

Economic Reconstruction in Postwar Hiroshima: Formation of Industrial Clusters and Application of the Diamond Model

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1. The Importance of Research on Hiroshima's Economic Reconstruction

1.1 The Purpose of this Research

Hiroshima City, which has a population of approximately 1.17 million, is located in the western part of Japan. For a long time, it has been maintaining its position as a regional hub city along with other similar-sized cities such as Sapporo, Sendai, and Fukuoka. Presently, the city is very lively; thus, it is difficult to imagine that Hiroshima was bombed and had turned into a burned field 63 years ago.

During World War II, on August 6, an atomic bomb was dropped by the US at the center of Hiroshima City, which was completely destroyed within moments. It is well known that after the atomic bomb was dropped, an American researcher predicted the future of Hiroshima stating that “Nothing will grow for 70 or 75 years.”

How could Hiroshima be reconstructed in such a short time after it had been almost completely destroyed? This is a common question raised by many visitors to Hiroshima, particularly overseas visitors. After looking around the Peace Memorial Museum, which was devastated by the destructive power of the atomic bomb, and stepping out of the museum, your eyes catch a very modern and vivacious city; it appears as an unbelievable scene. For people who endeavor to reconstruct their country or region after a conflict, Hiroshima might serve as a good example of a rebuilt city.

However, compared to the enormous amount of studies on the damage caused by the atomic bomb, the reconstruction of Hiroshima, particularly its economic reconstruction has not been a subject for research thus far. One of the probable reasons

for the lack of studies might be that it required a long time and considerable effort to come to terms with the scale of the entire damage. Some aspects related to the manner of reconstruction can be found in the official documents published by Hiroshima's prefectural office and city government; however, it remains to be clarified as to what enabled the city to rebuild its economic base and progress on the path of development.

Can we learn something from Hiroshima's experience of economic reconstruction and apply it to other postconflict areas in the world? In order to answer this question that originated from the Hiroshima Office of United Nations Institute for Training and Research, we initiated this research.

1.2 Resuming from the Destruction brought about by the Atomic Bomb

Hiroshima Prefecture, one of the 47 subnational jurisdictions of Japan, has a population of about 2.88 million, which makes it the 12th largest prefecture of Japan. Hiroshima's gross prefectural domestic product is ¥11.649 trillion, positioning it at the 11th place (according to the "Prefectural economic calculation annual report 2004," published by the Cabinet Office). The numbers are not remarkably high considering the fact that Hiroshima City, a government-ordinance-designated city of more than 500,000 inhabitants at its center, is included in the estimation of the prefectural gross products.

The prefecture comprises both mountainous areas with skiing grounds and seashores suitable for swimming. On the one hand, there is an industrial area along with the coastal area of Seto Inland Sea. On the other hand, agriculture and fishing have been flourishing in this prefecture. Hiroshima represents the typical features of Japan's geography and industries. Therefore, it is often referred to as "miniature Japan" or the "miniature garden of Japan."

At the end of the Meiji era, Hiroshima, which was the western end of the railway services at that time and where a big port was constructed, was selected to become a military city. In Kure City, approximately 20 km away from Hiroshima City, a naval arsenal was established, and Kure became Asia's largest military port.

An atomic bomb, which was dropped from Enola Gay by the US Army Air Forces, annihilated Hiroshima City. The total number of victims including the dead, injured, and missing exceeded 200,000.¹ The population of Hiroshima City before the bombing was estimated at 280,000–290,000, and the death toll as of December 1945 was calculated to be approximately 140,000 (possibly ranging from 130,000–150,000); however, the precise scale of damage has not been clarified even until today.² According to the research conducted by Hiroshima City, more than 90% of the buildings in the city appeared to be damaged; the committee that edited documents related to the damage in Hiroshima and Nagasaki estimated that the total value of the damaged assets amounted to ¥884.1 million. Moreover, 80% of the 512 factories upstream within 3 km from the hypocenter were heavily damaged; therefore, they could not be operated any more. Further, with regard to banks and companies, 80% of the total 292 banks and companies within 3 km were ruined.³

In this manner, Hiroshima City, which was once the largest industrial city in the Chugoku region and known as a “military city” before and during the war, was in complete ruins.

Considering this historical truth and Hiroshima’s present level of prosperity as the largest industrial city among the regions of Chugoku and Shikoku 63 years after the tragedy, except for some reserved bombed buildings in the city, we can state that the expression “rose like a phoenix from the ashes” is very suitable for Hiroshima. Moreover, the remarkable aspect of Hiroshima’s reconstruction is that the city was not rebuilt gradually for as long as 60 years; instead, the reconstruction was accomplished in only 20 years after the bombing, with a per capita prefectural income surpassing that of the per capita national income.

1.3 The Methodology of Industrial Development in Hiroshima and its

¹ Hiroshima City, *Hiroshima Shinsi Gyousei Hen [Hiroshima New History Administration]*, 1983, p.8.

² Chugoku Shimbun, HP, website, *Genbaku No Giseisyasuu Naze Aimai Nano: Jyou [Why Are Ambiguous the Number of Casualties from an Atomic Bomb:(a)]* http://www.chugoku-np.co.jp/hiroshima-koku/exploration/index_20070226.html .

³ Hiroshima City op.cit., pp.10-11.

Characteristics

The history of postwar Hiroshima's economic growth relied on the manufacturing industry centered on shipbuilding, which had flourished before the war, and on the machinery industry along with the development of the coastal region. The manufacturing industry has been led by heavy industries, mainly automobiles and shipbuilding. With regard to the amount of manufactured products in 1950, chemical industrial products accounted for 22.1% making it the leading industry, followed by food with 19.8% as the second, and transportation equipment including sea vessels and automobiles as the third leading industry. By 1955, transportation equipment accounted for 20.8% of the manufactured products and became the leading industry; it has maintained its leading position until the present day.⁴

It is often pointed out that one of the characteristics of Hiroshima's manufacturing industry is its advanced technology, which had contributed to the military industry during the war and was later converted into a civil industry; an example of this is the well-known automobile company Mazda. Since the late Meiji era, Hiroshima had been developed as a military city, which stationed provisions depots, clothing depots, and arsenals with the naval arsenals located at Kure City. In addition to the automobile and shipbuilding branches, many of the representative firms in shipping, steel, and general machine industries were engaged in the military machine industries during the war. For instance, the Japanese sake brewing company Miyake Honten was licensed to serve the Imperial Navy during the war, and Aohata began producing cans of jam for military use. Military-related industries included food and clothing industries. Many of them have their origins in traditional industries at Hiroshima such as "Tatara" steel manufacturing, whetstones, and needles that existed prior to the Meiji era. Moreover, even manufacturing machines studied and developed at the naval arsenals can be traced back to weaving machines required for the textile

⁴ Hiroshima Prefectural Office, *Toukei De Miru Hiroshima Sengo Gyunen No Ayumi [Advances in Hiroshima Prefecture 50 Years after the War from Statistics]*. Hiroshima Prefecture Planning and Development Department Statistics Section, pp.68-71.

industry of the Bingo region (Eastern part of Hiroshima Prefecture) where the cotton growing industry had traditionally been prospering.⁵

This wide range of industries formed a machine-related industrial cluster including the automobile-related, shipbuilding, and steel manufacturing industries. The machine-related industrial cluster can be observed in the present economic structure of Hiroshima. For example, the world's leading sports ball manufacturer, Molten, is included in the cluster since it manufactures the rubber parts of automobiles. Various types of small and mid-sized machine parts manufacturers constitute the machine-related industry in Hiroshima.⁶ As mentioned earlier in this essay, this industrial agglomeration spread all over Hiroshima, including its eastern part. However, the main region of the postwar formation of the machine-related industrial cluster is the western costal area covering the gulfs of Hiroshima and Kure. Hence, this essay focuses on the greater area of Hiroshima City comprising seven cities and five towns.⁷

In short, it can be said that Hiroshima's postwar economic reconstruction was based on strong fundamentals; it was based on the manufacturing industry that had been growing since a long time, and it took firm roots and developed after the war.

The industrial cluster has been cultivating many companies that have expanded their businesses in the world, such as Mazda, an automobile manufacturer; Molten, a sport ball manufacturer; and Kumahira, which is well known for its safes and vaults.

The influence of regional and locational advantages on competitiveness or economic growth has lately attracted global attention, as mentioned by a professor of Harvard Business School, Michael E. Porter, who is also a leading authority on competitive strategy and international competitiveness. Porter notes that prosperity

⁵ Shin Katsuryoku Senryaku research group, *Shin Katsuryoku Sousou Senryaku Sakutei Cyosa Houkoku Syo [Investigative Report of New Activation Strategy]*. 38-41: Shin Katsuryoku Senryaku research group, 2002, pp.38-41.

⁶ Bank of Japan and Stanford cooperative research, *Chiki No Gijyutu Kakushin to Kigyouka Seishin Ni Kansuru Cyosa [Research for Regions of Innovation and Entrepreneurship: Machine Industry Cluster in Broad Area of Hiroshima]*, 386, 2003, p.3.

⁷ The greater Hiroshima City area includes the following seven cities and five towns: Hiroshima City, Otake City, Hatsukaichi City, Kure City, Etajima City, Takehara City, Higashihiroshima City, Fuchu Town, Kaita Town, Kumano Town, Saka Town, and Osakikamishima Town.

depends on the productivity at that time when companies grade up their businesses by using the specified area's productive elements.⁸ He focuses on the role of the country and local conditions for determining the competitive advantages. He presents the so-called Diamond model for illustrating the competitive advantage of a nation, which comprises four important factors.⁹

- 1 . Factor (invested resources) conditions comprising skilled labor, natural resources, capital, and infrastructure
- 2 . Firm strategy, structure, and rivalry including a high level of local rivalry
- 3 . Demand conditions including the conditions at the local market level for a peculiar product of high quality
- 4 . Related and supporting industries including the competitive local supporting industries and suppliers¹⁰

A cluster is defined by Porter as the “geographic concentration of interconnected companies and institutions in particular fields. Critical masses—in one place—of unusual competitive success in particular fields.”¹¹ A cluster is a part of the fourth pillar of the Diamond model, i.e., related and supporting industries; however, it is, in fact, regarded as a “factor of reciprocity among the four conditions,” and it can have tremendous influence on the competitiveness of the industries.¹² Another key point for the formation of clusters is that it often originates from historical factors. Clusters with a wide range of industries can usually be found in developed countries.¹³

If this Diamond model and Cluster theory can be applied to the case of Hiroshima, the following supposition might be made: Hiroshima possessed high

⁸ M. E. Porter, *Kyoso Senryaku Ron* [On Competition (B)]: Diamond company, 1999(a), p.81.

⁹ Satoru Enomoto and Tatsuo Kinbara, “Kuudouka Ron No Shiten” [the Perspective of Evisceration]. *Quarterly Journal of Chugoku Regional Research Center*, 2000, p.7.

¹⁰ Porter, op.cit.,1999(a), p.83.

¹¹ M. E. Porter, *Gurobalu Senryaku No Honshitu* [Essense of Strategy : Solve the Trade Off and Create the Fit Builds Lasting Advantage in Competition],1999(b), p.29.

¹² Porter,op.cit.,(a), p.86.

¹³ *Ibid.*, pp.114, 121.

technologies and skilled labors in industries that were derived from traditional industries in the prewar era. The machine-related industry, which was converted from a military industry to a civilian industry, gave rise to intense competition and with governmental support, Hiroshima succeeded in its economic reconstruction.

