Prof. Dr. Takafumi Kurosawa
Kyoto University, Graduate school of Economics
kurosawa@econ.kyoto-u.ac.jp
Prof. Dr. Tomoko Hashino
Kobe University, Graduate school of Economics
hashino@econ.kobe-u.ac.jp

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# From the Non-European Tradition to a Variation of the Japanese Model of Competitiveness: The Modern Japanese Paper Industry in the Context of International Comparison[1]

Takafumi KUROSAWA and Tomoko HASHINO

## Introduction

In 1874 Japan's first machine-made paper was produced. Its history of 130 years is shorter than those in European countries. However, the Japanese paper industry grew rapidly in the 20th century, and Japan has remained the second largest paper producer in the world for almost 30 years after 1973.

Though it was overtaken by others afterwards, Japan's paper and paperboard production was still ranked third in the world (31.22 million tons annually), pulp production seventh (10.8 million tons), and its per capita paper consumption was eighth (247.4 kg) in 2007, as one of the top producers and consumers of paper.[2] Though it set out the last among the major papermaking countries in the 20th century, Japan grew the fastest (Graph 1 and 2). The growth was supported by the rapid expansion of its domestic market. Unlike other implanted industries, import dependency was low from the outset. Foreign manufactures operating in Japan were virtually non-existent. The fact that a system in which domestic manufacturers cater to most of the domestic

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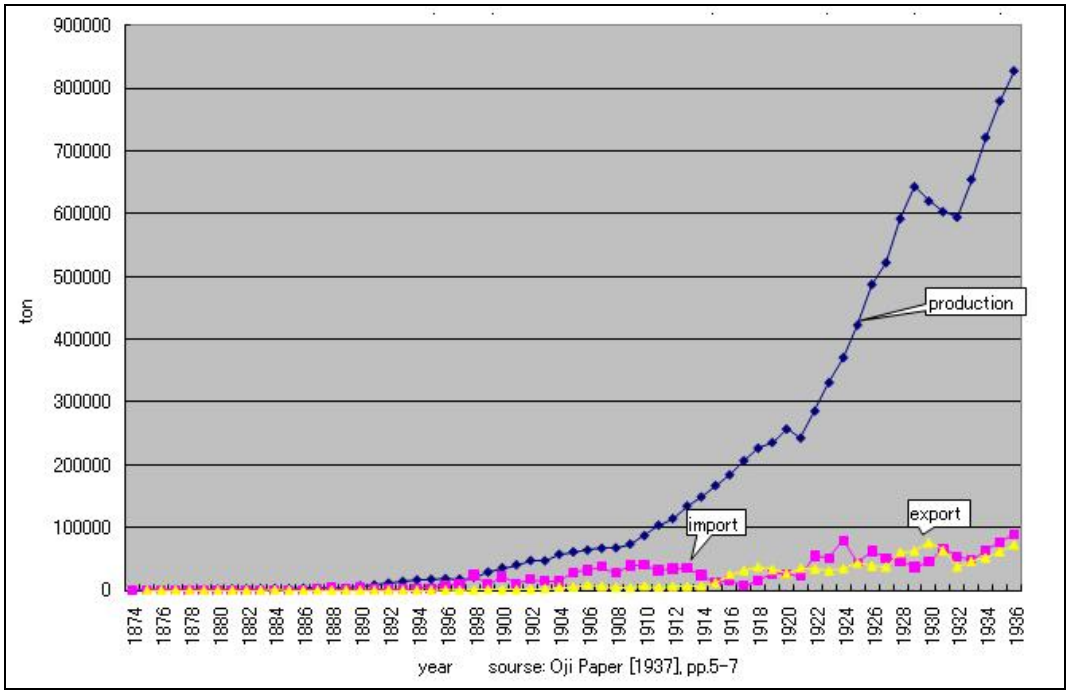
[2] http://www.jpa.gr.jp/en/ (Japan Paper Association)

demand was established already in its infant period and still retains today marks a feature of the paper industry of Japan.

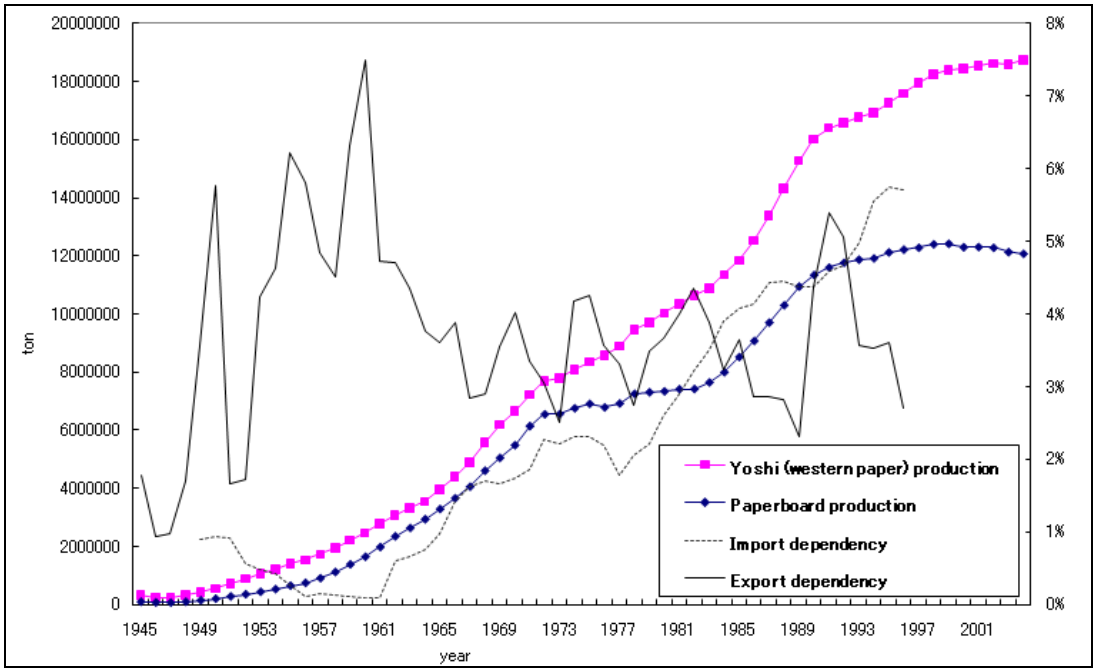
How was this fast-paced catch-up process, or formation of a new market through technology transfer to be exact, realized? Governmental protection is not a relevant answer; Japan lacked tariff autonomy between the mid 1880 to the eve of WWI, when its paper industry was at an infant stage, and private companies, with a direct governmental involvement limited to its very initial period, basically led its development. The rapid development of the modern paper industry should therefore be explained by other factors.

**Graph 1. Import and Export of Paper (all kind), and Production of Yoshi (Western paper) in Japan (1872-1936)**




The development of the Japanese paper industry in the 20th century is also interesting in terms of both international comparison and comparison with other domestic industries. After WWI, the paper industry was the first sector to form an oligopoly, which lasted until its dissolution following Japan's defeat in WWII The industry shrunk significantly during WWII, and made a restart with its production capacity halved due to Japan's lost territories. The postwar period saw fast growth. The domestic manufacturers retained their competitive edge over the imports in the domestic market, but they never enjoyed a strong competitive advantage in the global market, unlike many other Japanese industries flourishing after the war, such as shipbuilding, steel, electric and electronics, and automobile.

**Graph2. Production and Degree of Import-Export Dependency (five-year-average in percent figures) of Yoshi (western paper) and Paperboard in Japan (1945-2005)**




Source: Calculated from data in Suzuki [1967], appendix, and *Year book of pulp and paper statistics* (Minister Secretariat Office for Research and Statistics; Ministry of International Trade and Industry), edition of each year

The Japanese paper industry is unique in that it maintained a vertical integration of pulping and papermaking albeit with the problem of limitation of forestry resources faced in the course of development. The factors that supported this uniqueness were ample supply of domestic resources at its outset, the presence of a world-renowned textile industry in its expansion period, development of dissolved pulp (DP) industry in conjunction with the government policy of autarky. After WWII, this integration model was linked to the coastal location strategy based on free trade.

This paper analyzes this development of the modern Japanese paper industry from the standpoint of international comparison and inter-industry comparison, while linking it with the role the traditional paper culture of Japan plays in the formation of the modern paper industry.

Section 1 contains an overview of the historical background and general conditions of the Japanese paper industry from 1870s onwards through study of the following elements: (1) the positioning of *washi* (the traditional paper products) and *washi* industry, (2) the cultural and geographical conditions of the Japanese market, (3) the role of the national government and the market, (4) the business structure, and (5) the investment strategy, technological system, market characteristics and competitiveness.

Sections 2 and 3 contain period-by-period analyses. In section 2, the period between 1870s and 1945 shall be divided into two sub-periods for analysis. 2-1:Introduction of

the machine papermaking technology and *yoshi* (Western paper), and formation of the modern industry (from 1970s to 1910), 2-2: foundation of the large-scale process industry using wooden pulp, and oligopoly (from circa 1910 to 1945). Finally, section 3 shall deal with the period after WWII to the present. 3-1: The fresh start and the rapid growth after WWII (1945 to 1973), 3-2: expansion under the maturing economy, and 3-3: restructuring under the pressure for globalization (from mid 1990s).

## 1. Historical background and general conditions

### 1.1 Japanese paper and western paper: Japan's indigenous paper culture and the modern paper industry

The modern machine papermaking of the paper product types introduced from the Western countries started out in the mid 1870s. However, considering *washi*, the traditional Japanese paper (whose characteristic shall be described below), papermaking dates far back in 7th century. The hand-made paper industry introduced from China through the Korean peninsula made a significant development long before modernization. Papermaking until the Medieval Age was closely connected to religion also in Japan, where major part of the paper demand was for the Buddhist scriptures, transcription of sutras, and political records. The sutras were printed in book form around the 12th century onwards. Meanwhile, literature emerged around the end of 12th century, and the use of paper encompassed sliding-screen paper, tissue paper and *kaishi* (pocketable folded paper for versatile use), and it further spread into the daily life as fixture and livingware in the 14th century.[3]

The Japanese economy showed a proto-industrial development and sustainable economic growth in the early modern period (from the end of 16th century to the 1860s) where demand for paper went sky-high due to flourishing trade and manufacture, and increases in income and population. Under the *shogunate* system, many provinces promoted production of *washi* as a monopoly good. The result was a dramatic increase in amount and variety of paper and the popularization of the demand for paper. Paper was used not only for writing, books and wrapping, but also for fixtures like screen door and sliding door, and various other products such as umbrellas, paper lanterns, and raincoats. The use of paper in Japan was far wider than that in European countries, and due to this versatility, the Japanese paper industry had a relatively large market even before modernization and westernization.

These paper products formerly made by hand before the early modern period are collectively called *washi* (Japanese paper). On the other hand, the machine-made paper

[3] Miyamoto[1973], p.58

products imported from the West and was soon manufactured in Japan are called *yoshi* (Western paper). The history of modern paper industry is equivalent to the process of introduction and development of *yoshi* papermaking, but its development cannot be explained without its relations with *washi*.

Whereas in the West the difference between the product characteristics of handmade paper and machine-made one are relatively small and their modernization was centered on process innovation, the Japanese traditional *washi* and modern imported *yoshi* had three major differences. First is difference in material. *Washi* uses bast fiber (not the woody part) of *kozo* (paper mulberry, *Broussonetia kazinoki*), the *mitsumata* plant (*Edgeworthia chrysantha)* or *gampi* plant (*Diplomorpha sikokiana*). Second, there is a difference in the manufacturing process. Japanese papermaking employs the *nagashi-suki* (discharge papermaking)[4] technique, which is suitable for making thin paper with long fiber. This technique uses plant mucilage of *Abelmoschus manihot* called *nori* or *neri* for dispersing the wood pulp to enable production of strong and attractive looking paper. Sizing is usually not performed. The third is difference in product characteristics and use. Because of its strength, *washi* could be used for various purposes other than writing. Since ink bleeding was not a negative factor in the Japanese calligraphy using ink brush and inkstick, the unsized, coarse-surfaced *washi* was deemed fit for the traditional writing method.

As explained, there are significant differences between *washi* and *yoshi*, not only in terms of manufacturing technique but also in their use, thus they usually did not compete against each other in the same market. *Yoshi* was not desirable for traditional use such as fixtures, umbrellas, lanterns, clothing, and calligraphic paper, therefore could not replace *washi* there. The *washi* industry retained the traditional *washi* market during the 19th century, and seized an export market, which had been non-existent during the period of National Seclusion, and a new demand associated with modernization. *Washi* was used for government-compiled school textbooks until 1903, so demand for it expanded together with the spread of education after 1870s.[5]

*Washi* manufacturers, most of which were micro-sized, existed throughout Japan. Eventually they started to adopt machine papermaking for *washi* as well. In addition to the traditional bast fiber, they started using rag, and later on wood pulp and Manila hemp (e.g. used fish net) also.[6] Machine-made *washi* was first tried out in 1877, the

[4] "Letting the pulp stock water settle on the mold and allowing drainage of water through the screen thus forming a sheet of paper". Paper Museum[1998],p.8. See also Furuhata[2001], p.72 and Sakamoto[2001], p.50

[5] Yagi[1940], pp.45-47

[6] Daishowa Paper[1991], pp.429-430

machine-made *washi* paper napkin was commercialized in 1895, and manufacturing of mimeograph paper using the cylinder paper machine began in 1906. Both handmade and machine-made *washi* found themselves new export markets.[7]

In response to the impact of westernization, the *washi* industry experienced both process innovation and product innovation, through which it came up with a new hybrid product category, and industrial sector called "machine-made *washi*," independently from the traditional handmade *washi*. This intermediate market and product can be seen in other industries and products, such as the rickshaw, which was developed in Japan and spread to Southeast Asia[8], but it is a unique phenomenon in the paper industry- that the emulation and localization to fit the local situation were reciprocal between the Western countries and Japan.[9] As a result of this process, the boundary between *yoshi* and machine-made *washi* eventually became blurred.

