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The Transformation and Evolution of Japan's Manufacturing Industries: A Case Study about Toyota and Toshiba after the Global Financial Crisis[1]

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Abstract

This paper has analyzed the transformation and evolution of Japan's manufacturing industries after the global financial crisis in 2008. In this due course, we conducted case studies on Toyota (automobile) and Toshiba (semiconductor) as the two major industries in Japan. Specifically, against the huge impacts caused from the capitalist world economy at the macro-level beyond the control of a single sovereign state, Toyota and Toshiba have chosen fundamentally-different strategies at the micro-level resulting in opposite outcomes: success and failure. After the global financial crisis, from 2009 to 2010, Toyota had to face massive recalls of Lexus vehicles in the U.S. market, which brought out unmeasurable economic losses. On the other hand, Toshiba had to conceal its rapidly-deteriorating performances of internal management, which resulted in unprecedented accounting frauds in a structural manner. However, once its secret was publicly revealed in 2015, Toshiba ended up suffering from irreversible fatal damages. While experiencing these challenges and crises, as a result, Toyota was able to understand the true nature of its failure, and ultimately achieved the success of its core business. On the contrary, Toshiba failed to apprehend the true nature of its success and could not avoid the failure of its core business.

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THE CAPITALIST WORLD ECONOMY AND THE RISE AND FALL OF JAPAN'S MANUFACTURING INDUSTRIES

Huge Impacts at the Macro-Level and the Change of Times

After the end of the Cold War, in the eyes of Japanese people, both the capitalist world economy internationally and the business environments domestically have been changing at an astonishing speed. Just from the perspective of nominal GDP, Japan's economy used to account for 17.9% of the world GDP in 1994, but this ratio would plunge to 5.9% in 2015. In only two decades, Japan's relative weights in the world economy have decreased by three times from its highest to lowest points[2]. In history, from the mid-nineteenth century to the early 1970s, Japan had never missed the best opportunity of "two Golden Cycles"[3] and, as the forerunner in Asia, achieved the unprecedented level of huge successes in industrial developments. In the early stages of the Cold War, Japan's industries gradually began to take off and, based on "Izanagi's economic prosperity" starting from the year 1965, would achieve both economic recovery and revival far beyond anyone's expectations. During the oil shock period of the 1970s, based on a series of policy combinations based on "energy-saving" and "technology innovations" masterplans, Japan's core industries and Zaibatsu's affiliated companies would be able to improve their international competitiveness very successfully. In the year of 1968, Japan succeeded in establishing its new position as the world's second largest economy, which could last for about 42 years (1968-2010).

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[2] The Global Economic Data: https://www.theglobaleconomy.com/Japan/gdp_share [20th May, 2019] . Concerning this, if recalculated from the perspective of Purchasing Power Parity, it would have quite a different outcome in terms of economic analysis. In details, more data can be found in the following sources: OECD.2006. *The World Economy*. Paris. Development Centre of OECD:214.

[3] Concerning the so-called "two Golden Cycles", according to the historical analysis of Chinese scholar WANG Zhengyi, the first Golden cycle lasted during the period from 1870 to 1914. Then, the second Golden cycle lasted during the period from 1945 to 1970. In details, more data can be found in the following book: WANG Zhengyi. 2010. *Principle of International Political Economy*. Beijing. Peking University Press:42.

Nevertheless, since the collapse of the property-bubbled economy in the early 1990s, Japan' s prosperity and capabilities began to quake relentlessly and fundamentally. As the Neoliberalism supported by the Washington Consensus started to spread worldwide, both "economic globalization" and "digital revolution" during the Third Industrial Revolution would also open the door to a new era of the great transformation in the 21st century. During the same period, Japanese companies and industries had to face fierce competitions and challenges from emerging countries such as South Korea and China. In the Capitalist World Economy, Japan used to be known as the starting point of the "flying geese model" in the economic development process of East Asian Region in the 20th century. Simultaneously, it was common for late-developing countries to regard Japan as an ideal role model in terms of "learning by doing". However, Japan had to experience multiple shocks such as the Plaza Accord in the mid-1980s, the collapse of economic bubbles in the early 1990s, and the continued appreciation of the Japanese yen's value, which have been eroding the core foundations of the entire manufacturing industries in Japan. Among them, widely known as the "the artisan spirit of Japanese craftsman", the core competitiveness of Japan's high-quality products began to shake at the root level domestically and internationally. Consequently, in both relative and absolute terms, Japan has been gradually losing its glorious dominance of the past especially in major manufacturing industries such as semiconductors, shipbuilding, home appliances and electronics, all of which used to be perceived as Japan's core manufacturing industries qualitatively and quantitatively.

Strategic Choices at the Micro-Level and the Evolution of Paradigm

In modern history, every time Japan had to confront a national crisis such as the collapse of economic bubbles in the early 1990s and the Fukushima nuclear power plant accident in 2011, *The Essence of Failure*[4] has been always a highly cited reference in analyzing and studying the imminent crisis in Japanese society. Until now, together with policy-makers and business entrepreneurs, most people in Japan are recognizing *The Essence of Failure* as a masterpiece which they can learn important lessons from the history of the past. Perhaps, while reading why Japan