In Chapter 2 of this essay, M. E. Porter's Diamond model and Cluster theory will be examined. Chapter 3 will deliberate on the application of this model to the case of Hiroshima during the postwar period (between the end of the war and the high-growth period). Each aspect of the four factors of the Diamond model will be considered separately. Chapter 4 will briefly refer to the contemporary economic situation in Hiroshima.

2. Industrial Clusters and the Diamond Model

2.1 Research History of Industrial Clusters and Porter's Theory

Since Alfred Marshall and Max Weber, numerous economists have conducted research on industrial agglomeration as a factor that contributes to competitive advantages. Marshall discussed industrial agglomeration since 1890 and observed that the traditional productive factors of comparative advantages such as climate, soil, and mineral resources existed at specific locations; moreover, when these factors are associated with religious, political, and economic factors, a localized industry is established. He pointed out that industrial agglomeration stimulates the spillover of technology and knowledge and promotes innovation and improvement in production processes and organizations. On the other hand, Weber defined the factor of agglomeration as the reduction in the costs of production and sales by the integration of production processes at a specific location. Paul Krugman focused on the external demands; he established the geographical concentration model of industries, which was founded on high demand and increasing returns obtained by cutting down on

transportation costs.¹⁴

In Japan, industrial agglomeration has been referred to as a collection of mutually-related companies in a rather small area, and it is believed that the development of Japanese manufacturing industries has been supported by industrial agglomeration for a long time. Industrial agglomeration has been mainly formed by small and mid-sized enterprises, and they have laid the “technical foundation” of the industry.¹⁵ Industrial agglomeration has drawn considerable attention, particularly after the collapse of the bubble economy in the beginning of the 1990s. The “deindustrialization” caused by the overseas transfer of the production base of major companies could lend a vital blow to manufacturing firms that had contributed to the development of local economies in Japan. Therefore, a considerable amount of research on small and mid-sized companies or “technological agglomeration” was conducted in addition to the research on the relationships between the center (Tokyo) and the local areas.¹⁶

It was Michel Porter who emphasized on economic agglomeration as a dynamic impulse for generating innovation that would be critical for producing national competitive power. In the 1990s, he advocated the importance of industrial clusters. He introduced the concept of industrial clusters by expanding the conventional framework of clusters that comprised only companies in order to include various institutions such as research institutes and networking organizations as components of the clusters. He also focused on cooperation and competition between actors within the clusters.¹⁷ Porter identified that successful industries tended to concentrate on specific areas or nations. He suggested that geographical factors would contribute to the competitive advantages; thereafter, he presented the so-called

¹⁴ Yoko Ishikura et al., *Nippon No Sangyo Cluster Senryaku : Chihou Ni Okeru Kyoso Yuui No Kakuritu [the Strategy of Industry Cluster in Japan: Establishment of Competitive Advantage in Rural Area]*: Yuhikaku,2003, pp.45-46.

¹⁵ Masahiro Tsujita, *Waga Kuni Seizougyou Ni Okeru Sangyo Shyuseki Kouzou No Henyou to Sono Genin [Structure of Industry Cluster Changes and the Reason on Japanese Manufacturing Business]*. 2005, p.3 http://www.tsujita.com/works/works/dp_0507.pdf

¹⁶ Kenji Yamamoto, *Sangyo Shuseki No Keizai Chirigaku [Economic Geography for Industry Cluster]*, Housei University Press 2005, pp.1-2.

¹⁷ Department of Cabinet Office Director-General for PolicyPlanning, *Sekai Keizai No Cyoryu*

Diamond model consisting of four factors. The Diamond model was aimed at analyzing the reason as to why some companies located within a specific area could grow rapidly, implement continuous innovation, and produce high-quality merchandise.¹⁸

Since 1990, the Industrial Cluster theory based on the Diamond model has been highlighted throughout the world. In both the US and Europe, the effectiveness of industrial clusters in promoting innovation and maintaining high growth has been highly acclaimed. Moreover, the formation of industrial clusters served as a policy to strengthen the competitive power.¹⁹ Since the latter half of the 1970s, when the high growth era was ending, Japan has been reviewing the significance of the agglomeration of small and mid-sized companies with interest in achieving local autonomy.²⁰ The Japanese central government and local governments have been attempting to foster industrial agglomeration in order to develop local economies in Japan. We can find that some new industrial clusters such as information technology (IT) industries have emerged, while most existing clusters were formed based on old traditional industries. In Hiroshima, high-level military technologies that had aggregated before and during World War II remained unaffected and became the base for reconstruction and high economic growth in the postwar period. However, the existence of industrial clusters is not the only factor strengthening regional competitive power. The following discussion closely examines the four factors that constitute the competitive advantages of a location.

(1) Factor Conditions

“Factor conditions” comprise land, labor, capital, infrastructure, natural resources, and scientific knowledge. For a long time, general managerial resources such as

2004 Aki [*Trends in World Economics in fall 2004*], 2004, pp.14-15.

¹⁸ Porter, *op.cit.*(b), p.83.

¹⁹ Department of Cabinet Office Director-General for Policy Planning, *op.cit.*, pp.10-13.

²⁰ Kazutaka Takahara, “Kigyokan Network to Chiki Sistem” [System of Local and Inter-Business Network]. *Quarterly Journal of Chugoku Regional Research Center*, 2000, p.14.

transportation systems and availability of college graduates as workers were considered as requirements for gaining geographical advantages. Currently, managerial resources require high-quality and special skills as well as information corresponding to the demand of each industrial branch. For instance, software-related industrial agglomeration in the US has attracted many experts in computer science and programmers with high skills.

The existence of specialized high-quality institutions in the fields of education, training, research, and data collection, is also an important factor for the agglomeration, creation, and reproduction of advanced managerial resources in a region. Porter points out that the seemingly disadvantageous factors such as expensive land prices or poor natural resources can often work to stimulate innovation and lead to competitive advantages. This is an interesting observation for Japan, which has poor natural resources, and particularly for Hiroshima, which was heavily damaged by the atomic bomb.

(2) Firm Strategy, Structure, and Rivalry

As the second factor, Porter mentions the following two points: (1) controls, social norms, and incentives that promote investment in a specific industry as well as the macroeconomic conditions and political stability and (2) intense rivalry in a local area or competition with a multiple number of powerful companies in the same domestic industry.

Investment in this context includes investments on research and experimentation, education and training, and market exploration. For instance, in the US, systems such as venture capital or public stock offerings contribute to the stimulation of economic activities. The rivalry mentioned in category two is a crucial factor for realizing the competitive advantages by geographical conditions. This is because experiences with difficult domestic competitive conditions are essential for achieving success in the global market. As Porter cites, the intense rivalry among nine global automobile manufacturers in Japan has enhanced the quality of their

automobiles.

(3) Demand Conditions

Demand conditions refer to the quality of the local market, namely, the existence of local customers with a high level of demand and sufficient knowledge of merchandise or of local customers with exceptionally stronger demands for special merchandise that are in demand in other areas. Such customers motivate local companies to produce merchandise of a higher quality. On the other hand, demand conditions stimulate companies to innovate continuously by providing them with clues to identify their customers' future needs. This is particularly true when the local customers' needs reflect those of customers in foreign countries. What results in competitive advantages is not the size of local demands but their quality. The central government's policies such as regulation on production safety or environmental standards may have direct or indirect impacts.

(4) Affiliated and Supporting Industries

The last factor of the Diamond model refers to the presence of competent suppliers and affiliated industries. Local suppliers and affiliated industries in the vicinity offering special parts, machines, and services can lead to competitive advantages with respect to efficiency, knowledge, and innovation. Businesses with companies in the vicinity cut down trade and negotiation costs and facilitate smoother improvement and problem solving. Very competitive firms in the same field could complement each other with regard to research, development, distribution, and marketing. This affects innovation in terms of dissemination of information and joint development of new products. Raw materials and standardized parts can be efficiently procured from outside the country, but high-level applied technology and special skills are difficult to systematize, accumulate, and transfer. The advantage of location plays an important role in these

cases.²¹

2.2 Industrial Cluster and Interaction among the Diamond Factors

Porter explains that a cluster comprises specialized suppliers, service companies, distribution chains, customers, information providers, infrastructure companies, and affiliated industries. Moreover, industrial associations, institutions to accredit regulations, and university faculties can form parts of clusters. A cluster is an asset as a group.²²

Clusters often have historical origins. For instance, clusters in the US state of Massachusetts emerged from the research conducted at universities; many clusters in Finland are based on natural resources; and the transportation cluster in the Netherlands was formed on the basis of geographical location factors such as highly-developed watercourses and a long history of the shipping business. Some clusters are spinoffs of other related industries. The presence of the aeronautics and space science cluster at Southern California led to the formation of the cluster of golf equipment manufacturers at the outskirts of San Diego. Thus, the formation of a cluster is difficult at a location that lacks historical advantages.

Therefore, more profound and wider clusters have been formed in developed countries than in developing countries. This is due to the fact that the industries of the latter mainly depend on imported parts, service, and technology from the former. Even when some clusters can be observed, the number of participating companies and organizations is limited. According to Porter, competitive companies in developing countries tend to work independently rather than as participants of a cluster.²³

It can be noted that the paradigms of the Diamond model and industrial clusters do not simply predict that the satisfaction of the four conditions would automatically produce competitive advantages. The more important aspect is that the

²¹ Porter, *op.cit.*,(b), pp.83-86.

²² *Ibid.*, p.86.

²³ *Ibid.*, pp.114-115.

state of a certain part of the Diamond model can easily affect its other parts and create huge ripple effects. In other words, the existence of weak parts in the Diamond model would lead to limiting the productivity of the industry. For example, even if a certain industry faces intense competition, mere provision of discounts would not contribute to the competitive advantages. When the local environment becomes ripe for investments and customers demand high-quality merchandise, intense rivalry stimulates the productivity of companies.

Porter's ideas of an industrial cluster and the Diamond model have offered the basis for recent debates among economists concerning competitive advantages.

Kanai divides the effects of industrial agglomerations into the following three categories: (1) improvement of productivity of firms and industries that are part of the cluster, (2) enhancement of firms and industries' innovation capacity and the growth of their productivity, and (3) promotion of innovation and formation of new businesses to expand the cluster. He stressed on three basic factors that contributed to the formation of clusters: (1) the existence of resources and demands unique to the region, (2) the existence of affiliated and supportive industries, and (3) the existence of innovative companies in the region.²⁴ These points coincide with Porter's theory.

Furthermore, with regard to the development of clusters, Yamamoto emphasizes Porter's suggestion that private companies contribute to the growth of clusters more significantly than the government's policies. To be more precise, Yamamoto emphasizes the importance of initiatives taken by the private sector and not those by the government; he thereby refers to the greater effectiveness of supporting industrial policies initiated by local governments that are closer to the local companies.²⁵

²⁴ Kanai Kazuyori, "Cluster Riron No Kentou to Saikousei: Keieigaku No Shiten Kara" [Examination and Reconstruct of Cluster Theory: From the Perspective of Business Administration], in Yoko Ishikura et al., *Nippon No Sangyo Cluster Senryaku : Chihou Ni Okeru Kyoso Yuui No Kakuritu [the Strategy of Industry Cluster in Japan: Establishment of Competitive Advantage in Rural Area]*, Yuhikaku, 2003, pp.51-59.

²⁵ Yamamoto, *op.cit.*, p.150.

3. The Formation of Competitive Advantages in Hiroshima during its Postwar Reconstruction

3.1 The Industrial History of Hiroshima

As a first step to examine the application of the Diamond model to the case of postwar Hiroshima, it might be necessary to review history in order to reveal how the machine-related industry was established before the bombing. As Porter points out, historically, most clusters were formed as natural developments of traditions and not as products of artificial policies; the roots of many clusters, for example, the shipping industry in the Netherlands, can be traced back to the period prior to the twentieth century. If the origin of the machine-related industry is to be dated back to the prewar era, one might say that Hiroshima began its construction by retrieving prewar life and that it did not have to start afresh.

