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*Crisis construction and organizational learning: capability building in catching-up at Hyundai Motor*


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ISSN: 1047-7039
Crisis Construction and Organizational Learning: Capability Building in Catching-up at Hyundai Motor

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Abstract
Effective organizational learning requires high absorptive capacity, which has two major elements: prior knowledge base and intensity of effort. Hyundai Motor Company, the most dynamic automobile producer in developing countries, pursued a strategy of independence in developing absorptive capacity. In its process of advancing from one phase to the next through the preparation for and acquisition, assimilation, and improvement of foreign technologies, Hyundai acquired migratory knowledge to expand its prior knowledge base and proactively constructed crises as a strategic means of intensifying its learning effort. Unlike externally evoked crises, proactively constructed internal crises present a clear performance gap, shift learning orientation from imitation to innovation, and increase the intensity of effort in organizational learning. Such crisis construction is an evocative and galvanizing device in the personal repertoires of proactive top managers. A similar process of opportunistic learning is also evident in other industries in Korea.

Organizational learning and innovation have become crucially important subjects in management. Research on these subjects, however, is concentrated mainly in advanced countries (e.g., Argyris and Schon 1978, Dodgson 1993, Nonaka and Takeuchi 1995, Utterback 1994, von Hippel 1988). Despite the fact that many developing countries have made significant progress in industrial, educational, and technological development, research on learning, capability building, and innovation in those countries is scanty (e.g., Fransman and Kim 1984, Kim 1997, Kim and Kim 1985). Models that capture organizational learning and technological change in developing countries are essential to understand the dynamic process of capability building in catching-up in such countries and to extend the theories developed in advanced countries.

Understanding the catching-up process is also relevant and important to firms in advanced countries. Not all firms can be pioneers of novel breakthroughs, even in those countries. Most firms must invest in second-hand learning to remain competitive. Nevertheless, much less attention is paid to the imitative catching-up process than to the innovative pioneering process. For instance, ABI/Inform, a computerized business database, lists a total of 9,006 articles on the subject of innovation but only 145 on imitation (Schnaars 1994).

A crisis is usually regarded as an unpopular, largely negative phenomenon in management. It can, however, be an appropriate metaphor for strategic and technological transformation. Several observers postulate that constructing and then resolving organizational crises can be an effective means of opportunistic learning (e.g., Nonaka 1988, Pitt 1990, Schon 1967, Weick 1988), but no one has clearly linked the construct variable to corresponding empirical evidence.

The purpose of this article is to develop a model of organizational learning in an imitative catching-up process, and at the same time a model of crisis construction and organizational learning, by empirically analyzing the history of technological transformation at the Hyundai Motor Company (hereinafter Hyundai), the most dynamic automaker in developing countries, as a case in point.

Despite the prediction that none of South Korea's automakers will survive the global shakeout of the 1990s, having been driven out or relegated to niche markets dependent on alliances with leading foreign car producers (Far Eastern Economic Review 1992), Hyundai is determined to become a leading automaker on its own. Unlike most other automobile companies in developing countries, Hyundai followed an explicit policy of maintaining full ownership of all of its 45 subsidiaries, entering the
auto industry in 1967 as a latecomer without foreign equity participation. Hyundai has progressed remarkably since then.

In quantitative terms, Hyundai increased its production more than tenfold every decade, from 614 cars in 1968, to 7,009 in 1973, to 103,888 in 1983, and to 1,134,611 in 1994, rapidly surpassing other automakers in Korea, and steadily ascending from being the sixteenth-largest producer in the world in 1991 to being the thirteenth-largest in 1994. Hyundai is now the largest automobile producer in a developing country. It produced its one-millionth car in January 1986, taking 18 years to reach that level of production in contrast to 29 years for Toyota and 43 years for Mazda (Hyun and Lee 1989).

In qualitative terms, Hyundai began assembling a Ford compact car on a knockdown basis in 1967. It rapidly assimilated foreign technology and developed sufficient capability to unveil its own designs, Accent and Avante, in 1994 and 1995, respectively. The company thus eliminated the royalty payment on the foreign license and was able to export production and design technology abroad.

Hyundai’s rapid surge raises several research questions: (1) How did Hyundai acquire the technological capability to transform itself so expeditiously from imitative “learning by doing” to innovative “learning by research”? (2) How does learning in the catching-up process in a developing country differ from learning in the pioneering process in advanced countries? (3) Why is crisis construction an effective mechanism for organizational learning? (4) Can Hyundai’s learning model be emulated by other catching-up firms? (5) What are the implications of Hyundai’s model for future research? The following section briefly reviews theories related to organizational learning and knowledge creation. Then Hyundai is analyzed as a case in point to illustrate how the Korean firm has expedited organizational learning and to answer the research questions.

Crisis and Organizational Learning
Organizational learning, whether to imitate or to innovate, takes place at two levels: the individual and organizational. The prime actors in the process of organizational learning are individuals within the firm. Organizational learning is not, however, the simple sum of individual learning (Hedberg 1981); rather, it is the process whereby knowledge is created, is distributed across the organization, is communicated among organization members, has consensual validity, and is integrated into the strategy and management of the organization (Duncan and Weiss 1978). Individual learning is therefore an indispensable condition for organizational learning but cannot be the sufficient condition. Organizations learn only when individual insights and skills become embodied in organizational routines, practices, and beliefs (Attewell 1992). Only effective organizations can translate individual learning into organizational learning (Hedberg 1980, Kim 1993, Shrivastava 1983).

Absorptive Capacity
Organizational learning is a function of an organization’s absorptive capacity. Absorptive capacity requires learning capability and develops problem-solving skills. Learning capability is the capacity to assimilate knowledge (for imitation), whereas problem-solving skills represent a capacity to create new knowledge (for innovation).

Absorptive capacity has two important elements, prior knowledge base and intensity of effort (Cohen and Levinthal 1990). Prior knowledge base consists of individual units of knowledge available within the organization. Accumulated prior knowledge increases the ability to make sense of and to assimilate and use new knowledge. Relevant prior knowledge base comprises basic skills and general knowledge in the case of developing countries, but includes the most recent scientific and technological knowledge in the case of industrially advanced countries. Hence, prior knowledge base should be assessed in relation to task difficulty (Kim 1995).