[4] 村井友秀，戸部良一，鎌田伸一 and 杉之尾孝生.1984.『失敗の本質：日本軍の組織論的研究』. 東京：中公文庫. For example, refer to「中国 vs.日本50番勝負: 中国の強さは本物か」、『週刊東洋経済』2018年9月15日；「チャイノベーション」、『日経ビジネス』2018年12月10日。

failed in WWII, they might be trying to compare the present with the past in order to find a proper solution for the on-going crisis. Through this kind of collective learning, based on its historical experiences, Japan would be able to find important clues to solve the imminent challenges of the new ear. *Ab ante*, it would be also possible for Japan to realize the maximization of success and the minimization of failure ultimately. Similarly, since the beginning of 2018, the so-called "learning about China" has gradually become a new trend attracting growing attentions from mainstream media and major industries in Japan. As a new trend of collective learning in Japanese society, more people now want to know better about what is really going on with China's leading enterprises and industries. If so, until most recently as of 2019, from what kind of perspectives have Chinese scholars been conducting an academic research on Japan and its top manufacturing industries? Until now, when it comes to a study on Japan's manufacturing industries and its core competitiveness, the existing academic literatures in China have been mainly focusing on specific research issues such as how Japan could successfully obtain a high level of international competitiveness in the world market. Likewise, regarding Japan's manufacturing industries even after the global financial crisis, Chinese scholars still tend to focus on the same research questions mostly about how Japan's experiences can be applied to improving the core competitiveness of China's counterparts[5]. Hence, while reviewing the existing literatures about Japan's enterprises and manufacturing industries, we could often witness that some of important factors or key variables at the micro-level or at the macro-level tend to be overlooked or even omitted without having sufficient investigations. As a result, when it comes to China's current researches about Japan especially after the global financial crisis, the Chinese academia seems to lack case studies on the latest trends or on-going restructurings of Japanese companies or manufacturing industries. Under this kind of realities and academic backgrounds, as to Japan's major manufacturing industries of automobile and electronic sectors, this paper selected two different cases of Toyota (Automobile) and Toshiba (Semiconductor) respectively and conducted an in-depth analysis for both of them mostly focusing on what they have experienced after the global financial crisis.

[5] SU Hongwei. 2017. A Study on Integrated and Upgraded of Structure of Manufacturing Industries in Japan [Doctoral Dissertation]. Changchun city. Northeast Asian Studies College of Jilin University:169-76.

Rooted from this research design, concerning the huge impacts like the global financial crisis and the Fourth Industrial Revolution spread from the macro-level far beyond the control of a single sovereign state, we will scrutinize how Toyota and Toshiba lead to make different strategic choices at the micro-level. Then, by interpreting the true nature of crisis and the destiny of core business, this study will continue to analyze why Toyota and Toshiba have obtained dramatically opposite outcomes a decade later: success and failure. For this purpose, firstly, we are going to investigate the new trends and changes of Japan's major manufacturing industries for the past decades. Secondly, from the analytic framework of huge impacts at the macro-level and strategic choices at the micro-level, this intellectual endeavor is going to interpret Toyota's success and Toshiba's failure and eventually draw some critical conclusions.

THE TRANSFORMATION OF JAPAN'S MANUFACTURING INDUSTRIES AFTER THE GLOBAL FINANCIAL CRISIS

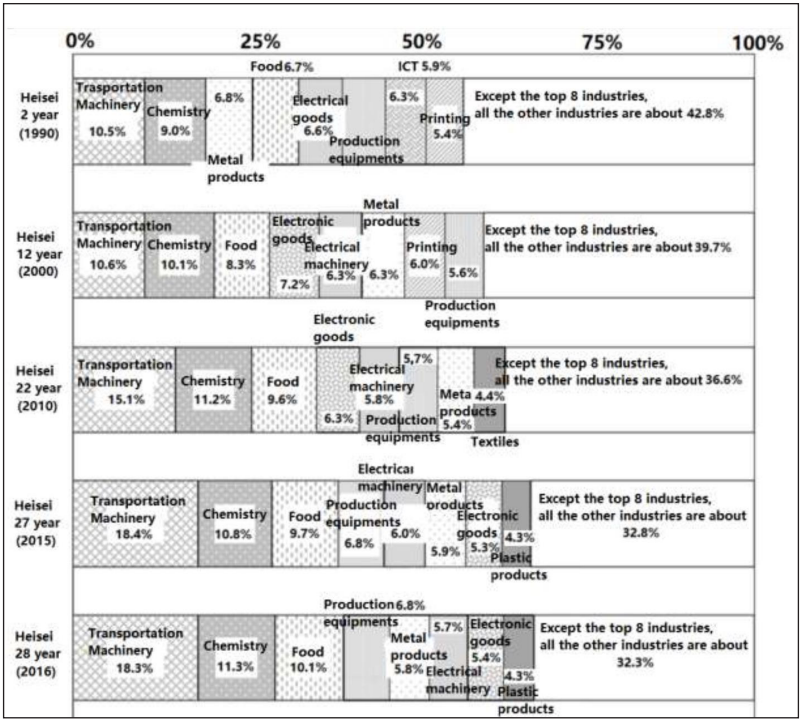
Since the collapse of the Bretton Woods system in 1971, whenever a sort of periodic "boom and burst" in the capitalist world economy led by the United State emerged in a form of financial crisis, global investment (speculation) forces regarded the Japanese yen as a safe asset causing a continuous rise in the value of it. On the contrary, during the same period, the currency values of other countries have declined significantly in the world market, weakening the robust competitiveness of Japan's domestic manufacturing industries in terms of international prices. During from the Asian financial crisis in 1997 to the global IT bubble collapse in 2000 and again from the global financial crisis in 2008 to the Euro crisis in 2010, this phenomenon of "the rise of the Japanese yen's value" had been maintaining for a long time. Therefore, in response to the economic shocks caused from the macro-level, Japan's manufacturing industries have been steadily evolving through various methods such as cost reductions, technological innovations, and structural reformation at the micro-level. On the other hand, besides the economic shock, another massive impact that began in the non-economic sphere has been also creating a series of fundamental changes.

The Fourth Industrial Revolution and the Chemicalization of Japan's Manufacturing Industry

As the Fourth Industrial Revolution[6] accelerates, there have been colossal changes in the true nature of science technology narrowly and industrial ecosystem broadly. Among them, besides significant advances in the Artificial Intelligence, "the chemicalization of Japan's (manufacturing) industries"[7] is also epitomizing this new trend. As widely known, Japan has been a global powerhouse in the automobile and electronic industries. However, according to the recent statistics about Japan's domestic manufacturing industries, it is obvious that fundamental changes are occurring in Japan's industrial structures. As shown in the Fig. 1, based on the total value-added amount of Japan's domestic industries in 2010, Japan's automobile (and transportation machinery), chemicals (and plastic products), and electronic (parts and electrical machinery) accounted for 15.1%, 11.2%, and 12.1% (= electronic parts 6.3% + electric machinery 5.8%) respectively. Then, based on the total value-added amount of Japan's domestic industries in 2016, Japan's automobile (and transportation machinery), chemicals (and plastic goods), and electronic (parts and electrical machinery) accounted for 18.3%, 15.6% (= chemical 11.3% + plastic products 4.3%), and 11.1% (= electrical machinery 5.7% + electronic parts 5.4%).