The industrial history of the Chugoku region to which Hiroshima belongs, can be traced back to the Asuka period (538–710 A.D.). Some researchers discovered ancient smelting facilities concentrated in west Japan, Hiroshima, Okayama, and north Kyushu. They were built probably around the end of the sixth century till the seventh century. For long, the Chugoku region and North Kyushu had been centers for producing iron from iron sand. Japan's unique method of manufacturing iron from iron sand called "Tatara" particularly prospered in the Chugoku region. This region accounted for 90% of all the iron production from the Edo (1603–1867) and Meiji (1868–1912) eras.²⁶ In particular, in 1883, Hiroshima accounted for 51.9% of the total iron production. Tatara was the major method of iron manufacturing applied to manufacture swords, ironware, and wires until the nineteenth century, when the technology of western-style iron manufacturing was introduced.²⁷

²⁶ Department of Archaeology, Graduate School of Letters, Hiroshima University (Ed.), *Chugoku Chihou Seitetsu Iseki No Kenkyuu [Research for Iron Manufacture in Chugoku Region]*, Keisuisya, 1993, p.309.

²⁷ Mitsukuni Yoshida, *Umi to Yama, Gijyutu No Densyuu: Hiroshima Wo Megutte [Ocean and Mountains, Transfer the Technology: On the Hiroshima]*, MAZDA, 1985, p.25.

Needle manufacturing comprised all the basic aspects of the manufacturing industry. Wires to manufacture needles were produced in the north of Hiroshima city. They were transported by ship to the castle town situated on the lower plains of the Ota River. A document states that many forges to manufacture wires were scattered along the Ota River in the first half of the 1800s. In the town near the Hiroshima Castle, there appeared to reside people who were experts at manufacturing needles and *samurai*'s in those times. The produced needles were transported to Kyoto, Osaka, and Edo.²⁸ Excellence in iron manufacturing generated the well-known file industry at Nigata in Kure City where various tools such as those for plasterers, carpenters, and farmers were manufactured at the end of the nineteenth century. The file manufacturing industry was mechanized, and it grew from the 1930s and provided licensed factories to the Kure Naval Arsenal. Even today, Hiroshima supplies 95% of the files produced in the Japanese market.²⁹ Hiroshima, which faces the Seto Inland Sea, traditionally built wooden ships for water transportation; the establishment of the Kure Naval Arsenal helped to lay the foundation of the modern shipbuilding industry.³⁰

< Militarization of Industries >

In the Hiroshima Prefecture, a naval district was set up at Kure City in 1889. After the First Sino-Japanese War (1894–1895), Hiroshima came to be known as a military city. In 1895, a western-style iron foundry was first established in the prefecture. In 1903, the Naval Arsenal was established at Kure. Hiroshima's character as a military city gained strength during World War II (1939–1945). Under the slogan of "reorganizing firms," entire industries were rapidly militarized. As a result, the number of factories (having more than five workers) sharply increased from 2,117 in 1936 to the peak of 3,255 in 1941 when the Pacific War against the US broke out. The number of workers

²⁸ Hiroshima City Local Resource Center, Hiroshima City Culture Development Organization, *Hiroshimashi Ni Okeru Hari Dukuri to Sono Gijyutu [Needle Industry in Hiroshima City and the Technology]*, Hiroshima City Education Board, 1990, pp.1-5.

²⁹ Hiroshima Bank Economic Research Institute, *Saikin Sannjyu Nenkan No Hiroshima Keizai No Ugoki: Dai Niji Sangyo No Seityo Kiseki Wo Chyusin to Shite [Developments Last Three Decades in the Hiroshima Economy: With a Central Focus on Growth Trajectory of Secondary Industries]*, Hiroshima Bank Economic Research Institute 1995, pp.99-100.

³⁰ *Ibid.*, p.26.

also increased from 54,460 to 87,106, and during the same period, the value of industrial production jumped from ¥177,935,000 to ¥487,880,000.³¹ The breakdown of the industrial production was caused by the proportion of peacetime industries such as cotton spinning and food industries that had become significantly lower, while that of the machine-related industry increased remarkably from 7.2% in 1930 to 38.8% in 1945. When Japan was defeated in 1945, the proportion of the heavy industries in Hiroshima Prefecture was lower than the national average of 79.9% with a figure of 52.2%. However, the proportion of workers who were working in the heavy industries was 64.4%, which was higher than the national average of 58.0%.

The existing factories such as Ujina shipyard, Yutani Heavy Industries (present day Kobelco Construction Machinery Co.), and Toyo Industries (present day Mazda) were militarized first. Moreover, Mitsubishi Heavy Industries set up a base at Hiroshima City and expanded its facilities from there. Toyo Industries began its business as a cork maker. In 1927, the company began to produce three-wheel trucks. Later, it became a subcontractor of the Kure and Hiro Naval Arsenal for which it was in charge of manufacturing hardware machines. In 1937, it commenced the production of guns for the infantry. It also began accepting orders to produce motors for planes.³² Toyo Industries was appointed as a military-commissioned factory under the cooperative management of the army and navy and received orders for manufacturing 10,000 infantry guns per month. By the end of the war, it had developed into a major war production factory with 10,000 workers.³³

On the other hand, the militarization of industries promoted the reconstruction of Hiroshima's infrastructure. In Kure City, *Honjo Suigenchi*, the largest dam in Asia at that time that stored and provided water to the navy, was completed; extra water was supplied to 150,000 citizens in Kure where water shortage had been a severe problem. Another dam was built at the western part of Hiroshima City, i.e., present day Higashi

³¹ Hiroshima City, *op.cit.*, p.1.

³² Hiroshima City, *Hiroshima Shinsi: Keizai Hen [Hiroshima New History : Economy]*, Hiroshima City, 1984, pp.1-3.

³³ Taiji Kawamura, *Jidousya Sangyo to MAZDA No Kiseki [History of MAZDA and Automobile Industry]*, Yuhosya, 2000, p.30.

Hiroshima City, to supply more water to Kure.³⁴

The developed military-related industry vanished due to the atomic bombing on August 6, 1945. When the war ended on August 15, nothing but burned fields were left behind at the center of Hiroshima City. The militarized industries of Hiroshima disappeared, and the enlarged war production factories were severely damaged.

3.2.1 War Damage in Japan and Hiroshima

Takeda provides a description of the Japanese people's hurt feelings immediately after the defeat.

“Immediately after its defeat, Japan's resources were exhausted due to the loss of a considerable number of things resulting from the long-drawn, full-scale war. The supply of consumer goods was under constraint; household expenses wiped out all savings, leaving nothing even for medical care; and people faced hunger and were dissatisfied. Food distribution was more delayed than ever before; it threatened people's daily life; and there were few opportunities of getting jobs to earn a living. Most companies that had lost their objective to produce military equipments for war were engrossed in finding a target for future production. The harsh occupation policy laid restrictions on war-related corporate activities; thus, a dark shadow was cast on the companies' future. Not only were material assets lost in the war, but more than that, the postwar era was characterized by a lack of energetic youth. The senseless war of attrition took away young lives and eliminated any possibility of a new era that could have been started by the youth. In such a devastated atmosphere, postwar Japan resumed its efforts toward development.”³⁵

³⁴ Kure City, *Shimin No Seimei Sen! Suido [Citizen's Lifeline! Water Service]*, http://www.city.kure.lg.jp/mitekure/mite13_03.html

³⁵ Haruhito Takeda (ed.), *Nippon Keizai No Sengo Fukkou [Post War Reconstruction of Japanese Economy: Inconcluded Structural Switch]*, Tokyo University Monodukuri Management Research Series: Yuhikaku 2007, p.2.

There were 250 cities that had been air raided during the war, and 115 of them were heavily damaged (they were designated as “war-damaged cities” in 1946). The total damage was estimated to cover an area of 63,000 ha and 9.7 million inhabitants (more than 10% of the Japanese population); moreover, the death toll was 3,30,000, and the number of injured was 4,30,000.³⁶

In the Hiroshima Prefecture, except for the A-bombed Hiroshima City, both the cities of Kure and Fukuyama had been terribly damaged by air raids. Despite this situation, citizens devoted themselves to saving others’ lives and thereafter worked hard to repair their houses and factories in order to restore their normal life or to begin a new life.

In Hiroshima City, after the bombing, the City Hall and other perpetual and military offices, which were supposed to adopt measures for such an emergency, had been destroyed. The number of Hiroshima City’s officials at that time is unknown, because the list of officials was destroyed in the bombing. However, it was estimated that there had been approximately 1,200 staff members before the bombing. Among them was the mayor, Senkichi Awaya, who died in his collapsed house; in total, 460 staff members were dead or missing as A-bomb victims.³⁷

The Hiroshima Prefectural Office, which was located only 900 meters away from the hypocenter, was instantly destroyed. Moreover, 615 of the 1,107 officials died, and in total, including other branches, 1,141 officials were killed. Nevertheless, a temporary prefectural office was set up at the Hiroshima East Police station on August 8—only two days after the bombing; the first initiatives including relief operations, food distribution, and issuance of certificates to war victims were undertaken from there. At the beginning of the relief operations, army troops stationed at Hiroshima were in charge of the distribution of food, clothes, and fuel. However, quite soon, by August 15, these operations were taken over by the prefectural office and the city government.

Unfortunately, Hiroshima was struck by another tragedy only about a month

³⁶ Akira Koshizawa, *Fukkou Keikaku [Reconstruction Plan]*, Chuo Koron 2005, p.154.

³⁷ Hiroshima City, *op.cit.*,1983, pp.2-6.

later, on September 17. It was a major typhoon called *Makurazaki*. The typhoon struck the cities of Kure and Hiroshima, and the number of victims estimated was 1229 dead and 783 missing. In addition to the houses that were destroyed, rice fields were flooded, and roads, bridges, and railways were washed away. The amount of damage caused by the typhoon was estimated to be approximately ¥200 million.³⁸ Hiroshima City was waterlogged; citizens' temporary housings such as huts and air raid shelters were submerged, blown out, or washed away. Therefore, Hiroshima City was in need of emergency measures against floods, such as sanitation, drainage, and bridging.³⁹

<The Damage to Industries>

The atomic bomb caused severe damage to Hiroshima's economy. An estimated 8,577 shops existed within a range of 3 km from the hypocenter, out of which 98.5% were completely destroyed. Moreover, 512 factories, which had probably been built of wood, in the same area were destroyed. It was estimated that more than 80% of all factories in the city were completely damaged. Most small and mid-sized factories were destroyed, while the machines in the major factories located more than 3 km away from the hypocenter were not severely damaged.

Hiroshima Machine Works, belonging to Mitsubishi Heavy Industries, was situated about 3.7 km away from the hypocenter and Ujina Shipbuilding, about 4.3 km away from the hypocenter. Only 30% of all facilities at both factories were damaged. Although their roofs and walls had collapsed and the windows were blown out and scattered, major machinery remained almost intact. At Toyo Industries, which was located approximately 5.3 km away from the hypocenter, some roofs were blown away and some buildings were damaged. However, the proportion of damaged parts was less than 30% of all the facilities. Unfortunately, since most of its employees were engaged in the evacuation of the building (*Tatemonosokai*), 119 were killed instantly, and 335 were injured. Japan Steel Works, which had 17,000 employees at about 6.2 km away

³⁸ Hiroshima prefecture, *Sengo 50nen Hiroshima Kensei No Ayumi [Advances in Administration of Hiroshima Prefecture after 50 Years the War]*, Hiroshima Prefecture 1996, pp.4-6.