The domestic production volume of *yoshi* in the narrowest sense surpassed that of *washi* (total of machine-made and handmade) in the early 20th century, and their gap kept widening ever since. However, one should not discount the fact that the production of machine-made *washi* was always growing. (See Graph 3) Later on, its production hit a plateau, but it managed to survive by finding the lower class product market in between the *yoshi* industry in the high-end to middle-grade product markets and handmade *washi* industry—which remained a side business of farming villages in various areas until after WWII——with finest craft and special niche product markets. The *washi* manufacturers went ahead of the *yoshi* industry to start using recycled paper.

The decline of *washi* industry was more a result of the gradual change in culture that included paper products, ever-westernized lifestyle in the 20th century, or the arrival of non-paper material than its defeat in the direct productivity and quality competition against *yoshi*. In the changeover from ink and brush to pen, *washi* was replaced by *yoshi*. This shows the fact that paper products do not exist on their own but as a part of

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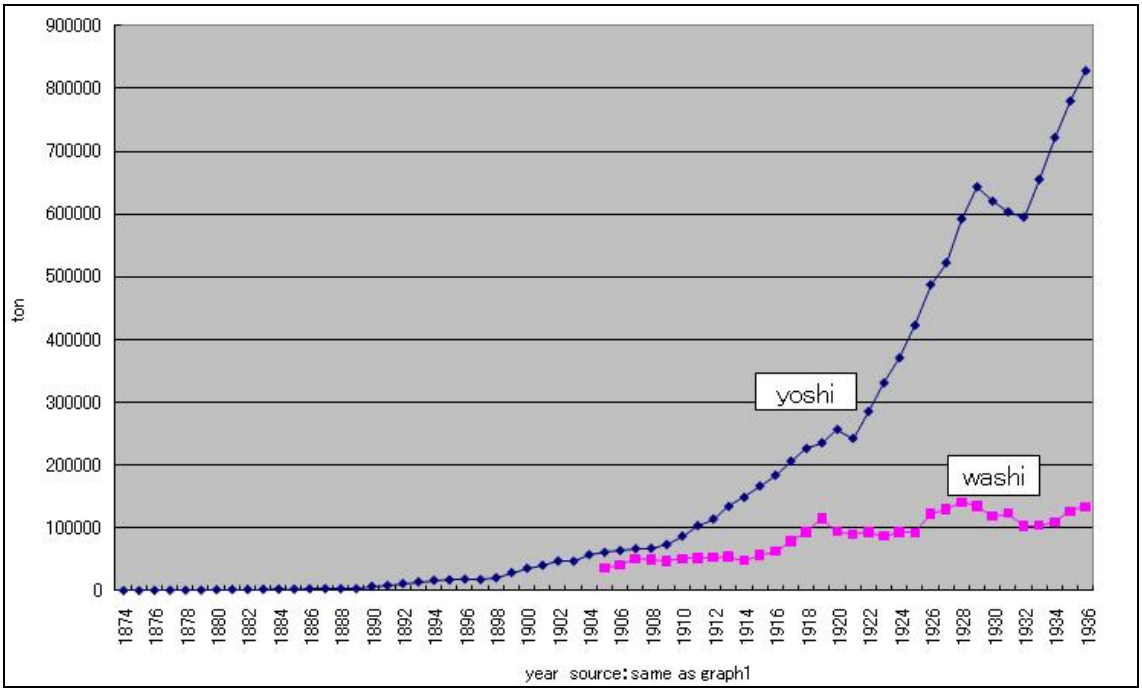
7 *Washi* was introduced to other countries by the Europeans who visited Japan in Edo Period. After the mid 19th century, *washi* was exhibited at World Expositions in Europe and in the US and was well received. For example, the Treaty of Versailles to mark the end of WWI was signed with English ink on *washi*, accommodating the request for the world's best paper and ink. Yagi[1940],p.47

8 Guan [2003], pp.133-148

9 The papermaking Division of Printing bureau, Ministry of Finance produced *washi* with the combination of traditional material paper mulberry and the western papermaking technique. The paper was exhibited in the Paris Expo, and was subsequently exported in great amount. Later, an imitations of this product using wood pulp as material appeared in Austria with the name 'Japanese Vellum', which was imported in Japan with the trade name 'Simili Japanese Vellum" from around 1900 and became popular. Further, in 1913, Kyushu Seishi Co., Ltd., one of the *yoshi* manufacturers of Japan made an imitation of Japanese Vellum with sulfite pulp, and it truck root in Japan as Craft Paper. Paper Museum [2004] p. 17

the complex, culturally systematized array of products.[10] Just as the sheet glass replaced the screen paper, and the western-style umbrella replaced the oilpaper umbrella, the westernization in Japan scaled down the demand for *washi*.[11] However, the highly refined *washi* culture and extensive *washi* production that existed before the westernization paved the way for development of the paper industry in general, with its old consumers of paper, literate culture encompassing a broad cross-section of the society, and high rate of literacy.[12]

**Graph 3. Production of Yoshi (Western Paper) and Washi (Japanese Paper) in Japan (1874-1936)**




The highly developed *washi* industry and *washi* culture existed during the early modernization period of Japan, in which *yoshi* could be only competitive in the printing paper market. This market, newly formed by the introduction of printing technology, made a rapid expansion during the speedy modernizing and westernizing process after the Meiji Restoration (1868). The public demand for paper, including paper notes and various public acts and deeds, and private demand including newspaper and magazines that mushroomed as a result of the change of the political system, and for translation and novels triggered by the Western culture, constituted the main market for *yoshi*. The

[10] The use of ink in the government offices was permitted in 1908, after which the use of *yoshi* with a pen or pencil became the standard.

[11] Miyamoto[1973], p.75

[12] The literacy rate of the Japanese is said to have reached 50% earlier than Spain, Italy (men), etc., which was around 1850 for men, and around 1900 for women. See Courbage and Todd[2007], table 1, p.16.

modern paper industry of Japan emerged by targeting this new market, introducing the machine-based paper industry whose dominant technological design was being established in the Western countries right at that time.

### 1.2 Geographical Condition and Self-sufficiency of the Japanese Market

The geographical and natural resources conditions had major impacts on the development of the Japanese paper industry. The following three points are important.

#### ①Cultural and Geographical Location

Due to the cultural and physical distance from the Western cultural sphere, the entry barrier for the Japanese *yoshi* industry was quite high compared to the latecomers in the periphery of Europe. Detached geographically and linguistically from the European cultural area, technological transfer by voluntary migration of engineers and workers was unlikely. In addition, just as Japan was adopting the *yoshi* technology, the machine papermaking technology was already highly advanced in Western countries, and the minimum investment required for winning an international competitive advantage had increased. The existing local producers of *washi* did not possess large capital, connections in foreign countries, or foreign language capability, which were indispensable for introducing yet-to-be-known modern business organization and fully-fledged introduction of factory labor to support the technology. Against this backdrop, it was Eiichi Shibusawa and other leading business people, who were actively introducing modern industry to various sectors of Japan, and who became the bearers of the paper industry. After 1870s, a series of intermittent market entries occurred in the paper industry in Japan, where the number of players was limited overall. Under this circumstance, an oligopoly emerged relatively early.

The great distance from the major paper manufacturing countries can naturally work as a certain protection, if the materials market and the consumption market coexist within the region. In 19th century Western paper manufacturers did not have any production base in East Asia. The high cost of transport from the place of origin helped the Japanese paper industry be independent. In 1911, the transport cost of a standard paper product from Europe accounted for about 35 % of the selling price in Japan.[13] In a matter of seven years after the birth of the *yoshi* industry, the import dependency dipped from 100 % to 20 %. (See Graph 4) Such a rapid replacement of export products with domestic ones without the presence of tariff protection can be said to have realized thanks partly to the geographical 'isolation' of Japan. On the other side of the coin, this

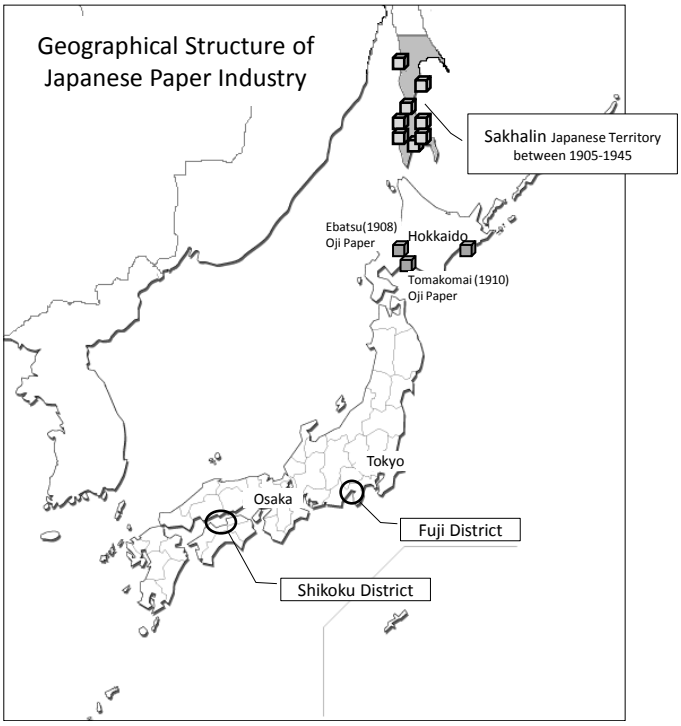
[13] The price of paper for newspaper printing in the 1911 was 113.9 yen per 2000 pounds (=907 Kilogram), while the freight charge from Europe to Japan by secret cartel was 40 yen. Nippon Yusen[1927], appendix, Suzuki[1967],p.125

distance provided the background for the domestic market orientation of the Japanese paper industry, which still remains today.

### ②Natural Resources and Geographical Condition: Japan, a Country with Forests and Water

The Japanese paper industry was blessed with the natural resources such as paper material and water, and favorable transport condition for domestic supply. Cotton rag was used as ingredient for the machine-made paper in the incipient period, and paper factories were located in cities like Osaka, Tokyo, Kobe and Kyoto. Similar to Europe, sourcing of rag soon became a bottleneck; rice straw pulp was tried as a replacement and successfully commercialized in 1883. Meanwhile, the wood pulp was in the pipeline in the West right around that time. In 1890, the use of mechanical pulp and chemical pulp started also in Japan. Japan has been in fact forest-rich country, and its forest coverage ratio is still high today at almost 70 %[14]. In order to utilize the rich, almost untapped coniferous forests, papermaking plants in Hokkaido Island started in 1900, and Sakhalin joined in as an important supplier of coniferous trees after Japan won it upon its victory in the Russo-Japanese War (1904-05) but lost this territory again after the end of WWII. In the postwar period, the broad-leaf trees from the mainland supported the surge in production thanks to a technological innovation until 1970s, when Japan grew more dependent on materials from overseas.

[14] For example in 1974, the forest accumulation was 2.1 billion square meters, comparable to Sweden. Oji Paper[1987], p, 54




Located in the monsoonal region, Japan is rich in water resources, thus blessed with sites suitable for the paper industry that consumes vast amount of water. The rich water resources also supported hydraulic power generation, which served as a major energy source to the paper industry in the first half of the 20th century.

The paper mills often had their own power generation facility and sold the surplus electricity. In Hokkaido, the hydraulic power generation by paper factory was the forerunner of Hokkaido Electric Corporation and was a hotbed of the electric chemical industry. Paper industry also requires heat sources. Japan was not so handicapped in terms of sourcing of domestic coal through 1950s, and after that imported energy was available under a relatively advantageous condition.[15]

As an archipelago, sea transport supported the paper industry both for the domestic production in Hokkaido and Sakhalin, and for import of foreign materials. This resulted in construction of papermaking plants along the coast.

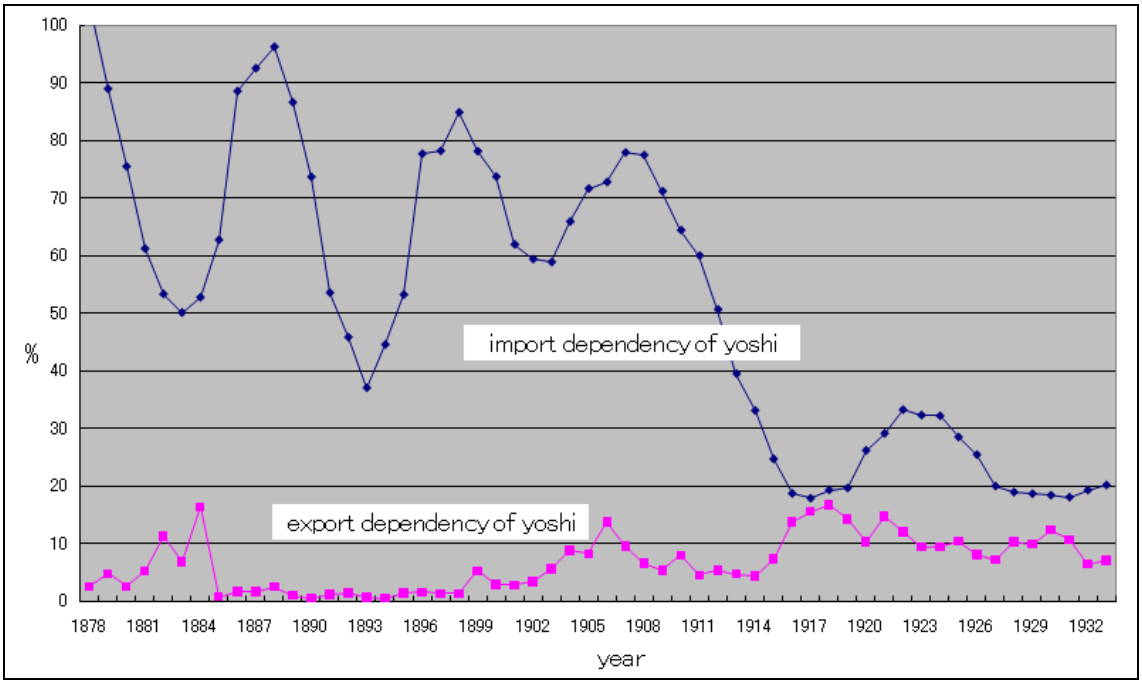
### Self-sufficient Market, Low Import Dependency and Scarce FDI

The third point to be noted is the fact that a rapid development of the paper industry took place under a very low level of import/export dependency (See Graph 4) as well as inward and outward foreign direct investment, excluding the direct foreign direct investments in its colonies during the prewar period. Although the pulp import ratio was on the increase, the fact that the second largest market in the world through the

[15] Sub materials are also important. Japan achieved the self sufficiency of soda, hydrochloric acid, hypochlorite and sodium sulfate in 1880s. Sulfuric acid plant near the Mint was privatized to product it. 100% domestic production of caustic acid was as late as WWI. Suzuki [1968], pp. 247-251.

last three decades of the 20th century was virtually held self-sufficiently by the domestic companies is quite exceptional in the global history of the paper industry.