Intensity of effort represents the amount of energy expended by organizational members to solve problems. Exposure of a firm to relevant external knowledge is insufficient unless an effort is made to internalize it. Learning how to solve problems is usually accomplished through many practice trials involving related problems (Harlow 1959). Hence, considerable time and effort must be directed to learning how to solve problems before complex problems can be addressed. Such effort intensifies interaction among organizational members, thus facilitating knowledge conversion and creation at the organizational level.

As shown in Figure 1, prior knowledge base and intensity of effort in the organization constitute a $2 \times 2$ matrix that indicates the level of absorptive capacity. When both are high (quadrant 1), absorptive capacity is high; when both are low (quadrant 4), absorptive capacity is low. Organizations with high prior knowledge in relation to task difficulty and low intensity of effort (quadrant 2) will gradually lose their absorptive capacity, moving rapidly down to quadrant 4, because their prior knowledge base will become obsolete as task-related technology moves along its trajectory. In contrast, organizations with low prior knowledge in relation to task difficulty and high intensity of effort (quadrant 3) will be able to acquire
absorptive capacity, moving progressively to quadrant 1, as repeated efforts to learn and solve problems elevate the level of relevant prior knowledge (Kim 1995).

Knowledge and Learning

Many social scientists have attempted to delineate knowledge dimensions (Garud and Nayyar 1994, Kogut and Zander 1992, Polanyi 1966, Rogers 1983, Winter 1987). Polanyi’s two dimensions, explicit and tacit, are the most widely accepted. Explicit knowledge is knowledge that is codified and transmittable in formal, systematic language. It therefore can be acquired in the form of books, technical specifications, and designs, or as embodied in machines. Tacit knowledge, in contrast, is so deeply rooted in the human mind and body that it is difficult to codify and communicate and can be expressed only through action, commitment, and involvement in a specific context. Tacit knowledge can be acquired only through experience such as observation, imitation, and practice.

Tacit knowledge is the core of a firm’s prior knowledge base. The firm may have some proprietary explicit knowledge such as firm-specific blueprints and standard operating procedures. However, they are useful only when tacit knowledge enables its members to utilize them. Much of the knowledge that underlies the effective performance of an organization is tacit knowledge embodied in its members (Howells 1996, Nelson and Winter 1982).

Organizational learning takes place primarily through the dynamic process of four modes of conversion between the two dimensions of knowledge within the organization (Nonaka 1994, Nonaka and Takeuchi 1995). Tacit-to-tacit conversion (socialization) takes place when tacit knowledge within one individual is shared with another through training, whereas explicit-to-explicit conversion (combination) takes place when an individual combines discrete pieces of explicit knowledge into a new whole. Tacit-to-explicit conversion (externalization) takes place when an individual is able to articulate the foundations of his or her tacit knowledge, whereas explicit-to-tacit conversion (internalization) takes place when new explicit knowledge is shared throughout the firm and other members begin to use it to broaden, extend, and reframe their own tacit knowledge.

Figure 2 depicts the dynamic process of organizational learning in the catching-up process. It shows that prior knowledge base and intensity of effort affect the dynamics of knowledge conversion through a spiral process that starts at the individual level and moves up to the organizational level. Organizational learning tends to become faster and larger in scale as more actors in and around the firm with adequate prior knowledge intensify their efforts to convert knowledge within and between themselves. The outcome of knowledge conversion and creation feeds back to the prior knowledge base to increase its level.

In addition, migratory knowledge significantly affects the building of the prior knowledge base in the catching-up process (Badaracco 1991). Books, technical specifications, designs, and physical equipment transfer explicit knowledge, whereas the migration of individuals from one organization or country to another transfers tacit knowledge, elevating the level of the prior knowledge base.

Learning Systems

All organizations are learning systems. They learn as they develop, produce, and market products. All learning systems have a specific learning orientation reflecting the values and practices that determine what is learned and where. Learning orientation determines the way organizations acquire, share, and utilize knowledge. It might emphasize knowledge source, product-process focus, documentation mode, dissemination mode, learning focus, value-chain focus, or skill development focus (Nevis et al. 1995). In the catching-up process, as shown in Figure 2, different learning focus (duplicative imitation, creative imitation, or innovation) requires a different level of prior knowledge and a different degree of the intensity of effort. Learning orientation affects the spiral process of knowledge conversion.

Organizational factors (intention, autonomy, fluctuation and creative chaos, redundancy, requisite variety, and leadership) affect formal and informal processes and structures that facilitate organizational learning (Nonaka 1994, Nonaka and Takeuchi 1995). Redundancy and requisite variety reflect the characteristics of units of knowledge available in the organization. Redundancy in information and experience facilitates “learning by intrusion.”
from different perspectives, whereas requisite variety advances the knowledge creation spiral by matching the variety and complexity of the environment. Intention and autonomy shape the knowledge frame that provides the ability to link units of knowledge and their priorities. Intention defines an organization’s goals and fosters its employees’ commitment, providing direction for the intensity of effort, and autonomy provides an environment in which a self-organizing team is able to function creatively. Fluctuation and creative chaos shape knowledge dynamics that foster the ability to manage the dynamic process in which individual units of knowledge are combined and transformed. Entrepreneurial leadership is also an important factor that creates organizational conditions conducive to learning.

As shown in Figure 2, the organizational factors also affect the spiral process of knowledge conversion and crisis construction. In addition, sociocultural factors influence the formation of work ethics. Vogel (1991) provides a seminal discussion of how cultural and situational factors formed work ethics in Korea and three other East Asian countries. What is most notable in Korean organizations is crises constructed proactively by top managers, which serve to intensify effort.

**Crisis and Learning**
Cumulative or linear learning along the current trajectory can take place under normal circumstances. Discontinuous or nonlinear learning, however, takes place normally when a firm perceives a crisis and deploys strategy to resolve the critical situation (Meyers 1990). Organizations tend to engage in major changes mainly after they have been confronted with crises (Miller and Friesen 1984, Tushman et al. 1985). In such cases, the firm must invest heavily in the acquisition of new tacit and explicit knowledge as well as in knowledge conversion activities to overcome the crisis in the shortest possible time. The term “crisis” is expressed in Chinese using two characters, (weiji, 危机), the first meaning “danger” and the second “opportunity.” Some firms manage to turn a crisis into an opportunity by transforming absorptive capacity in a discontinuous way to reap tremendous growth through enhanced competitiveness. A crisis may be creative in that sense; otherwise, it is apt to become destructive.

