

Why has Japanese Global Competitiveness Been Declining in the Automobile Industry? Comparative Analysis of Korea



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ABSTRACT: The paper is to study the reasons why the global competitiveness of the Japanese industry has weakened significantly in the automobile industry. Four leading causes will be analyzed to weaken Japanese global competitiveness regarding technical, market, policy, and corporate factors. Above all, the human element, which is consisted of the dynamics of entrepreneurs, workers, experts, politicians, and administrative bureaucrats, is the most critical in analyzing the technical, market, policy, and corporate factors of global competitiveness in each industry.

In Japan, workers and experts were responsible for technology transfer within the industry. Japan was far ahead of Korea regarding technological equipment, but there were frequent cases of human leaking. Japanese automakers' entrepreneurs failed to the quality management of the overseas workforce while promoting a growth-centered corporate strategy, resulting in a massive recall in 2009. As for the Japanese automobile industry, global competitiveness has been weakened due to the inability of the technicians to supply an overseas workforce to cope with the boom period of the worldwide market.

In addition, politicians and bureaucrats, via the government's industrial support or policy, played an inevitable role in enhancing the competitiveness of Japan in early development. As an industry incumbent, Japan formed an industrial ecosystem while pursuing industrial development through government-led industrial policy. Thus, when the economy came into a recession, especially macroeconomic stagnation, there should have been timely action or policy support at the government level. With the technological development of products, the market of the industry was booming or depressed at that time, along with the government's policy and strategic support to develop each sector and to maintain its global competitiveness. The Japanese government failed to take advantage of the market due to the wrong choice of investment period and, thus, caused to lessen the gap with Korea.

The investment reduction or cost reduction decided by entrepreneurs as one of the main factors, explained in detail by the corporate factor as the internal cause, is noteworthy among the four factors of weakening global competitiveness. The biggest reason Toyota lost global competitiveness, mainly due to its massive recall in the automobile industry, is that it made small investments during critical periods, delayed investments, or impractical cost reduction strategies in significant investment periods. The technology, market, and policy factors are the leading causes because of the necessary-to-sufficient relationship with the investment or cost reduction. With the decision-making process for investment or cost reduction by entrepreneurs, Toyota Motors would have avoided the massive recall in the global arena.

KEYWORDS: Global competitiveness, automobile industry, recall, Japan, Korea, Toyota, Hyundai

I. BACKGROUND AND OBJECTIVES

The characteristics of the automobile industry are scale-intensive and less dependent on science compared to the electronic industry, the innovation process is easier to predict, and the concept change is less frequent. The knowledge base of the automobile industry is more important than the other industries because it is tied to the fact that the global market for each part is challenging to form and separate from a particular type of automobile body. It is in contrast to individual computer parts and peripherals, which are sold in different market-independent products. The difference means that the more internalized key technology or know-how in the automotive industry, the more competitive it maintains. In this case, the latecomer can also increase their competitiveness and survivability.¹ It is said that due to the technical nature of the automobile industry, Hyundai

¹ Lee, K. (2007). *Economics of Technological Catch-up in East Asia*. Parkyoung Press.

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Motor (Hyundai), as a fast follower, was able to invest in enormous R&D.

As an incumbent compared to Hyundai, Toyota Motor Corporation (Toyota) has led the global automobile industry with its advanced Toyota production system since the second oil crisis in 1979.² However, Toyota faced a massive recall of 12.4 million units in 2009 when quality problems began to surface. The environmental causes of Toyota's mass recall problems can be analyzed as external factors such as severe competition in the global automobile industry, electronic automobile expansion, and yen appreciation and as internal factors, including the old-fashioned growth strategy of Toyota production system, fade of Toyota culture, and quality control failure.

The Toyota production system, created in the 1950s and started to show prominence in the 1980s, simultaneously pursues quality, cost, and product performance by eliminating dissipation through incremental improvements called "Kaizen." The Toyota production system was modified from a growth to a balanced production system in the early 1990s and began to be applied to overseas plants in the 2000s.³ Entering the 2000s, Toyota encountered an explosion of complexity in automobile management due to a rapid increase in overseas factories, the production volume, and the expansion of automobile digitalization. The effort to spread Toyota production methods to world factories is confronted with such a complex explosion, resulting in a mass recall. It was one of the leading causes of the weakening competitiveness of the Japanese automobile industry. Toyota's massive recall in 2009 is enormously meaningful to the Korean automobile industry, now taking the lead from catch-up.

II. THEORETICAL CONSIDERATIONS

The concept of competitiveness is not absolute, but it is difficult to define precisely because it is based on a comparative object, that is, a combination of relatively superior or inferior factors, and other external factors may change from time to time depending on the scope and purpose of the analysis. The definition of competitiveness is mainly made at the national level. First, Scott and Lodge (1985) saw the ability of the nation to create, produce and distribute services and goods in international trade while increasing resource returns.⁴ Porter (1990) defines the capability of a country to build a home base for a particular industry to achieve high productivity and continue to improve it.⁵ Cho, D. S. (1998) defines national competitiveness as the nation's competitive position in international markets among similar economic development nations.⁶

The country's high productivity consistently positions competitiveness as a competitive advantage. It can be understood as the ability to develop and accumulate resources that can compete for and efficiently use accumulated resources. To measure competitiveness, it is necessary to check the country's current position by analyzing the relative rankings with other countries. Strengthening competitiveness means that comparative countries reduce the close gap with the countries of the highest rankings. This indicates that competitiveness increases if the gap with the leading countries decreases over time.

Porter (1990) argues that national competitiveness depends on the country's ability to innovate and quality improvement. The domestic industry needs to create conditions to improve its productivity to increase its capability. The nation is expected to encourage new developmental elements such as skilled workers, robust technology, and a knowledge base. In addition, national competitiveness is determined by the productivity of the domestic industry, and it has proposed the national competitive advantage theory that companies should be able to maintain a high level of productivity by providing a high-quality environment.⁷ The diamond model comprises four factors: factor conditions, demand conditions, related and supporting industries, firm strategy, structure, and rivalry. In addition to these four factors, the government and the chance factor indirectly affect international competitiveness as a change subject for the effective use of these factors as exogenous variables.⁸

The factor conditions are required to compete in the relevant industries, such as skilled workers and infrastructure. The factor is classified into five categories: human resources, which include skill level, labor cost level, and working time, physical resources, such as water resources, climate, and location, knowledge resources, financial resources, and social overhead capital. Factor creation is a result of the investment. It takes place actively in human, knowledge, economic, and social indirect resources through investments under the cooperation of the government and corporations. The demand conditions are the essence of

² Kim, H. C. et al. (2009). *Toyota DNA*. Institute for Japanese Studies, Seoul National University.