[6] Until today, concerning how to define the Third or the Fourth Industrial Revolution and related concepts, the mainstream academia in the world have not reached a consensus yet in many aspects. However, despite this kind of realities and historic backgrounds, many experts are growly recognizing the World Economic Forums held in January 2016 as a symbolic turning-point in the great transformation from the Third Industrial Revolution to the Fourth Industrial Revolution. In this context, although it might be still premature to use this terminology of "the Fourth Industrial Revolution" in this paper, this study will attempt to accept this terms positively and conduct a related in-depth analysis in order to catch up with what is currently going on with this and Japan's related manufacturing industries.

[7] Itami TAKAYUKI. 2009. The Chemicalization of Japanese Industries. Chemistry and Industry, 62(2):111-13.



Sources: The official webpage of the Ministry of Economy, Trade, and Industry, "The Statistics Report of Japan's Industries in the Heisei 29 year, downloaded on 28th February, 2018, https://www.meti.go.jp/press/2017/02/20180228003/20180228003.html, visited on 20th May, 2019.

Fig. 1: Relative Comparison of Japan's Domestic Industries in Terms of Value-Added Proportions

Namely, as both global market and business model are rapidly evolving, the chemical industry has already begun to develop into a key industry leading Japan's economy. In response, experts are expecting that this new trend of "the chemicalization of Japan's industries" will continue in the future. However, compared with the automobile or electronic industries, Chinese scholars are still relatively unfamiliar with Japan's chemical industries. For example, Japan's automobile industry has global brands like Toyota, Nissan Renault, Honda, and Mitsubishi. Likewise, Japan's electronics industry also has legendary giants like Toshiba, Sony, Mitsubishi, and Hitachi.

Against this backdrop, among those top global chemical companies as of 2009 (after the global financial crisis), BASF ranked first, DOW ranked second, and Sinopec ranked third. On the contrary, as Japan's leading

chemical companies, Mitsubishi Chemical ranked only 14th and Sumitomo Chemical ranked only 17th[8]. However, in terms of the technological capabilities and market structures of the global top-quality chemical industries, Japan's key chemical companies are small and medium-sized ones, not large ones. Because, except for medical sectors and agricultural fertilizers, many of Japan's small and medium-sized chemical companies have been maintaining the highest levels of both "quality" and "quantity" in the global market. For example, the ultra-precision chemical materials and components of automobiles, electronics and aircraft manufacturing. Hence, according to the analysis of experts, some of Japan's chemical industries have already formed a (Japan-led) monopoly market (or oligopoly market) among the entire value-chains of production and consumption in the global marketplace. *De facto*, in the early 21st century as the critical point when the "digital revolution" of the Third Industrial Revolution was rapidly accelerating, Japan's chemical industries could supply the global market with top-quality chemicals and IT components in large quantities, which led to an unprecedented period of success. Likewise, while experiencing the second critical point of the "Artificial Intelligence" of the Fourth Industrial Revolution around 2016, Japan's chemical industries are now undergoing a second period of success.

It should be noted that, fundamentally speaking, the global demands for ultra-precision chemical materials and components for fuel cells and ICT components are continuing to soar especially among automobile and electronic industries. Consequently, Japan's chemical industries are now being perceived as a key driver of robust competitiveness in both automobile and electronic industries.

"Six-fold Pains" and Returning of Japan's Manufacturing Companies

After the global financial crisis in 2008, Japan's manufacturing industries are known to have been suffering from the so-called "Six-fold Pains"[9] as follows: (1)the continued appreciation of the Japanese yen' value; (2) the domestic legal system heavily focused on protecting workers; (3) the high-level of corporate income tax; (4)the strengthening standards of environmental protection; (5)the unstable supply of electricity; (6)the

[8] "Global Top 50," Chemical & Engineering News, 7th June, 2010, p.14.

[9] Mizuho Research Institute. 'The 'six-fold pains' problem of Japanese companies still remains', https://www.mizuhori.co.jp/publication/research/pdf/today/rt140318.pdf#search=%276%E9%87%8 D%E8%8B%A6%27 , visited on 20th May, 2019.

delayed signing of FTAs. During the same period, in Japan's domestic politics, the DPJ captured power in September 2009. However, in just three years and three months, the political power had to be returned to the LDP. Again, in December 2012, the Abe administration of the LDP succeeded in maintaining its political power and began to implement the so-called "Abenomics" together with a series of related economic policy measurements. Based on this, until now, the Japanese government has been attempting to increase the core competitiveness of Japan's manufacturing companies and industries in a relatively short period of time.

From a long-term perspective, this intended to transform Japan's economic system into a virtuous cycle. Therefore, concerning the above-mentioned "Six–fold Pains", the Abe administration tried to implement the new policy adjustments as follows: (1)Against the long-standing appreciation in the value of the Japanese yen, Japan has been pursuing a new monetary policy of expanding the overall supply of yen through repeated quantitative easing; (2)For the high-level of domestic corporate income taxes, implementing a new policy to lower the income tax ratings from 39.54% in 2010 to 29.74% in 2018; (3)Concerning the legal system biased toward the protection of domestic workers, advancing a new system of automatic manufacturing facilities to realize a higher-level of automatic production system; (4)In response to stricter standards of environmental protection, upgrading an entire system of manufacturing industries into higher value-added industrial sectors; (5)Regarding the instability of electricity supply, adopting a new method of "multi-species and small-volumes production" to overcome the traditional way of electricity over-consumptions; (6)As to the delay of proceeding the FTAs, activating a new rule of trade strategies like the TPP and the RCEP to improve the current situations in foreign trades. Under these backgrounds, the overall domestic investment ratio of Japanese companies has been steadily increasing from about 70% in 2008 to 78% in 2018. In addition, there has been a significant increase in the number of Japanese companies moving their manufacturing facilities back to Japan.