Crisis may stem from external sources. They may be evoked naturally when the firm loses its competitive standing in the market and in technology. Literature abounds on market and technology-evoked crises (e.g., Abernathy 1978, Cooper and Schendel 1976, De Greene 1982, Meyers 1990, Miller and Friesen 1984, Shrivastava 1988, Tushman and Anderson 1986, Utterback and Kim 1985). A crisis may also be generated deliberately by an external principal. In developing countries, particularly where the state orchestrates industrialization, the government could impose a crisis by setting challenging goals for firms in a strategically designated industry. An external change generates a crisis for top managers but not necessarily for organizational members at the lower echelon.
Top managers can construct a crisis internally, either in response to or in the absence of an external crisis. A constructed crisis (Pitt 1990) may be set up deliberately at either the corporate level (corporate crisis) or the suborganization level (team crisis). Crises constructed at Hyundai are primarily team crises. Team crises may be more frequent and easier to manage than corporate crises, because they may have more focused and clearer goals. The shared sense of the internally constructed crisis among organizational members intensifies their efforts to expedite learning, elevating the absorptive capacity of the organization (see Figure 2). An organization with effective learning may frequently evoke constructed crises and institutionalize the process and structure to make discontinuous learning possible and turn crises into opportunities.

A case study was conducted to assess the impact of crisis construction on discontinuous learning in the catching-up process. It illustrates how the two elements of absorptive capacity, migratory knowledge, the four modes of knowledge conversion, organizational factors, externally evoked and internally constructed crises, and learning orientation affect organizational learning in a Korean firm.

Research Methodology

Stage 1

In 1984, an analysis was done to compare independent Hyundai and dependent Daewoo, a company engaged in a joint venture with General Motors. Company records, plant observations, and interviews with executives were used in the research (see Amsden and Kim 1989).

Stage 2

Subsequently, in-depth case studies of Hyundai's technological learning were done almost once every two years. Again, information was obtained from Hyundai's company records, plant tours, and interviews with executives in the research (see Amsden and Kim 1989).

Stage 3

Hyundai published a well-documented history book (1,130 pages) in 1992 (see Hyundai Motor Company 1992), which provided rich historical information about the 1960s and 1970s and helped to verify and enrich case writeups of Hyundai's transformation in the 1980s and 1990s. It was supplemented with more recent records and interviews.

Stage 4

The case writeup covering 1967 to 1995 was completed in 1995. It was thoroughly reviewed by a senior engineer at Hyundai and an independent industry analyst.

Organizational Learning in Catching-up at Hyundai

Phase 1: Assimilation of Assembly Operations

Lacking experience in automobile production at the outset, Hyundai formed a taskforce in 1967. By drawing some team members from its construction division who had strong project management and engineering background, and recruiting some from other auto producers who had production experience, Hyundai ensured requisite variety in taskforce experience and knowledge. The recruited engineers brought in migratory knowledge that raised Hyundai's level of tacit knowledge related to automobile production.

In 1968 Hyundai entered into an Overseas Assembler Agreement with Ford, whereby Hyundai was to assemble Ford compact cars on a semi-knocked-down (SKD) basis. Ford transferred "packaged" technology to Hyundai with a set of explicit knowledge, such as blueprints, technical specifications, and production manuals. The agreement also included the training of Hyundai engineers at Ford sites and the dispatch of 10 Ford engineers to Hyundai to help translate the transferred explicit knowledge into tacit knowledge and to transfer to Hyundai Ford's tacit knowledge on procurement planning, procurement coordination, production engineering, process engineering, production management, welding, painting, after-service, and marketing. Also, Hyundai's suppliers sent their engineers to set up equipment and train Hyundai technicians. The most competent engineers trained by Ford were assigned to production and production engineering departments. In other words, the agreement with Ford gave Hyundai valuable migratory knowledge with which to upgrade its tacit and explicit knowledge related to auto assembly, moving the company up along the y-axis (toward a higher prior knowledge level) in Figure 1. Migratory knowledge alone is not sufficient, however. It must be reinvented by its user (Rice and Rogers 1980) through learning by doing (Arrow 1962) or learning by using (Rosenberg 1982).

At the same time, Hyundai constructed a crisis by setting an ambitious goal to complete plant construction in the shortest possible time to minimize lead time of production. Its engineers, technicians, and construction workers lived together in a makeshift structure on the plant site and worked 16 hours a day, seven days a week. The crisis generated intense interactions among the members, intensifying knowledge conversion in a spiral manner at the individual, group, and organizational levels and thus moving Hyundai leftward along the x-axis (toward higher intensity of effort) in Figure 1. Consequently, with
high prior knowledge and high intensity of effort (quadrant 1), Hyundai achieved the shortest time (six months) between groundbreaking and first commercial production among the 118 Ford assembly plants around the world.

Hyundai also created a crisis for its production members by setting an ambitious goal to acquire a production capability in the shortest possible time. While plant construction was underway, production teams rehearsed production operations by disassembling and reassembling two passenger cars, a bus, and a truck over and over to routinize the production procedures, internalizing transferred explicit knowledge (production manuals) into tacit knowledge. When the plant was completed, workers had sufficient tacit knowledge to assemble cars with minimum trial and error. At the outset, technical emphasis was largely on the mastery of production capability to meet Ford’s technical specifications. Rapid assimilation of production capability enabled the assembly production to evolve gradually from SKD toward a complete-knocked-down (CKD) operation. In short, in the first phase Hyundai expedited organizational learning by constructing an internal crisis in the absence of an external crisis.

**Phase 2: Development of a “Korean” Car Under License**

The second major jump in technological learning at Hyundai came in the mid-1970s, when the government imposed a crisis by making a radical policy change requiring the automobile industry to shift from assembly production of foreign cars on a CKD basis to the development of locally designed “Korean” cars. Policy implementation to develop “Korean” subcompact cars was highly centralized by the government, with the nation’s president as the chief policymaker and the Ministry of Trade and Industry as a coordinating and implementing agency. In 1973, the government formulated The Long-Term Plan for Promotion of the Automobile Industry and ordered four automobile companies to submit detailed plans to develop Korean cars. Progress reports had to be briefed to the president regularly. The government’s plan was very specific. For instance, the indigenous model had to be original, smaller than 1,500 cc in engine size with a local content ratio of at least 95%, less than $2,000 in production cost, and introduced in the market by 1975. The government also specified that production capacity per plant should be more than 50,000 units per year, at a time when the total annual passenger car production in the nation was a mere 12,751 units. To foster growth of the industry, the government established seven principles to promote indigenous subcompact model development. They included, among other things, protection of the local market from new entrants and from new foreign knock-down imports, a significant tax reduction, promotion of vertical integration leading to new business opportunities, preferential financing, tax concessions, and an administrative decree to guarantee a large market share for the indigenous model. Thus the crisis gave Hyundai an opportunity to expand its car business into the subcompact market under government protection.