**Graph 4. Degree of Import- and export Dependency (Five-year-Average in percent figures) of Yoshi (Western Paper) and Paperboard (1878-1933)**




Source: Oji Paper [1937], pp.5-7.

However, it is premature to conclude from this that the market was free from import pressure. In fact, the domestic price was pegged to the global market price to a considerable level under the relatively low tariff rate, and the low import level should have been maintained because the domestic manufacturers ceaselessly introduced new technologies and took advantage of the environmental conditions. Above all, the Japanese market-specific quality requirement, such as particularity about the texture of paper products, request for a short delivery period, high quality and accommodation of variable production orders can be considered a high entry barrier for foreign exporters based in a market with different characteristics and with tougher transport conditions.

The low level of FDI is another result of this market condition. There was virtually no foreign capital operating in Japan from the incipient period of the industry in the 19th century throughout the early 21st century, with the exceptions of technical licensing and a joint venture between Sanyo Pulp and Scott (a US paper mill), and between Jujo Paper and Kimberly in 1960s.

The same goes for the FDI. After 1930s, the major Japanese paper mills were no small businesses globally, yet had no intention to expand their operation outside Japan other than to invest in Japan's former colonies and FDI for ensuring material supply. The capabilities required for maintaining their domestic market share and for developing foreign markets were entirely different for the Japanese paper companies, whose main battleground was the Japanese market.

In the background of this structure are multi-faceted factors; in addition to the cultural and geographical conditions, the following factors were involved. (1) The technological level of the domestic manufacturers rapidly improved at the same time as the domestic market grew steadily in line with the rapid modernization of the economy on the whole, (2) the neighboring East Asian region which formed Japan's hinterland before WWII, (3) among the countries involved, China especially kept a closed system for an extended period after WWII, and (4) other factors such as the Japanese government's prolonged reluctance in the foreign investment policy, followed by appreciation of the Yen, the structured low profitability of the Japanese paper market, ownership and governance structure of Japanese firms posed many obstacles against corporate buyouts.

This signifies the fact that the growth factor of the Japanese paper mills was not the geographical expansion of the sales market, but particularly the formation and expansion of the newsprint paper market before WWII[16], and the expansion of the domestic market due to the product diversification in the postwar period.

It is important to note that since the birth of the modern paper industry there was a long-lasting projection of domestic demand that the *yoshi* market would continuously boom, which held true more or less consistently. Being a latecomer, and aggressive in systematic emulation of the Western industrial structure, consumption and lifestyle, Japanese paper producers always used the per capita consumption of paper in the Western countries as the gauge for projecting its future market size. Thanks to the population growth until the 1980s and a continuous increase in per-capita consumption of paper in Japan, the domestic paper mills were able to maintain their (quantitative) growth without making much effort at overseas product sales.

### 1.3 The Role of the Government and the Market

The role the government played in the Japanese paper industry differed from period to period.

[16] Shinomiya[1995], p.62

### 1-3-1 Mid 1870s to circa 1910

After the mid 1870s and before the end of 19th century the role of the national government was crucial as the engine for westernization, and as the developer of the requisites for the modern industries such as the judicial system and infrastructure. At the same time, the government played a crucial role in generating the initial product demand, as the public sector required *yoshi* for bank notes, certificates of land title, and for other purposes. However, since it lacked the tariff autonomy and did not take any protectionist measures, it did not have a role to play as a direct protection entity. Although there was a direct involvement in the form of establishment of public enterprises of the papermaking section of the Mint Bureau, the significant role of the national government was confined to the very initial stage of the technology transfer. The prosperity of the Japanese paper industry from 1880s to the present was basically due to the effort of private enterprise.

### 1-3-2 circa 1910 to 1945

The first half of the 20th century saw a stabilized private demand for *yoshi* and international competitiveness, which let the Japanese private paper manufacturers to achieve import substitution. In this period, when extensive use of wood pulp was achieved, the biggest governmental support was the generous forest utilization grant of the national forest in the north to the domestic major paper mills at a bargain price. Tariff protection was also initiated, and in 1911 the import duty on newsprint paper was drastically raised from 5 % to 15 %. This worked to a certain degree. However, compared to the peripheral countries in Europe, the significance of the tariff protection is considered to have been relatively small. An oligopolistic structure was formed during that time, but the government did not have an anti-trust policy and never reacted to it. In 1930s the government backed the self-sufficiency of pulp by a national policy, and during the war it controlled the economy.[17]

### 1-3-3 1945 to1980s.t

After WWII the private companies remained the main players in the paper industry, and the prime role of the government was creation of a competitive market environment. Under the US occupation, the Oji Paper Company which formerly boasted a market share of close to 80 % was broken up into three, a strict Anti Trust Act was instituted, and holding companies were forbidden. As a merger plan of the three former Oji Paper

[17] However, public support during the prewar period was not non-existent. In 1937, a prefectural papermaking industrial research institute was founded in Shizuoka, one of the largest centers of paper industry in Japan. Daishowa Paper [1991], p.55

Company surfaced at the end of 1960s, it faltered in the face of negative stance from the government. Resource-wise, the role of the government was cut down after the war, as sourcing to private and communal broad-leaf forests on the mainland and foreign resources were mainly developed.

In contrast, the government intervention was present in the industry during the postwar period through 1980s, similar to many countries in Europe. However, its function and purpose differed somewhat from period to period.

① In the postwar years of recovery (1945-1955), the goal was to develop the condition for the resumption of production and the recovery to the prewar level through direct methods such as materials control.
② In the rapid economic growth period (1955-1973), the main task was to protect the domestic market from foreign companies, which were considered to be far more powerful than their domestic competitors. Import restriction (until around 1962), tariffs (5-15 % in 1960s) and foreign direct investment regulation (until around 1969/71) were imposed. Intervention in the competitive condition among domestic companies in the market was bare minimum.
③ In the stable growth period (1973–1980s), Japanese paper mills maintained their international competitive edge in the domestic market, and faced excessive production capacity under the recession, which was more of an issue than protection against foreign capital. Unlike many other manufacturing industries which managed to eliminate these issues by developing overseas markets, the paper industry faced continuous government intervention (by the Ministry of International Trade and Industry (MITI, current Ministry of Economy, Trade and Industry) such as facility authorization, operation curtailment advice, restriction on facility expansion, planned retirement of production capacity, endorsement of recession cartels, etc.

#### 1-3-4 1990s to Present

In the 1990s, MITI shifted its stance to deregulation and promotion of competition to follow suit the global trend. Lifting the ban on holding companies and introducing new policies and legislations to encourage restructuring of business and divestiture of business facilitated M&As among the domestic companies in 1990s.

### 1.4 Business Structure and the Vertical integration of Pulp-Paper Production

Basically, the Japanese paper and paper pulp industries consist of specialized

companies, which started with manufacturing of paper or pulp itself. Lumber manufacturers and paper container makers never achieved a vertical integration by penetrating into the papermaking business, because lumber manufacturers in Japan are generally small, Japan's transition to a mass consumption society came late, and entry of major consumer goods manufacturers didn't take place until later. As compared to the conspicuity of vertical integration cases, such as owning forests and mountains as a business foundation, or merging with foreign chip manufacturers, diversification was never the way for Japanese paper companies, except for a limited foray into some product sectors related to their core business. The three giants that penetrated into Hokkaido and Sakhalin Islands in 1910s managed to secure their competitive base through the vertical integration of pulping and papermaking. On the other hand, the remaining producers did not have their own pulp department and developed a unique segment of special products by the use of imported pulp.

After WWII, the dominant manufacturers were all vertical integration type, which owned the pulping process.[18] Globally, it is quite a unique phenomenon and can be called a unique feature of Japan. It is because many 20-Century papermaking nations were forest-rich, and either produced pulp and paper in an integrated manner (as in Scandinavia and North America), or dedicated to papermaking while depending on pulp importation (Continental Europe and Korea). In case of Japan, it has a sizeable population and paper production volume, but is the integrated type, producing both pulp and paper. This system imports wood (logs or wooden chips) in lieu of pulp from a distance, as a result of turning to the foreign materials around 1970s when its own resource supply hit a limit, before which it had already established an integrated production of pulp and paper based on the domestic resources available.

This system is also an outcome of Japan having been the biggest producer of rayon in the mid 20th century. It was because pulp manufacturers had been established in the course of pursuing domestic production of rayon pulp. One other factor is the presence of coastal style development model with a dependency on imported material, such as steel making. The import of pulp followed suit the higher dependency on foreign resources, but the domestic paper companies already had their own pulping department, so the pulp import often took the form of "develop-and-import" through a joint venture with companies in forestry in resource-rich countries. This integral production of pulp and

[18] As of 1999, eight of the top ten paper and paperboard manufacturers were integrated pulp and paper manufacturers. Among the 64 plants of these top ten companies, 28 are integrated plant including pulping and papermaking processes. On the other hand, paperboard companies tend to depend mainly on recycled paper and use very limited amount of virgin pulp. Out of the total of 452 paper and pulp factories, only 54 are integrated type, and those owned by SMEs use purchased pulp or recycled paper as material. Oji Paper [2001a] pp. 78-79

paper was retained, even though some move toward location in the place of consumption for more dependency on recycled material.

The relationship with the *zaibatsu* (family conglomerates) and postwar business groups was also quite restrictive. The biggest paper manufacturer, Oji Paper Company, Limited withheld strong financial and personnel relations with the Mitsui *zaibatsu*, especially in purchasing the forest resources, but did not have much business ties with its affiliates. The major *zaibatsu* kept it a rule to run an affiliate in each major industrial sector, but in the paper industry, the influence of *zaibatsu* except for Mitsui and Mitsubishi was confined to a very minimum. Instead, the paper industry-formed unique corporate groups, for example, Mr. Heizaburo Okawa, commonly known as Paper Tycoon doubling as president of Karafuto Industry Corporation and Fuji Paper Company. One of the factors for the industry's uniqueness may have been the fact that the newspaper business, its biggest customer, was detached from the *zaibatsu*.

In the transplanted industry of *yoshi* papermaking, the waves of new entry into the market were seen in the following four periods: (1) The earliest period during the latter half of 1870, (2) the corporate start-up period in the latter half of 1880s, (3) the boom years during WWI when the import pressure disappeared, (4) the latter half of 1930s, and (5) directly after WWII with an increased number of companies due to divestitures. In the prewar period, the oligopoly was tight, followed by establishment of the three-company system in 1910s with the emergence of wood pulping and papermaking factories. In 1933, Oji Paper Co., Ltd. was established through the merger of these three giants, resulting in a market share of 80 %. After WWII, Oji faced divestiture, and continuous new market entries diminished the market shares of its successor companies to between 10 and 20%.

Compared to the latecomers of East Asia, Japan shows a smaller disconnect between the conventional industry and the modern one. One such example is the machine-made *washi* industry. This sector comprised of many SMEs and held about 30% of the paper market share before 1910s, and subsequently 10% to 20% through 1960s. The Production of machine-made *washi* requires only small machinery and inexpensive facilities.[19] It started using recycled material from an early period, therefore the material sourcing was limited to the local area, and there was a room for SMEs to operate. On top of its mainstay low-quality consumer goods such as old type of tissue paper and coarse paper, paperboard products tailored to their purposes were produced. This left niche markets mainly in the major consuming areas for SMEs to

[19] Machine-made *washi* was produced with a cheap and simple cylinder paper machine, which employs a common principle with *nagashi-suki* (see footnote 4).

survive in. As pointed out above, some of them managed to make a foray into production of *yoshi* in the product diversification in the postwar era.

### 1.5 Investment Strategy, Technological Condition and Competitiveness

The paper industry is unique among the manufacturing industries in Japan in that it did not pursue exporting much, even though it cleared the technology introduction at the earliest timing in 19th century and managed to replace themselves with importers, and that it kept depending on the new manufacturing technology of the time from the leading papermaking countries in the West.

Being a process industry, competition in the paper industry mostly takes the form of investment competition. While it is not to the degree of petrochemical or steel industries, the decisive factors of the profitability and competitiveness of the company are when, into which facility, and at what time to invest. In the case of the Japanese steel industry, which garnered its global competitive edge after WWII and has been maintaining it for a half century, the foundation of its competitiveness was an investment strategy to capitalize on the advantage of a latecomer, such as bold and extensive investment aimed at a long-term domestic market expansion, while eyeing at richer countries' demand as a model, and a total introduction of the state-of-the-art equipment after the dominant design was fixed[20]. The paper industry adopted this strategy as early as ca. 1910, which can be considered a factor contributing to its self-sufficiency. Nevertheless, the major postwar technological system and sourcing conditions in the paper industry did not contribute to changing the dominance of the companies in the resource- and technology-rich Scandinavian and North American countries, unlike the case of the Japanese steel industry.