³ Kim, H. C. (2006). *Another source of Toyota's competitiveness: Sales power*. The Korean-Japanese Journal of Economics and Management Studies 34.

⁴ Scott B. R. & Lodge G. C. (1985). *U.S. Competitiveness in the World Economy*. Harvard Business School Press. Boston. MA. 6.

⁵ Porter M. E. (1990). *The Competitiveness Advantage of Nations*. New York: The Free Press.

⁶ Cho, D. S. (1998). *International Management*. Seoul: Gyeongmun Press.

⁷ Cho, D. S. & Moon, H. C. (2006). *National Competitiveness Theory and Practice*. Seoul: Korea Economic Daily, 63.

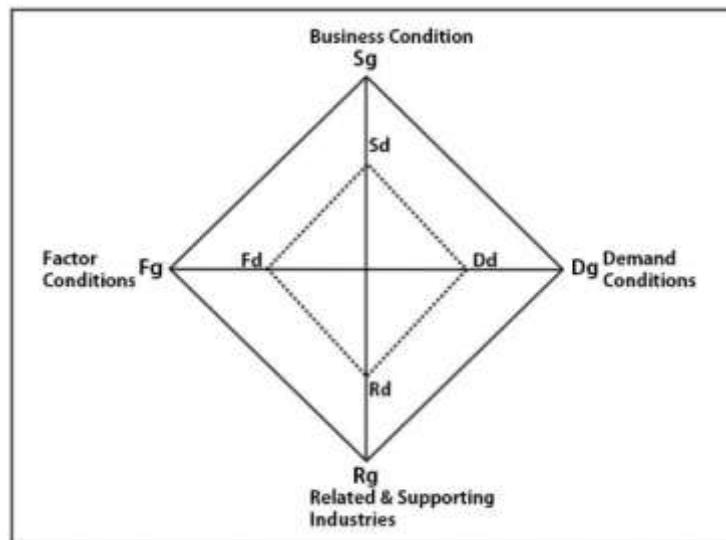
⁸ Porter M. E. (1990). *The Competitiveness Advantage of Nations*. New York: The Free Press. 127.

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domestic market demand for industrial production and service. It can be divided into a quantitative factor of market size and demand quality of the subdivision market. Related and supporting industries evaluate the national competitiveness of a particular sector and associated industries, which explains the source of competitiveness by dividing it into vertical and horizontal related sectors.⁹

The source of competitiveness in related industries stems vertically from when the quality of the raw materials or supplied parts is excellent or when an enterprise can advance into other related industries with a vertical combination. Horizontal-related industries can share business activities in the value chain, which refers to industries that use the same technologies, natural resources, network distribution, and marketing activities.¹⁰ As the strategy and organizational form of the corporation become different from country to country, it is a result of reflecting the economic characteristics of a nation.

To evaluate competitiveness with Porter's diamond model, it is necessary to support solid physical factors in the country. However, if the government is small enough not to be able to trade with foreign countries, there are limits to applying the model. Completing the error of the range and origin of the diamond model, two extended diamond models are created, the first being the generalized double diamond (GDD) model shown in Figure1,¹¹ and the second is the 9-factor model shown in Figure2 that includes physical resources and human resources.¹² The GDD model consists of the roles of domestic and multinational corporations within the country. Thus, it is possible to measure the status of the national competitiveness of individual countries quantitatively.¹³



Source: Moon, H. C., Rugman A. M. & Verbeke A. 1998
Figure 1. Generalized Double Diamond (GDD) model.

In the absence of solid physical factors in developing countries such as Korea, the lack of explanation of economic growth with the diamond model, Cho, D. S. (1992) improved how to measure the national competitiveness by utilizing the insufficient physical factors. The 9-factor model was proposed as a source of competitiveness not only the physical factors but the four determinants of national competitiveness, such as workers, politicians, administrative officials, entrepreneurs, professional managers, and technicians, which called 9 factors for a systematic analysis.¹⁴

⁹ Porter M. E. (1990). *The Competitiveness Advantage of Nations*, New York: The Free Press. 73-100.

¹⁰ Porter M. E. (1990). *The Competitiveness Advantage of Nations*, New York: The Free Press. 105.

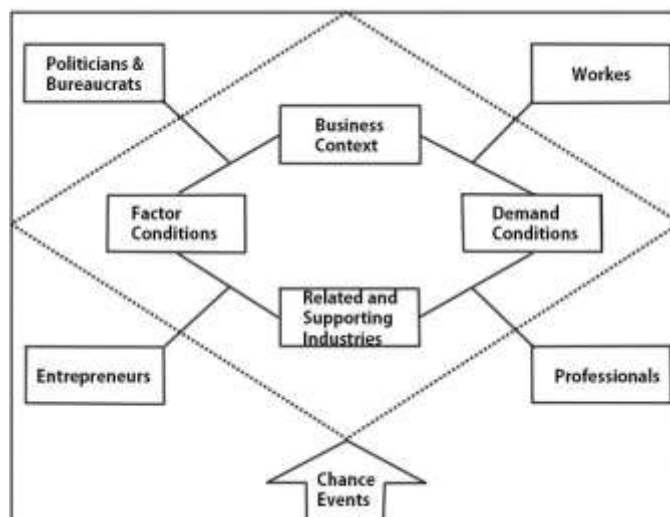
¹¹ Moon, H. C., Rugman A. M. & Verbeke A. (1998). *A generalized double diamond approach to the global competitiveness of Korea and Singapore*, *International Business Review*. 7. 135-150.

¹² Cho, D. S. (1998). *International Management*. Seoul: Gyeongmun press.