In 1973 Hyundai submitted its masterplan for a new plant with a capacity of 80,000 “Korean” cars. Its actual production in that year was 5,426 cars. The plan represented a drastic departure from the past strategy of merely assembling foreign cars. It required the development of a highly successful “Korean” subcompact car that could be exported in substantial volume and simultaneously increase local market share enough to absorb the proposed production capacity. The plan posed a major constructed crisis for Hyundai engineers.

Although it lacked absorptive capacity, Hyundai decided to obtain foreign technologies from many different sources in an “unpackaged” form to maintain independence from foreign multinationals. However, the company had the clear goal of assimilating the imported foreign technology as rapidly as possible. Prior knowledge accumulated from mere assembly of largely foreign parts and components was inadequate for the new task. As the first step, Hyundai organized a project team and had its members master literature related to the various aspects of auto design and manufacture, thus accumulating new tacit knowledge converted from explicit literature-knowledge to enhance its prior knowledge level.

Hyundai approached 26 firms in five countries to acquire different technologies: 10 firms in Japan and Italy for car design, 4 firms in Japan and the United States for stamping shop equipment, 5 firms in the United Kingdom and Germany for casting and forging plants, 2 firms in Japan and the United Kingdom for engines, and 5 U.S. and U.K. firms for an integrated parts/components plant. The foreign companies gave Hyundai engineers observation tours not only of their own sites but also of the leading automobile manufacturing plants that were using the suppliers’ technology, enabling Hyundai engineers to relate knowledge converted from literature to actual physical operations. Through that process, Hyundai engineers gained significant insight to large-scale, modern automobile manufacturing systems. Hyundai then entered into a licensing agreement with Italdesign for body styling and design, and with Mitsubishi for gasoline engine, transmission, and rear axle designs, as well as casting technology. Engineers were sent to those technology suppliers for training.

Hyundai acquired more foreign technologies from a greater variety of sources than its competitors in Korea. Up to 1985, Hyundai had signed 54 licenses with foreign
suppliers in contrast to 22 for Daewoo, 14 for Kia, and 9 for Ssangyong. Licensing sources included Japan (22), the United Kingdom (14), the United States (5), Italy (5), Germany (3), and others (5). Mitsubishi accounted for only half of the Japanese licenses, reflecting Hyundai’s independence in acquiring foreign technologies (Hyun and Lee 1989).

How Hyundai assimilated style design technology is illustrative. Hyundai formed a team of five design engineers, had them study literature related to auto styling, and sent them to Italy to participate closely with Italdesign engineers in the design process. Hyundai gave the team the ambitious goal of assimilating all the styling technology from Italdesign so that they could undertake subsequent style designs on their own. For one and a half years, the engineers lived together in an apartment near Italdesign, kept a record of what they were learning during the day, and had group reviews every evening. Such intensive interaction among the team members resulted in a very rapid spiral process of knowledge conversion within the team, significantly expanding Hyundai’s tacit and explicit knowledge in styling. The team engineers later became the core of the style design department at Hyundai.

Although many engineers at Hyundai acquired necessary knowledge related to specific technologies, the company did not have experienced engineers who could put the knowledge together. To minimize trial and error, Hyundai hired for a three-year period (1974–1977) a former managing director of British Leyland as its vice president and six other British technical experts for the successful development of its first indigenous model, further increasing the prior tacit knowledge level of the firm. The technical experts, as the chief engineers of the chassis design, body design, development and testing, die and tooling, body production, and commercial vehicle design departments, played crucial roles in helping Hyundai engineers convert explicit knowledge supplied by licensors into tacit knowledge and integrate specific tacit knowledge into a workable system. After the British engineers left, Hyundai used moonlighting Japanese engineers to troubleshoot problems.

Hyundai developed its first indigenous model, Pony, with a 90% domestic content in 1975, making Korea the second nation in Asia to have its own domestic automobile. Hyundai quickly improved the car’s quality over the years. It exported 62,592 cars to Europe, the Middle East, and Asia, accounting for 67% of Korea’s total auto exports in 1976–1980 and 97% in 1983–1986. Pony accounted for 98% of Hyundai’s exports during those periods. The company’s local market share in passenger cars also increased, from 19.2% in 1970, to 59.4% in 1976, to 73.9% in 1979.

Crisis Construction and Shift of Learning Orientation. A constructed crisis speeded plant construction and expedited the assimilation of production technology. However, the continuing assembly operation (first vertical line in Figure 3) had a low performance goal and hence required little effort, leading to boredom and limited learning (point A in Figure 3), to a point where efforts had some property of decreasing return. The vertical direction of each succeeding phase has the same problem of decreasing returns on efforts.

Crisis construction shifted learning orientations (horizontal directions in Figure 3). The second constructed crisis shifted learning orientation from duplicative assembly of Ford cars on a CKD basis to the development of a “Korean car,” moving to point (C). It provided a new learning frontier and increased return on effort. Because changing learning paths requires a huge amount of human psychological energy, top managers had to construct crises. Hyundai has continuously shifted its learning path—from a duplicative imitation-oriented one, to a more creative imitation-oriented one, to an innovation-oriented one—and in the process has accelerated its learning in a stepwise pattern, as shown in Figure 3.

Another important point is that Hyundai could not enter at point (B) from the beginning because of its insufficient prior knowledge base. Point (B) required too high a performance goal, given the company’s prior knowledge base, and in turn too much efforts. Effort alone cannot expedite learning. It must be matched with the necessary prior knowledge to elevate absorptive capacity. Prior knowledge gained in the assembly of foreign cars provided a platform for the development of a Korean car.

Learning Process in Catching Up. A joint venture with a leading automobile firm is apt to lead to a passive attitude on the part of the recipient in the learning process, as technical assistance is always available from the parent company and the performance of the transferred technology is guaranteed by the supplier. In contrast, Hyundai pursued an independence strategy. It unpackaged technology transfer and independently took the responsibility of organizing imported technologies and components from multiple sources into a workable mass production system. That approach entailed a major risk because Hyundai would have to take total blame, not the foreign suppliers, if technology failed. However, it forced and motivated Hyundai engineers to assimilate foreign technologies as rapidly as possible throughout the process.