As a process industry, the manufacturing technology is embedded in the apparatus, thus the role played by the apparatus manufacturers should not be overlooked. The domestic companies started the production of paper machine early, but in the prewar period the key facility in production were mainly imported machines or their copies, and in the postwar period they were either imports or the domestic version of licensed machines from Western manufacturers. There was no Japan-unique innovation of significance at the core of the papermaking technology, thus the effort was confined to selective introduction of technology, its partial modification and *kaizen* (improvement) at the shop floor level.[21]

However, especially after 1980s, the Japanese manufacturers came to a point where

[20] Shioji [2008]
[21] Shinomiya [1995], p.59

they produced extremely high-quality products to meet the high expectation of the Japanese consumers. It was realized thanks to the close collaboration with the major foreign machine makers and their licensees in Japan, and such domestic companies under the license agreement were sometimes the first one to adopt the most current innovation from the licensor, ahead of their counterparts in Europe or North America [22]. At the same time, the Japanese paper mills accumulated the refined know-how for realizing an excellent product quality, and along with it introduced highly advanced manufacturing and quality management methods. These activities were indispensable in meeting the demand of the consumers and customer industries in Japan, as well as a source of their competitive advantage against foreign competitors in the domestic market. Nevertheless, these elements were not of significant concern in foreign markets, thus were not tied to enhancement of the export competitiveness.

## 2 From Introduction of Modern Papermaking under Westernization to Creation of Oligopolistic Market Structure (1870s-1945)

### 2-1 Technology Transfer and Formation of a New Market (1875-1908/12)

The quarter of a century from 1875 (when the paper machine was operated for the first time) to 1910 (when the first large-scale integrated paper plant using wood pulp was established) can be positioned as the period of transplantation and introduction of the modern paper industry to Japan. At the time when modernization and implantation of the modern industry were still at a fledgling stage, the biggest challenge faced was to establish not only an industry but also a consumption market from scratch, while overcoming the tremendous cultural, technical and social gaps and introducing new products and new technologies.

#### 2-1-1 Production, consumption and import trends and the market shares of *washi* and *yoshi*

First, the long-term trend of the industry's development shall be outlined. Graph 3 shows the *yoshi* production and import volume in Japan. In 1874, when *yoshi* production was launched, the importation was only 320 tons, as the *yoshi* consumption market itself was quite small. However, the domestic production and consumption volume showed an upward trend since then, reaching 2,388 tons in 10 years (1884), and a continued growth to 16, 507 tons (1894), 35,552 tons (1900), 86,906 tons (1910), to 256,704 tons (1920). As seen here, the increase in 20th century was at an exponential

[22] Fujii [1999], pp.35-60

rate, and it was the per capita consumption of *yoshi* that supported it. The per capita *yoshi* consumption was merely 0.01 kilograms in 1874, far below that of *washi*. Then it started to increase to 0.13 kg (1890), then to 0.57 kg (1900) and surpassed 1 kilogram in 1910. It further exceeded 5 kilograms in 1935, which was far more than the consumption level of South European countries.

Contrary to the surge in domestic production, importation tended to remain flat. Graph1 above on the import dependency of *yoshi* (the five-year average) shows a dip to 30 % in five years since the start of domestic production, and a further decline to around 10 % in the WWI period. The early timing of the transition to domestic production and its rapid spread is a conspicuous characteristic of the paper industry, as compared to the other transplanted industries in Japan.

As discussed above, the *washi* industry sustained its competitiveness in its unique market even after the establishment of the *yoshi* industry, through such efforts as introduction of machine papermaking (See Graph 3). Statistics on the *washi* production before 1905 are not available, but the production volume of *washi* (including the machine-made products) is assumed to have been still more than that of *yoshi*. According to a government survey in the first half of 1870, paper products (handicraft products) accounted for 4.6 % of the industrial products. The paper here is obviously *washi*. The figure was no inferior to the performance of the raw silk (5.5 %) that supported the European silk textile industry, or tea production (3.5 %).[23] The production volume of *washi* was overtaken by that of *yoshi* at the beginning of 20th century, and its ratio declined to 30 % around 1910, and further to 20 % around 1920, when it hit the bottom and experienced stagnation since then[24]. As can be seen here, the importance of the *washi* industry should not be overlooked. In any case, the *yoshi* industry took the main role in the paper industry, quarter of a century after its introduction.

### 2-1-2 How was the Paper Industry Transplanted?

Next, the transplantation process of *yoshi* industry shall be elucidated with a focus on a national project and a private one, which played crucial roles at its earliest period.

Contrary to the other transplanted industries, machine paper industry followed a

[23] Hashimoto and Osugi [2000], p. 47

[24] The market share of the machine-made *washi* temporarily surged to 28 %, in the midst of material scarcity right after WWII. It declined to a little more than 10 % in 1960s. the consolidation of product categories of *yoshi* and *washi* and diversification of paper products itself caused the category of machine-made *washi* to be unmatched with the reality, and after 1967 it was reclassified either into 'paper' or 'paperboard'. See *Year book of pulp and paper statistics* (Minister Secretariat Office for Research and Statistics; Ministry of International Trade and Industry), edition of each year.

course of private-led development from its early stage. However, in 1870s, the papermaking section of the Mint also played a prime role in introducing production engineering and developing engineers. The public papermaking plant invited a German engineer to support the start of production. The plant used a traditional material *gampi* at the beginning, and attained pulp based on the *washi* papermaking technique. Then, paper mulberry was adopted to make *washi* using both handmade and machine-made techniques. In 1877, an imported paper machine was introduced to produce banknote paper. It also succeeded in a pulping test with rice straw in 1878.

In 1879, only four years after the start of production, the papermaking section of the Mint successfully reproduced an American cylinder paper machine (vat machine). In this situation, the private paper companies that were struggling to stabilize their management base petitioned together to the governmental paper factory to stop selling printing paper in the market. Consequently, the national plant ceased to produce printing paper products other than those for exclusive use by the government.

What helped the private paper companies to get going was the bulk order of land certificate paper from a government enterprise. The Meiji administration established the possessory titles to land, and issued the landlords certificates of their landownership. As the demand for this certificate was enormous, the paper section of the Mint sourced the *yoshi* used for this purpose to one of the newly established private paper companies called Mita Seishijo (Mita Paper). Mita Seishijo sourced the amount beyond its production capacity to four other newly established private companies such as Shoshi Gaisha (that later became Oji Paper Co., Ltd.). This government demand supported the business of the private companies throughout 1880s.

Among the private paper companies, Shoshi Gaisha is of paramount importance as the first private paper manufacturer of Japan. The company was the direct predecessor of the two giants in today's paper industry, Oji Paper Co., Ltd. and Nippon Paper Industries Co., Ltd., thus 1873, the year of its establishment, marked the starting point of the modern paper industry in Japan. Shoshi Gaisha was formed under the initiative of Eiichi Shibusawa, a representative entrepreneur and businessperson of Meiji Japan. Shibusawa visited the Paris Expo as a member of the delegation of Tokugawa shogunate in 1867, where he was impressed by the commerce and industry of Europe, and he recognized the need for introducing the modern papermaking into Japan as a source of civilization as soon as possible. The founders of the company comprised of twelve key entrepreneurs of the time, who also became its shareholders. Shoshi Gaisha was established as the first manufacturing enterprise based on the modern limited liability company system, in the time when Japan did not even have a Company Law.

Import of paper machine, hiring of foreign technical experts, funding, selection and procurement of the plant sites, construction of the plant, installation of machinery, and recruitment and training of the workers constituted a wide range of challenges that the newly established forerunner Shoshi Gaisha had to resolve. It purchased English paper machines (78-inch frontlinear paper machines from James Bertram) through Walsh, Hall & Co. The plant was originally planning to conduct printing and bookbinding as well. Its original intention was to use rag as the main material with wheat and rice straw as sub-materials, but the sourcing of rag was found to be difficult.

In this period, other paper companies imported machinery from UK, USA, Germany and other countries. The companies hired foreign experts from the providers of machinery to give guidance not only on installation and operation of the supplied products, but also on plant management in general. After the foreign experts left upon achievement of stable production, the companies sent their engineers overseas for acquisition of the necessary skill.

### 2-1-3 The Process of Growth and Business Structure after the Establishment of the Machine Papermaking Industry (1880s-ca.1910)

Thus the *yoshi* production saw a full-fledged production, and in the 1880s, private demand, especially for printing paper for newspaper and books supported the industry.[25] The domestic production of *yoshi* was only 16 tons (compared to 320 tons of imports) in 1874, but it jumped to 1399 tons (imports: 492 tons) in 1880, and it expanded further to 2278 tons (imports: 538 tons) in 1885, to 6527 tons (imports: 4713 tons) in 1890, 17260 tons (imports: 3381 tons) in 1895, in line with the newspaper market growth.

Behind this surge in output was the start up boom in mid 1880s. Railway, spinning and mining were the most active among the prosperous industries, but there were also new entries into the machine-made paper industry. The total number of corporations in the paper industry in 1890 was seven (with eight plants and ten paper machines, a total roll width of 721 inches), but it increased further to ten companies (eleven plants and eleven machines, 1103 inches) in 1895, and eleven companies (fifteen plants and twenty-six machines, 2276 inches) in 1900, and twelve companies (sixteen plants and thirty-five machines, 3104 inches) in 1905.[26]

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[25] The average daily circulation of eight major newspapers in Tokyo at that time was about 72,300 copies (Miyamoto and Yui [1973], p. 93). In the 1880s, publication of boy's magazines, women's magazines, literature magazines and other specialized magazines continued, and also those of works of fiction gained momentum. Publishers were established one after another. (Ibid., pp.99-100)

[26] Suzuki[1967], p.105

In 1880s the fledgling *yoshi* industry went through a conversion of materials. [27] In the early 1880s, Heizaburo Okawa (of Oji Paper Co., Ltd.) developed rice straw pulp, improving the quality and significantly cutting the production cost. The paper mills started to use rice straw either as the sole pulp material or main pulp material at the end of 1880s.

Meanwhile, wood pulp manufacturing technology was developed and applied in the western countries. As Japan had a short history of using rag as material, and felt a keen need for switching over from rice straw to other materials, the efforts were made early to introduce new technologies. They were led by Heizaburo Ohkawa and Joichiro Mashima (of Fuji Paper Co., Ltd.). Oji Paper Co., Ltd. tried to adopt the sulfite process, while Fuji tried out the ground wood process. Both paper makers used American pulp digesters and managed to develop wood pulp. After commercialization of wood pulp, the major paper mills in Japan set up fully fledged wood pulp mills, and relocated their plants to mountainous areas.

After the main demand for paper shifted to the private ones such as newsprint paper, the major challenge for the industry was the competition against the imported paper. Under this circumstance, *yoshi* manufacturers and *yoshi* traders formed Seishisho Rengoukai (Japan Paper Mills Association) in 1880, emulating Paper Makers' Association of the USA. This organization established the highest price of the high-end printing paper and lowest price for the low-end ones. As the imports were mostly high quality products, it attempted to set the highest price lower than the price of the imports to repress the demand for them, and to set the lowest price to damp the competition among its member companies. This attempt turned out to be not very successful, but it is still considered the earliest form of cartel organization in Japan.[28]

### 2-2 Utilization of the Northern Resources, Formation of Oligopoly and Wartime Establishment (ca.1910-1945)

As a result of the victory in Russo-Japanese War between 1904 and 1905, Japan established its position as an emerging military power in East Asia. This period is considered the end of the industrial revolution in Japan. At that time, *yoshi* won a central position in the paper industry. Domestic producers had been already established. The major challenges in this period were improvement of technological base and furthering of the domestic production of machineries. The state-of-the-art plants in this

[27] Description here was taken from Miyamoto and Yui [1973].
[28] Japan Business History Institute [1999], pp. 5-10, and Miyamoto and Yui [1973], p.97 and pp.104-105.

period had a international technological level and size, and presented an embodiment of the modern mass production. Paper industry became one of the representative sectors of organized capitalism. The intensified trend toward oligopoly for monopolization of resources peaked with the merger of three dominant manufacturers in 1933. After 1930s, domestic production of pulp for rayon expanded, and the paper industry was incorporated into the wartime economy.

### 2-2-1 Trend of Economic Growth and Changeover of Demand Structure by Westernization

The annual growth of the real GNE in the 19 years from 1914 averaged as much as 7.3 %. Even in the so-called chronic recession period of 1920s, it stayed at 2.1 %. The Great Depression from October 1929 came in the midst of the austere policy by the Japanese government in a bid to return the gold standard system, and triggered *Showa Depression*. Later in 1936, as the government switched to an expansionary policy, the Japanese economy made a rapid growth at an annual rate of 6.1 % between 1932 and 1936, in which heavy industry and chemical industry thrived.[29]

The year 1912, 45 years after Meiji Restoration, marked the first year of Taisho era (1912-1926), which was succeeded by Showa era (1926-1989). Between Taisho and early Showa was a period of dramatic westernization of people's lifestyle. Many of the traditional customs from Edo period (1603-1868) perished, and modernism prevailed in the atmosphere of the time. In this period, the demand structure of the people changed, and a *yoshi*-specific demand expanded. Not only the paper used for textbooks was switched from *washi* to *yoshi*,[30] but journalism and publication also flourished in an open atmosphere called 'Taisho Democracy'. Magazines and literature collections were published one after another, and picture postcards became popular. Products like candies, soap, and cosmetics pushed up the demand for containers and packages. In the development of polychrome and offset printings, the usage of paper expanded, resulting in a demand for wider range of paper types and sophistication of quality.[31]

### 2-2-2 Development of Northern Wood Resources and Import Replacement during WWI

Next, turning to the production, fir (*Abies firma*) and hemlock fir (*Tsuga sieboldii*) were the earliest wood pulp materials used, but in this period, the use of coniferous resources including Yeddo spruce (*Picea jezoensis*) and Sakhalin fir (*Abies*

[29] Hamano et al.[2009], p.152
[30] Miyamoto and Yui [1973], p.142
[31] Miyamoto and Yui [1973], p.123

*sachalinensis*) that occur in the northern territory was made possible, and they were extensively used to get softwood pulp. These tree types occurred homogeneously and collectively, thus made lumbering cost cheaper. And they were distributed in the national forests, allowing the paper makers to purchase material en masse under an advantageous condition.