It should be noted that, after the global financial crisis, the gap in average wages between Japan and China continues to narrow than ever before. Simultaneously, unlike Japan's chemical industries maintaining its absolute advantage, both automobile and electronics industries in Japan are gradually losing their absolute advantages in a severe competition with their counterparts of South Korea and China.

Japan's Industrial Policies and the Evolution of Traditional Paradigm

From the perspective of state's intervention to the market or industrial policy, in the 1970s, the Japanese government began to activate a series of new industrial policies to develop its domestic semiconductor industries encouraging the MITI to invest heavily in "Super LSI Technology Research Union" more than a hundred million US dollars. Then, within a relatively short period of time, Japan's semiconductor companies would successfully catch up with their competitors in the U.S. and Europe. However, unlike Japan's incredible successes of the 1970s, most of the new industrial policies promoted by the Japanese government like "the Fifth Generation Plan" and "the Sigma Plan" would end in failure. After the end of the Cold War in the early 1990s, under the historical background of neoliberalism and globalization supported by the Washington Consensus, the so-called "*framework group*" within the Japanese government would gradually take the initiative in the political process of policy-making. In general, these "*framework group*" tended to put more emphasis on the micro-level strategies of corporate managements rather than the macro-level strategies of the Japanese government induced by the MITI and related organizations. Hence, as a result, this would inevitably weaken the traditional role of the Japanese government in domestic manufacturing industries. However, due to the rising consensus of crisis triggered by the so-called "lost ten years", the role of the Japanese government began to strengthen again from the early 21st century. Consequently, the emerging "*targeting group*" within the METI and the Japanese government could gradually overwhelm its strong competitors in "*framework group*" and gained leadership in the policy-making process. Then, through this political process within the Japanese government, the new industrial policies of the Japanese government in the 21st century would begin anew.[10]

On the other hand, after the global financial crisis, the Fourth Industrial Revolution has begun to accelerate rapidly than ever before. Consequently, this is leading to a great transformation of the new paradigm which is fundamentally different from the traditional paradigm of the past. Specifically, this new paradigm is composed of three key concepts of openness, convergence, and connectivity, which are profoundly changing the "(traditional) laws of games" of the entire industrial ecosystem around

[10] Jin Zaixun (KIM Jae-Hoon). 2020. A Study for the Multi-Structural Transformation of Japanese Society in the Heisei Era: From the Perspective of 'the Chrysanthemum' and 'the Society 5.0'. *Japan Studies*, 175(4): 24-7.

the world. Consequently, under this new paradigm of the Fourth Industrial Revolution, the basic rules of games for achieving success (or survival) in the global manufacturing industries are also undergoing fundamental changes as well. Most of all, in the global industrial ecosystem, the core value chains are gradually shifting from closeness to openness, from individual strategies to platform strategies, and from supplier-oriented to consumer-oriented networks. Naturally, if any of Japanese companies failed to respond properly to the environmental changes, they would be inevitably lead to a crossroad heading towards an irreversible decline or failure. Likewise, under the same macro-level environmental changes, even the global-leading industrial forces are also unable to avoid structural changes at the micro-level. In this context, the huge success of both U.S.'s MAAAF in the 21st century and China's TAPI after the global financial crisis might be better interpreted as typical examples of a historical transformation[11]. However, on the other hand, most of the ambitious industrial policies promoted by the Japanese government in the 21st century have turned out as a failure one after another including "New Industrial Structure Vision", "Information Navigation Plan", and "Future Vision" and so on.

It should be noted that, after the global financial crisis, Toyota had to accept massive recalls of Lexus cars in the U.S. market in 2009. Besides, Toshiba's secret of accounting frauds was publicly revealed in 2015 ending up suffering from irreversible damages. As a result, both Toyota and Toshiba were facing the last moment when they had to make a crucial decision that would determine the fate of their companies in the near future.

TOYOTA'S ADVERSITY AND EVOLUTION

In 2008, when the global financial crisis broke out, as Japan's top car manufacturer, Toyota had just overtaken the traditional American powerhouse GM motors ranking the first automobile company in the U.S. market. However, during the period from 2009 to 2012, Toyota had to accept unprecedented massive recalls in the North American market, with its Lexus vehicles known to have serious engine defects. Then, over the next few years, Toyota was responsible for the return of about 12 million vehicles for quality re-inspections and had to endure some of

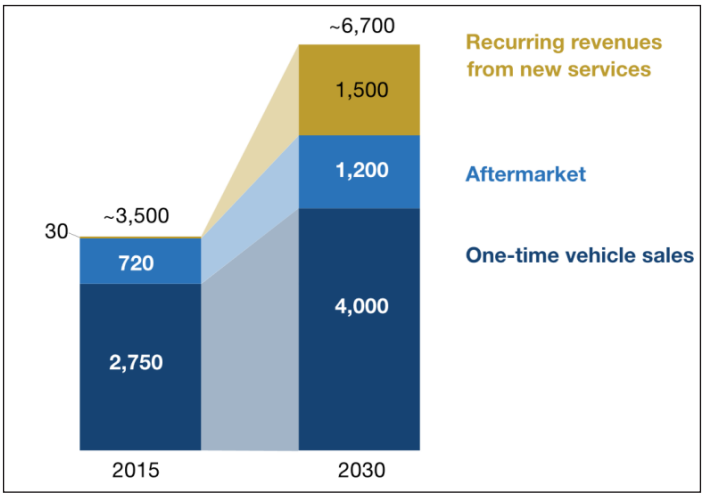
[11] This word "MAAAF" includes the U.S.'s ICT giants such as Microsoft, Apple, Amazon, Alphabet, and Facebook. Similarly, another word "TAPI" includes China's largest companies such as Tencent, Alibaba, PetroChina, and ICBC.