¹³ Cho, D. S. & Moon, H. C. (2006). *National Competitiveness Theory and Practice*. Seoul: Korea Economic Daily. 113.

¹⁴ Cho, D. S. (1992). *National Competitiveness*. Seoul: Maeil Economic Daily.

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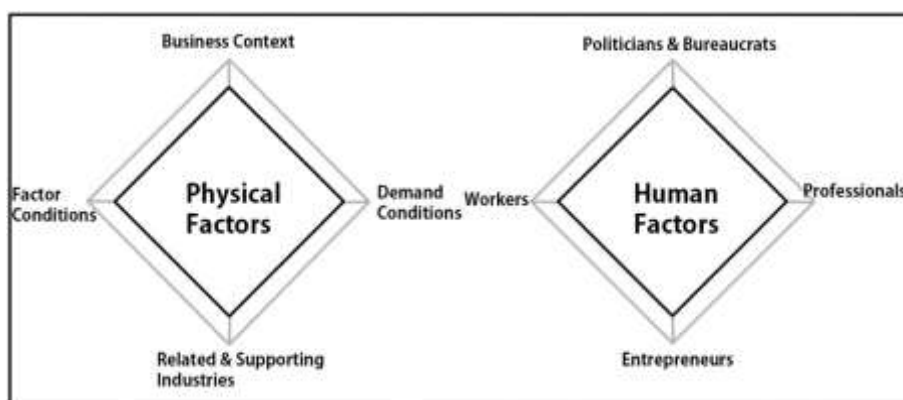


Source: Cho, D. S. 1992

Figure 2. 9-factor model (Cho, D. S., 1992)

In Porter's diamond model (1990), human factors such as workers are considered the production factor condition, but they are less comprehensive and systematic than the 9-factor model. In the case of the generalized double diamond model created to overcome these limitations, the national competitiveness was expanded only to the international level. In the case of the 9-factor model, the source of national competitiveness was developed to physical and human factors but not at the international level. Cho, D. S. & Moon, H. C. (2006) proposed a dual double diamond (DDD) model by integrating the generalized double-diamond model and the 9-factor model to overcome these limitations of extended models.

The dual double diamond model can be utilized more comprehensively than Porter's (1990) because it divides the source of national competitiveness into physical and human factors and classifies the scope into domestic and international dimensions, as shown in Figure 3. More accurate measurement results can be presented. The material factors of the dual double diamond model can be divided into production factor condition, management condition, related and supporting industry, and market demand condition. The production factor condition is composed of environmental and capital resources. Management conditions include strategy, structure, global mindset, corporate culture, overseas investment, recognition of the market system, producers participating in economic activities, and merchant consumers. Related and supporting industries are divided into vertically and horizontally related industries in transportation, logistics, telecommunications, financial and stock market, education, science and technology, clusters, and living environment. Market demand conditions can be analyzed in terms of the size and quality of the market.¹⁵



Source: Cho, D. S. & Moon, H. C. (2006)

Figure 3. Dual Double Diamond model

¹⁵ Cho, D. S. & Moon, H. C. (2006). *National Competitiveness Theory and Practice*. Seoul: Korea Economic Daily. 131-132.

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The human factor comprises workers, politicians, administrative bureaucrats, entrepreneurs, and experts, and it can create national competitiveness by efficiently utilizing the physical factors. Workers are divided into the quantitative scale and qualitative competitiveness. The main contents include the size of the labor market, the level of education, and belonging to the organization. Entrepreneurs understand individual competence and social conditions, and entrepreneurs' efforts in economic development reinforce national competitiveness. Experts must keep the nation's competitiveness constant with competence, such as professional managers and technicians in each field of society.¹⁶

Therefore, it is possible to comprehensively analyze the factors attributable to the industry compared with Porter's diamond model (1990) and to analyze the competitiveness corresponding to the global changes of the nation and industry. It is unable to collect the data of the same institute for all survey subjects in the data collection, and it is difficult to analyze the micro factors because of the macro analysis. It also has the advantage of measuring the competitiveness of each element included in the expected standard and setting a direction for the national competitiveness enhancement measures.

III. ANALYTICAL METHOD

As for global competitiveness, this study will analyze industrial competitiveness as a research model instead of corporate level as follows. Industrial competitiveness can be measured by indicators such as export competitiveness, total production or productivity of the relevant industry, and competitiveness indicators of the relevant industrial companies, such as growth potential, profitability, market share, market value, and status in the global industry. If industry boundaries are clear and these industries are in oligopoly, they can demonstrate their competitiveness with the performance indicators of the top three to five companies. The automobile industry, which is interested in the research, is oligopolistic, so the performance of firms can be used as a representative performance index. The competitiveness of leading firms can be interpreted as the industry's competitiveness.

It is necessary to mention the role of the government in that the catch-up or reversal phenomena in terms of corporate competition are fundamentally the corporation's work, and the pattern of competition, such as pursuit and reversal, is influenced by the characteristics of the industry to which the corporation belongs. In addition, the government's intervention may involve the fact that the first movers systematically interfere with the latecomers to maintain their monopoly system. In particular, the government's industrial policy to support those latecomers or SMEs will have to be distinguished between factors, especially considering the technical design.¹⁷ In analyzing global competitiveness, government policies and changes in both domestic and global markets are important factors that cannot be ignored. Therefore, it is correct to analyze the competitiveness of the industrial unit rather than the competitiveness of the enterprise unit.

There have been many materials on strengthening Korea's competitiveness in analyzing global competitiveness. Korea has rapidly grown in the display, shipbuilding, and automobile industries and is ranked globally as number one or two. Domestic research institutes, including Samsung, Hyundai, and LG Economic Research Institutes, have analyzed the global competitiveness of Korean industries. One of the reasons for less conducted research on the weakening of Japan's competitiveness is that academia in Japan viewed it as transforming industrial strategies in another direction. In addition, there was a tendency to consider that investment could have been faster while investing heavily in new industries rather than those industries. Regarding domestic and international market share and sales volume, Japan has lost global competitiveness in specific industry sectors compared to the previous decade.