Each of Hyundai’s learning phases apparently was associated with four stages: preparation, acquisition, assimilation, and improvement/application, leading to the rapid
import substitution of personnel, engineering, and research in each phase (see Table 1).

At the outset of each learning jump, Hyundai took preparatory measures to acquire the migratory knowledge needed to elevate to its prior knowledge base. Those measures included poaching of experienced personnel from outside, extensive literature search, observation of technology in operation, and temporary hiring of foreign engineers. Experienced personnel from other firms or from abroad significantly raised the tacit knowledge base not only by the knowledge embodied in them, but also through knowledge socialization (from poached personnel to Hyundai personnel) prior to investment. The poached personnel constituted the core of Hyundai’s taskforce team.

Such an elevated prior knowledge base, albeit insufficient, enabled the team members to comprehend and internalize advanced explicit knowledge in literature. The team members were then sent abroad to observe facilities in operation in advanced countries, which gave them the opportunity to relate their knowledge from literature to actual physical settings in operation, further advancing the prior knowledge base. Whenever its tacit knowledge base was judged to be insufficient, Hyundai hired foreign engineers to augment its personnel.

The tacit knowledge base developed during the preparation phase helped Hyundai identify sources of foreign technology, strengthened its bargaining power in negotiations with foreign suppliers, and enabled it to acquire foreign technology on favorable terms. Foreign firms supplied both explicit (blueprints, technical specifications, equipment, manuals, etc.) and tacit knowledge (training and OJT supervised by foreign expatriates), but it was the prior knowledge base and intensity of effort at Hyundai that made the foreign technology transfer effective. Hyundai first relied on “packaged” technology transfer but rapidly unpackaged it as it developed the capability to substitute increasing portions of foreign input. Through preparing for and acquiring foreign technologies, Hyundai significantly increased its prior knowledge base.

Hyundai then intensified its in-house efforts to expedite the assimilation of imported foreign technologies. The
### Table 1  Spiral Process of Organizational Learning in Catching-up*

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars produced</td>
<td>Ford Cortina</td>
<td>Pony</td>
<td>Excel</td>
</tr>
<tr>
<td>Technology mastered</td>
<td>Assembly technology</td>
<td>Initial design technology</td>
<td>Deepening design technology</td>
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*An constructed crisis facilitated expeditious learning at each phase. Prior knowledge base developed at the end of each phase provided a platform for the succeeding phase.

**Assimilation** of know-how took place largely through "learning by doing" and "learning by using" in production. The assimilation of imported technologies led to incremental *improvement* of the imported technologies and their *application* to other areas. The sense of crisis intensified knowledge conversion at the individual level, and the shared sense of crisis heightened knowledge conversion at the organizational level through intense interaction among members.

After the first cycle of preparation to improvement/application in assembling Ford cars, Hyundai repeated a similar cycle in developing the Pony. Phases 3 and 4 also went through such a cycle. The mastery of one cycle provided the platform for starting the next cycle (Kim and Kogut 1995). Such repetition of similar cycles made up the spiral process of learning in catching-up.

**Phase 3: Development of an Advanced Car Under Limited License**

The third major jump in Hyundai’s acquisition of absorptive capacity came in the early 1980s after the second oil crisis. In the face of losses due to rising gasoline prices and falling car sales, Hyundai decided to make a major investment to develop the next generation FF (front engine, front wheel drive) car to sell in the North American market, attempting once again to turn a crisis into an opportunity. The proposed production capacity was 300,000 units per year at a time when Hyundai was producing 57,054 passenger cars and the total number of cars produced in Korea was a mere 85,693 units. Hyundai was using only 32% of its production capacity (150,000 units). It was determined to turn the domestic-market-oriented automobile business into a largely export-oriented one. In response to the external oil crisis, Hyundai once again constructed a major internal crisis. The objective was to acquire the absorptive capacity needed to develop the next generation car and triple the production capacity.

Hyundai approached several major car producers—Volkswagen, Ford, Renault, and Alfa Romeo—for FF technology as a way to diversify its technology sources. However, all those companies demanded equity and management participation and viewed Hyundai as a local assembly subsidiary of their FF cars. Hyundai eventually approached Mitsubishi again. In 1981, Mitsubishi agreed to license engine, transaxle, chassis, and emission control technology to Hyundai. In return, Hyundai gave a 10% equity share to Mitsubishi without the latter’s management participation. Not only did Hyundai retain all managerial control, but also reserved the right to import parts and technology from Mitsubishi’s competitors and to compete directly in Mitsubishi’s own markets. Hyundai sourced body styling from Italidesign and constant velocity joint technology from British GKN and Japanese NTN.

With the background of developing and manufacturing the Pony since 1976, Hyundai had a sufficient prior knowledge base to assimilate FF car design and manufacturing without foreign engineering assistance. However, technological learning was important in three areas.
The first was the manufacture of a car to meet the most stringent safety and environmental requirements of the United States. The second was the adoption of the computer-aided-design and computer-aided manufacturing (CAD/CAM) systems, the adoption of the assembly line control (ALC) system, and the development of transfer machines, which would lead to full computerization from design to manufacturing and parts/components handling and thus lay a crucially important foundation for Hyundai’s development of cars on its own. The third was the construction of a proving ground, which would complete the infrastructure necessary for the next stage of strategy.

In the case of CAD/CAM systems, Hyundai organized a project team in March 1979 to develop a long-term plan to computerize design and manufacture. The project team collected literature and catalogs on CAD/CAM and spent the next 14 months internalizing explicit literature-knowledge into tacit knowledge. Using knowledge gained from literature, the team purchased an advanced computer system and a graphic plotter and undertook an in-depth study of Mitsubishi’s operational CAD/CAM system. The team expanded to include two or three representatives from each department that would be affected by the CAD/CAM system, “socializing” tacit knowledge gained by the original members to new members. During the next 19 months, the expanded team determined the scope of CAD/CAM application and undertook an in-depth study of available alternative software packages. Hyundai selected the Catia package developed by French Dassault Aerospace in May 1982 and conducted preparatory work for almost 36 months before implementing the system.

Hyundai completed the FF plant in February 1985, tripling its production capacity from 150,000 units to 450,000 units per year. Its FF Excel passed both emission and safety tests and began being exported to the U.S. market in February 1986. Hyundai sold 168,882 Excels in 10 months during 1986, over 60% more than its ambitious goal, turning its loss to profit. With the sale of 263,610 in 1987, Excels became the best-selling import car of the year in the United States, overtaking Nissan Datsun, Honda Civic, Subaru DL/GL, and Toyota Corolla.