these inventories reaching up to about 3 million vehicles. Furthermore, simultaneously, Toyota inevitably had to compensate for the recalling costs of $2.4 billion, the consumer damage costs of $1.6 billion and the legal penalty of $1.2 billion US dollars in a row. Additionally, in February 2012, the chief executive of Toyota Motors, Akio Toyota, was also required to attend to the official hearings of the U.S. Congress and forced to apologize in public. To make matters worse, once a fatal earthquake in Fukushima was followed by a huge flood in Thailand in the same year of 2011, Toyota could not but suffer from a serious damage in its global supply chains domestically and internationally. In fact, even before the global financial crisis, it was widely known that Toyota had already undergone a huge recall of 1.93 million defected cars in Japan's domestic market. Nevertheless, just five years later, Toyota had another major recalls in the U.S. market. Therefore, around 2009 and 2010, many experts did not hesitate to predict that it would be extremely difficult for Toyota to recover for many years to come. Without doubt, from every aspect, the future of Toyota seemed to be definitely pessimistic.

Macro-Impact of the Fourth Industrial Revolution and the Evolution of Traditional Paradigm

After the global financial crisis, besides the aftermath of the massive recalls, Toyota has been facing another huge impact. This is not only a challenge from other domestic or international car-makers, but also a new challenge from the leading internet-service companies such as Uber and Google as the forerunners of the Fourth Industrial Revolution. Particularly, as a leading U.S. innovator, Uber provides various car-sharing services to global consumers on the mobile internet basis. Although founded only about a decade ago, Uber's annual sales revenue has already reached about 1/25 compared with that of Toyota in 2018. Much to our surprise, although the estimates are somewhat fluctuating, Uber's market capitalization is already equivalent to one-thirds of Toyota's in the same year. In the contemporary global market, Uber has created its lucrative business model based on "(car) sharing (through wireless internets)" and "(traffic) service (through smart phones)" and kept generating considerable amount of sales and profits. In comparison, as Japan's top car-maker, Toyota has been maintaining its traditional business model based on "(consumer's) ownership (of cars)" and "(producer's) sales (of cars)". In the current global market, as shown in the Fig. 2, the automobile industry is a huge market with its total size of $3.5 trillion US dollars. Among them,

once subdivided into each segments, the sales of completed vehicles account for $2.75 trillion, the after-sales market for $0.72 trillion, and the so-called "car-sharing and mobility (based on wireless internets and smart phones)" sector for about $0.03 trillion US dollars. According to McKinsey' analysis, by 2030, the total sales of completed vehicles are expected to reach approximately $4.0 trillion with a little growth or no significant changes as a whole. However, on the contrary, the after-sales market is forecasted to grow up to $1.2 trillion. Likewise, the "car-sharing and mobility" sector will be able to develop rapidly up to $1.5 trillion US dollars. Hence, as time goes by, the current gap between Toyota's automobile sales and Uber's "car- sharing and mobility" division would be narrowing down on a gradual basis.



Sources: McKinsey.2016.'Automotive revolution-perspective towards 2030.'uploaded in January 2016, https://www.mckinsey.com/~/media/mckinsey/industries/high%20tech/our%20insights/disruptive%20trends%2 0that%20will%20transform%20the%20auto%20industry/auto%202030%20report%20jan%202016.ashx, visited on 20th May, 2019.

Fig. 2: The Forecast of Global Automobile Industries in 2030

From the traditional perspective, in the international automobile market, the basic structures of the business model used to be composed of "(producer's) sales" and "(consumer's) ownership" with the focus on "product" at its core. However, in the new era of the Fourth Industrial Revolution, those traditional methods should coexist with new ones especially in terms of a business model. In this regards, specifically, the

new business model should be essentially composed of "(car) sharing" and "(transportation) service" with the focus on "platform(s)" at its core. As a result, besides a traditional market for completed vehicles, this will give birth to a new "blue ocean". Therefore, fundamentally speaking, both Uber and Google should be viewed as strong competitors against Toyota, not as temporary threats. Consequently, under this kind of backgrounds, the current business models of the global automobile industries have been also gradually evolving from the traditional "product"-oriented to the new combination of "product and platform"-oriented ones. For example, from the standpoint of producers, the traditional method of "sales" are also gradually evolving into the new method of "sales and service (providing)". Likewise, from the standpoint of consumers, the traditional paradigm of "ownership" are also gradually evolving into the new paradigm of "ownership and sharing". In this due course, cars have been also evolving from "machinery products (in a traditional sense)" to "electronic products (in a real sense)". Hence, under the new paradigm of these new business models, automobile's hardwares and softwares are going to be increasingly designed and manufactured based on the new criteria of openness, convergence, and connectivity. Naturally, in the process of manufacturing, automobiles are going to use more of cutting-edge electronic components and technologies in large quantities, which would be closely related to the Information Communications Technology (ICT). Consequently, in the entire process of automobile manufacturing, the global information technology giants such as Intel, NVIDIA, Qualcomm are growingly developing stronger business partnerships with car-makers like Toyota. On the contrary, the communication technology giants such as Google and Uber are rapidly forming a full-fledged competition with Toyota through the commercialization and industrialization of "unmanned-driving technology" and related business spheres.

The True Nature of Failure and the Success of Core Business

After the disaster of massive recalls in 2010, Toyota did seriously reflect on the true nature of its failure and finally chose a unique solution. It was not to rely on state-led industrial policy at the macro-level, but to focus on two strategic plans of organization reform and consciousness reform at the micro-level. Through this process of introspective reforms, Toyota could discover two fundamental problems: firstly, in the organization network of manufacturing process, each individual or group members had

been implicitly tending to prioritize "quantity" over "quality"; secondly, in the manufacturing process of organization network, each individual or group members had been implicitly tending to pursue "unreasonable cost reduction" rather than "quality". According to Toyota's analysis, the first problem turned out having been caused by the company's macro-level strategy itself of targeting for "establishing a production system of 10 million cars (on an annual basis)". Namely, to achieve the goal of Toyota's strategy at the macro-level, the existing incentive structures were encouraging individual or group engineers to follow "the psychology of collective actions" of prioritizing "quantity" over "quality" within each internal sectors of the company. Furthermore, the "psychology of collective actions" had been also becoming prevalent and even worsening the situations beyond the control of Toyota. Similarly, the second problem also turned out having been arisen from the company's micro-level strategy itself of targeting for "unreasonable cost reduction (on a constant basis)". Namely, to achieve the goal of Toyota's strategy at the micro-level, although field engineers were already aware of those potential quality issues, they were unable to report actively to their senior management executives. Finally, this has resulted in missing the best opportunity to solve fundamentally those potential quality problems. Shortly, Toyota concluded that those distortions of "psychology of collective actions" and "implicit path dependency" in individual or group members were the true nature of its failure.