In the study, four factors will be used in analyzing the causes: technical, corporate, market, and policy factors. The model was developed by combining Michael Porter's competitiveness model (1990) and the Dual Double Diamond model by D. S. Cho & H. C. Moon (2006). Porter identified four variables in the diamond model factor conditions, demand conditions, related and supporting industries, firm strategy, structure, and rivalry, as the fundamental factors determining competitiveness. In addition to these four factors, the government and the chances that indirectly influence global competitiveness as the subject of change for effective use of these factors are exogenous variables. Integrating these two models and describing each part as a technical, market, corporate, and policy factor set up a global competitiveness model. The human factor of the dual double diamond model of Cho, D. S. & Moon, H. C. (2006) was added to the analysis model.

Therefore, the research model is composed of four main factors, which are a technological factor, market factor, policy factor, and corporate factor. Additionally, the role of the human factors of entrepreneurs, experts, workers, and bureaucrats will be contemplated. This paper comparatively analyzes the global competitiveness of the automobile industry in Japan and Korea.

¹⁶ Cho, D. S. & Moon, H. C. (2006). *National Competitiveness Theory and Practice*. Seoul: Korea Economic Daily. 133-134.

¹⁷ Lee, K. et al. (2008). *Economics of Catch-up between Firms*. 21st Century Books. Chapter 1.

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However, since a comparison of Korea's strengthening and Japan's weakening competitiveness cannot be analyzed in the same way, the competitiveness of Korea will be used in analyzing the detailed factors of weakening global competitiveness of the Japanese industry but applied in a differentiated way in the study.

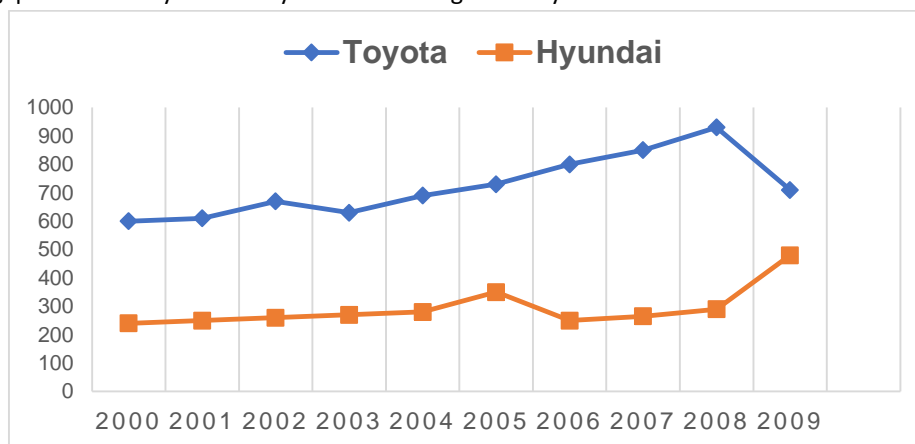
IV. WEAKENING FACTORS OF GLOBAL COMPETITIVENESS IN THE JAPANESE AUTOMOBILE INDUSTRY

i) Precipitous decline in export from the severe global competition

Japanese automobile companies have entered the automobile market since the 1930s, and Korean automakers have entered the market since the 1960s. Since then, two oil shocks in the 1970s and the popularization of automobiles in Japan have caused Japanese automakers to grow and gain a competitive advantage in the global market based on the production organization and technology-oriented benefit represented by the Toyota system in the 1980s.¹⁸ At the time, Korean automakers had their mass production system at the level of Japanese automobile companies in the 1960s, taking the first step toward overseas markets. In the 1990s, as the Korean automobile industry grew, it promoted rapid development through popularizing automobiles, mass exports, and developing proprietary technologies, laying the foundation for securing global competitiveness. However, in 1997, Korean automakers entered the IMF's bailout and suffered a significant restructuring, which slowed growth.

On the other hand, Japanese automakers focused on the advanced automobile market based on their quality competitiveness, further strengthening their global position. As a result, in 2007, Toyota Motor took over the position of the world's No. 1 automobile company, which was owned by GM cars for the past 77 years. The global automobile market stagnated in the second half of the year after the global financial crisis in September 2008. Some expected deficits amounted to 461 billion yen, equivalent to approximately 5.993 trillion won.¹⁹

Compared to Toyota and Hyundai in terms of production, the gap sharply decreased in 2009 due to the deteriorating management of Toyota. Toyota has continued to increase since 2003, but since 2008, production has plummeted due to the financial crisis. Hyundai has been on a moderate upward trend since 2006, which rose sharply in 2009. Therefore, it is confirmed that the production gap between Toyota and Hyundai will be significantly reduced in 2009.



Source: International Organization of Motor Vehicle Manufacturers (OICA)

Figure 4. Comparison of Production between Toyota and Hyundai (2000-2009, Unit: 10000 units)

Amid the global financial crisis and the massive recall of Toyota, Hyundai is increasing its market share to a position equal to that of global automakers based on quality management and design. The growth led to fifth place in the world in 2010. Competition became more intense as the automobile market entered the 2000s. Korean automakers have built their factories centering on emerging markets, spurred quality management internally, and launched automobiles of quality and design suitable for the global market, which was relatively higher than that of competitive automobile companies even under the global financial crisis. It maintains the same price, quality, and performance level as the world's automobile companies. It has a 100,000-mile 10-year guarantee of design innovation and a strategic alliance with Hyundai Capital and insurance companies. In addition to pursuing an aggressive global marketing strategy, it has achieved a competitive advantage in emerging markets such as China and India.

¹⁸ Barber, B.M., Darrough, M.N. (1996). *Product Reliability and Firm Value: The Experience of American and Japanese Automakers, 1973-1992*. The Journal of Political Economy. Vol 104 No 5, 1084-99.

¹⁹ Lee, H. G. (2010). *Background and Implications of the Toyota Crisis*. Industrial research institute.