**Phase 4: Becoming Independent**

The fourth jump in technological learning took place in September 1994, when the fiercely independent Hyundai unveiled Accent, the first subcompact car designed on its own (its predecessors had been based on Mitsubishi designs). It was benchmarked on the Toyota Tercel for performance and the Chrysler Neon for cost (Fortune 1995).

Although Hyundai was successful in manufacturing a subcompact FF car (Excel) and selling it in the North American market during the mid 1980s, it soon faced a technological dilemma. Mitsubishi, its major source of important technology for the FF car, and other foreign suppliers were unwilling to share their latest technology. Hyundai, however, lacked the absorptive capacity to keep upgrading its car quality to match that of its competitors in the North American market. Consequently, like Japanese export cars in the 1970s, Hyundai’s Excel ended at the bottom of the Consumer Reports ranking, which greatly tarnished its image in the U.S. market. That experience prompted Hyundai to develop an extensive R&D network, not only in Korea but also abroad, to expand its absorptive capacity.

Hyundai’s R&D efforts date back to 1978, when it established a primitive R&D center, primarily for facelifiting current compact and subcompact cars. Efforts to develop its own capability, however, began to take shape in 1984 when Hyundai established the Advanced Engineering and Research Institute to develop its own engines and transmissions, the Passenger Vehicle R&D Center, the Commercial Vehicle R&D Center, and the Manufacturing Technology R&D Center. Hyundai also established joint R&D laboratories with local universities. In addition, in 1986 the Hyundai American Technical Center, Inc. (HATCI) opened in Ann Arbor, Michigan, and the Hyundai Styling Studio opened in Los Angeles to conduct R&D on cars for the U.S. market. Hyundai set up a technical center in Frankfurt to monitor technological developments in Europe and to design and engineer new cars for the European market. It opened an R&D center in Japan as the initial step toward entering that market in 1997.

The number of research engineers at Hyundai has increased, as shown in Table 2, from 197 in 1975 to 3,418 in 1990 and 3,890 in 1994, accounting for nearly 10% of the company’s total employment; almost half of the engineers hold postgraduate engineering degrees. Hyundai recruited many Korean-American engineers from U.S. universities, some with experience at General Motors and Chrysler. For example, all but a few of the 35 senior research engineers with Ph.D. degrees at its Advanced Engineering and Research Institute are U.S. trained. Hyundai also invested heavily in continued training of its engineers. The number of R&D scientists and engineers sent abroad for training, ranging from short-term training and observation to long-term graduate degree programs, increased from 74 in 1982 to 351 by 1986. R&D investment also increased sharply, from 1.1 billion Korean won ($2.2 million) in 1975 to 400 billion won ($501.3 million) by 1994. R&D expenditures were 1.8% of Hyundai sales.
in 1982 and 4.4% in 1994, almost 60% higher than those of its domestic competitors such as Daewoo and Kia.

The development of its alpha engine illustrates how Hyundai became independent of Mitsubishi, which licensed Hyundai "old" engines but refused to share its state-of-the-art ones. As Hyundai lacked experience in designing even a carburetor engine, let alone an electronically controlled one, its decision to develop a state-of-the-art engine was another example of major crisis in technological learning. In 1984, Hyundai organized a taskforce with a vision of developing such an engine. However, none of the team members had any experience in engine design, and no car with an electronically controlled engine was available locally from which Hyundai engineers could learn.

The taskforce was divided into several teams to do research on (1) hydrodynamics, thermodynamics, fuel engineering, emission control, and lubrication; (2) kinetics and dynamics related to engine and car design and CAD; (3) vibration and noise; (4) new ceramics; (5) electronics and control systems; and (6) manufacturing control and CAM. More than 300 R&D personnel had received training overseas before the engine project was officially launched in 1984. Those team members collected all available English and Japanese language literature on engines and transmissions and mastered the literature to raise their prior knowledge level. Hyundai then entered into an agreement with British Ricardo Engineering, which provided initial assistance in technical training for engine design. Hyundai next hired two Korean experts who had gotten engine development experience at General Motors and Chrysler, respectively, after earning their doctoral degrees at American universities. Hyundai also hired an engineer from Ricardo for a three-year period beginning in 1985 (Hyun 1995).

Despite the training and consulting services by Ricardo and the three experts, Hyundai engineers underwent 14 months of trial and error before the first prototype was made. However, the engine block broke into pieces in its first test. New prototype engines were made almost every week, only to be broken again and again. No one on the team could figure out why the prototypes broke down during the test runs, and even Hyundai managers began to doubt the company's capability to develop a competitive engine. The team had to scrap 11 more broken prototypes before 1 survived the test. There were 288 engine design changes, 156 changes in 1986 alone (Hyun 1995). Ninety-seven test engines had to be made before Hyundai refined its NA (natural aspiration) and TC (turbo charge) engines, 53 more engines for durability improvement, 88 more for developing a car, 26 more for developing its transmission, and 60 more for other testing, totaling 324 test engines, as well as more than 200 transmissions and 150 vehicles before Hyundai perfected them in 1992.

Hyundai's alpha engine outperformed comparable Japanese ones. Hyundai's NA engine, for example, took 11.1 seconds to reach 100 km/h, whereas Honda CRX 3V took 11.30 seconds. Hyundai also outperformed Honda in fuel efficiency: 20.2 km/l versus 19.4 km/l for a four-gear manual transmission. The successful experience of developing the alpha engines (1.3 and 1.5 liters) led to the development of beta engines (1.6, 1.8, and 2.0 liters), making Hyundai completely independent of foreign license in engines for midsize, compact, and subcompact cars. Hyundai's new 1.8-liter, 16-valve, double overhead camshaft engine (DOHC), for instance, takes only nine seconds to reach 100 km/h, outperforming a similar model of Japan's Toyota (HMC 1992). With the two engines and its own transmissions, Hyundai reduced royalty payments for compact and subcompact cars to zero.