Judging from the outcomes, Toyota could find the fundamental solution at the micro-level. Specifically, for the success of its core business, Toyota has launched micro-level reform plans. To correct those two problems, two reform plans at the micro-level had to be adapted to realize "organization reform" and "consciousness reform" within the entire Toyota group domestically and internationally. Firstly, because the existence of the macro-level strategy itself turned out having been the trigger of massive recalls, the original strategic goal of "establishing a production system of 10 million cars" should be amended properly. Soon, according to the new principle of "reorganization by functional classification", Toyota began to undergo a relentless restructuring within its entire level of group sectors domestically and internationally. Secondly, because the existence of the micro-level strategy itself also turned out having been another trigger of quality problems, the original strategic goal of "unreasonable cost reduction" should be rationalized properly. Then, according to the new principle of "systemic reorganization by functional classification",

Toyota's management system initiated to reorganize its original structural system of "sectoral management organizations" into "function-oriented organizations" domestically and internationally. In this due course, to upgrade the core competitiveness of Toyota Group as a whole, Toyota has put forward the following three new principles: "Reallocate the best experts in Toyota", "Delegate the decision-making rights to field personnel", and "Realize the best product design and production plans". Furthermore, Toyota has dramatically changed the famous tradition of its vertical supply-chains structure[12] with its vendors and partners in a more horizontal manner. In the past, based on Toyota's pre-determined requirements, the existing business partners had been strictly limited in their roles as passive suppliers only for consignment productions. Fundamentally speaking, as an aggressive endeavor at the micro-level in response for the huge impacts at the macro-level, Toyota also decided to change the old tradition of research and development especially in its core technology sectors from the authoritatively vertical method to a more democratically horizontal one. About a decade later, both of organization reform and consciousness reform, two major reforms are highly praised for Toyota's tremendous success. According to the fiscal settlement in March 2018, Toyota has manufactured 10.4 million vehicles in total and broken its previous record of highest productions since its foundation. In addition, Toyota could increase its net profit rates by about 36% compared with the previous year and acquire a net profit of 2.5 trillion Japanese yen. Additionally, in the same year, Toyota has produced the second largest number of cars in the world market and achieved a remarkable success in its core business.

TOSHIBA'S ADVERSITY AND DETERIORATION

After the global financial crisis, in April 2015, Toshiba's internal accounting manipulation was revealed, which ended up in broadcasting to the public as a huge scandal. Soon after, Toshiba had to pay about 460 billion Japanese yen to global investors in the process of solving this problem. Hence, Toshiba could not but sell its manufacturing division of home appliance to Chinese company Media. In addition, it was inevitable for Toshiba to sell another manufacturing division of image sensing and medical equipment to Japanese rivals Sony and Canon respectively.

[12] Asli M. Colpan, Takashi Hikino and James R.Lincoln.2010. *The Oxford Handbook of BUSINESS GROUPS*, Oxford. NY: Oxford University Press, pp.130-36.

Through the continued sales of its subsidiaries, Toshiba managed to raise enough funds to pay compensation for its stakeholders. However, with another revelation of the second mega-scandal in December 2016, Toshiba confronted a second crisis, which would irreversibly determine its gloomy fate in the end. Specifically, as of August 2015, it was revealed that only eight nuclear power plants of Toshiba's original 39 projects with CB&I in the U.S. were actually under constructions. Without doubt, this was far below the original goal. Therefore, it became clear that Toshiba would have no choice but to bear the forthcoming heavy losses in the near future. Once this fact was known in public, it became impossible for Toshiba to dodge this second crisis in the conventional way. Eventually, in June 2017, Toshiba's top management decided to sell its core subsidiary, the semiconductor manufacturing division. However, Toshiba's decision would lead to trigger more serious problem. In modern history, out of the top ten global semiconductor manufacturers, Japan had a total of six companies in 1989 when the economic bubble in real estate had not yet collapsed. As shown in Table 1, under this kind of historical background, Toshiba was the only remaining Japanese company among the global top 10 semiconductor manufacturers in 2017.

Table 1: The Global Top Semiconductor Manufacturers

Rank	Company	Nation	Company	Nation	Company	Nation	Company	Nation
	1989		2000		2011		2017	
1	NEC	Japan	Intel	US	Intel	US	Samsung Electronic	South Korea
2	Toshiba	Japan	Toshiba	Japan	Samsung Electronic	South Korea	Intel	US
3	Hitachi	Japan	NEC	Japan	Toshiba	Japan	SK Hynix	South Korea
4	Motorola	US	Samsung Electronic	South Korea	TI	US	Micron	US
5	TI	US	TI	US	Renesas	Japan	Qualcomm	US
6	Fujitsu	Japan	ST Micro	Europe	Qualcomm	US	Broadcom	US
7	Mitsubishi Electric	Japan	Motorola	US	ST Micro	EU	TI	US
8	Intel	US	Hitachi	Japan	Hynix	South Korea	Toshiba	Japan
9	Matsushita Electric	Japan	Infineon	Europe	Micron	US	WD	US

Sources: Jin Zaixun (KIM Jae-Hoon). 2020. Restrictions and Anti-restrictions: The Bilateral Game of Semiconductor Trade Frictions between South Korea and Japan. *Japan Studies*, 172(1):9-19.
Notes: The rankings in the above list have been summarized based on the annual sales revenues of each companies in the past.