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Table 1. Trends of major management indicators of Hyundai (Unit: billion won)

	2005	2006	2007	2008	2009
Sales profit	479,484	447,752	465,682	485,720	502,747
Operating profit	19,825	11,092	18,901	21,857	33,794
Net profit	29,266	15,299	16,837	14,592	44,122

Source: Hyundai website <http://pr.hyundai.com>

In particular, the large trade surplus of Japan since 1980 has led to the appreciation of the yen. Even after the Plaza Agreement on the dollar exchange rate adjustment in 1985, the Japanese automobile industry has faced pressure on the preference of the yen several times. In the early 1990s, due to the yen exchange rate of less than 100 yen, Nissan Motor showed a massive deficit in 1992, and Toyota almost saved the debt. The yen strengthened slightly in the 2000s but remained modest at 122.6 in April 2007, and turned back to more robust at 80.6 yen in January 2009. Finally, the continued strong yen phenomenon has significantly negatively impacted Toyota's export fronts. Entered the global automobile industry in 2000, Toyota faced the chase and price competition of Korea and China. The Korean won depreciated against the US dollar. Still, the Japanese yen was appreciated. The Japanese automobile industry faced price competition with Korea, which has rapidly developed in the global market since the 2000s in major markets, and responded sensitively to low-priced cars in Europe, China, and India.²⁰

Table 2. Trends of major management indicators of Toyota (Unit: million yen)

	2005	2006	2007	2008	2009
Sales profit	18,551,526	21,036,909	23,948,091	26,289,240	20,529,570
Operating profit	1,672,187	1,878,342	2,238,683	2,270,035	-461,011
Net profit	1,171,260	1,372,180	1,644,032	1,717,879	-436,937

Source: Toyota website <http://www.toyota-global.com>

The strong yen has had a catastrophic effect on Toyota. In 2009, which was 58 years since the loss of Japan in 1950 and there was an operating loss of 461 billion yen. It decreased by 2.7313 trillion yen compared with the 2.2 trillion yen operating profit in 2008. The leading cause of the functional deficit in 2009 shows a decrease in sales of 1.489 trillion yen and an increase in the yen to 760 billion yen, showing how much pressure the strong yen is for Toyota. The sharp yen appreciation following the financial crisis in 2008 required Toyota to cut costs drastically. To some extent, Toyota production methods that simultaneously demand quality, price, and performance for parts manufacturers have been passed to Japanese parts companies. Still, overseas manufacturers have been unreasonable, and price cuts have been linked to poor quality of automobiles due to poor quality of parts, which led to the massive recall.

ii) Excessive expansion with poor-quality control

As the global market environment deteriorated, Toyota intensified price competitiveness through cost reduction rather than strict quality control. The cost reduction can be attributed to the first and second rounds of the yen appreciation. In this situation, the price competitiveness has continued to weaken, and competitors producing low-priced, relatively high-quality vehicles, such as Hyundai, have been intensely pursued. So, overseas production has been growing since the 1990s. In expanding production and parts procurement, which Japanese companies formerly made, to a global scale, Toyota's strict quality management system faced a problem. As of March 2009, Toyota had 53 manufacturers in 26 countries.²¹

It is mainly caused by the change in the Toyota system and the adverse effects of the cost reduction strategy. In response to corporate strategy changes, Toyota reduced the design period from 18 months to 12 months with the rapid globalization of production and parts procurement. It seems obsessed with the goal of cost reduction by adopting common parts among other car

²⁰ Cho, C. & Kang, H. K. (2006). *Structural changes and implications of Japanese automobile industry under strong yen*. Korean Academy of Motor Industry. Korea Automobile Industry Association. 5-24.

²¹ Park, K. I. & Hong, S. S. (2010). *Effects and implications of the recent Toyota recall incident*. Trade Focus. Vol 9 No 2. Korea International Trade Association International Trade Institute.

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models, and it conflicts with the core value of Toyota that has been built so far.

To occupy the top position in the global market, overseas production has been overloaded in terms of the infrastructure of the parts supply chain and human resources that are responsible for supervision and control. In 2008, Toyota ranked first by beating out General Motors (GM) in the global automobile industry, with its production reaching 10 million units. As a result, there will be disruption in securing human resources to supervise smooth parts supply and quality control. Toyota started to deal with new local suppliers and delegated supervision functions for quality control to the local staff or suppliers instead of Toyota headquarters. Continuous high sales and the absolute trust of consumers can not lead to innovation, and Toyota is in a management crisis. Toyota, the world's fastest-growing global company, needed help to solve the problems that had been raised many times from the point of view of the producers rather than the consumers.²²

To survive in the global competition, Toyota has survived to cost reduction throughout the company, neglecting quality control in everything from design to assembly of finished cars. In the first design stage, a complicated method of products is required in the complexity of automobile technology with advanced electronics and environmentally friendly automobiles. The technical characteristic exceeds the manufacturing capability of the production site and provides a basis for design defects respectively. Especially hybrid car 'Prius', which is synonymous with the eco-friendly vehicle, needs to be improved in the design of the ABS control program. Toyota is confronted with the high growth of Prius, and it is enough to advance technological defects of new products born by a high degree of mechanical engineering and electronics. Toyota could not prevent it from reducing its cost. Excessive use of parts in about 50 models has resulted in the deterioration of the design quality. This has led to amplifying the ripple effect of defects in one piece. Value engineering, a technique to simplify the necessary functions, was the driving force.²³

In the second component procurement stage, reducing the delivery unit prices is unreasonable to secure price competitiveness for competitors in Korea and other countries. The causes of component manufacturers are one factor in lowering the quality of parts, and management needs to be addressed. Japan has pointed out that parts makers are adopting more odd jobs to respond to the demand from the automakers to cut delivery prices, which leads to a deterioration in the production quality of parts. In other words, Toyota has increased the proportion of overseas procurement of components to cope with global competition. Still, transferring the integrated quality management system between Toyota and parts companies overseas has been difficult.²⁴

In other words, Toyota has increased the proportion of overseas procurement of components to cope with global competition. Still, transferring the integrated quality management system between Toyota and parts companies overseas has been difficult. In the case of accelerator pedal defects, the lack of quality defects in the same parts produced by DENSO, Japan's largest Toyota-affiliated parts company, led to a lack of close communication between Toyota-Denso and Toyota-CTS that is one of the accelerator pedal manufacturers in the US.²⁵ In the stage of assembling the finished car, Toyota tended to create a similar environment as much as possible, as compared to competitors such as Honda and Nissan. As overseas production bases have soared since the 2000s, the export workforce pool has been limited, making it difficult for Toyota to maintain quality control at home and abroad.