As a result of continuous R&D efforts, Hyundai achieved the largest domestic market share in 1995: its Accent is the best selling subcompact; the Avante is the best selling compact; the Sonata II is the best selling midsize car; and the Grandeur is the best selling full-size car in Korea. Hyundai also bounced back in its exports, particularly in new markets, from 225,393 units in 1990 to 392,239 in 1994. Hyundai is still behind the high-class Japanese and U.S. manufacturers, but the quality gap has definitely narrowed. The company's aim is to match Japanese quality but at a more competitive price. Hyundai
has also become an important technology exporter to Thailand, Egypt, Zimbabwe, the Philippines, Malaysia, and other countries. It even exported a style design to Mitsubishi. Further, Hyundai is betting billions of dollars on a “green” car breakthrough. It plans to spend more than $5 billion on R&D from 1995 to 2000, lifting its R&D spending from 4.4% of sales in 1994 to 7.0% by 2000.

Behind the process of expeditious learning are Chung Ju-Yung, chairman of the Hyundai Group, and Chung Se-Young, his brother and chairman of Hyundai Motor. The group chairman is known as the most far-sighted and boldest risk-taking entrepreneur in Korea (see Kirk 1994). The history of his construction and shipbuilding divisions is also repeated with constructed crises and their successful transformation into creative learning (see Amsden 1989, Amsden and Kim 1985). He managed ongoing dialogues with taskforce leaders and their members. He visited sites regularly and maintained daily telephone contact with taskforce leaders to check the work in progress.

Summary and Discussion
Hyundai has transformed itself from a mere assembler of Ford models to a designer and exporter of its own cars and engines in less than three decades. Unlike firms in other developing countries, Hyundai has pursued a strategy of independence in developing technological capability. Its advancement from one phase to the next through the preparation for and acquisition, assimilation, and improvement of foreign technology appears to have been a spiral process. Migratory knowledge gave rise to prior knowledge base, and constructed crises intensified efforts, leading to expeditious organizational learning. The Hyundai case illustrates not only the process of expeditious learning, but also several idiosyncratic characteristics of organizational learning in catching-up.

First, catching-up firms, particularly those in developing countries, reverse the sequence of research, development and engineering (R,D,&E) of the advanced countries. Hyundai first acquired a production capability from its eight-year (1968–1976) experience in the assembly of Ford models. It then focused on the acquisition of an engineering capability, sequencing from subcompact to compact, to medium-size, to large cars. The number of years between steps steadily decreased: seven years (1976–1983) between subcompact and compact, five years (1983–1988) between compact and medium-size, and four years (1988–1992) between medium-size and large cars. It is logical for an inexperienced company in a catching-up country to sequence from a subcompact model, as its competitive edge depends more on price than quality in comparison with larger models. On the basis of production and engineering capability, Hyundai launched the development of its own cars. Again, Hyundai sequenced from subcompact (1994) to compact (1995), requiring only one year between the two. Hyundai is now doing serious research to break through in its “green” car project.

A similar process is evident in other industries in Korea. A series of studies covering more than 200 firms in different industries (Kim 1997) has shown that industries in Korea reversed the sequence of R,D,&E. They started with engineering (E) for products and processes imported from abroad in the 1960s and 1970s, then progressively evolved into the position of undertaking substantial development (D) in the 1980s. Research (R) became critical only in the 1990s.

Hyundai also reversed the sequence of technology trajectory of the advanced countries. Assembly technology from Ford in 1967 and technologies imported from various sources to produce the Pony in the mid-1970s were all mature technologies of advanced countries. Assimilating and improving those technologies through learning by doing enabled Hyundai to challenge more advanced technologies related to FF cars. Core technologies were again imported from advanced countries. The mastery of the FF technologies provided a platform for Hyundai’s development of its state-of-the-art engines.

Second, migratory knowledge gives rise to a prior knowledge base. For catching-up firms, relevant knowledge is available elsewhere in various forms. The acquisition of prior knowledge through literature review and poaching of new personnel may be very effective for identifying and acquiring technology available elsewhere and facilitating learning in the subsequent phases. Particularly, mobile experienced personnel have been a major source of new tacit knowledge at Korean firms, as well as a major source of technology diffusion in many industries within Korea. The role of migratory knowledge and the government in the Hyundai case indicates the importance of institutions and interorganizational relations in organizational learning and innovation (Lundvall 1992). However, in-house efforts are indispensable to reinvent the transferred knowledge, particularly in the absence of mediating institutions that provide technology services (Attewell 1992).

Third, crises were constructed proactively rather than reactively. The first two crises (i.e., to expedite the assimilation of assembly production and to develop a “Korean car”) were constructed proactively in the absence of external crises, and the third crisis (to develop an FF car and triple production capacity for the U.S. market) was constructed in response to the externally evoked oil crisis.
However, the external crisis served only as a trigger. Hyundai’s internally constructed crisis was not designed to return Hyundai to its pre-oil-crisis position, but rather to transform Hyundai from a small automaker focusing primarily on the domestic market into an international contender challenging the most sophisticated U.S. market. It was proactive for long-term growth, rather than reactive to an externally evoked crisis for short-term survival. The fourth constructed crisis (to develop its own cars) was also proactive. The taskforce to develop Hyundai’s own engines and transmissions was formed in 1984, four years before the company faced a market crisis in the United States, and most critical R&D problems were solved by 1986, two years before the market crisis. In other words, all the crises Hyundai constructed internally were proactive and at the suborganization level.

Why is an internally constructed proactive crisis, particularly at the suborganization level, more effective for organizational learning than an externally evoked crisis as a reactive means to respond to an external change? An evoked crisis creates a performance gap, a major discrepancy between how the organization performs now and how it ought to perform to survive. However, the phenomenon of crisis denial may occur: refusal to recognize that the crisis is real. It sometimes stems from different perceptions and interpretations of environmental changes among people involved and sometimes from active resistance to maintain the status quo or inertia in adhering to current norms and past practice. Consequently, the organization facing an evoked crisis must exert a significant portion of its energy to educate management coalition and organizational members to agree that there is a crisis, mitigate resistance to change, and unlearn past practices. Different perceptions of crises and diverse opinions on prescriptions also make it difficult for an organization facing an evoked crisis to direct its energy toward effective learning.

In contrast, constructed crises present a clear gap between the current performance and the performance needed in the future. Further, the top managers can manipulate the performance gap in constructed crises so as to make them creative rather than destructive. Constructed crises are an antidote to inertia. They generate intense pressure to create mandates for change (Meyers 1990), enabling the management coalition to reach consensus on organizational goals. Given unambiguous goals to close a performance gap, mandates for change, and determination of the management coalition, constructed crises also prompt members to accept organizational goals.