Table 1: Trend in Use of Paper Materials

| | 1909 | 1922 | Increase |
|---|---|---|---|
| Wood | 53,609 (22.1%) | 271,930 (53.6%) | 507% |
| Rice Straw | 126,870 (52.3%) | 149,400 (29.5%) | 118% |
| Rag | 34,117 (14.0%) | 31,687 ( 6.3%) | 93% |
| Others | 28,260 (11.6%) | 54,067 (10.7%) | 191% |
| Total | 242,856 (100%) | 507,084 (100%) | 209% |

(Data taken from the table on p. 155 in Suzuki [1967] and converted to metric ton.)

Fuji Paper Co., Ltd., one of the two giant paper companies at that time completed its state-of-the-art newsprint paper factory in Ebetsu, Hokkaido, in 1908. Two years later, its rival Oji Paper Co., Ltd. started operation of a pulping and papermaking plant. Both were large modern plants designed after the observation in Scandinavia, etc. Among them, Tomakomai plant was powered by electricity from a 25000 hp hydropower generator, and it even traded the surplus power. It was equipped with 142-inch wide frontlinear paper machines, and two 100-inch types. Also, Sakhalin became a main supply base of wood pulp after 1915 (with a joint sulfite pulp plant of Oji and Mitsui), and a manufacturing base with wood pulping and paper production processes (Karafuto Kogyo Co., Ltd.).[32]

Such utilization of the northern softwood resources also changed the competitive environment. Especially when the imported pulp became scarce during the WWI, Oji Paper Co., Ltd., Fuji Paper Co., Ltd. and Karafuto Kogyo Co., Ltd., which were self-sufficient with their northern plant, made a significant growth[33]; in 1913, on the eve of WWI, their self-supply ratio of pulp was merely 62 %, but it grew to 87 % in 1921 after WWI.[34]

Prior to WWI in 1911, the printing paper duty was raised from 5 % to 15 %, giving a

[32] The Survey on Forest Utilization commissioned by the Sakhalin Agency in1911 proposed a plan to set up 11 pulping plants in Sakhalin to produce 143,000 tons of pulp annually, which formed a basis for subsequent national forest utilization plan. Suzuki [1967], p.179.
[33] Suzuki [1967], pp.124-125
[34] Suzuki [1967], p.155

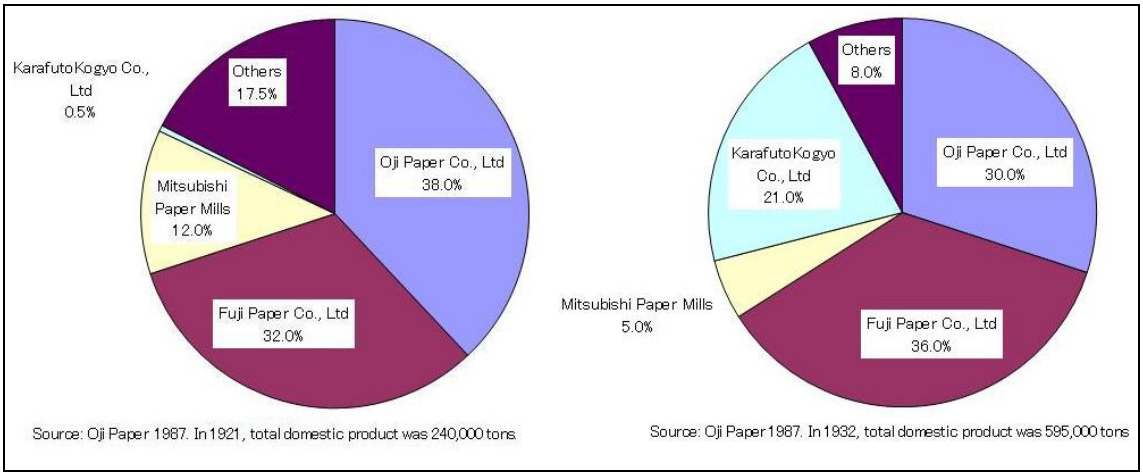
favorable environment for self-sufficient rate of newsprint paper. Later during WWI, the Japanese paper industry established its footing in every sense of the word, not only for material. Imitated paper machines, their auxiliary machinery such as wire screening for paper manufacture and felt were now also produced in Japan. When import of high-grade paper and special paper, which were entirely sourced to foreign producers, became difficult during the war in Europe, the Japanese companies began filling in with wide variety of *yoshi* including high quality paper. The art paper, which was formerly entirely imported from Scandinavia was also subject to independent production, which pushed down its import dependency significantly. Further, in the early 20th century through WWI, Japanese paper manufacturers ventured into paperboard production, whereby the paperboard industry followed the *yoshi* industry to strike root in Japan.

### 2-2-3 Cooperation under Recession, Establishment of Oligopoly and Establishment of 'Grand' Oji Paper Corporation

In the spring of 1920, the Japanese economy plunged into the Great Depression of the postwar period, triggered by the freefall of the stock market. Curtailed operation hours, closure and bankruptcy became rampant in many industries. In case of the paper industry, it had doubled the production capacity by extensive investment in the boom during the WWI. As import of paper and pulp resumed after the end of the war, the paper companies suffered from decline in product price and excessive production facility.

Under these circumstances, the market became more oligopolistic. The drivers of this oligopolistic system by staging corporate buyouts were Oji Paper Co., Ltd., Fuji Paper Co., Ltd. and Karafuto Kogyo Co., Ltd., which had established a self-sufficient pulp supply system and was highly profitable.

**Graph 5. Market Shares of Major Paper Manufacturers in 1921 and 1932**




Another measure against recession was the cartel activity. As was the case in Europe, the interwar period Japan went through the formation of the organizational capitalism, and the paper industry was at its front line with the early formation of oligopolistic system among the three giants.

The cartel activity by Japan Paper Association (reorganized from Japan Paper Mills Association in 1906 and 1913) continued for 18 years between 1921 and 1939, with some intermissions in between. 35 At the end of 1921, the association put 'inventory adjustment' and price-keeping of paper product on the agenda, result of which was an agreement concerning shorter operation hours and encouragement of export, signed by 12 member companies including all major paper makers. This 20 % cut in operation hours for 15 months as of December 1920 was agreed. The companies that successfully slashed the operation received a cash incentive, and the ones that promoted export received a grant from this association. Thanks to these, the industry could overcome the issue of excessive finished goods inventory. These incentives were phased out by the end of 1922.

In August 1926, 9 members of Japan Paper Association implemented an average of 12 % cut in operation hours and kept it for 28 months, and after a short release of control, they resumed it in 1929, at the face of a prolonged period of recession. Japan Paper Association also implemented a powerful measure of sealing inventory (i.e. a mandatory suspension of shipment) to counter dumping by the foreign paper makers.

The paperboard sector established industrial associations by each category of business in an attempt to maintain the price (Yellow Paperboard Association with 17 members in 1925, Brown Paperboard Association with 9 members in 1931, and Cardboard Association with 6 members in 1934). Similarly, though somewhat weaker in

35 For cartel activities, see Shinomiya [1997], pp.140-299, Miyamoto and Yui [1973], pp.136-141, and Daishowa Paper[1991], p. 56.

control, the machine-made washi sector also created cartel organizations by product category after 1930s.[36]

The intensified three-way competition under the recession led Karafuto Kogyo Co., Ltd. to end up in financial difficulties. In such situation, Oji Paper Co., Ltd. merged Karafuto Kogyo Co., Ltd. and Fuji Paper Co., Ltd. in 1933, integrating the three giants. A greater Oji Paper Co., Ltd. was formed with an annual output of 544,320 tons, the paid-in capital of 150 million yen[37], and the control of more than 80 % of *yoshi* production in Japan. It monopolized the newsprint paper business. It had a comparable size to International Paper Company in the USA, and was one of Japan's largest corporations.

The merger of the three companies was a direct attempt to strengthen their market dominance, but it also contributed to enhancing productivity through product specialization by factory, and to saving production cost and indirect cost. In addition, the imported low-grade paper that had grappled the market share of 50% after 1931 with the help of devaluation of the yen quickly lost its ground, the inventories were cleared, and the massive legacy debt from Karafuto Kogyo Co., Ltd. was steadily paid down.

It was not only Oji Paper Co., Ltd. that came out of merger in 1930s. In Fuji District, the biggest industrial cluster of the industry, Showa Paper Mfg. Co., Ltd. that had been established during WWI merged with some local firms to become Daishowa Paper Mfg. Co., Ltd. and became the second largest paper company next to Oji Paper Co., Ltd. This was an effort to counter the material shortage, materials control and the pressure for factory conversion during the Sino-Japanese War.

In 1930s, export to the Asian region increased. Thanks to the expansion of both domestic demand and export, the paper industrial output maintained an annual growth rate of more than 10 %. The Japanese products dominated the Chinese and Manchurian (current northeastern China) markets. In 1937, the size of export became twice as large as in 1932.

### 2-2-4 Role of Rayon and Policy of Self-Sufficiency of Pulp

The 'grand' Oji Paper Co., Ltd., established in 1933, practically monopolized the northern softwood resources. Oji Paper consumed most of its pulp material by itself, so the other paper companies had no other choice but to depend on imported pulp.

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36 Daishowa Paper[1991],pp.35-38

37 Even Tokyo Dento Kabushiki Kaisha (now TEPCO), one of the then largest companies of Japan, had a paid-in capital of 400 million yen, and Kanebo and Toyobo, the largest spinning firms were capitalized at around 30 million yen. (Miyamoto and Yui[1973], p.149). The description below is based on pp.149-153 of this book, unless otherwise specified.

Subsequently, the pulp import increased from 60,000 tons in 1932 to 140,000 - 150,000 tons around 1935.[38]

It must be emphasized that the rayon industry was also a key consumer of the imported pulp. In the early 20th century, the textile industry was the main industry of Japan, unlike the more advanced paper producers in North America and Europe where the main industry had been replaced by the capital-intensive sector. In 1937, Japan was the world's largest rayon manufacturer, producing 270,000 tons. The import dependency of its raw material, dissolved pulp (DP), accounted for as much as 83 %[39]. However, as the Japanese government experienced an international solitude after the Manchurian Incident in 1931, it curtailed the use of imported pulp. In pursuit of autarky, the government put a top priority on the self-sufficiency of DP. The cotton industry, the main sector of the textile industry had no choice but to depend on the imported cotton, but for the rayon industry, it was possible to attain the self-sufficiency of raw material, if the woody resource in its de facto territory could support the expanded production of DP.

As a result of a strong backup by the national government and investment by the rayon manufacturers, many pulp makers sprung up in the latter half of 1930s, namely, Nippon Pulp Industries Co., Ltd. and Sanyo Pulp Co., Ltd. in 1937, and Kokusaku Pulp Co., Ltd. and Tohoku Shinko Pulp Co., Ltd. in 1938, most of which received a technological assistance from Oji Paper Co., Ltd.

Thus self-sufficiency rate of pulp quickly rose (Table2). However, this did not help improve the pulp sourcing difficulty faced by the other paper mills, which were hard hit by Oji's monopolization of pulp and the import restriction by the government. This was because the government strategically prioritized DP for the military purpose.[40]

**Table 2 : Annual Domestic Output of DP and Import Volume by Country** (tons)

| | Total of Domestic Production and Import | Domestically Produced | | | Import | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Areas under Japan's Control | | | Western Countries | | | | | | |
| | | Mainland Japan | Foreign Part (Sakhalin, Korea, Taiwan) | Manchuria | Import Total | USA | Canada | Sweden | Norway | Finland | Others |
| 1935 | 160,283 | 0 | 33,964 | N/A. | 126,319 | 54,676 | 6,742 | 3,958 | 48,186 | 12,574 | 183 |

[38] Daishowa Paper[1991],pp. 34-35.

[39] Oji Paper [2001c], p.53

[40] In 1937, eight import pulp-dependent domestic paper firms such as Mitsubishi Paper jointly applied for permission for granting of virgin wood and operation of pulping business, but it was declined by the government for its policy priority on rayon. Daishowa Paper[1991], pp. 62–67

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1936 | 225,191 | 0 | 56,082 | N/A. | 169,109 | 87,293 | 1,705 | 10,918 | 50,229 | 17,224 | 1,740 |
| 1937 | 348,723 | 0 | 58,220 | N/A. | 290,523 | 138,212 | 20,468 | 39,277 | 55,509 | 32,588 | 4,469 |
| 1938 | 219,069 | 14,665 | 90,323 | 12,609 | 101,473 | 42,613 | 16,208 | 11,997 | 18,142 | 10,291 | 2,222 |
| 1939 | 300,230 | 49,866 | 109,690 | 30,338 | 110,336 | 43,804 | 8,393 | 13,165 | 26,724 | 18,250 | N/A.- |
| 1940 | 344,507 | 113,679 (33.0%) | 120,795 (35.1%) | 14,095 (4.1%) | 95,938 (27.8%) | N/A. | N/A. | N/A. | N/A. | N/A. | N/A.- |

Reprint from Oji Paper [2001c], p. 53

Nevertheless, the existence of the rayon industry plus the autarky policy of the national government defined the structure of the Japanese paper industry for years to come; under this circumstance, non-Oji paper producers ventured into the pulp sector, and most of the newly established DP manufacturers started producing also pulp for paper in the postwar period, and eventually advanced into papermaking sector as mentioned below. For example, Daishowa Paper Mfg. Co., Ltd. succeeded in making KP from red pine for the first time in 1939, and was getting increasingly self-sufficient. In its neighborhood in Fuji District, 21 pulping factories were established during this period.[41] Mitsubishi Paper Mills Ltd., which had tried in vain to produce bamboo pulp in Taiwan around 1910 and hence depended on the imported pulp, initiated the pulp production in newly colonized Manchuria.[42] In 1940, Dainippon Recycled Paper Co., Ltd. was founded to use recycled paper as material.