As many employees are transferred overseas whenever overseas factories are established, frequent personnel exchanges in each head office division have made it challenging to communicate closely with Toyota headquarters and parts companies. In the 1990s and 2000s, the number of foreign factory establishments in Toyota's overseas factories surged to 15 and 18, respectively. As a result, overseas production of 3.58 million units exceeded domestic production of 2.79 million.²⁶

In particular, the massive recall of Toyota put Japanese automakers at significant risk. In 2009, Toyota recorded a large operating loss for the first time in 71 years. In the meantime, the brand image and global competitiveness have been hurt by quality management. As a result of these recalls, problems have been pointed out in the course of excessive cost reduction and expansion of overseas production bases, raising awareness of risk management in global production systems. Toyota established its global quality committee to establish a top-quality management position in six world regions and took internal remediation

²² Hyun, Y. S. (2011). *Causes and Lessons Learned from the Massive Recall of Toyota Motors*. Journal of the Korean Society of Production Management. Volume 22, No. 1. March. 21-37.

²³ Kang, M. H. et al. (2010). *Risks and countermeasures of the global production system - In the wake of the Toyota recall incident*. CEO Information. No. 743. Samsung Economic Research Institute.

²⁴ Fujimoto, T. (2010). *Suffering from the monster of complexity*. Nikkei Business. February 5.

²⁵ Coombs, W. T., & Holladay, S. J. (2007). *The Negative Communication Dynamic: Exploring the Impact of Stakeholder Effect on Behavioral Intentions*. Journal of Communication Management, 11, 300-312.

²⁶ Toyota Motors official homepage <http://www.toyota-global.com>

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measures, including reassigning safety-related duties to 1,000 engineers. In addition, they externally strengthened communication with parts suppliers and strengthened management of foreign parts companies that are supplied from overseas production bases.²⁷

Why did Hyundai, which had been actively introducing the Japanese production system since its inception, abandon Japan's worker-oriented characteristics in production technology and develop engineer-centered production technology? Suppose technology is to be divided into physical and social technology. In that case, it is not a matter of imitating the technology of the leading country when technology catches up with the following countries is done but making a planned and creative modification by the institutions and norms.²⁸

Considering the workability of general workers at the initial stage of industrialization, excellent engineers who have received an elite education and general labor practices in Korea in the process of accepting the Japanese production system are selected. The strategic choice in production technology is the case of path-based technology pursuit. As for the internal success factors of Hyundai's technology pursuits, the company is actively engaged in learning efforts, technology strategy, flexible response to changes, independent export strategy, and capital structure to make independent decisions. The monopoly structure of global technology is not a solid unified entity. It is said that the international technology transfer environment was relatively easy to introduce from technical service companies.²⁹

iii) Growth-centered corporate strategy for cost reduction

Four factors broadly analyze Toyota's growth-oriented management strategy and organizational culture crisis: the first is expansion-oriented management strategy, the second is the fatigue phenomenon of Toyota production method, the third is the lack of organizational response capability, and the fourth is the fading of Toyota culture. From the early 1990s, Toyota pursued a growth strategy to expand overseas production in the face of the deficit crisis. It is clear that the will to be the world's top automaker in the early stages of the global master plan in 2002 and 9.8 million sales targets announced in September 2006. Toyota has been optimistic about future automobile demand with the influence of the management strategy policy. It has expanded the production capacity of over 3 million units overseas from 2004 to 2009 to have a production system of 10 million units at home and abroad.³⁰

The global master plan, established in 2002, pursued an expansion strategy to achieve a 15% global market share by 2010. As a result, the global production of Toyota's automobiles has dramatically increased from 5.21 million in 2000 to 8.21 million in 2008 and 7.81 million in 2009 from 4.21 million in 1991 to 4.8 million overseas. In particular, since 2003, production has increased by 60-70 million units annually. The number of Toyota overseas factories has risen sharply from four in the 1970s, 5 in the 1990s, 10 in the 1980s to 15 in the 1990s and 18 in the 2000s. In particular, Toyota expanded and built 17 overseas factories since 2000, and in 2008, they operated 56 factories in 26 countries. The overseas production volume has dramatically increased from 1.39 million in 1997 to 4.2 million in 2008, increasing from 28.4% to 51.2% respectively. Overseas production and proportion, overseas bases, and employees were also confirmed during 1997-2008.³¹ It failed an expansion-oriented management strategy.

Secondly, the Toyota production method requires constant challenges for perfection, aiming at an aggressive competition that simultaneously achieves quality, cost, and product performance. It has been pursuing cost reduction and high quality at the same time by early visualizing the problem and thoroughly eliminating the dissipation. Since the global oil crisis in 1979, Toyota has taken the lead in the worldwide automobile industry as a delicate process innovation of production methods, such as Toyota production, rather than a complex process innovation, such as facility innovation. Since the 1990s, the principles of Toyota's production methods have expanded to include product development, personnel training, and organizational culture.³²

The logic of Toyota's production method, "the lean product development system," was actively introduced. After 1993, the development period was shortened from 26 months to 18 months in the 1990s and 12 months in the 2000s until the launch of the new car model.³³ In the meantime, dramatic cost reduction through the cost competitiveness campaign 21 (CCC 21)

²⁷ Andrews, A. P., Simon, J., Tian, F., & Zhao, J. (2011). *The Toyota Crisis: An Economic, Operational and Strategic Analysis of the Massive Recall*. Management Research Review, 34(10), 1064-1077.

²⁸ Nelson, R. R. (2004). *The Challenge of Building an Effective Innovation System for Catch-up*. Oxford Development Studies. Vol 32. No 3.

²⁹ Kim, G. (1994). *The growth structure of the Korean automobile industry from the perspective of technological capability development: Focusing on the case of Hyundai Motor Company*. Socioeconomic Criticism 7.

³⁰ Kim, H. C. et al. (2009). *Toyota DNA*. Institute for Japanese Studies, Seoul National University.

³¹ Korea Institute for Industrial Economics & Trade, Industrial Statistics Portal (ISTANS) homepage <http://www.istans.or.kr/website/index.jsp>

³² Kim, H. C. et al. (2009). *Toyota DNA*. Institute for Japanese Studies, Seoul National University.