³⁹ Hiroshima City, *op.cit.*,1983, pp.21-22.

from the hypocenter, suffered only slight damages on certain parts of its buildings.

On the other hand, financial institutions suffered large-scale damages. The main financial institutions had their branches at the center of the city; most of them, such as the Hiroshima branch of the Sanwa Bank, Geibi Bank (present day Hiroshima Bank) were completely destroyed. Many of their employees, who were on their way to work at the time of the bombing, became victims. Nevertheless, only the Hiroshima branch of the Japan Bank survived, except for the third floor. The building was temporarily used as a common base for other banks.

Another severe damage caused by the atomic bomb to industrial activities concerned essential services. Within a radius of 2 km from the hypocenter, the electric current was cut off owing to the bombing; the gas supply was stopped after the collapse of the head office and factories of Hiroshima Gas. Except three cars, none of the trams in the city were able to function. Thus, the city's economy was in utter disarray.⁴⁰

3.2.2 The Governmental Strategy for Implementing the Reconstruction Plan

The Allied Forces arrived in Japan on August 23, one week later than planned, because of a typhoon. The Supreme Commander of the Allied Powers (SCAP), General Douglas MacArthur, arrived at the Atsugi Air Base outside Tokyo to take command of the Allied Occupation on September 2; the surrender documents were signed aboard the US fleet Missouri at the Bay of Tokyo. The two principles of the US occupation policy in Japan were “nonmilitarization” and “democratization.”⁴¹ The supreme policy-making body at the US, the State-War-Navy Coordinating Committee planned a so-called US Initial Post-Surrender Policy for Japan, which was specified by MacArthur as follows:

“First, dissolve the military power, and punish the war criminals. Then,

⁴⁰ Hiroshima City, *op.cit.*, 1984, pp.11-20.

⁴¹ Fumio Fukunaga, *Sengo Nippon No Saisei [Reconstructon of Japan after the War]*, Maruzen 2004, pp.17-19.

establish a political foundation via elections. Modernize the constitution. Conduct democratic elections, and make women eligible to vote. Release the 'political criminals,' and liberate the farmers. Foster liberal labor movements. Promote free market economy, and abolish oppressive police. Develop a free and responsible press. Liberate education and deconcentrate political power, and separate religion and nation.”

First of all, disarmament was rapidly achieved. On September 2, 1945, the day when the surrender documents had been signed, there were 2,576,000 soldiers in Japan. All of them were disarmed by October 16.⁴²

What type of economic policies did the US-led Allied Forces adopt? First, the US attributed Japanese aggression to the *zaibatsu* (business conglomerates) and landlords with their many tenants. Thus, the *zaibatsu*'s were dissolved and land reforms were enforced. The SCAP also initiated labor reforms by establishing labor laws promoting the organization of labor unions. Further, despite the Japanese people's severe poverty, which had resulted from and was driven by the defeat and rampant inflation, at the beginning of the occupation, the US did not devote any efforts for improving the situation, insisting that they were not responsible for the reconstruction or revitalization of the Japanese economy.

The Japanese government initiated the so-called priority production systems, thereby prioritized the reconstruction of the coal and steel industry in order to escape from the economic crisis induced by inflation and the shortage of raw materials. However, this system did not yield any results and further worsened the economic depression. From 1947 onwards, the SCAP adopted measures for economic recovery and provided directions to the Japanese government. Imura distinguished three categories of measures: setting up a financial corporation for reconstruction, adjusting subsidies, and obtaining US financial aid as a supplement. The Financial Corporation for Reconstruction was established in January 1947. It was to be run only by investments from the government. For two years, it was financed via a total of ¥295.1

⁴² Rinjiro Sodei, *Macarthur no 2000 Nichi [2000 Days of Macarthur]*, Cyuo Koron sha 1976, pp.119-120.

billion in the form of a new loan to important industries. In fact, most of the loan was provided by issuing bonds. The proportion of loan per industry for the financial years 1947 and 1948 was as follows: coal industry (35.0%, 38.1%), power industry (4.7%, 27.0%), fertilizer industry (6.0%, 3.1%), shipping industry (4.5%, 3.5%), and steel industry (2.9%, 2.3%). The second important measure was the provision of adjustment subsidies aiming at the stabilization of the prices of materials required for key industries. The subsidies were provided by expanding income tax liabilities. The last measure—US financial aid or Governmental Appropriations for Relief in the Occupied Area (GARIOA)—was limited to the purpose of emergency food aid and medical care. At the request of MacArthur in 1947 and due to the “Reverse Course” or the policy shift occurring along with the intensifying Cold War, the amount of aid increased. In 1949, the Economic Rehabilitation of the Occupied Area Fund (EROA Fund) was initiated to supply machines and industrial materials such as heavy oil and iron ore. EROA Funds supplied products sold by the US army and extra bonus food. However, the total cost incurred by Japan for the occupation forces was much larger than the US financial aid received.⁴³ Being affected by occupation policies that were indirectly implemented by the SCAP through the Japanese government, Hiroshima was taking steps toward rebuilding the city.

After the surrender of Japan, a small contingent of Allied Forces disembarked at Kure City, prefecture of Hiroshima, on September 26. It was an advance party to initiate the impending occupation. People were hurriedly preparing to welcome the occupation forces. Later, 20,000 Allied Forces occupied both the cities of Kure and Kaita. The following year, the Allied Forces were joined by the British Commonwealth Occupation Force (BCOF), increasing the number of occupation forces to approximately 31,000. Hiroshima was under the control of the Chugoku Regional Headquarters and the Military Government of Hiroshima, whereas the prefecture office was in charge of activities and services involving administration, procurement,

⁴³ Imura, *Gendai Nippon Keizai Ron [Contemporary Japanese Economics]*, Yuhikaku 1993, pp.49-60.

education, economy, and labor.⁴⁴

<The National Government's Reconstruction Plan for War-damaged Cities>

As mentioned earlier, there were 250 cities that were severely damaged by the war. During the two months prior to the surrender, each main local city was targeted by air raids. After the defeat, these cities had to be urgently reconstructed in the manner similar to Hiroshima and Nagasaki, the two A-bombed cities. Moreover, 115 cities were designated as war-damaged cities according to the "Special City Planning Law" of 1946. In these cities, reconstruction projects were implemented in accordance with the "Basic Plan for Reconstruction of War-damaged Cities," which was adopted by a cabinet meeting in December 1945; the project was led by the Institute for War Damage Reconstruction, founded in November 1945. The same standard applied throughout the country in terms of extensions of roads, creation of green fields, etc. The "Basic Plan" was intended to hold the government responsible for the planning and commissioning of city projects and to provide local government officials such as prefectural governors and town mayors with fixed subsidies from the national government.

With regard to the prefecture of Hiroshima, the three cities, namely, Hiroshima, Kure, and Fukuyama, were designated as war-damaged cities. These three cities and the prefectural office held discussions in October 1946 over the readjustment of town lots, which later constituted each city's basic plan for reconstruction. From 1946, the plans were implemented for a period of five years in accordance with certain work divisions between the prefectural office and the respective city government.⁴⁵

After the surrender, the reconstruction plan was smoothly implemented in each local city owing to the rapid establishment of the basic reconstruction plan by the government. A few days before the defeat, discussions on how to establish the principle of reconstruction and enact a special law for it had begun among government

⁴⁴ Hiroshima Prefecture, *op.cit.*,1983, p.8.

⁴⁵ *Ibid.*, p.28.

officials working at the department for city planning. After the surrender, they immediately began to work on the establishment of the Institute for War Damage Reconstruction.

The SCAP objected to the idea of “war damage reconstruction,” stating that “it is presumptuous for a defeated country to want to reconstruct their country. Restoration is enough.” The SCAP did not contribute to city planning.

The objective of the city planning initiative as part of the war damage reconstruction project led by the Japanese government was “to provide for the improvement of people’s life and the development of a beautiful local environment. It thereby focused on efficiency, healthcare, and protection against disasters in order to prevent cities from growing excessively and to promote the growth of local cities.” The basic plan referred to town streets, bays and ports, canals, airports, and drainages, and it required that those be built based on a high level of standards. For example, the main motorways had to be large enough to be adaptable to future motorization technology.

Each war-damaged city began its reconstruction based on this plan; however, the degree of progress depended on their inhabitants’ enthusiasm. In particular, Hiroshima City’s progress was remarkable as it intensely initiated its reconstruction plan earlier than some other cities that had to later reduce the size of their reconstruction plans.⁴⁶

<The Process of War Damage Reconstruction of Hiroshima City>

With the imperial army dissolved after the defeat, Hiroshima City assumed responsibility for the tasks of collecting the remaining bodies and cremating them, and cleaning up the burned sites. Since Mayor Awaya had been killed in the bombing, on October 22, the new mayor, Shichiro Kihara, assumed his position. Thereafter, Hiroshima City progressed from the implementation of emergency measures for damages induced by the atomic bomb and the typhoon to the further reconstruction of the city.

The City Office created a new department, the “Reconstruction Bureau,” and

the city assembly established a new function, namely, the “Reconstruction Committee.” A so-called Neighborhood Association took the lead for organizing a support group for war damage reconstruction and called for citizens’ cooperation with the city government. In February 1946, an advisory council for the reconstruction of Hiroshima City was set up for providing advice to the mayor with regard to the city’s reconstruction plan. The council comprised 26 members including members of the city assembly and representatives of the financial circles of Hiroshima. The proposal of the reconstruction plan was completed in July 1946; the Institute for War Damage Reconstruction made slight amendments before approving the plan. However, the city government did not possess sufficient funds to implement the plan; thus, it had to request the national government and the prefectural office for subsidies.⁴⁷

3.3.1 Factor Condition: Convert War Legacy to Peace Industries

The defeat brought about the extinction of the war industry. A massive “war legacy” and large-scale unemployment were left behind in Hiroshima. The Kure Naval Arsenal had about 90,000 employees on their premises of 3,000 square meters, including the factories of the Hiro area. The Naval Arsenal and the two shipyards of the Hitachi Zosen Corporation—one belonging to Mitsubishi Heavy Industries and the other small and mid-sized shipyards—had, in total, built 10% of the Japanese fleets before the end of the war. After the surrender, they were forced to stop work,⁴⁸ since 30% of the buildings of the Hiroshima Shipyard and Hiroshima Machine Works had been damaged. They were restored with a budget of ¥20 million, which was the compensation amount for the war damages incurred in October 1945. Soon after the repair works began in November of the same year, the SCAP stopped the compensation payments. Hence, if they had not commenced restoration activities in October, they would have been forced to close down their factories. With regard to

⁴⁶ Koshizawa, *op.cit.*, pp.158-171.

⁴⁷ Hiroshima City, *op.cit.*,1984, pp.26-34.

⁴⁸ Hiroshima Prefecture, *op.cit.*,1983, pp.171-173.

Toyo Industries, some parts of their facilities were occupied by the temporary prefecture office and used as a hospital for survivors; in the factories, machines were being repaired and readied for work.⁴⁹

The most critical factor condition in postwar Hiroshima concerns the most advanced technology and skilled workers whose origins were based on the old traditional industry. The requisite technology and skills were developed in line with the expansion of the war industry during the war. However, it was not easy to convert this war legacy into something that would be useful for the peace industries, as there were some obstacles. The attitude of the SCAP toward Japan's economic reconstruction was negative at the beginning of the occupation period. There were two principles of the occupation policy—nonmilitarization and democratization. Accordingly, the SCAP considered rooting out militarism by reforming the Japanese system as the most urgent and essential policy and not the economic reconstruction of Japan. Consequently, the military-related industries were first dissolved, while the Japanese government, deprived of its sovereignty, could do little to protest against this policy.