### 2-2-5 Controlled Economy and the Blow by the Wars[43]

The Sino-Japanese War broke out in 1937. After that the Japanese economy strengthened militarization and control. Positioned as a non-military industry, the paper industry was tossed around like a boat in a storm. In the year 1938 the official pricing system was introduced to curve the soaring prices. It was also applicable to the paper industry in the form of the highest price. In the following year, the market price was fixed as of September 18. This price control lasted until May 1951.

Following imported pulp, the rationing also started for raw materials, fuels and other

[41] Craft pulp production capacity in 1938 was 63,000 tons for Oji Paper Co., Ltd., 7,500 tons for Daishowa Paper Mfg. Co., Ltd., 7500 tons for Takasaki Paperboard, 2000 tons for others. Oji enjoyed a dominant position. Daishowa Paper[1991], p. 55 and pp. 62–67

[42] Unlike Sakhalin (occupancy since 1905), Taiwan, Korea and Manchuria only had a limited importance in the history of papermaking and pulping in Japan. Pulp production began in Korea and Yalu River area of Manchuria by Oji Paper, Co., Ltd. and others after 1918. Expectation for the forest-rich Manchuria was high, but pulping and papermaking in other places had to wait until 1938 and later. Five companies involved themselves in these projects. However, lumbering and sourcing cost of pulp materials in Manchuria for its lack of social infrastructure, and it never did achieve a key position as a sourcing base until it was lost in the defeat of Japan. Daishowa Paper [1991], p. 69

[43] The description here is based on Daishowa Paper [1991], pp. 57-91.

materials in 1939. The supply to the paper industry was cut back drastically. Prioritizing the military demand and restricting the freedom of speech and news report, production of newsprint paper was cut down. In 1940, *yoshi*, paperboard and *washi* products were sold through a sectoral sales control company. In 1944, these sectoral companies were dissolved and replaced by a single controlling company.

Under the wartime economy, a coercive streamlining of companies and plants in the whole manufacturing sector was promoted with the purpose of enhanced productivity and control. It was also applied to the paper industry in 1942, by which 380 small and medium-sized paper firms came under this move, and they were reorganized into 143 companies with 319 plants by 1944. The establishment of Daio Paper Corporation by merger of 14 paper factories in Shikoku is a conspicuous example of it[44]. In 1943, it was applied to the publishing industry as well, where companies ranking 200th or lower in terms of consumption of paper (22.6 tons or less) were forced to merge or close down. As a result the number of publishers shrunk to a third.

Conversion of paper mills from civil to military use took place by the governmental orders. At Oji Paper Co., Ltd., eight of its plants were converted to make paper products used by the military and eight others were subject to detachment, conveyance and rent to serve in the war. Its Ebetsu Plant that had been set up as the first fully-fledged paper plant in Hokkaido was also detached as a separate company for airplane assembly, after its papermaking facility was transferred to Manchuria.[45] At the end of WWII, paper production plunged to a minimum as a result of shortage of materials, energy, human resources and facility, plus damage from air raids. Consequently, after the war in 1946, the paper output diminished to 19 % and pulp output to 16 % of what used to be 1.57 million tons for paper and 1.28 million tons for pulp in 1940.[46] The Japanese paper industry made a fleeting advancement into the colonies under the expansionist government's policy, and it went down together with it.

## 3. Paper Industry in the Postwar Period (1945-Present)

The postwar paper industry started out with the division of the 'grand' Oji Paper Co., Ltd. into many smaller firms. The market concentration quickly dropped, also by the entry of new firms. Loss of Sakhalin that Oji Paper Co., Ltd. used to monopolize, increased dependency on the monopoly-free broad leaf tree forests on the mainland and imported resources largely repainted the competitive landscape of the paper industry.

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44 Daio Paper Corporation[1995],pp1-11
45 Oji Paper [2001c], p. 13
46 Daishowa Paper [1991], p.119.

On the basis of the legacy from the prewar and wartime periods, the vertical integration model of pulping and papermaking processes prevailed. Together with the conversion of material, new technologies were introduced from abroad, and partially modified to help maintain the world-class technological level, and brought about a remarkable improvement in productivity. On the other hand, because many companies with the homogenous competitive resources competed for capital investment to cater to an expected market growth, they ended up with cyclic excess in facility. Under such circumstances, the national government issued a strong administrative guidance after another, marking a stark comparison with its prewar stance toward this industry. In the midst of structural high-price of materials and low price of products, the profitability of paper industry continued to stumble across the board. Japan became the third largest paper producer in late 1950s and went one notch up by surpassing Canada in 1973 with its product lineup continuously diversifying.[47] After 1990s, some of the world's top ten paper companies were founded for the first time in a half century since the grand merger of Oji Paper, as results of the large-scale M&As.

## 3-1 Postwar Restoration to Rapid Economic Growth (1945-1973)

### 3−1−1 Postwar Restoration and a Drastic Transformation of Industrial Structure

The defeat in WWII deprived Japan of Manchuria, Korea and Taiwan, plus Sakhalin that had been supplying 44 % of the domestic woody pulp before the war[48]. Since the lumber from Sakhalin had grown in the national forests, low-cost supply with high-volume transaction had been guaranteed. On the other hand, it was red pine and black pine and other trees in private hands on the mainland that became the central source of pulp in the postwar period, which were considered worrisome for their lack of stability in price and transaction[49]. Since the lost territory also had a number of paper plants beside the wood resources, it automatically meant decline in production capacity. The damages by the air raids was limited, but destruction of the economic infrastructure, extreme lack of resources and fuel, and the controlled economy through 1940s made it hard for the production to recover.

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[47] By the change from wooden boxes to cardboard boxes, conversion to a mass consumption society and a 'packaging revolution', the ratio of paperboard in the entire paper product production jumped from 15% (1945) to 24% (1950) to 40% (1960), and eventually to 47% in 1966. However, after that, it started to decline due to conversion to other packaging materials such as plastic and diversification of demand for *yoshi*, etc. It it has been hovering around 40% from 1980s to the present. Suzuki [1967], appendix. pp.18-19 and *Year book of pulp and paper statistics* (Minister Secretariat Office for Research and Statistics; Ministry of International Trade and Industry), edition of each year.

[48] Daishowa Paper [1991], p.177 and p. 179.

[49] Miyamoto and Yui [1973], p.168

Under the controlled economy, low-grade *washi* products prospered, because they were free from the governmental control, and they could be made from recycled material using a simple facility. Hundreds of micro enterprises newly entered the industry. [50] In 1949 the control on paper and coal was lifted. During the Korean War that broke out in 1950, the paper pulp industry experienced a part of the 'Three White Products Boom' (i.e. sugar, cement and paper), in which demand for craft paper such as cement bags surged. In 1953 the paper output made a recovery to the prewar highest level of 136,000 tons, and in 1954 it reached 209,000 tons.[51]

The defeat also triggered dissolution of the oligopolistic system in the paper industry. After 1945, the GHQ led a systematic divestiture of oligopolistic firms as a part of its democratization policy of Japan. Such minor affiliated concerns as pulping companies and some factories were detached from the main entity,[52] and Oji Paper Co., Ltd. itself was split into three companies with separate mainstay product. The divestiture created Tomakomai Paper Co., Ltd. (producing newsprint paper by inheriting most of the corporate forests), Jujo Paper Co., Ltd. (medium-grade paper) and Honshu Paper Co., Ltd. (high-grade paper, tissue paper, special paper and high-grade paperboard). In 1949, each company's share of output was 17.2%, 16.8 % and 8.5 % respectively, and they were followed by Hokuetsu Paper Mills, Ltd. with 5.8%, Mitsubishi Paper Mills Ltd. with 3.3%, Daishowa Paper Mfg. Co., Ltd. with 2.5%, and Kokusaku Pulp Co., Ltd. with 2.0%.[53]

The postwar business structure in the paper industry was a result of not only the division of 'grand' Oji Paper Co., Ltd., but also of the following changes: (1) emergence of new leading companies due to the change in competitive condition, (2) the vertical integration of pulping and papermaking processes and, (3) creation of comprehensive manufacturers through diversified entry into *yoshi*, *washi* and paperboard sectors.

**(1) Emergence of new leading companies**

As the northern coniferous tree resources formerly monopolized by the key enterprises became relatively less significant, and smaller private and communal forests in the other regions became more significant, the paper companies based on the local forestry resources in different regions also increased their relative significance. As the demand for newspaper as a mass-produced product was relativized by greater product diversification, it also provided an opportunity for medium-sized companies.

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[50] The main product was low-grade printing paper made from ground pulp and recycled paper. Daishowa Paper [1991], p.124

[51] Oji Paper [2001c], p. 352

[52] Oji Paper [2001c], p. 65

[53] Oji Paper [2001c], p. 341

That cut out a way for some SMEs in Fuji District, the supply base for Tokyo Metropolitan area, and those in Shikoku, the supply base for the West Japan, to distinguish themselves as the postwar giants. Among them were Daishowa Paper Mfg. Co., Ltd. (in Fuji District, ranked third in 1958) and Daio Paper Co., Ltd. (from Shikoku, ranked third in the domestic newsprint paper market share in 1975). They achieved positions very close to the three offspring of 'grand' Oji Paper through an aggressive investment strategy. This resulted in less production concentration ratio. In 1965, the top ten paper companies shared merely about 45 % of the market share. While the Japanese paper industry itself grew to the third largest in the world in 1962, its largest manufacturer was still ranked lower than 25th in the world.[54]

### (2) Vertical Integration of Pulping and Papermaking Processes

The paper manufactures born out of Oji Paper Co., Ltd. were the ones, which had a mere partial role to play in the networked division of labor. Therefore, it was difficult for them to survive after the Oji-based business connections were dissolved, so they ventured into neighboring areas of business. In that process, the mutual entering of dedicated pulp manufacturers and papermakers were the most important moves.

These entries into the pulping business were triggered by a lack of pulp due to the collapse of material base from the prewar period, and competition with rayon manufacturers in pulp sourcing. Between 1941 and 1946, 37.1% of the craft pulping facilities were lost, and the remaining facilities output plunged to 7.6%, and import of pulp was on a rocky footing due to the foreign exchange constraint. At that time, there were only five firms specializing in pulping, namely, Kokusaku Pulp Industry Co., Ltd., Tohoku Pulp Co., Ltd., Sanyo Pulp Co., Ltd., Nippon Pulp Industries Co., Ltd., Kokoku Rayon Pulp Co., Ltd., which together held far less production capacity compared to the domestic papermaking capacity.[55] The purchasing of SP was extremely difficult for papermakers, especially during the boom of the rayon industry, which led the paper manufacturers to tap into pulp production to secure material on their own[56].

On the other hand, the specialized pulp makers advanced into the papermaking process due to factors like aggravated market price of pulp after the pulp boom, paper manufacturers' move toward integration of the pulping process, and apprehension about instability and future of the demand for DP in the midst of the synthetic fiber

[54] Daishowa Paper [1991], p. 227

[55] Oji Paper [2001c], p. 231

[56] In 1949, Mishima Industry (predecessor of Toyo Pulp) and Kanzaki Paper Co., Ltd. started the pulp production. Daishowa Paper Mfg. Co., Ltd. became self-sufficient with pulp in 1952 and set a pulping plant. Oji Paper [2001c], pp. 141-150

recession[57].

**Table 3: World's Top 10 Paper Producers and Their Paper and Pulp Production Ratio**

★ (Ratio of pulp production, when paper and paperboard production is considered as 100.)

| | 1956 | | 1965 | | 1975 | | 1985 | |
|---|---|---|---|---|---|---|---|---|
| 1 | U.S. | 70 | U.S. | 76 | U.S. | 82 | U.S. | 80 |
| 2 | Canada | 124 | Canada | 138 | Japan | 63 | Japan | 45 |
| 3 | U.K. | n.a. | Japan | 76 | Canada | 148 | Canada | 141 |
| 4 | W.Germany | 50 | USSR | 97 | USSR | 90 | USSR | 84 |
| 5 | USSR | 101 | U.K. | 6 | China | 64 | W.Germany | 24 |
| 6 | Japan | 86 | W.Germany | 46 | W.Germany | 29 | China | 70 |
| 7 | France | 41 | Finland | 174 | Sweden | 188 | Finland | 107 |
| 8 | Sweden | 260 | France | 46 | France | 43 | Sweden | 130 |
| 9 | China | 35 | Sweden | 209 | Finland | 130 | France | 36 |
| 10 | Finland | 186 | China | 61 | U.K. | 9 | Italy | 18 |

Note: This table is based on the statistics at the end of Toyo Keizai [1966], Toyo Keizai [1978], Oji Paper [1987], Oji Paper [2001a]. The original data come from *Pulp and Paper World Review*. The figures for U.K. are calculated separately based on data from *Forestat of FAOSTAT*, FAO (http://faostat.fao.org/site/291/default.aspx)

In the year 1965, the ratio of the papermaking section of the former pulp manufacturers to the entire sales became very similar to that of papermakers, such as 78 % for Kokusaku Pulp Industry Co., Ltd., 51% for Tohoku Pulp Industry Co., Ltd., 52% for Nippon Pulp Industries Co., Ltd. and 18% for Sanyo Pulp Industry Co., Ltd.[58]. This way, together with the existence of a world's largest rayon industry, an integral production system came into place, which can be called a Japanese model.

#### (3) Creation of Comprehensive Manufacturers

The Japanese pulp industry in the prewar period comprised of somewhat specialized dedicated manufacturers of pulp, *yoshi*, paperboard and *washi*. Combined manufacture of pulp and *yoshi* was not unusual, but examples where paperboard companies and machine-made *washi* makers also produced pulp and/or *yoshi* were few and far between. After WWII, mutual entries were also observed here, resulting in the identical business areas for each[59].