³³ Liker, Jeffrey K., and James M. Morgan (2006). *The Toyota way in services: the case of lean product development*. The Academy of Management Perspectives 20.2: 5-20.

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movement from 2001 to 2003. Ultimately, Toyota expanded the parts procurement system to globalize and modularize components to increase assembly line productivity. Even after the end of CCC 21, the company has further strengthened its cost-cutting efforts through value innovation, which aims to produce 10% less expensive cars than the world's car prices. But it also reduced the organizational slack as a driving force to overcome crisis for the organization.³⁴

Third, the rapid increase in overseas production since 1997 caused many management problems, especially since the operational situation of overseas factories became dire. For example, the Texas plant in the United States should have been addressed to nurture human resources to raise the initial utilization rate. As a result, among the five levels of Toyota's production capacity, the proportion of employees in the first stage reached 70%. Even workers with little production experience have been assigned to group leaders, dramatically weakening their ability to solve problems quickly.³⁵ It is very shocking compared to the fact that in 1988, Toyota's US plant in Kentucky, the first American plant in Toyota, was preparing thoroughly through rigorous training in Japan to bring Toyota production to the US.

The situation shows the basic principles of Toyota's production method that visualize the cause of the problem at the production site and start to solve the problem from the source, and that the employees accumulate their capability through dynamic learning. It can be pointed out that it began to lose since Toyota made significant innovations in the early 1990s to overcome the crisis. The ability to train Toyota production methods in new production workers has been weakened due to the abolition of the headquarters mainly responsible for training. It is said that it became one of the fundamental reasons for the mass recall in 2009.

There had been signs of a crisis for several years before the recall, but they did not take preemptive measures. In 2004, Toyota received complaints from Lexus and Camry in the United States. Since 2007, they have recalled more than ten times from overseas and have seen a loophole in quality control. The president of Toyota, Watanabe, officially apologized when five people were injured because he did not take measures such as recalling even if he knew the defects in 2006. At that time, three executives were convicted of documents due to business negligence, and they received an administrative disposition. In August 2009, four people died due to the accelerator pedal defect of the Lexus ES350 in the United States. The background of such problems repeatedly arises from the head office executives' culture, making it easier to listen to consumers' complaints and judge the situation efficiently.³⁶ It is because of Toyota's lack of organizational response capability.

Lastly, Toyota's customer-oriented culture gradually faded as it ignored customers and lousy content and delayed the recall decision in accepting and processing customer complaints. The production discontinuance system, the core of Toyota's production system, was founded in February 2008 due to increased customer claims. Still, the plan was not operated with priority given to achieving the production goal. It proves a fundamental disintegration of Toyota's production methods and culture.³⁷

The loss of Toyota's culture is a crisis of Toyota's leadership in that it is accelerated by focusing on short-term profit after the introduction of the top-down profit management method, called 'Global profit management' adopted in 2002.³⁸ On the other hand, Watanabe Masahiro and Hayashi Masanaki 2007 warned that Toyota's misguided strategy and practice would cause severe problems for Toyota, a book called "The Darkness of Toyota." In 2010, after the massive recall of Toyota, Japan's Minister of State, Seiji Mihara, also pointed out that Toyota lacks a customer perspective.³⁹

Unlike other automakers in Japan, Toyota has maintained its technology development strategy and independent management rights without falling into the temptation of providing advanced technology from overseas makers. As a parallel mover strategy, Hyundai has made risk-preferential decisions in establishing technology catch-up. It is because Hyundai's technological level is far from the advanced makers, and it isn't easy to catch up with the regular path-following pursuit. In the early stage of the venture, entrepreneurs can concentrate all the company's resources on technology development. And the personal tendency of entrepreneurs who want to go toward the goal, among other things. Despite internal concerns about future risks, it is believed that the CEO's bold decision-making to achieve the plan has made an outstanding contribution to the success

³⁴ Hino, S. (2006). *Inside the Mind of Toyota Management Principles for Enduring Growth*. New York, N.Y.: Productivity Press.

³⁵ Kang, M. H. et al. (2010). *Risks and countermeasures of the global production system - In the wake of the Toyota recall incident*. CEO Information. No. 743. Samsung Economic Research Institute. 65-71.

³⁶ Jeong, Y. H. & Jeung, M. (2010). *Lessons and implications of the Toyota management crisis*. Hyundai Economic Research Institute.

³⁷ Kim, H. C. (2011). *Korea's Emperor Management and Japan's Master Management*. 21st Century Books.

³⁸ Jung, I. G. (2010). *Toyota Production System*. Window of Time Press.

³⁹ Shim, W.S. & Steers, R. M. (2012). *Symmetric and Asymmetric Leadership Cultures: A Comparative Study of Leadership and Organizational Culture at Hyundai and Toyota*. *Journal of Business World*, 47 (4), 581-591.

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of the technology catch-up strategy.⁴⁰

The environmental situation from the establishment of Toyota Motor Corporation to the growth period is summarized by the high level of technology of the Japanese machinery industry, the close relationship with the Japanese military, and the rapidly changing political situation. Under these circumstances, Toyota has made risk-averse decisions in establishing its technology catch-up strategy. Although it is a latecomer, it has adopted a path-following pursuit strategy, which gradually reduces the gap with advanced makers while manufacturing the automobile parts of advanced makers based on the high level of technology of the Japanese machinery industry.

The ordinary pursuits of these two companies' catch-up strategies are that other companies in the two countries have given a portion of their management rights by relying on advanced technology. Still, they have never yielded management rights in exchange for technology provision. Although Hyundai took a parallel strategy to Toyota, the differences between the two differ depending on the specificity of the two companies. In contrast to the fact that Hyundai has adopted a technology independence strategy through its technology development and made bold risk-preference decisions by top management, Toyota found it a prudent risk-averse decision. In discussing the success and failure of the catch-up theory, it is hard to generalize with success stories of one or two companies. In establishing the catch-up strategy of the enterprise, various factors such as political economy, the cultural specificity of the individual country, the technical level of the industry, and the competence of the enterprise should be considered.

iv) Lack of timely response by the Japanese government

Since the 1990s, the Japanese government's fiscal expansion policies have been implemented about 30 times. Even during the global financial crisis, budgetary expansion measures were promoted four times with 132 trillion yen. While the economic recovery packages were ineffective, the government budget deficit almost reached 200% of GDP. As a result of the exhaustion of policy effects, the government's reduced choice of additional policy measures led to massive restrictions on the use of policy instruments. In particular, the government's difficulties in supporting businesses occurred due to public financial challenges.