The Pauley Reparation Mission, for instance, commissioned by the Allied Forces, announced in November 1945 that “everything that was excessive than that needed to maintain the minimum size of the Japanese economy should be removed from Japan.” One month later, in December, the next Pauley interim report clarified the severe measures of this policy: “Half of the machine industry tools, thermal power plants, and chemical industries, and three-fourth of the steel production should be removed as reparations. The same policy applies to the entire military-based production, the shipbuilding capacity, and the production of light metals. In addition, all assets outside Japan should be confiscated.” In January 1946, the SCAP began designating 400 former arsenals and plane factories as reparations and authorized the Japanese government to place them under its control. The second reparation was pronounced in August, designating 505 factories occupied with the production of machine tools, sodium carbonate, caustic soda, sulfuric acid, steel, shipbuilding,

⁴⁹ Hiroshima City, *Hiroshima Kenshi: Gendai [History of Hiroshima Prefecture: Modern Age]*, Hiroshima Prefecture, 1983, pp.21-22.

civilian arms, and thermal power plants.⁵⁰ In terms of reparations, the Naval Arsenal was given the first priority. Consequently, 30% of the number of machines specified by the interim plan of reparations were removed from the Naval and Army Arsenal and carried to the US. (Later, the Reverse Course of the American occupation policy dropped the arsenals from the list of reparations, so that other machines could be stored at the arsenals.)⁵¹

At the Naval Arsenal of Kure, Harima Shipyard (presently IHI Co.), which did not belong to the lines of *zaibatsu*, was ordered by the general headquarters (GHQ) to make limited use of the Arsenal for the purposes of conducting salvage operations, fleet dismantlement, and the repairs of commercial ships. Moreover, 5,000 skilled workers who had been working at the Arsenal during the war were in charge of the operations. The steel manufacturing facilities were used to scrap the fleet. However, since other shipyards had no work because of the collapse of the shipbuilding industry, they lost their financial base and were unable to build ships independently anymore, except those permitted under the constraints of the SCAP's order and the reparations. The only things that could still be produced in the shipyards were pots and pans, frying pans, hoes, and spades.⁵²

At the same time, some attempts to convert these military facilities to facilities for the peace industry began with the permission of the SCAP. At the Naval Air Technical Arsenal located within the Hiro area, the Hiroshima railway bureau was in charge of manufacturing parts for locomotives and for repairing automobiles. Moreover, a private company began to produce tools for ships, agricultural machinery, and sewing machines at the Hiro Arsenal.

The machine tools industry relied on the war industry; thus, their massive production facilities became nuisances at the beginning of the occupation. Their owners gradually restarted manufacturing anything they could make, such as farmer

⁵⁰ Hiroshima Prefecture, *op.cit.*, 1983, p.179.

⁵¹ Takeaki Teratani, *Zousenjo No Fukkou to Hatten: Sekai no Ouza he [Recovery and Development of Shipbuilding Industry : Toward the World Champion]*, Nippon Keizai Hyoron sya 1993, p.87.

⁵² Hiroshima Prefecture, 1983, pp.171-178.

tools, which, reflecting the social conditions of the food shortage, were needed in order to produce food grains. Hiroshima Machine Tool Works manufactured grinders for grains and grain-polishing and rope manufacturing machines; they utilized the scrap of air planes to produce braziers and pots for rice. Workers were visiting every farm to sell them and to keep factories working. Hiroshima Shipyard also devoted itself to maintain its functioning. Their workers went as far as Kyushu to get their factory machines repaired, so that they could utilize them for their own benefits. The Hiroshima branch of the Japan Steel Works began manufacturing parts for railways and farming equipments. Toyo Industries established a plan to convert their production facilities into a nonmilitary industry merely two months after the defeat; as soon as they obtained permission from the SCAP, in December 1945, they began manufacturing three-wheel automobiles, bicycles, drills, and tools.

The companies were faced with other even greater hardships than the ones emanating from the reparations: shortage of raw materials and limited energy sources such as electric power and coals. In addition, power failures occurred very often, which reduced the actual operative hours. Of course, almost all companies were short of funds. However, it can be said that since these problems were inevitable, companies made efforts to maximize the productivity of their resources, and as Porter pointed out, this was achieved by mending and improving facilities and streamlining the management.⁵³

<Transforming Kure Naval Arsenal for Nonmilitary Use>

Kure City had a population of 400,000 during the war, since it was a military port with a Naval Arsenal. After the defeat, the Naval Arsenal and the related industries were abandoned, and this left about 100,000 workers unemployed. The population decreased to about 150,000. Although the British occupation created about 20,000 jobs, the proportion of unemployed people in the entire population of Kure was 6.3%, much

⁵³ Haruto Takeda, 2007, p.4.

higher than the national average.⁵⁴ Unemployment became a critical issue. Facilities belonging to the Naval Arsenal were used by private companies that were engaged in salvaging ships and dismantling the military fleet. These tasks were expected to be completed by the fall of 1948. Moreover, the British occupation forces began their withdrawal in 1947; thus, citizens working at their facilities lost their jobs.⁵⁵

Kure, which was notorious as “A model city of unemployment,” worked to obtain permission to use the former naval facilities for peaceful purposes similar to that done by three other former military port cities, namely, Yokosuka, Sasebo (Nagasaki), and Maizuru (Kyoto). After the defeat, public opinion toward these cities was not favorable. Thus, it was very difficult to persuade people, but the city of Kure devoted itself to enact the so-called Conversion of the Former Military Port City Law, which was to be applied to special local self-governing bodies. As a result, the law was passed by the National Diet and enthusiastically approved by the local referendum. It finally came into effect in June 1950. This law enabled Kure City to reuse the former military sites and military facilities.⁵⁶

In accordance with the Conversion of the Former Military Port City Law, Kure City invited factories to set up their businesses at the site of the former Kure Naval Arsenal. As a result, Toyo Pulp and Chugoku Industries built their firms at the former Naval Air Technical Arsenal. The most notable achievement was the success in inviting an American major shipbuilding company, the National Bulk Carrier (NBC). The NBC was searching for a suitable dock for building the world’s largest tanker that could cope with the future demand for oil. The largest dock in Asia, the Kure Naval Arsenal, attracted its attention. In 1951, the NBC signed a contract with the Japanese government for using the Kure Naval Arsenal. One year later, the world’s largest tanker at that time was built at that dock with a capacity of 38,000 where “Yamato”—once the world’s largest military fleet—was constructed. The tanker was

⁵⁴ Kure City, *Sensai Fukkou Shi [Record of War-Damage Reconstruction]*, Kure City, 1960, p.66.

⁵⁵ Kure City history editing department, *Kure No Rekishi [History of Kure]*, Kure City, 2002, pp.326-327.

⁵⁶ Kure City history editing department, *Sensai to Fukkou [Kure: War-Damage and Reconstruction]*, Kure City: Kure City 1997, pp.90-91.

built with support from skilled workers who had worked at the Kure Naval Arsenal before the defeat.⁵⁷

When the Japanese government signed a contract with the NBC for lending a part of the shipyard and purchasing another part of the Naval Arsenal, it required the NBC to adhere to certain conditions. Since the Japanese government assumed that “in 10 years, the Japanese shipbuilding industry will have recovered to its prewar level, there will probably be some companies that would wish to use the facilities.” Thus, the contract was signed for a period of 10 years. Moreover, the contract stipulated that as much as possible, materials should be procured from within Japan. Finally, the NBC was obliged to disclose American technology for the purpose of training Japanese workers, so that they would become skilled welders. The NBC hired 660 former skilled workers of the Kure Naval Arsenal and the Harima Shipyard. Only seven technicians and staff arrived from the US, while all other employees were Japanese. For the latter, it was the very first experience of building a merchant vessel, but their high skills that were necessary for building the military fleet were equally useful for the postwar shipbuilding industry.⁵⁸ In addition, Japan could acquire the efficient technique of weld and block methods that had not yet been introduced in Japan. It is said that the continuous production of merchant vessels at the former Naval Arsenal laid the foundation for the future of the shipbuilding industry in Japan by delivering the skills of building large-sized tankers at a low cost from Kure to all over Japan, on the basis of the combination of highly skilled Japanese workers and American rationalism.⁵⁹

The NBC was not the only company contributing to the reuse of the former Naval Arsenal. In fact, the NBA branch in Kure produced a number of the world’s largest tankers until it suffered from the recession in the shipbuilding industry. Consequently, it delegated all facilities and workers to the Kure shipyard in 1962. Later, the Kure shipyard achieved groundbreaking success in some fields such as bridge

⁵⁷ Ibid, p.92, Kure City, *op.cit.*, 2002, p.329.

⁵⁸ Teratani, *op.cit.*, pp.159-165.

⁵⁹ Kure City history editing department, *op.cit.*, 2002, p.330.

building and the production of boilers. For instance, it manufactured the huge Ondo Bridge between the mainland of Kure and Ondo Town. The shipbuilding department of Kure Shipyard merged with the IHI Corporation and continued to build the world's largest tankers. Amagasaki Steel Works at Kure, which had been employed to manufacture major screws of the military fleet, was merged with Kobe Steel, and eventually, it became the world's leading company in the field of manufacturing ship propellers. The Kure factory of Babcock-Hitachi K. K. took over the facilities in which the major cannon of Yamato was produced in order to manufacture boiler plants and supplies for nuclear power plants and chemical plants. Hiro Zoki (present Shin Nippon Machinery Co.), the machine manufacturer for vessels, which had taken over the facilities and workers of the Naval Air Technical Arsenal, gained the largest market share for small turbines. Kotobuki Industries, which had set up factories at the site of the foundry industry, grew rapidly in the field of casting anchors for ships and thus accomplished the transformation of its military technology.⁶⁰

3.3.2 Firm Strategy, Structure, and Rivalry: High Level of Rivalry in the Automobile Industry and Innovation

Many companies in various fields such as food, clothes, construction, and machinery industries were founded in Hiroshima and developed to become the world's leading companies in their respective fields. The common advantages that they shared were the ability to develop innovative goods and a remarkable strategy. For instance, the Andersen group, a well-known baker that was founded after the war, invented frozen dough that enabled it to sell freshly baked breads at locations away from their factories; in 1963, Fumakilla invented the Electric Mosquito Destroyer for the first time in the world; Disco made rapid progress in cutting silicon IC wafers to become a leading precision machine producer.⁶¹

⁶⁰ *Ibid.*, pp.346-350.

⁶¹ Nikkei Bistek (ed.), "Hiroshima Hassiyo Kigyo no Kenkyuu" [Research for Companies in Hiroshima Origin], *MOT Wo Kiwameru Gijyutu Keiei Senryaku Shi* [Research for the Companies Originated in Hiroshima], *Record of Strategy for Management Technology to Master of Secret of*

The most renowned episode of a company's innovation would be the story of Mazda (formerly known as Toyo Industries), Hiroshima's leading company, which invented the rotary engine that had a great impact on the automobile manufacturing industry. The remarkable growth of Mazda was mainly due to the reuse of military facilities that had once been used for producing arms. Mazda invented the rotary engine by overcoming all obstacles including the already mentioned reparations imposed by the GHQ to gain strength in the face of intense competition with other competent companies and become one of the well-known Japanese automobile companies.