### 3-1-2 Issues of Rapid Economic Growth Period: Material Conversion and Product Diversification

A GHQ-recommended amendment to the Forest Act in 1951 reinforced restriction on

[57] As a result of the cyclic recession of synthetic textile industry and increase in paper consumption after mid 1950s, DP only accounted for 9% of all pulp output in 1964. Toyo Keizai [1966], p.151

[58] Out of the pulp output in 1975, 82% accounted was for self-consumption. Fifteen specialized pulping mills only accounted for 2.3%. Toyo Keizai [1978], p. 151 and p.154.

[59] Suzuki [1967], p.349

timbering, causing a surge in the virgin wood price[60]. In the midst of steep rise in coniferous tree price after 1950s, efforts were made to utilize the broad-leaf tree resources. For example in 1954, Kanzaki Paper Co., Ltd. was the first to produce semi-chemical pulp (SCP) from deciduous trees.

A major characteristic of the postwar Japanese paper industry is a material conversion. Specifically, this included (1) conversion to pine tree among coniferous, and to broad-leaf trees, (2) conversion from logs to wooden chips, and from domestic wood to imported wood, (3) start of outward FDI to the resource-producing countries and pulp sourcing through joint ventures, (4) increasing use of pulp from recycled paper, and (5) conversion to woody SCP in the sector that still used rice straw such as corrugating medium[61].

Here, (1) through (3) shall be elaborated.

The use of new materials was realized among the coniferous tree resources, namely, red pine (*Pinus densiflora*) and Japanese black pine (*Pinus thunbergii*). The use of deciduous trees such as beech expanded. The ratio of coniferous and broad-leaf trees as materials was 95% to 5% in 1952, but it changed to 42% to 58% in 1969. It was the fully-fledged commercialization of KP method in 1952 that brought about this change[62]. After that, each manufacturer pursued a conversion to deciduous tree resources due to the lack of coniferous ones, and conversion from SP method to KP method. Technical innovation such as semi-chemical pulp (SCP), semi-ground pulp (SGP) and chemical ground pulp (CGP) also contributed to a wider use of broad-leaf trees.

The use of imported wood commenced with imported logs in 1950s[63], and was later replaced with wooden chips. Import from the West Coast of USA started in 1963. Toyo Pulp Co., Ltd. was the world's earliest company to develop exclusive berths for its exclusive wooden chip carriers, with its other competitors following suit[64]. MITI also subsidized this activity. In 1960, the ratio of logs and wooden chips was 76 to 24, and subsequently in 1965 it became inverse, and in 1969 it proceeded to 3 to 7[65].

This optimum overseas sourcing of virgin materials and domestic production of pulp and paper by the vertical integration marked the foundation of a prototype of coastal-style plant that characterized the postwar Japanese process industries, though

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60 Oji Paper [2001c], p. 349

61 The share of rice straw in the entire paper materials diminished from 11.2% in 1955to 3.6% in 1965. Toyo Keizai [1966],p. 266

62 Oji Paper [2001c], pp. 70-75

63 Oji Paper [2001c], pp. 97-98

64 Oji Paper [2001c], pp. 163-169

65 Oji Paper [2001c], p. 239

it came somewhat later than in the other sectors, such as steel and chemical[66]. The emerging companies like Daishowa Paper Mfg. Co., Ltd. and Daio Paper Corporation were especially systematic in pursuit of this strategy. In 1973, 16 companies imported wooden chips from ten countries including North America, using a total of 51 chip carriers. The import dependency of raw material for pulping reached 35 % and wood was positioned as the second most imported resource next to oil[67]. From around 1970, joint development of overseas virgin wood resources became noticeable.

However, it was not that pulp import ceased. The Japanese outward FDIs were initiated in 1953 with the aim of local production and import of pulp, and shifted into full swing around the end of 1960s[68].

### 3-1-3 Government Intervention and Limited Reorganization

Being a process industry, the paper pulp industry has very limited flexibility in adjusting the supply and demand. The Japanese paper also faced cyclic overproduction. In the absence of Anti-Monopoly Act before WWII, a recession cartel by the paper industry was maintained by the initiative of private firms on their strong market dominance. However, the postwar government shifted from a do-nothing policy concerning the oligopoly to a direct intervention policy to solve the issue. It was MITI that initiated the move. When overproduction triggered the prices to plunge and worsened the business conditions of the paper companies, MITI issued guidance to the firms to shorten their operation in a coordinated manner. As it was not enough, it further banned new investment for facilities and sometimes even forced them to reduce their production capacity. These measures were officially considered exceptions to the anti-monopoly rules, which were principally managed on the basis of the strict anti-cartel policy. This type of intervention method was repeatedly used during recessions from 1960s to mid 1980s.

What's worth noting is that the merger of the three Oji Paper successor companies in 1968 fell through by the judgment of the anti-monopoly authority. If this merger had been to come true, it would have produced a company with market dominances of 37.5 % in *yoshi*, 24.5 % in *yoshi* and paperboard combined, and 60 % in newsprint paper. The government showed an affirmative stance at the beginning, but in the face of a heated public discussion over the uncovered merger deal between the top two steel makers that

66 Oji Paper [2001c], pp. 158-159 and p.359. Coastal location was already made before that time, but for the purpose of product shipment, and the materials were sourced domestically. In the chemistry industry, 1958 marks the year one of the coastal chemical complex (in Iwakuni and Niihama).
67 Daishowa Paper [1991], p.282
68 Daishowa Paper [1991], pp.344-351

directly followed it, it reversed its attitude. Hence the paper merger deal was ditched[69]. Later on, medium-sized mergers and acquisitions took place, but the market share of the top firms did not increase any further, and the so-called dog-eat-dog competition characteristic of the industry never changed much[70].

### 3-2 Softening of Growth and the Paper Industry in Instability (1973-1990)

#### 3-2-1 Oil Crisis, Appreciation of the Yen, Downturn in Business and Cartel, and Environmental Response

It was the first oil crisis in 1973 that put an end to the Japanese postwar boom lasting for over 20 years from 1955. The paper manufacturers benefited temporarily from the soaring prices, but the subsequent recession hurt their corporate earnings. After the oil crisis, the Japanese economy decelerated from a 10 % rapid annual growth to a medium rate of around 4 %.

Unlike many other products, the consumption and production of paper kept expanding even at the time of staggered growth. However, the paper industry lowered its standing in the manufacturing industry. In this period, its profit margin was very low at 2 % or less, only a half of the manufacturing industry average. In the oil crisis and the subsequent period, soaring fuel and material prices, and wild fluctuation of product prices were a blow to the paper companies. The response to the problems of pollution, which surfaced as a social issue from the latter half of 1960s, also aggravated their low-profitability characteristic. In the year 1970 the sludge in Fuji District became a symbol of the environmental pollution issue. Fourteen anti-pollution laws were enacted in the same year, and in the 1970s the whole industry strived for improvement of environment by investing 245 billion yen[71].

Like the other industries, the paper industry was also exposed to drastic fluctuations in demand. After the Plaza Accord in 1985, the yen shot up from 240 to the dollar to 150 yen in a matter of a year. The Japanese manufacturing industries coped with this change well, but the low interest-rate policy and measures to spur more domestic demand to address the soaring yen generated an economic bubble. The demand for

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69 However, the offspring of Oji maintained various forms of affiliation. For instance, in 1972, five Oji successor companies jointly set up Nippon Paper Pulp Research Institute. Oji Paper [2001b], p.147

70 In 1976, Oji Paper Co., Ltd., the biggest paper firm in Japan, had a paper market share of 14.9%. The top three companies jointly held a share of 37%, plus top five had 48.6%. However, the newsprint paper industry, maintained a strongest degree of oligopoly, in which market share of the top one, top three and top five companies were 29.5%, 66.6% and 83.7% respectively. In this period, Tomakomai Plant for newsprint paper and Kushiro Plant of Honshu Seishi for paperboard were the world's largest in the respective business area, but they are two of the very few exceptions. Toyo Keizai[1978], p.67

71 Oji Paper [2001b], p. 173

paper mushroomed after 1987. The domestic shipment registered 11 million tons in 1984, 13.95 million tons in 1988, and 16.23 million tons in 1991. Moreover, the special act that had been containing the new investment for a five-year period expired in 1988. The paper producers responded to this situation by drumming up the equipment investment in full cry. It collectively amounted to 1 trillion 890 million yen (about 15 billion dollars) in a five-year period between 1987 and 1991. 43 paper machines were added to the industry, and the production capacity augmented by 5 million tons on an annual production basis, or by 17 %[72]. These facilities became excessive in the recession phase and resulted in a bear market and price decline, and weighed on the management all the way into mid 1990s.

### 3-2-2 Use of Foreign Resources, Integrated Production at Coastal Manufacturing Bases and Use of Recycled Paper

In this period, the use of inland wood resources hit the ceiling and dependency on foreign resources that had began in 1960s took hold. The import dependency of materials for pulping accounted for 46.1 % in 1979, and it declined to a low of 37.5% in 1985. But later it bounced back again to 61.9 % in 1994 due to the appreciation of the yen and waning of the domestic forestry industry.

The initial resource supply mostly came from North America, and in 1979, 70 % came from the West Coast of North America, 17 % from Oceania and 13 % from USSR. Diversification of the source areas to Southeast Asia and Oceania had been tried out from 1960s[73], but the so-called 'Chip Crisis' of 1979 added an impetus to this trend; in this year, the price of the North American virgin wood skyrocketed 2.5 times due to the local supply-and-demand situation, severely affecting the business result of the Japanese paper manufacturers[74]. Thanks to the diversification effort to cope with the situation, the radios changed to 52.3 % from North America, 25.7 % from Oceania and 11.8 % from Chile. The sourcing to the southern states of the USA and to South Africa was now fully in progress. Also, there was a shift from natural forests and secondary forests to plantations[75].

As mentioned above, the wood chip transport by dedicated chip carriers and the integrated pulping and papermaking along the coastal production bases was kicked off

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72 Oji Paper [2001b], p. 302

73 In 1968, Daishowa Paper Mfg. Co., Ltd. established joint ventures in Malaysia and Australia to purchase rubber and eucalyptus chips on a long-term contract. Their competitors followed it suit. Daishowa Paper [1991], pp.317-320 and Oji Paper [2001b], p. 334

74 Oji Paper [2001b], pp. 180-181, and pp.227-228

75 Oji Paper [2001b], p. 227, 279 and 320

in 1960s. The existing plants on the coast were located rather for the product shipment purpose than material import, but after 1970s the assumption was changed to the use of raw materials from overseas, and new plant locations and merger of existing companies on the coast were promoted[76].

Against this backdrop, the new large-scale capital investment was commonly spent on the coastal location projects, from a standpoint of the use of foreign resources. In the acquisition of Toyo Pulp Co., Ltd. by Oji Paper Co., Ltd., the decisive factor of the deal was Toyo Pulp's coastal location.

As already emphasized, the import of raw materials for pulping and the domestic integrated pulping and papermaking are the peculiar features of the Japanese paper industry, which means the Japanese paper makers held the technical know-how in pulping. It is why those companies also advanced overseas to manufacture pulp there[77]. This move gained momentum at the beginning and end of 1970s and during the period of the strong yen after 1985. Many of them were FDI-based joint ventures with the local companies in the forestry industry to which the Japan side provided their expertise in pulping. Such investment projects were under way in North America, Brazil Southeastern Asia and elsewhere, and most of the products there were exported to Japan[78].

The first importation of such finished goods made overseas was in 1976, when newsprint paper manufactured by a joint venture between Jujo Paper Co, Ltd. and Weyerhaeuser of the USA was exported to Japan. Oji Paper Co., Ltd. followed it suit in the year 1980.[79] In both cases, the Japanese partner provided the guidance on production control.[80] Such a development-and-import scheme was done in response to the appreciation of the yen, and phasing out of the import duty promoted in the US-Japanese trade friction and GATT negotiations were also in its background.[81] FDIs

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76 Oji Paper [2001c], p. 201

77 The first case of this type of FDIs was Alaska Pulp set up in 1953. It was followed by Other plants, such as Honshu Seishi (N-BKP, Canada in 1967), Jujo Paper Co, Ltd. (RGP, Canada in 1968), Daishowa Paper Mfg. Co., Ltd. (N-BKP ,Canada in 1970), and Sanyo-Kokusaku Pulp Co., Ltd. and Oji Paper Co., Ltd. (RGP, NewZealand in 1971).

78 The most representative one is Celulose Nipo Brasireira S.A. in 1970, a joint venture with a Brazilian national policy concern CVRD (Companhia Vale do Rio Doce) . This project was financed by the Japanese government in the form of ODA. Nine major Japanese pulping firms and Itochu Corporation invested in this project for development of eucalyptus plantation and construction of a world's largest L-BKP plant based on the Japanese technology. Japan procured 75% of the pulp produced there. Oji Paper [2001b], pp.176-177

79 Oji Paper [2001b], p. 230

80 Oji Paper [2001b], pp. 275-276

81 The import duty for newsprint paper was 5.5% in 1972, and was reduced in a phased manner to 0% in 1990. That for coated paper was lowered from 10% to 4.1%, and that for paperboard was reduced from 10% down to 2.5%. In 2004 the tariffs on paper and paperboard were completely lifted. Oji Paper [2001b], pp. 248-249

to the existing export markets were commenced in mid 1980s for the purpose of product supply to the local market, whose number never increases much even today.[82]

Another important move after the oil crisis is increased use of recycled paper. There is a long history to the use of recycled paper, especially the paperboard and machine-made *washi* product areas. This trend was promoted by the technological innovation after the war. 1958 marked the first introduction of the DIP (deinked pulp) facility for newspaper in Japan.[83] The use of DIP spread after the oil crisis for its excellent energy efficiency. Especially in the midst of the second oil crisis, the use of recycled paper for *yoshi* was no longer a taboo. Weight reduction demand for newsprint paper was started in this period and gave advantage to the low transparency of DIP.[84] The rate of recycled paper in the entire paper output mounted from 36.2% in 1970 to 51.0% in 1985.[85] The collection rate of newspaper was maintained at a high of 90.4% in 1989, and collection further spread across the society, including that from the businesses whose rate used to be low.[86] Today the collection rate and use of recycled paper is at the world's highest along with Germany (Table 4) and South Korea.[87]

**Table4: Collection Rate and Usage Rate of Recycled Paper**

| 2007 | Collection rate (collection volume / paper and paperboard consumption) | Usage rate (recycled paper consumption / paper and paperboard output) |
|---|---|---|
| Japan | 73.7% | 61.6% |
| Germany | 72.8% | 68.3% |
| USA | 54.4% | 36.1% |
| China | 37.9% | 68.3% |
| World average | 53.1% | 52.7% |

Higher dependency on recycled material also affects where to locate plants as well as competitive condition, by which the companies now strategically sought optimum locations for their plants in large urban areas close to recycled paper collection sites.