Macro-Impact of the Global Financial Crisis and the Change of Traditional Paradigm

In the 1980s, in terms of "quality" and "quantity", Japan's semiconductor industries succeeded in catching up (or even overtaking) its rivals in the world market. Furthermore, Japanese companies would soon develop into international giants in semiconductor industries. Then, as a form of trade restrictions, the U.S. government took a counter-action to block the rapid development of Japanese semiconductor manufacturers. Under these circumstances, officially and relentlessly, the USTR began to put a strong level of trade pressures on the Japanese government, forcing Japan to import considerable portions of semiconductors from the U.S. manufacturers. During the Cold War period, when the two major camps were confronting in serious tension, the U.S.-led "COCOM" regime had been restricting both imports and exports of semiconductors and related technologies in the world market. Hence, except the structural entry-barriers such as the highest level of science technology and the huge amount of initial investments, the semiconductor industry itself also had strategic entry-barriers imposed by the "COCOM"[13] regime in the capitalist world economy led by the U.S. However, after the end of the Cold War, the U.S. became the only hegemony in international politics, which gradually put an end to the effectiveness of the "COCOM" regime. Simultaneously, in the early days after the end of the Cold War, both the U.S. government and semiconductor companies came to recognize Japan's counterparts as the only imminent threats in the global market.

Against this backdrop, from the early 1990s, the absolute advantages that Japan had enjoyed in the international semiconductor market were going to be push into an irreversible crisis. However, despite a series of fundamental changes going on at the macro-level, Japanese semiconductor companies adhered to the original strategy of focusing only on "high-quality" and "high-price" semiconductors without any proper readjustment. In this due course, even when South Korea's Samsung Electronics succeeded in topping the global market shares in DRAM for the first time in the early 1990s, Japan's counterparts did not take a proper action against this hidden

[13] COCOM is an abbreviation of "Coordinating Committee for Export to Communist Countries". In details, more data can be found in the following book: WANG Yong. 2007. *The Economic and Trade Relation between the U.S. and China*. Beijing. Chinese Market Publishing:208-10.

champion[14]. A decade later, as a sort of historic turning point in the early 21st century, the "digital revolution" initiated by the Third Industrial Revolution began to accelerate far beyond anyone's expectations. Simultaneously, from the standpoint of traditional paradigm, the industrial ecosystem of the global semiconductor market also started to emerge a series of fundamental changes one after another. As the most representative case, according to the macro-level analysis, a single industry of semiconductor manufacturing began to be sub-divided into two major sectors of "consignment production" (Foundry) and "IC design company" (Fabless). Naturally, except only a few exceptions, most non-Japanese semiconductor companies made a strategic choice of specializing in only one of them: "Foundry" or "Fabless". However, during this fundamental transformations of traditional paradigm and manufacturing process, most Japanese semiconductor manufacturers intransigently maintained their so-called "department store's management system" and refused to make a strategic choice of specializing in either of "Foundry" and "Fabless". On the other hand, under the strong leadership of the Japanese government in the early 21st century, a series of large-scale restructuring plans were also experimented among domestic semiconductor giants in Japan. However, in an extremely complicated process of repeated negotiations, Japanese companies failed to reach an agreement, which could not realize the large-scale restructuring plan in the entire Japanese semiconductor industries. As a result, Japan's semiconductor industries failed to recognize the true nature of the huge impacts at the macro-level and take a proper reaction at the micro-level, which would lead to the narrower path of irreversible decline.

The True Nature of Success and the Failure of Core Business

In a traditional sense, from the time of its foundation to the present, Toshiba has already successfully had a number of famous CEOs in the Japanese business community. At the same time, it has been widely known that Toshiba has been maintaining an ideal structure of corporate governance in Japan with its high reputation in Japanese society for a long time. From the perspective of the training center for an ideal business leader, as the legendary former president of Toshiba group, Toshio Togo (1896-1988) started his career as a field engineer and would become the fourth president

[14] Jin Zaixun (KIM Jae-Hoon). 2020. Restrictions and Anti-restrictions: The Bilateral Game of Semiconductor Trade Frictions between South Korea and Japan. *Japan Studies*, 172(1):9-19.

of The Japan Business Federation (日本経済団体連合会) in 1974. In the eyes of previous generations of Japanese people, Togo has been highly praised as the father of Japan's original technology for turbine and jet engines, and sometimes referred to as "the God of Toshiba" until today. From the perspective of an ideal structure for corporate governance, amidst the typical Japanese corporate culture represented by Zaibatsu, Toshiba has been a rarity of having a completely separate governance structure between management and ownership. Hence, before the huge accounting scandal went to public in 2015, most people had taken it for granted that Toshiba might be the ideal company model with its corporate governance structure completely separated between management and ownership. However, in the process of investigating two accounting scandals, it became clear that Toshiba had been actually suffering from a very typical type of "principal-agent problem". Especially, while undergoing the huge impacts of the global financial crisis, Toshiba's management performances began to deteriorate rapidly. In response, as the top decision-makers of Toshiba group, both current and former presidents consecutively decided to hide it during their incumbencies and tried to avoid any possible responsibilities as long as possible. As this same pattern of undesirable behaviors had been repeating over time, Toshiba's problem has become more aggravated into uncontrollable situations. According to the official report published by the Board of Audit and Inspection of the Japan Stock Exchange, during the period from 2009 to July 2015, it estimates that Toshiba had falsely increased its pre-tax profits by 224.8 billion Japanese yen.[15] Furthermore, the entire process of these systematic accounting manipulations turned out having been including not only Toshiba's top management executives, employees, auditors and accountants, but also high-ranking government officials in the METI and the Japanese Government as well. In conclusion, fundamentally speaking, this should be analyzed as a structural problem that happened inevitably at the macro-level, not as an individual problem that happened accidentally at the micro-level.