Toyo Industries began as a small cork producing company, named Toyo Cork Industries in 1920 and changed its name to Toyo Industries when it converted its business into the machinery industry. In 1931, it began manufacturing three-wheel trucks. After 1898, when the first automobile had been imported to Japan, the Japanese automobile market was dominated by imported cars. As of 1935, domestic car production was 5,100, accounting for only 13% of the total car supply. The first three-wheel car was imported one year after the first four-wheel car was introduced in Japan in 1931. Motor Manufacturer (today Daihatsu) and Toyo Industries initiated the production of three-wheel cars. At that time, the Japanese government emphasized the importance of automobile manufacturing for military use as a national policy, and accordingly, Toyota and Nissan were founded. However, three-wheel cars were popular among ordinary citizens. Consequently, as a result of the demand for arms during the war, the three-wheel and the four-wheel car production was discontinued until the war ended.⁶²

After the war, the specifications of the second reparation did not allow Toyo Industries to use 223 machines and facilities in the category of machine tools and 981 machines and facilities in the category of private arms.⁶³ Fortunately, from the perspective of Toyo Industries, the GHQ banned the production of automobiles, but

MOT, No. 009, Nikkei Business Publications, Inc, 2005, p.127.

⁶² Kawamura, *op.cit.*, pp.14-26.

⁶³ Hiroshima Prefecture, *op.cit.*, 1983, pp.181-182.

permitted to manufacture up to 1500 trucks per month. Therefore, after having obtained the permission for production from the GHQ by the end of 1945, Toyota, Nissan, and Toyo Industries attempted to repair their own factories and began the production of trucks. Toyo Industries made ten trucks in that year and achieved a production rate of 100 cars per month by the summer of 1946.

The priority production policy of 1946 gave second priority to automobile companies for the procurement of materials and only third priority to the coal and steel industry because automobiles and trucks were required for transportation.⁶⁴ The intensifying Cold War led the Strike Report commissioned by the US Department of Army to announce that “as regards peace and prosperity, it will be less risky to develop Japan as a strong industrial country than to maintain the unstable and unhealthy economic situation at present in this populated area.” McCoy’s declaration at the Far East Committee demanded that the Supreme Commander of the GHQ, MacArthur, should abrogate all remaining reparations that had prevented Japan from reusing military factories for a long time citing that Japan’s production for peaceful purposes should not be banned.⁶⁵

This implied that at least Toyo Industries, whose three-wheel car production rate exceeded its previous peak during the war, would be free from the severe burden of reparations. Their production boosted even further thanks to the special procurement demands for the Korean War (1950–1953). Three-wheel trucks constituted a major part of public transportation around that time, being less expensive than four-wheelers and suitable for the narrow roads of Japan. Therefore, their demand increased sharply. The proportion of three-wheel trucks in the total truck production was about 50% in 1949, but it exceeded 70% in the following four years. The market for three-wheel trucks was occupied by Toyo Industries, Daihatsu, and Mitsubishi Heavy Industries, and the competition among these three companies was very intense; in particular, Toyo Industries and Daihatsu vied with each other for supremacy.⁶⁶ When newly emerging

⁶⁴ Kawamura, *op.cit.*, p.32.

⁶⁵ Hiroshima City, *op.cit.*, 1984, pp.69, 78.

⁶⁶ Hiroshima Prefecture, 1983, pp.229-230.

automobile company Honda joined the competition, the car market became even more intensely competitive.

At that time, the environment surrounding the automobile industry began to improve. After the war, the GHQ allowed Japan to only manufacture trucks. In 1947, however, the GHQ granted Japanese companies conditional permission in that they were allowed to produce up to 300 cars per year. In the fall of 1948, the limit on production was abolished. The price controls for automobiles and tires were discontinued by 1950, and domestic dealing with imported cars was liberalized. In 1954, the commodity sales tax rate for automobiles was reduced, which further improved the automobile production environment.⁶⁷

Toyo Industries continued producing drills, implements, and machine tools, whose production increased as well. However, the production of three-wheel trucks accounted for 90% of the total production of Toyo Industries. New models were introduced successively, the size of cars became larger, and engine displacement increased from 700 cc to 1400 cc. In order to outdo other car companies, Toyo Industries attempted to produce large-sized trucks, which were demanded by transportation companies. It eventually became an industry leader in 1954. In order to expand further, Toyo Industries employed their original strategy of setting up a special contract-selling shop in each prefecture. By establishing its sales system, it strengthened its position in the market of three-wheel trucks.⁶⁸

During the 1950s, Japan welcomed a new era of motorization. Popularity shifted from three-wheel trucks to four-wheel automobiles. The Ministry of Economy, Trade and Industry announced the idea of encouraging the production of cars for ordinary people. Consequently, all automobile manufacturing companies devoted themselves to inventing new cars for all sections of society. Thus, the volume of car production, which was only 20,000 in 1955, began to increase drastically. This was mainly due to the intense sales competition among the automobile companies. Toyo Industries prospered and invented reasonable, light vehicles that enjoyed high

⁶⁷ Taiji Kawamura, 2000, pp.32-33.

⁶⁸ Hiroshima Prefecture, *op.cit.*, 1983, pp.231-232.

popularity among ordinary citizens. It achieved the leading position in terms of the numbers of cars produced, outdoing Toyota for three years from 1960. At the same time, in 1961, Toyo Industries conceived the idea of inventing a “dream engine” in order to respond to the demands of the prospective “motorized society.” This invention referred to a rotary engine that would be smaller, lighter, less noisy, and more powerful. In order to study the technology necessary for achieving these goals, the company sent skilled workers to former West Germany. It was the first step of a five-year process for the invention of the rotary engine.⁶⁹

As the leading automobile company, Mazda stimulated the manufacturing and shipbuilding industries in Hiroshima. It reestablished its original strategy of winning the domestic competition, while benefiting from the policies of the Japanese government, the GHQ, and the social environment. Mazda developed to become a top-level company not only in Japan but also in the rest of the world. Porter points out that it is in Japan where intensive domestic competition played the most remarkable role. By exemplifying the existence of more than 100 companies in the tool manufacturing industry, he notes that there are more than ten competent companies capable of global dominance located in the industrial sector of Japan. The presence of such strong rivals has a strong impact on all factors of the Diamond model.⁷⁰

A similar example can be found with regard to another industry in the same reconstruction period of the postwar era: the traditional industry of Hiroshima, namely, the needle manufacturing industry, which provided the basis for the manufacturing industry, while experiencing severe competition.

During the war, needle manufacturing companies received iron wire only via rations. Moreover, they could utilize only one material for making needles, the official price was fixed, export was forbidden, and about 20 companies were forced by the government to integrate into seven companies. Further, after the war, the needle manufacturing companies continued to experience difficulties in management, since their needle factories located within 3 km from the hypocenter had suffered enormous

⁶⁹ Kawamura, *op.cit.*, pp.50-54, Mazda website: <http://www.mazda.co.jp/philosophy/rotary/story/>

⁷⁰ Porter, *op.cit.*,(a), p.25.

damage.

However, there was a high demand for needles after the war; thus, the seven companies resumed their businesses by 1947. The special procurement induced by the breakout of the Korean War in 1950 invited several newcomers to set up businesses in the needle industry. As a result, the number of companies manufacturing needles rose to a new peak of 40. After the special procurement, however, many manufacturers' businesses collapsed because of the damping behavior and the burgeoning recession. Competition intensified among manufacturers in the Kansai area, which had not been damaged by air raids during the war, and the needle manufacturers in Hiroshima experienced a major crisis. As a countermeasure, in 1953, they founded the Needle Adjustment Union of Japan. Through this union, they attempted to adjust the production levels by themselves in order to prevent overproduction and consequently the damping behavior. They also collaborated to strengthen the import system and hence the sales of needles to the markets of India and the Middle East by setting a fair price. At the same time, along with the modernization of manufacturing technology, they invented an electric furnace in 1955 and the cutting machine in 1962.⁷¹ Bankoku Needle Co. led those innovations and is today a leading company worldwide. Notwithstanding that success, Bankoku Needle Co. continues to challenge itself to advance in new fields, such as the manufacturing of care spares and the fabrication of injection needles in cooperation with local companies.⁷²

3.3.1 Demand Conditions: High Quality Merchandise required by the Navy

In terms of the formation of companies, Porter highlights the impact of the establishment of military-related facilities in certain areas stating that "Sometimes, profitable factors and demand conditions are produced by chance. They affect the birth of companies." For example, because the US Air Force decided to deploy Strategic Air Commands (SAC) at Omaha in the State of Nebraska, optical fiber for

⁷¹ Hiroshima City Local Resource Center, *op.cit.*, pp.7-8.

⁷² Bankoku Needle Co. Website: <http://www.bankoku-needle.co.jp/>

telecommunication was first laid in this area in the US. Local telephone companies improved their technology to match the demand from the SAC. As a result, excellent telecommunication infrastructure that was developed in Omaha formed a basis for the development of telemarketing industries' cluster.⁷³

This pattern of development applies to Hiroshima, which was a military city for the period from the Sino-Japanese War to World War II, where facilities such as the Kure Naval Arsenal developed the most advanced technology at that time. The NBC regarded the technology that had produced the largest military fleet, Yamato, as the world's leading technology, as explained in the section on conditional factors. Kure was different from other Naval Arsenals in Sasebo and Yokosuka in terms of its facilities to manufacture arms and steel floors of fleets, which required the highest level of technology in various fields.

Furthermore, the Army's Food Depot and Clothes Depot continued to produce high-quality food and clothes for the military. One of its impacts was the development of the canning industry. While canned beef and a number of types of fruit cans were developed and commercialized, a jam canner, Kidoen (present Aohata) founded in 1932, became Japan's leading producer of jam and bottled food. Another example is the fountain pen maker, The Sailor Pen Co, which invented a pen tip with a gap. The founder of the company invented the tip by examining and improving the fountain pen presented to him by a naval officer returning from Europe.⁷⁴ These pioneers responded to the forefront needs of the time by leading the innovation efforts of companies.

Regarding the automobile industry, it can be noted that the unique needs of the Japanese happened to be the most advanced ones. Suzuki remarks on the characteristics of Japanese automobiles by saying that "They were small, efficient, and economical automobiles such as mini-cars in the prewar period and light vehicles in the postwar period. The automobiles suitable for the Japanese society became a global standard in the 1960s and 1970s when emission control was being focused upon and

⁷³ Porter, *op. cit.*,(a), p.124.

⁷⁴ Nikkei Bistek, *op. cit.*, p.157, and Hiroshima Bank Economic Research Institute, *op. cit.*, p.74.

the oil crisis had occurred.”⁷⁵ In addition, Japanese automobile manufacturers did not concentrate particularly on mass production; instead, they aimed at small production levels of various types of automobiles while constantly pursuing the expansion of their production size. Since Japanese automobile customers’ demands were originally divergent, manufacturers had to frequently introduce changes and diversifications in their models.⁷⁶

The trend in the US was completely different. In the US, first, standardized cars for ordinary people appeared in the market. After the expansion of the market, car models were diversified in the process of upgrading to high-grade cars. In Japan, the development of the market and diversification of models proceeded concurrently. Therefore, while Japanese car manufacturers had mainly produced trucks, they also made efforts to quickly acquire basic skills to manufacture light vehicles via technical collaboration with European manufacturers. They attempted to enhance their own skills by adopting new technologies. When the Japanese society entered into the so-called era of motorization, they were able to adopt a strategy of offering various series of models to meet the various demands of people from high-class cars to affordable cars. The intense competition among car manufacturing companies drove them to invent more diverse models of cars.⁷⁷

It should be noted that Hiroshima was said to be the “suitable place for test marketing” along with Shizuoka City. Hiroshima, a regional hub city with populations in coastal and mountainous areas as well as in the urban and country areas may be referred to as “miniature Japan.” Since this characteristic has been highlighted for a long time, companies such as Fast Retailing in Yamaguchi City, which later developed into UNIQLO clothing shop worldwide, have chosen Hiroshima for setting up their first shops.⁷⁸

⁷⁵ Suzuki, Kazuyoshi, *20 Seiki no Kokusansya [Domestic automobiles in the 20th century]*, Mikishyobou, 2000, p.10.