### 3-2-3 Change of Product Market and Formation of the Japan-style Quality

[82] The first example of it was a thermosensitive paper plant of Kanzaki Speciality Papers, Inc., opened in Massachusetts in 1986. Later on, more of such FDIs could be seen in Europe and China, though their n umber is not that many. Oji Paper [2001c], p. 376

[83] Oji Paper [2001c], p.357

[84] Contrary to Europe, weight reduction in Japan was commenced by the request from the newspaper company side. For this purpose, Oji Paper kicked off mass-production of TMP (thermomechanical pulp) in 1976 for the first time in Japan. Oji Paper [2001c], pp. 166-168

[85] Daishowa Paper [1991], pp. 430-431

[86] Oji Paper [2001b], p.202

[87] Data source: http://www.jpa.gr.jp/states/global-view/index.html#topic04 (Japan Paper Association) Original Data is taken from *RISI Annual Review.*

### Condition

Along with material sourcing, there was a big change in the material market after mid 1980s. In 1978 the per capita paper consumption grew to 142 kilograms, ranking 8th in the world, on par with major European countries such as Germany, though not as much as Scandinavia and USA.[88] As the paper market matured, the quality and variety of products became important. Specifically, there were three directions there: (1) weight reduction, (2) penetration into information-related product market, and (3) diversification and expansion of sanitary products.

For the benefit of (1) weight reduction (of newsprint paper, for example), investment to replace the existing SP facility with the sturdy craft pulp facility was made, together with various environmental measures. These facilities were imported from Kamyr of Sweden and facility manufacturers of Finland, and were partially modified for improvement in Japan. (2) Information-related products were of increasing significance in conjunction with higher performance, lower cost and familiarization of office and automation equipments. Investment on coaters and other equipments were made. In (3) the sanitary market, new capital expenditure was made to accommodate the soaring demand for paper diaper started in this period.[89]

Japan was a latecomer in the *yoshi* area, but in late 1980s the quality demand in the Japanese market reached those of the major advanced Western paper producers and is considered to have overtaken them in many areas. In a market where consumer's request for appearance is extremely particular, and where there is a tradition of *washi*, the Japanese general consumer's quality expectation reached an extremely high level together with the increase in income, such as texture, thinness and durability of paper. The corporate users made extremely severe requests to the paper makers. For example, the Japanese newspaper companies that enjoyed 95 % of home delivery ratio (the highest in the world) had a very short lead-time, and they particularly disliked web-break. The same went for the quality of service. Generally speaking, the Japanese manufacturing industry is characterized by zero-defect request to the ppm level, and a flexible just-in-time production system that caters to high-mix, small lot production with short lead-time and high-frequency delivery. In the industrial sectors such as paperboard, this response to the Japan-specific market condition is considered to have formed a basis of its competitiveness against the imported products.

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88 Daishowa Paper [1991], p. 397
89 Oji Paper [2001b], pp. 258-285

## 3-3 Saturation of the Domestic Market and Globalization (1990 to Present)

### 3-3-1 Saturation of the Domestic Demand and Impact of Globalization

In 2001 Japan was overtaken by China in terms of paper production volume, and lost its second global position that it had held for twenty eight years. It was a result of the stagnant domestic demand after 1990s as well as the rapid expansion of paper production in China. In 2001 Japan's paper and paperboard production volume of 3,182 tons marked a peak in its history of about 130 years, but the backwater of domestic production had already started in 1991 for paperboard. Albeit the lower economic growth rate, the per capita paper consumption was still expanding from early 1970s to early 1990s, then there came a period of flat growth. The population growth rate has also declined, and after 2006 it turned to the negative. The paper demand saturated for the first time in the Japanese history, and after 1990s the stagnant paper demand hovered at a rate even lower than the growth of real GDP. This directly meant aggravation of the management environment and a failure of the existing growth model for the highly domestic demand-oriented Japanese paper industry. The backlash of the overheated domestic economy at the end of 1980s was enormous, by which the eight major paper companies registered a profit decline for five consecutive years after 1989.[90] It was also an outcome of cyclic and structural factors combined.

The emergence of China signals an end to the era, when a prominent market in East Asia with a world-class size automatically promised Japanese firms an international position. However, it is not the only impact from the outside. Since 1990, large cross-border M&A deals were carried out in the West. These Western enterprises also penetrated into China and Southeastern Asian countries after 1990s, as seen in the case of Pan Asia Paper. Also, Asia Pulp & Paper (APP), Asia Pacific Resources International Holding (APRIL), Advanced Agro (AA) and other emerging paper companies in Southeastern Asia expanded to open production bases in China, and accelerated an export drive to the Japanese market. It was then that the Japanese paper industry became keenly aware of the need for business management geared toward global competition, and that for pulling out of domestic market orientation and over-dependency on domestic sales for the first time after WWII.

Policy environment also changed significantly in 1990s. Recognizing the limitation of the conventional intervention-type method, MITI abandoned measures such as authorizing cartels during recession, and took a direction toward strengthening global competitiveness by encouraging competition and business restructuring under the

[90] Oji Paper [2001b], pp. 304

slogan of 'Selection and Concentration'.[91] For promotion of the latter, legislation and taxation system were reformed to facilitate inter-company M&As and divestitures of business units. In 1997, the long-held ban on holding companies was lifted, which had been placed in the name of prevention of industrial over-concentration. In addition, as a part of the measure to cope with the financial crisis, the pervasive cross holding of shares was increasingly dissolved in the public and private sectors alike after mid-1990s. Fair Trade Commission that had opposed to the merger deal among three former Oji companies in 1960s, relaxed its stance toward large-scale mergers for the sake of competition against foreign companies, pending detachment of the business area whose market share would be considered excessive. There was no case of hostile takeover in Japan After WWII, and internal growth was the main growth strategy for many industries including the paper industry. However, the situation changed after 1990s. The number of friendly takeovers increased after mid 1990s, in which the paper industry also took part. There has been no successful hostile takeover bid in Japan still to this day.

### 3-3-2 The Tide of M&As and Formation of the Two-Group System

Last to be mentioned is the trend in restructuring and concentration of paper manufacturers after 1990 that led to the formation of the two major groups.

In July 1992, a merger of Jujo Paper Co, Ltd. and Sanyo-Kokusaku Pulp Co., Ltd. was announced, and the deal went through in April the following year to create the industry's largest company, Nippon Paper Industries Co., Ltd. (NPI). Jujo Paper Co., Ltd. was one of the three legacies of former Oji Paper Co., Ltd., and Sanyo-Kokusaku Pulp Co., Ltd. was a product of the 1972 merger of two national policy concerns from 1930s. In 1997, Jujo Paperboard in the NPI Group merged with Nippon Sigyo and renamed itself Nippon Paperboard. In March 2000, NPI, the then second largest in Japan, announced a business integration with ailing Daishowa Paper Mfg. Co., Ltd., the then fourth largest paper manufacturer, and created Nippon Unipac Holding in March 2001, which became the top paper firm in Japan and 6th in the world. The paperboard section of this group was restructured as Nippon Daishowa Paperboard Co., Ltd. This integration under a genuine holding company was the first such case in Japan. The group was renamed Nippon Paper Group, Inc. in 2004. In 2006, it enjoyed the consolidated operating revenue of 8.521 billion yen (10th in the world), and in 2007, its paper and paperboard production was 7.65 million tons, employed 12,580 personnel,

[91] Kurosawa[2009], pp. 211-257

and its paper and pulp business dependency was 84.4%[92].

This move was the priming water for a countermovement from Oji Paper Co., Ltd. (renamed from Tomakomai Paper Co., Ltd. in 1960), which was the largest among the three successors of former 'grand' Oji Paper and acknowledged itself as the industry leader. In October 1993, a half year after the merger of Jujo Paper Co., Ltd. and Sanyo-Kokusaku Pulp Co., Ltd., Oji Paper Co., Ltd. (with a market share of 9.8%) acquired another successor of former Oji Paper called Kanzaki Paper Mgf. Co., Ltd. (2.5 %) and formed New Oji Paper Co., Ltd. In 1996, New Oji Paper Co., Ltd. (12 %) further merged with yet another of the three offspring of 'grand' Oji Paper and the largest paperboard manufacturer called Honshu Paper Co., Ltd. (7.5%), and resumed its traditional nomenclature, Oji Paper Co., Ltd. At its outset, it enjoyed the third largest sales in the world, and it further acquired three other businesses including a paperboard firm in 2002. In 2006, its sales registered 9,697 million dollars (ranked sixth in the world), and its paper and paperboard output was 8.2 million tons (world's fifth) with 19,560 employees and its paper and pulp business dependency at 89.1%. It is currently promoting Nantong Project in China, one of the biggest FDIs in the paper industry (with an initially planned annual output of 1.2 million tons, which was later reduced to 800,000 tons) in search of conversion from the management with a high dependency on the domestic market[93].

These two biggest groups have a market share of 25% each. The ones to follow them are Daio Paper Corporation (22nd in the world) and Rengo Group, both of which have a domestic market share in sales of close to 10%. Daio Paper Corporation is a product of a merger involving fourteen SMEs including machine *washi* makers in Shikoku area during WWII, and achieved a rapid growth in the postwar period with the consumer business such as tissue paper as its centerpiece. Its Mishima Plant was completed in 1997 as one of the world's largest integrated plants for pulping and papermaking on the coast, equipped with a berth for 100,000 ton-class carriers, and boasting an annual output of 1.66 million tons. It is a company that maximized the advantage of importing materials while streamlining business as a process industry, and is one of the only three full-line paper manufacturers in Japan[94]. On the other hand, Rengo Group has its root in a time-honored paperboard company established in 1909, and is today Japan's top manufacturer in paperboard, cardboard and packing paper product businesses[95].

Combined, these four companies had close to 70% of the market share (on the

92 Nippon Paper Group [2009]
93 Oji Paper [2009]
94 Daio Paper Corporation [1995]. See also; http://www.daio-paper.co.jp/company/index.html
95 Rengo [1995]. See also; http://www.rengo.co.jp/english/about_us/outline/index.html

revenue basis), and together with Lintec Corporation (4.1%) and Hokuetsu Paper Mills, Ltd. (Hokuetsu and Kishu Paper Co., Ltd. since 2009) (3.5%) reached 83% in the year 2006[96]. Even after the reorganization, the paper industry is yet to overcome the common structural problems shared by many Japanese manufacturing industries such as low profitability[97]. And the further restructuring attempts including take over bid and affiliation of the secondary and tertiary groups have failed. At any rate, it can be said that the restructuring in the 1990s has left the Japanese paper industry with a new business structure with an awareness of the maturing domestic market and globalization.

## Conclusion

In the first half of 20th century, Japan was the fifth most populous independent nation after China, USA, USSR and Germany, and it still ranked ninth in 2000. Its per capita paper consumption kept increasing for 120 years, from zero (excluding consumption of *washi*) 130 years ago to 247 kg in 2006, on par with the average of the wealthiest European nations. Started out last among the major paper producers, Japan's *yoshi* industry reached the world's second largest level thanks to the thriving domestic demand. This position has been lost after the emerging economies joined in to offset its relative size, which now poses the Japanese paper industry a question of how to migrate from the common conventional growth model shared with some other manufacturing industries to a new one.

This growth model includes a highly developed unique paper culture, the natural and geographic conditions favorable to the paper industry, the technology introduction and investment strategies that exploit the latecomer's advantage to the hilt and, the readiness to cater to the severe quality request of the Japanese market. Especially in the postwar period, the domestic production of pulp expanded due partially to the world's largest rayon industry that encouraged new entrants into the market. It resulted in a vertical integration model that combined pulping and papermaking processes inside Japan, using the wooden chips imported from overseas joint ventures. This model is changing in Japan, as dependency on recycled material is increasing, but it seems to be taken up instead by China, which has become the largest paper producer of the world.

At any rate, the history of development of the Japanese paper industry can be

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96 http://gyokai-search.com/3-kami.htm

97 According to the 2008 figures, the operating margin for Oji Paper Co., Ltd. was 3.2% and that for Nippon Paper Industries Co., Ltd. was 2.7%.

considered quite unique, when compared with those in the Western countries that led the 20th.

## Graphs and Tables

Graphs

1. Import and Export of Paper (all kind), and Production of *Yoshi* (Western paper) in Japan (1872-1936)
2. Inland Production and Degree of Import- and Export Dependency (Five-year-average in percent figures) of *Yoshi* (Western Paper) and Paperboard in Japan (1945-2005)
3. Production of *Yoshi* (Western Paper) and *Washi* (Japanese Paper) in Japan (1874-1936)
4. Degree of Import- and export Dependency (Five-year-Average in percent figures) of *Yoshi* (Western Paper) and Paperboard (1878-1933)
5. Market Shares of Major Paper Manufacturers in 1921(A) and 1932(B).

Tables

1. Trend in Use of Paper Materials
2. Annual Domestic Output of DP and Import Volume by Country (tons)
3. World's Top 10 Paper Producers and Their Paper and Pulp Production Ratio
4. Collection Rate and Usage Rate of Recycled Paper

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