The Japanese government must review the safety-related system of products in the automobile industry, especially the legislation concerning the recall action to enhance the effectiveness of Toyota's massive recall. Furthermore, about the Product Liability Act, it was analyzed that the Japanese government failed to respond promptly, especially by not inducing automakers to provide more precise information on development risks. The government has not been able to strengthen the corporate responsibility to provide sufficient information for domestic and global consumers to make wise choices in cases where property damages are likely to occur to automobile products embodying new or advanced technology.⁴¹

In the case of the massive recall, suspicions were raised that a late apology, a statement to blame the consumer, a misrepresentation of relevant information, and unclear information disclosure. The president of Toyota, Akio, apologized ten days after the recall, and Prius was aware of the defect before the problem began to spread. At the official apology of the president, the reason for the explanation was insufficient, and some executives showed disappointment, such as attributing the cause of quality problems to consumers rather than deep introspection. Furthermore, there was no apology at the Japanese government level, and the Japanese prime minister forced Toyota to respond swiftly to the recall at the corporate level.⁴²

In the event of a recall in a foreign country, such as a large-scale recall of Toyota, the government has to encourage improving the information supply system so that relevant information can be provided promptly. In addition, it is necessary to build an information gathering, analysis, and production system such as an 'early warning system' to deal with at the governmental level. To ensure quick and fair relief in the event of a global consumer injury caused by a large-scale recall, the Japanese government should have supplemented the product liability system, the class action lawsuit, and the consumer group dispute settlement system to improve its effectiveness.⁴³ It was necessary to actively participate in the government's consumer policy, particularly in the policy-making process related to consumer safety, and actively promote opinions to guarantee consumers' interests in the domestic and international arena.

⁴⁰ Lee, K, Jeong, M. S., and Kim, Y. J. (2008). *The role and strategy of the service industry for the transition from leading chasing to chasing together*. The Korean Economic Association.

⁴¹ Jung, Y. S. (2011). *Results and implications of investigating the cause of the sudden acceleration accident of Toyota Motor Corporation in the United States*. Korea Consumer Agency.

⁴² Jeong, Y. H. (2010). *Lessons and implications of the Toyota management crisis*. Hyundai Economic Research Institute.

⁴³ Jung, Y. S. (2011). *Results and implications of investigating the cause of the sudden acceleration accident of Toyota Motor Corporation in the United States*. Korea Consumer Agency.

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V. CONCLUSION

Regarding the four causes mentioned above of technical, market, policy, and corporate factors, the study tries to analyze why the global competitiveness of the Japanese industry has been weakened, especially in the automobile industry. Technology, market, and policy factors are external causes of weakening the Japanese industry, and a corporate factor is an internal cause. Above all, the human factor, which is consisted of the dynamics of entrepreneurs, workers, experts, politicians, and administrative bureaucrats, is the most critical in analyzing the technical, market, policy, and corporate factors of global competitiveness in each industry.

In particular, the human factor plays a crucial role in the analysis model of the study. Workers and experts were responsible for technology transfer within the industry. There were frequent human leaks in Japan, which was far ahead of Korea regarding technological equipment and facilities. Japanese automakers' entrepreneurs failed to the quality management of overseas human resources while promoting a growth-centered corporate strategy, resulting in a massive recall in 2009. As for the Japanese automobile industry, global competitiveness has been weakened due to the inability of the technicians to supply overseas manpower to cope with a boom period in the global market.

In addition, politicians and bureaucrats, via the government's industrial support or policy, played an inevitable role in enhancing the competitiveness of Japan in early development. As an industry incumbent, Japan formed an industrial ecosystem while pursuing industrial development through government-led industrial policy. Thus, when the economy came into a recession, especially macroeconomic stagnation, there should have been timely action or policy support at the government level. Concerning the technological development of products, the market of the industry was booming or depressed at that time, along with the government's policy and strategic support to develop each sector and to maintain its global competitiveness. The Japanese government failed to take advantage of the market due to the wrong choice of investment period and, thus, caused to lessen the gap with Korea.

The investment reduction or cost reduction decided by entrepreneurs as one of the main factors, explained in detail by the corporate factor as the internal cause, is noteworthy among the four factors of weakening global competitiveness. The biggest reason Toyota lost global competitiveness, especially due to its massive recall in the automobile industry, is that it made small investments during critical periods, delayed investments, or impractical cost reduction strategies in significant investment periods. The technology, market, and policy factors are the leading causes because of the necessary-to-sufficient relationship with the investment or cost reduction. With entrepreneurs' decision-making process for investment or cost reduction, Toyota Motors would have avoided the massive recall in the global arena.

Through these analyzes, these four main factors are a necessary condition for Japan to lose its global competitiveness in the automobile industry, and the decision of entrepreneurs, workers, technological experts, administrative bureaucrats, and politicians, who are comprised of the human factor is sufficient condition and explained by the study. Previous studies of comparison between Japanese and Korean industries have been conducted so far focused mainly on Korea's catch-up or reversal phenomena explaining how Korea pursued Japan. However, the study tries to focus on why Japan experienced a weakening of global competitiveness in analyzing the structural changes in the industry, which has played a crucial role in the development of the Japanese economy, contributing to the future growth engine.

In the study, the automobile industry has been analyzed so that it is expected to explain how the industry has lost industrial competitiveness and, consequently, in what ways Japan's global competitiveness has been weakened. Therefore, it will be a study examining the factors that undermine the global competitiveness of Japan in a particular industry and comparing countries through quantitative index extraction and qualitative analysis processing. The result of the study is expected to enhance global competitiveness by advising entrepreneurs to develop substantial corporate strategies and policymakers to implement effective industrial policies. It will be useful as evidentiary material for the phenomenon that Korea and other East Asian countries are also chased by China, which could leave meaningful suggestions.

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