⁷⁶ Shimokawa, Koichi, *Nippon No Kigyo Hattenshi [Development history of Japanese companies]*, Kodansha, 1990, pp.183-186.

⁷⁷ Keiichiro Nakagawa et al., *Kindai Nippon Keieishi No Kiso Chishiki [Basic knowledge of Japanese modern management history]*, Yuhikaku, 1974, pp.404-405.

⁷⁸ Nikkei Bistek, *op. cit.*, pp.195-196.

3.3.4. Related and Supporting Industries: Formation of Clusters and Supporting Small and Mid-sized Companies

With regard to supporting industries, this essay deals with following three topics: (1) formation of a machine-related industrial cluster, (2) governmental policies, and (3) support by financial institutions.

(1) Formation of a machine-related industrial cluster

Research on “Regional Innovation and Entrepreneurship” conducted by the Development Bank of Japan and Stanford University in the US outlines the characteristic of industries in Hiroshima as follows:

“In Greater Hiroshima City Area, a machine-related industrial cluster exists in a wider sense including shipbuilding and steel manufacturing industries with the automobile-related industry as its center. It comprises 2000 firms and 80,000 workers that produce products worth ¥2700 billion.”⁷⁹

Another research paper on the strategy of the automobile industry in Hiroshima points out that Hiroshima possesses an industrial agglomeration with a strong nature of a “company town” (*Kigyo Jokamachi*), centering around Mazda. However, it is also said to differ from the typical company town in that “the existence of the core institutions with the functions of decision making and development bring competitive advantages to companies in the region through intimate information exchange with such institutions with regard to the improvement of technology and the formation and expansion of business relationships.”⁸⁰

Prior to the war, Toyo Industries minimized the proportion of the outsourcing of processing by adopting the system to manufacture almost all parts in-house.

⁷⁹ Development Bank of Japan and Stanford University, *op. cit.*, p.10.

⁸⁰ Shoko Research Institute, *Hiroshima Chiiki No Jidousya Snagyo Niokeru Torihiki Kankei No Henka to Jiba Kigyo No Ikinokori Senryaku [The change of dealing relationship in automobile industry and local enterprises' strategy for surviving in the Hiroshima area]*, (2006), Summary, www.shokosoken.or.jp/chousa/img/18-2.pdf

However, in the process of rapid growth in the postwar era, rationalization and outsourcing were promoted. Cooperative companies directly dealing with Toyo Industries increased from 43 firms in 1950 to 104 firms in 1960. It can be said that along with the growth of Toyo Industries, the automobile parts manufacturing industry too developed rapidly. The productive structure of the automobile industry in Hiroshima Prefecture has Mazda (former Toyo Industries) at the top of pyramid as well as preliminary and secondary cooperative firms to support it. In 1952, 20 of the preliminary cooperative firms that received direct orders for machines and metal plates from Toyo Industries organized a group named “Toyukai” with the objective of “fostering friendship among the members, building closer connections with Toyo Industries, and strengthening cooperation among each other in order to improve skills and promote rationalization.” In 1961, the secondary cooperative firms set up a group called “Tokokai” and strengthened the cooperative relationship with Toyo Industries and its subcontractors. (Toyukai and Tokokai merged into one group later). In the 1980s, a new group named “West Japan Yokokai” was formed with a wider range of cooperative firms (66 firms) including most major automobile parts manufacturers in Hiroshima Prefecture.⁸¹

Mazda, once the leading automobile manufacturer in Japan (it is the fifth largest automobile company presently) and known as Toyo Industries in the past, played a very important role in the growth of other industries including non-automobile industries.

For example, Chugoku Industries, established at the site of a part of the former Naval Arsenal that produced steel fabricated parts as a metal products manufacturing firm, began manufacturing automobile parts for Toyo Industries in 1953 by diversifying the products in accordance with the era of motorization. The nonmetal casting industry such as aluminum production is traced back to traditional foundry in the prewar era. During the war, they focused on producing casting parts for military machines. One such company, Hiroshima Aluminum Industries, originally produced aluminum casting products for household use. In 1934, they began manufacturing parts

⁸¹ Hiroshima Bank Economic Research Institute, *op. cit.*, pp.22-24.

of three-wheel trucks for Toyo Industries, grew with Toyo Industries in the postwar period, and completed a production line of continuous sand casting for the first time in that field in 1961. It is now a leading company in the industry. The plastic product manufacturing industry was born after the war, and it developed rapidly by manufacturing automobile parts with Dikyo and Nishikawa Kasei as the two leading companies collaborating with Mazda. The rubber products manufacturing industry originated from manufacturing the soles of Japanese sandals at the beginning of the twentieth century. During the war, they began manufacturing tubes for automobiles and became one of the four largest production centers in Japan next to Tokyo, Osaka, and Hyogo. For ten years after the war, their major product was rubber shoes. However, from the 1960s, their production of industrial rubber products for automobiles increased rapidly.⁸²

Molten, famous for production of soccer balls, began to collaborate with Mazda in the process of expanding its manufacturing from trucks to automobiles in the second half of the 1950s for the purpose of stabilization of its management. At that time, a company located in Okayama Prefecture received all orders of rubber parts for Toyo Industries; however, fortunately, Molten received a trial order. Molten soon purchased a pushing machine and a second-hand press machine, and manufactured rubber parts. Thereafter, organizing more industrial facilities, in 1959, they began producing rubber for Hume pipes, rubber hoses for gas, rubber packing for oil cookers, and so on. Gradually, the number and amount of orders and products expanded.⁸³

In Hiroshima, the leading companies in each industry within the wide range of machine-related industries have been forming an industrial cluster under the leadership of Toyo Industries. Of course, it should also be noted that governmental policies played a key role at the beginning of the reconstruction process in the postwar period.

<Reconstruction Project >

⁸² Ibid, pp.46-61.

⁸³ Molten, *Souzou to Yakushin: Molten 25nen No Ayumi [Creation and Progress, 25-year-history of Molten]*, Molten, 1983, pp.33-35.

In the process of economic reconstruction in Hiroshima after the bombing, the speed of project implementation had a great influence on the progress of reconstruction.

Postwar reconstruction projects in each city resulted in a huge change in Japanese old “castle-towns” formed around the beginning of the Edo era. Building infrastructures at the centers of cities constituted the basis of the postwar high-growth of the economy.”⁸⁴ Many reconstruction projects were down-sized later. However, since Hiroshima initiated its project earlier than other cities, it successfully rebuilt the city mostly as planned.

Hiroshima’s reconstruction was led by the Hiroshima Peace Memorial City Construction Law as a result of a passionate petition by Mayor Shinzo Hamai to the SCAP and the Japanese government. Since it was the time when the Dodge Line policy was introduced, the budget allocated for the project was reduced to only one ninth of the initially estimated cost. However, the national government added approximately ¥31 million to subsidize the project via a supplementary budget in 1949. Next year, ¥270 million was appropriated for reconstruction projects at Hiroshima and Nagasaki, out of which Hiroshima received two-thirds of the amount. It was an increment of ¥100 million from the previous year. In 1950, EROA funds were utilized for public projects including building the 100 m-wide Peace Boulevard, Peace Bridge, and West Peace Bridge, which were designed by Isamu Noguchi, as projects commissioned by the national government. The former military sites were allotted free of cost to the city for building schools, parks, and hospitals.⁸⁵

<From Consumption Prefecture to Production Prefecture>

Hiroshima City’s reconstruction project was mainly led by Hiroshima City itself, and the City Hall was working in cooperation with the prefectural office. However, when Ohara became the new governor of the prefecture in 1951, he set up a new slogan,

⁸⁴ Koshizawa, *op. cit.*, p.174.

⁸⁵ Hiroshima City, *Hiroshima Genbaku Sensai Shi [Hiroshima’s record of bombed damage]*, Hiroshima City, 1971, p.61.

“Convert Hiroshima from a consumption prefecture to a production prefecture.” This was the guidepost on the way for Hiroshima Prefecture to build a new prefecture by laying more emphasis on developing industries. There have been many debates for and against the effect of the concept of a “production prefecture.” However, during the period (1952–1962) when this policy was exercised, a change occurred. The per capita prefectural income was ¥31,797, which was equal to only 78% of the national per capita income in 1950. However, in 1956, the amount more than doubled to ¥78,107 (equal to 95.7%). In 1958, it slightly surpassed the national per capita income at ¥90,906 (100.2%).⁸⁶ It focused on agriculture and fishing industries; however, Hiroshima City’s reconstruction project also included supporting industries, developing transportation systems as the basis for fostering the economy, and implementing disaster-control programs. It was initiated about ten years earlier than the famous “income-doubling program” led by Prime Minister Hayato Ikeda, who was born in Hiroshima, at the national level. There is a view that the framework of the production prefecture might have provided some impetus to the income-doubling program.⁸⁷

This concept of a production prefecture includes the following four policies for building the foundation for economic reconstruction in addition to the supporting measures for small and mid-sized firms.

1. Conversion of former military sites for nonmilitary use and invitation to companies
2. Resumption of foreign trade and development of the domestic market
3. Development of a transportation system
4. Disaster-control measures
- 5.

1. Conversion of former military sites for nonmilitary use and invitation of companies
Seven former military sites existed in Hiroshima City, Kure City, Takehara City,

⁸⁶ Hiroshima Prefecture, *op. cit.*, 1996, pp.46-47.

⁸⁷ Takeshita, Toranosuke. *Chihou Jichi Toha Nanika [What Is the Local Autonomy?]*, Gendai Shiryo Shyppan, 2006, p.69.

Fukuyama City, Otake City, and Kaita Town. The prefectural office, working in cooperation with city and town offices, attempted to secure the site, race, and electric power; paid compensation to the fishery and agriculture industries; built industrial foundations such as roads and embankments; and provided tax exemptions to companies. Some former military facilities were rented to the Mitsubishi Shipyard and Hiroshima Ryoko Company. Moreover, a new bylaw to encourage the establishment of factories was enacted in 1953, and maintenance works of roads and ports were conducted.

2. Resumption of foreign trade and development of the domestic market

The once-active trade with Asian countries became dormant after the war. Immediate measures included research on records of exports, encouragement of production suitable for export, advertising of special products, submission of local products at exhibits, and preparation for opening the Hiroshima port. For the purpose of promotion of goods in the domestic market, the prefecture office stationed its staff in charge of the sales campaign both at Tokyo and Osaka. Trade fairs were held at departmental stores.

3. Development of transportation systems

Heavily damaged by air raids, the atomic bomb, and the flood caused by the typhoon, roads in Hiroshima prefecture were in a terrible condition. Repairing of the roads was an urgent agenda by around 1950. Thereafter, with the increase in transportation by cars, land transportation systems became an important project agenda. Major roads such as Route 2, Route 31, and the Hiroshima-Matsue route were improved and paved. Wooden bridges were changed into sustainable iron bridges, and a toll road system was introduced. Traditionally, Hiroshima was the hub for marine transportation. Hiroshima port was restructured as a major trade port in the largest industrial city in Chugoku region, and a 10,000-ton berth for large fleets was constructed. Hiroshima airport was constructed by support from Hiroshima City and local financial circles and opened in 1961.