Likewise, after receiving the same macro-level impacts caused by the global financial crisis, a number of Japanese companies have been suffering from similar and serious quality scandals in a row. Specifically,

[15] Toshiba Corporation. 'Notice on Restatement of Past Financial Results, Outline of FY2014 Consolidated Business Results, Submission of 176th Annual Securities Report and Outline of Recurrence Prevention Measures, etc.' https://www.toshiba.co.jp/about/ir/en/news/20150907_1.pdf, downloaded on 6th June, 2019; 'Toshiba Slashes Earnings for Past Seven Years.' Wall Street Journal. https://www.wsj.com/articles/toshiba-slashes-earnings-for-past-7-years-1441589473, visited on 6th June, 2019.

starting with Toshiba's accounting scandal in April 2015, it went revealed that Mitsubishi Motors had been also manipulating the fuel efficiency figures of its vehicle tests in April 2016. Those huge quality scandals in Japan never stopped here. In June 2017, due to the tragic explosions of Takata's air-bag system, the leading Japanese air-bag manufacturer Takata went to bankrupt. Then, in October 2017, it became publicly clear that the leading Japanese steel manufacturer Kobelco had been manipulating their quality inspection figures for a long time. Consequently, due to the quality defects of Kobelco's steel in large quantities, this triggered to raise a series of serious quality problems for a total of about 500 Japanese companies including Mitsubishi's MRJ aircraft, Toyota Motors' vehicles, Shingansen(Bullet trains) and so on[16]. Until today, some of them are still in a difficult situation without a hope of improvements in any near future. Although it might be very hard to believe, after the global financial crisis, Japanese manufacturing industries that used to represent high quality products in the world market are gradually becoming a seismic center of the massive quality scandals. Under this kind of macro-level environments, fundamentally speaking, the root cause of Toshiba's accounting manipulations can go back to the wrong strategic choice at the micro-level. Specifically, in the early 21st century, Toshiba ambitiously did set up a brand-new strategic plan to build multiple nuclear power plants domestically and internationally. In 2006, it decided to take over the U.S. nuclear power company Westinghouse by paying excessive acquisition costs. According to experts' analysis, as there has been a consensus in Japanese society, such a wrong decision must be interpreted as the decisive factor in the rapid deterioration of Toshiba group. Especially, in the entire process of Toshiba's decision-making in Japan about acquiring Westinghouse from the U.S., there is one more important fact that we should never overlook: The Japanese government did exert enormous influences on the nuclear energy business sector through various channels. In fact, around the time when Toshiba decided to acquire Westinghouse in 2006, another Japanese giants Hitachi also began to cooperate actively with the international nuclear power company GE Electric Power Company in the U.S.. Likewise, Mitsubishi was also strengthening its business partnership with the French nuclear power company Areva. Back then, according to the Japanese government's grand strategy, the relative proportion of nuclear energy was expected to increase up to about 30%

[16] 'Kobe Steel's Falsified Data is Another Blow to Japan's reputation.' The New York Times. https://www.nytimes.com/2017/10/10/business/kobe-steel-japan.html, visited 6th June, 2019.

to 40% among the entire domestic energy supply in Japan until the year of 2030. To this end, even after the global financial crisis, the Japanese government also encouraged Toshiba to join actively the new business model of constructing nuclear energy projects and related fields requiring large-scale investments. As a result, in the course of experiencing the global financial crisis in 2008 and the Fukushima nuclear power plant accident in 2011, Toshiba would end up with an irreversible failure mainly caused by the new business model of constructing multiple nuclear power plants in global-scale. Finally, Toshiba failed to protect the true nature of its success, and could not avoid the failure of its core business.

CONCLUSION

This paper has conducted an in-depth analysis on the changes and evolutions of Japanese manufacturing industries after the global financial crisis. In this course, as the most representative manufacturing powerhouses, Toyota (automobile) and Toshiba (semiconductor) are selected for the case studies of this research design. Specifically, in response to the two different impacts happened in the capitalist world economy at the macro-level far beyond the control of a single sovereign state, Toyota and Toshiba are found to have chosen fundamentally-different strategies at the micro-level resulting in dramatically-opposite outcomes: success and failure. Among them, from a macro-level perspective, those two huge impacts are referring to the new economic impacts of the global financial crisis happening in 2008 and the new paradigm shifts of the Fourth Industrial Revolution accelerating around 2016.

According to the analysis of this study, during the period from 2009 to 2010, Toyota had to face massive recalls of Lexus vehicles in the U.S. market, which brought out unmeasurable economic losses. Hence, many experts did not hesitate to predict that it would be extremely difficult for Toyota to recover for many years to come. In response to the same impacts at the macro-level, during the same period of time, Toshiba decided to conceal its rapidly-deteriorating performances of internal management, which resulted in unprecedented accounting frauds in a structural manner. However, once its secret was publicly revealed in 2015, Toshiba ended up suffering from irreversible fatal damages. On the other hand, during the on-going great transformation of the Fourth Industrial Revolution, Toyota has been confronting a fierce competition with the global CT giants such as

Google and Uber. Likewise, Toshiba has been challenged by the emerging semiconductor giants like Samsung and many others competitors.

While experiencing unprecedented level of challenges and crises, as a result, Toyota chose a unique solution of focusing on two strategic plans of organization reform and consciousness reform at the micro-level. In this course, Toyota also decided to delegate the decision-making rights to field personnel or engineer groups rather than office workers or management executives. Furthermore, as the Fourth Industrial Revolution are fundamentally causing the new paradigm shifts, Toyota has dramatically changed the famous tradition of its vertical supply-chains structure with its vendors and business partners in a more horizontal manner. Fundamentally speaking, Toyota was able to apprehend the true nature of its failure, and ultimately achieved the success of its core business. However, on the contrary, Toshiba decided to invest heavily in a strategic plan such as the brand-new business model of constructing multiple nuclear power plants at the macro-level, which were strongly encouraged by the Japanese government. In this course, unlike Toyota, Toshiba conversely decided to delegate the decision-making rights to office workers or management executives rather than field personnel or engineer groups. As a result, during the beginning of the Fourth Industrial Revolution, Toshiba inevitably had to sell its core part of semiconductor manufacturing to other competitors in the process of solving its imminent accounting scandals. Fundamentally speaking, Toshiba failed to protect the true nature of its success, and could not avoid the failure of its core business.

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