreign investor. See Martin Hart-Landsberg, *The Rush to Development. Economic Change and Political Struggle in South Korea,* Monthly Review Press, New York, 1993, pp. 90–3.
47. It is very hard to evaluate the difference between these terms in publications. Nonetheless, there is a clear trend away from such terms as 'license agreement' towards such terms as 'technological co-operation' or 'joint development'. However, 'a lot of what South Korean firms consider research and development spending is actually money spent on reverse engineering attempts rather than basic research' (Hart-Landsberg, *op. cit.*, p. 254).
48. According to *Business Week,* 16 September 1996, p. 33, LG, Samsung and Daewoo were, respectively, the 3rd, 5th and 7th largest TV producers in the world. With the realization of the intended takeover of Thomson Multimedia (which finally failed), Daewoo would have become the world's largest TV producer.
49. Eu-Chul Lee, 'High-tech borderland', *Samsung Newsletter. May/June 1996,* Samsung Group, Seoul, pp. 13–14; *Business Week,* 12 August 1996, p. 20; and *Handelsblatt,* 3 April 1998, p. 14.
50. There are possibly two exceptions where the chaebol operate as independent actors at the upper end of the market: DRAMs and computer monitors. In addition, some high-end products/parts (e.g. fighter airplanes, submarines, high-speed trains) are produced under foreign license without any room for strategic decisions about world-wide product strategies by the chaebol.