4. Disaster-control measures

Hiroshima was a disaster-prone area, often damaged by floods brought about by typhoons such as the Makurazaki Typhoon that struck immediately after the war. Therefore, disaster-control measures were urgently needed. Due to overcutting of trees in the mountains to obtain firewood for shipbuilding and salt-producing (in the coastal areas) and steel manufacturing (in the mountainous areas) before, during, and after the war, heavy rains often caused landslides and damaged the cultivated fields and low-lying urban districts around the Otagawa River. The disaster caused by Makurazaki Typhoon severely damaged the southern coastal areas. The prefectural office immediately adopted disaster-control measures by repairing bare mountains and landslides.

Hiroshima Prefecture, with a number of dangerous steep slopes in mountainous areas, was vulnerable to typhoons, heavy rain, and high-tide. The budget for disaster-control measures was accorded priority in the period between 1945 and 1950. Embankment works along the main rivers including the Otagawa River, construction of seawalls, and improvement of roads, were executed as projects supported by the national government.⁸⁸

<Supporting Measures for Small and Mid-sized Firms>

In addition to the above measures for designing a production prefecture, governmental support for small and mid-sized firms played an important role in the reconstruction of manufacturing industries in Hiroshima.

Small and mid-sized firms were afflicted with severe financial difficulties and shortage of materials brought about by the war; furthermore, inflation in the postwar era weighed heavily on their management, and the Dodge Line policy generated recession and financial distress. In particular, around 1948, many small firms suffered from difficulties in borrowing loans, shortage of materials due to limited allotments, and heavy tax burdens. In fact, a report by the Hiroshima branch of Japanese Bank in 1949 found that money shortage occurred as a result of delay in payments by parent

companies, reduction of advance payments, overloads of taxes, and a rise in salaries. In the same year, many companies were on the verge of bankruptcy due to financial distress.

The national government initiated full-fledged supporting measures in July 1948 by establishing the Small and Medium Enterprise Agency. In the next year, the National Finance Corporation was founded for financial support, and it provided long-term micro finance to small and mid-sized enterprises. The amount of finance provided was ¥500,000 at the maximum and ¥20,000 at the minimum. The Hiroshima branch of the National Finance Corporation witnessed a flood of applications. Reasons for the applications were mentioned as buying a sewing machine, opening a tailor shop, repairing an inn, etc. To respond to such demands, the prefectural office launched a new finance system in 1950 named the “Hiroshima prefecture micro finance system for small and mid-sized enterprises” for “enterprises whom ordinary financial institutes do not finance.”⁸⁹

Furthermore, the office initiated measures to encourage business rationalization and established bureaus comprising small and mid-sized firms and commercial establishments. Hiroshima City initiated visiting and inspecting services for factories in 1950. In seven industries including metal, machine, chemical, fiber, woodwork, food, and printing, expert professors from Hiroshima University provided advice on management, labor management, and production technology.⁹⁰

Responding to requests from some industries, the prefectural government set up five types of industrial experimental stations including those related to clothes, machinery, metal, and food.⁹¹

In reality, such technical advice served as a strong support for promoting innovation in companies. For instance, Bankoku Needles, currently the leading company in the field that first restarted manufacturing needles in Hiroshima after the war based on finance obtained from local banks despite the destruction of its factory,

⁸⁸ Hiroshima Prefecture, *op. cit.*, 1996, pp.57-64, 66-73.

⁸⁹ Hiroshima City, *op. cit.*, 1984, pp.163-166.

⁹⁰ Ibid, p.169.

⁹¹ Hiroshima Prefecture, *op. cit.*, 1996, p.65.

began to replace manual work with electric furnaces for carburizing. The idea originated from the auto temperature adjustment attached to an American baking machine. It was the Hiroshima Industrial Experimental Station that successfully developed the electric furnace with support of experts on iron processes. By reducing inferior products with the developed electric furnace, Bankoku Needles continued to manufacture high-quality gliding needles. In order to export needles, they also worked with the Design Department of Toyo Industries and invented a packaging mechanism to easily unwrap needles by pushing a button.⁹²

<Financial Institutions' Support>

As noted earlier, the most critical issue for small and mid-sized enterprises was to secure funds. In addition to the governmental systems of micro-finance, financial institutions such as banks and credit associations in local areas supported the growth of companies.

When the war ended, the number of banks in Japan was 61 as a result of the war-time policy of “one bank in one prefecture” (Five banks whose headquarters were in Hiroshima Prefecture merged into one bank in 1945). A new law was enacted to establish new banks as a financial measure for small and mid-sized enterprises.

First, the policy to encourage rather smaller local banks for the need to supply funds to small and mid-sized enterprises led to the establishment of 12 banks during the period 1950–1954. The Mutual Savings Bank Law of 1951 helped mutual financing companies (*Mujin gaisha*) to convert into banks for small and mid-sized enterprises.⁹³ The mutual financing company was a financial system for ordinary citizens, which was introduced in the middle of the Kamakura era (1192–1333), which was similar in form to the micro-finance scheme introduced by Grameen Bank in Bangladesh. By fixing the number of shares and amount of funds and calling for participants, the company provided funds to all participants in an order that was

⁹² Chugoku Shimbunsha, *Top ga Kataru: Ge [Presidents' talk, part 2]*, Chugokushimbunsha, 1981, p.193.

⁹³ Hiroshima City, *op. cit.*, 1984, pp.365-368, Hiroshima Bank Economic Research Institute, *op. cit.*, p.91.

decided by lots or by other forms. After the Meiji era, this system was industrialized.⁹⁴ The second largest local bank in Hiroshima at present, Momiji Bank, was formerly a mutual financing bank. In the same year when the Mutual Bank Law was enacted, the Credit Association Law was also introduced. It allowed credit corporations whose investments met a certain standard to convert into credit associations. Moreover, 249 credit corporations out of 645 in total converted into credit associations in 1951.⁹⁵

The result can be observed in the increased amount of loan balance of equipment funds. In the first half of the 1950s, the proportion of private financial institutions and governmental funds constituted half of the amount of the loan balance of equipment funds. However, in the latter half of the 1950s, the proportion of governmental funds decreased, while the proportion of private financial institutions increased. Moreover, the number of new loans for equipment funds acquired by manufacturing industries in 1955 shows that while the proportion of city banks was only 4.3% and local banks' was 5.1%, mutual financing banks occupied 67.9% and credit associations' accounted for 18.1% of the loans. This indicates the important role of mutual financing banks.⁹⁶

Major banks whose head offices were situated in Hiroshima Prefecture include the Geibi Bank (presently Hiroshima Bank) established before the war, Hiroshima Sougo Bank (presently Momiji Bank), and Kure Sougo Bank (which later became Setouchi Bank, then merged into Momiji Bank) that were newly established by the Mutual Financing Bank Law. As a result of the reform of financial systems to encourage division of labor, each bank was required to develop its own specialty. Adopting specific roles, financial institutions met enormous demands for funds from companies. This was a characteristic feature of the Japanese financial system.⁹⁷

As of July 1951, the number of firms in Hiroshima prefecture was 84,810. Moreover, 70,707 out of them were under individual owners' managements. Since loans from ordinary banks were allocated to large companies, there was little room for

⁹⁴ Japan housing Mujin Co., HP, website: http://www.nihon-jm.co.jp/about_mujin.html

⁹⁵ Hiroshima City, *op. cit.*, 1984, pp.368-369.

⁹⁶ Takeda (ed), *op. cit.*, pp.257-263.

⁹⁷ Hiroshima Bank Economic Research Institute, *op. cit.*, p.91.

providing loans to small and mid-sized enterprises. Therefore, Article 1 of the Mutual Financing Law announces that its objective is to provide finance for small and mid-sized enterprises and all citizens.⁹⁸ The mutual financing banks adopted the role of financing small and mid-sized companies.

Another new institution, namely, credit associations, was born as a local cooperative financial institution based on the Credit Association Law. Credit associations provided loans to small and mid-sized enterprises and local citizens in specific areas. Moreover, 19 out of the 21 credit corporations in Hiroshima were reorganized as credit associations by 1953.⁹⁹

In this manner, many financial institutions supported companies' management in accordance with the companies' sizes.

For instance, Molten originated from a rubber manufacturing factory in the prewar era. After the war, it resumed its business as Myozyo Gomu, and the then President, Kiyoshi Nobori, set up a new company. At that time, the institution that offered funds was the company's main bank, Hiroshima Shinyo Kinko, a credit association. Molten was dealing with other banks including Hiroshima Bank and Yamaguchi Bank. However, they mainly relied on Hiroshima Shinyo Kinko not only for funds but also for advice on the company's establishment and mediation for obtaining loans from other banks. For example, Molten obtained short-term loans and operating funds from Hiroshima Bank and Hiroshima Shinyo Kinko, while it obtained long-term loans and equipment funds from the Japan Finance Corporation for Small and Medium Enterprises with the president's real estate as collateral through the channel of Hiroshima Shinyo Kinko. In 1961, for instance, they obtained loans for the establishment of a new factory through Hiroshima Shinyo Kinko's mediation.¹⁰⁰

⁹⁸ Hiroshima Universal Bank's history editing department, *Hiroshima Sogo Ginko 70Nen Shi [Hiroshima Universal Bank's 70 years history]*, (Hiroshima: Hiroshima Universal Bank, 1993), pp.238–240.

⁹⁹ Hiroshima Credit Association, *Hiroshima Shinyo Kinko 50nen Shi [Hiroshima Credit Association's 50 years history]*, (Hiroshima: Hiroshima Shinkin Bank, 1996), p.125, Japan Credit Association, HP, website: <http://www.shinkin.org/>

¹⁰⁰ Molten, *op. cit.*, pp.28-29.

4. Present Industrial Cluster in Hiroshima

As examined in the essay, in the prewar era, Hiroshima had traditional industries such as needle manufacturing and shipbuilding. During the war, military-related industries developed. The industrial cluster was formed in the postwar period based on managerial efforts, governmental support, and other factors. This essay on the history of Hiroshima shows how Hiroshima Prefecture, having Hiroshima City that was devastated by the atomic bomb, could reconstruct its economy, pushing the per capita prefectural income to the national income level to prepare for the high-growth period. Of course, Hiroshima was not completely unique; it is true that industrial clusters can be observed all over Japan, and as a symbolic word, *Monozukuri* (innovative manufacturing) shows, manufacturing industries in all local areas drove Japan to the present status of a developed country. In this sense, what Hiroshima illustrates is the modern history of a typical Japanese industrial city with a very rare and dramatic experience of reconstruction after being struck by an atomic bomb.

In recent times, many challenges, led by the national government, to create and develop industrial clusters have been witnessed. The Ministry of Economy, Trade and Industry has been promoting Industrial Cluster Projects since 2001 in order to develop technology and new products at the internationally advanced level by strengthening innovations by industry-academia-government collaborations aggregated in local areas. The projects have been conducted in 19 wide areas in regions including the Chugoku region where two projects have been implemented. One of the projects is the “Renewal Project of Machine-related Industry in the Chugoku Region.” The Ministry of Education, Culture, Sports, Science and Technology launched the “Creating Intellectual Cluster Project,” focusing on universities and public organizations with the aim of producing technological innovations of the latest technology in specific fields of information and communication technology and nanotechnology to obtain international competitive power. Moreover, 10 clusters over

12 regions including the bio cluster in the Hiroshima area were selected.¹⁰¹

The high-growth period is over, oil crises have occurred, the bubble economy has burst, and companies in Hiroshima such as Mazda have been influenced by business conditions and have experienced ups and downs. However, Hiroshima still retains the industrial cluster that supports its manufacturing industries.

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