Crisis construction can be used as a strategic means to shift learning orientation. Hyundai used constructed crises to shift its learning from duplicative-imitation-oriented, to a more creative-imitation-oriented, and finally to innovation-oriented, continuously expanding the learning frontier to increase the return on effort. Because changing learning paths requires an enormous amount of psychological energy, entrepreneurial top managers had to construct crises.

Constructed crises also increase the intensity of effort at the individual and organizational levels in the search for alternative courses of action, and hence are creative rather than destructive (Kim 1997). Mandates for change generate volume of effort, whereas goal consensus and identification provide direction of effort, clearly focusing effort on expeditious learning for growth. The goal focus and high intensity of efforts to resolve crises not only prompt members to search actively for information on new ways to respond to them and to expedite knowledge conversion and accumulation at the individual level, but also intensify interaction among members, giving rise to knowledge conversion and accumulation at the organizational level.

Finally, past successes in transforming crises into creative learning evoke the self-confidence that leads to further risk-taking by crisis construction (March and Shapira 1987). A cycle from crisis construction to successful resolution to self-confidence and back to crisis construction characterizes Hyundai’s history in accumulating an absorptive capacity.

Is Hyundai’s learning model evident in other industries in Korea? A similar learning process is used, albeit to a different degree, in other Korean industries. For example, Korean firms in electronics (Kim 1980, 1997), shipbuilding (Amsden 1989, Amsden and Kim 1985), steel (Amsden 1989, Amsden and Kim 1985), machinery (Amsden and Kim 1986), and semiconductors (Kim 1997) have undergone a similar process of crisis construction and expeditious learning in catching-up. Crisis construction and expeditious learning are widespread in Korean manufacturing.

Hyundai is the most outstanding company in constructing crises proactively for opportunistic learning, mainly because it has the most entrepreneurial and boldest risk-taking top managers. In addition, the top and middle managers have been trained largely in the crisis construction and transformational process in Hyundai’s project-based construction and shipbuilding companies. Those managers maintained ongoing dialogue during the process of crisis management, which created a “can-do” culture at Hyundai. Pitt (1990) concludes that crisis construction is
an evocative and galvanizing device in the personal repertoires of proactive top managers, who think synthetically rather than analytically and are prophetic and single-minded.

Can Hyundai also use crisis construction for pioneering? Learning goals may be more specific and clearer in catching-up than in pioneering. The catching-up company can use crisis construction to achieve goal identification and consensus and to generate enormous energy from organizational members in searching for and converting knowledge at the individual and organizational levels. Relevant knowledge is readily available in various forms. The catching-up company can acquire prior knowledge through literature review, poaching of personnel, observation tours, and technology licensing. In contrast, the pioneering company must work with a strategic ambiguity that provides only broad direction (Nonaka 1988) and it has difficulty identifying external sources of relevant knowledge. Consequently, learning in pioneering may be creative but not necessarily expeditious.

Can catching-up firms in other countries emulate Hyundai’s learning model? The answer is yes and no. They can improve the effectiveness of organizational learning by emulating the learning process illustrated in Figures 2 and 3 and the learning cycles listed in Table 1. But they may lack some of Hyundai’s implicit advantages, such as well-developed human resources with the trait of being hardworking and cushions provided by the government and subsidiaries.

First, the availability of well-trained human resources cannot be easily matched by firms in other countries. According to a United Nations report, Korea is one of the only four developing countries that made a double jump from low level to medium level and from medium level to high level in terms of the human development index between 1960 and 1992. It had the largest absolute increase and the highest score among those four countries in 1992 (United Nations Development Programme 1994). The number of scientists and engineers per 10,000 population is the highest among the developing countries and closer to that of France and the United Kingdom, at least in quantity (Ministry of Science and Technology, Korea 1994). Human resource development requires a long-term investment.

Second, the Koreans’ habit of hard work and their long working hours cannot be easily emulated by firms in other countries. Such cultural traits stem from several factors. Korea’s land area is scarcely bigger than New Jersey in the United States, or Hungary. It is crossed by mountains, and a relatively small portion of the land is arable for its population of more than 44 million people. In population density, Korea trails only Bangladesh and Taiwan. The cramped conditions and severely cold winters appear to have forced Koreans to work hard and long to survive in an unfavorable environment. Additionally, the older generation has been motivated by the memory of deprivation and hard times under Japanese occupation and the destructive Korean War. An obsession to “beat Japan” to settle old scores and national economic competition with North Korea are also major forces motivating Koreans (Porter 1990). Such cultural and situational factors cannot be duplicated in other countries.

Third, government strategy and support, as well as cushions provided by cash-cow subsidiaries within the diversified Hyundai Group, enabled its automobile division to have a long-term focus and to take risks. For companies using equity market financing or operating in a single business, such long-term thinking and risk-taking may be difficult.

In conclusion, the Hyundai case leads to several speculative propositions to explore in the future. (1) A proactively constructed crisis is a more effective strategic means of shifting learning orientation and facilitating organizational learning than a reactively evoked crisis. (2) Entrepreneurial owners are more likely to construct and resolve crises than employed managers, particularly when they have governmental and interorganizational support for a long-term view. (3) A visionary entrepreneur, energetic teams, and effective dialogues between them are needed to turn constructed crises into expeditious learning. (4) Crisis construction and its transformation into expeditious learning may be easier to implement in catching-up than in pioneering. (5) Catching-up firms in both developing and advanced countries can elevate their prior knowledge base significantly by tapping migratory knowledge. (6) Catching-up firms in the developing countries reverse the sequence of technology trajectory of the advanced countries, entering first into the mature stage of technology and progressing gradually toward increasingly sophisticated technologies. (7) Catching-up firms in the developing countries sequence the process of capability building from production to engineering and innovation, reversing the direction of research, development and engineering (R,D,&E) common in the advanced countries. (8) For catching-up firms in developing countries, a strategy of independence is more difficult to manage but more effective in organizational learning than is joint venture with firms from advanced countries.

Acknowledgment

The author acknowledges the thorough and constructive comments from four anonymous reviewers, one of whom gave creative ideas underlying Figures 2 and 3. The case study underlying this article is based

References


Duncan, Robert B. and Andrew Weiss (1978), "Organizational Learning: Implications for Organizational Design" in B. Staw (Ed.) *Research in Organizational Behavior*, 1, 75–123.


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Accepted by Ikujiro Nonaka; received February 1996. This paper has been with the author for one revision.