

Industries and Global Competition

A History of Business Beyond Borders

Edited by
**Bram Bouwens, Pierre-Yves Donzé
and Takafumi Kurosawa**

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Chapter 11

Three Markets and Three Types of
Competitiveness: Pulp and Paper Industry

Takafumi Kurosawa and Tomoko Hashino

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11 Three Markets and Three Types of Competitiveness

Pulp and Paper Industry

Takafumi Kurosawa and Tomoko Hashino

Introduction

Paper is a universal and familiar product for any industrial society. Although digitization eroded its dominance as an information carrier, one can hardly live without paper's use in printing, packaging and wrapping material, sanitary products, and a variety of industrial materials. Paper has over 2,000 years of history and has been consumed in virtually all regions of the world. On the supply side, almost all major industrial nations have a paper industry. These features make it an ideal object of long-term historical analysis of the industry-specific patterns of competitiveness.

Each region had its own specific supplier-consumer relationship. Despite considerable global integration in the flow of raw material (wood, wood-chip, and waste paper) and semi-finished products (pulp), the world market had been divided into the continental size of regional markets.

However, treating these regions as geographical units of analysis does not suffice for the analysis of competitiveness, especially when we look at the entire value chain, which includes not only paper production, but also raw material supply, pulp production and processing/consumption of paper. This is because each region has two types of sub-regions and actors, namely 1) nations, regions, and firms with competitiveness in the upstream of the production process and material flow (forestry and pulp production) and 2) the aforementioned actors with competitiveness in their downstream (paper making and processing/consumption of paper). The former can be categorized as 'resource-push,' and the latter as 'consumption-pull.' In addition, the third category ('hybrid integration') can be introduced, to explain another pattern of competitiveness wherein both the features of 'resource push' and 'consumption pull' are combined. This chapter investigates the history of pulp and paper industry in Europe, North America, and East Asia (mainly Japan) by applying these three categories. For this purpose, we analyze not only the paper industry, but also the pulp industry and other related sectors.¹

This chapter addresses the following questions: What are the features of the paper industry, and what are the main determinants of its location and competitiveness? Which part of the world has competitiveness in this industry and why? How did it shift over time, and what were the main drivers of the change? What type of geographical unit or typology of region can be applied to identify both structural elements and historical changes in the industry?

The first section of this chapter analyzes the status-quo of the global paper industry. Section 2 outlines the characteristics of the pulp and paper industry and analyzes the ‘industry specific time and space.’ Section 3 provides basic features of the historical development of the three major markets in the 20th century (North America, Europe, and Japan). Section 4 introduces two analytical concepts (consumption pull and resource push). Section 5 discusses the third category (hybrid integration) focusing on Japan. Section 6 summarizes structural changes in the global competitive landscape in the 21st century.

1 Pulp and Paper Industry in Today’s World

1.1 *The Presence of Rich Economies and Forest-Rich Regions*

Before analyzing historical developments, the global market landscape should be presented. Table 11.1 shows the top 20 paper producing countries in 2013.

The table shows a strong presence of large economies and the considerable share of forest-rich countries in the northern hemisphere. China (world share: 26%) and the United States (18.3%) have a dominant position, followed by Japan (6.5%) and Germany (5.6%). Except for the inverse position of China and the United States, the first to fourth ranks correspond to gross domestic product (GDP) of the respective countries. Some industrialized and prosperous economies with relatively large populations, such as Korea, Italy, and France, as well as forest-rich nations with a strong tradition of the pulp and paper industry, such as Canada, Sweden, and Finland, form the second group. In contrast, the United Kingdom, the world’s fourth paper producer during the 1960s (4.8% in 1964), dropped to the 19th position, with only 1.1%.

What is the size of consumption of each nation? The top four paper producers are also the four largest consumers of paper, in the exact sequence (see column “c”). The self-sufficiency rate (column “g”) of three largest producers (China, United States, and Japan) ranged from 103% to 96%. It is striking that all top 15 consumer nations are also among the top 20 producing nations. Simply put, even in the globalized economy, paper is largely produced where it is consumed, though the extensive mutual trade among nations makes the actual situation more complex owing to specialization into diverse grades.

Table 11.1 Production, Consumption and Trade of Paper, Pulp, and Wasted Paper (World's Top 20 Paper Producing Nations in 2013)

Ranking of Paper Production	Country	Paper and Paper Board														
		Production					Consumption					Export and Import				
		a	b	c	d	e	f	g	b	i	j	k	l	Net Export (million ton)	Net Export (million ton)	Net Export/Production Ratio (%)
		Production (million tons)	World Share (%)	Consumption (million tons)	World Ranking	World Share (%)	Per capita Consumption kg/year	Self-Sufficiency Ratio (%)	Export Amount (million ton)	Export Value (billion USD)	Import Amount (million ton)	Net Export (million ton) <td>Net Export/Production Ratio (%)</td> <td></td> <td></td> <td></td>	Net Export/Production Ratio (%)			
1	China	104.7	26.0	101.4	1	25.1	75	103	6.2	6.6	2.8	3.3	3.2			
2	US	73.7	18.3	71.8	2	17.8	226	103	11.9	10.1	9.9	1.9	2.6			
3	Japan	26.2	6.5	27.3	3	6.8	214	96	1.1	1.6	2.2	-1.1	-4.1			
4	Germany	22.4	5.6	19.5	4	4.8	240	115	13.2	13.3	10.3	2.9	12.8			
5	S. Korea	11.8	2.9	9.6	9	2.4	195	124	3.3	2.4	1.0	2.3	19.1			
6	Canada	11.1	2.8	5.9	15	1.4	169	190	8.3	6.5	3.1	5.3	47.4			
7	Sweden	10.8	2.7	1.8	n.a.	0.4	197	599	9.7	9.6	0.7	9.0	83.3			
8	India	10.6	2.6	12.4	5	3.1	10	86	0.4	0.3	2.2	-1.8	-16.6			
9	Finland	10.6	2.6	1.1	n.a.	0.3	212	946	9.9	9.1	0.5	9.5	89.3			
10	Indonesia	10.6	2.6	7.2	12	1.8	29	147	4.0	3.4	0.6	3.4	32.1			
11	Brazil	10.4	2.6	10.2	6	2.5	52	103	1.4	1.7	1.2	0.3	2.5			
12	Italy	8.6	2.1	9.7	8	2.4	157	89	3.8	3.6	4.8	-1.0	-11.9			
13	France	8.0	2.0	8.9	10	2.2	141	90	4.3	4.5	5.2	-0.9	-11.2			
14	Russia	7.7	1.9	6.8	13	1.7	48	113	2.5	1.7	1.6	0.9	11.7			
15	Spain	6.2	1.5	5.9	14	1.5	127	105	3.2	2.7	3.0	0.3	4.4			
16	Mexico	4.8	1.2	7.5	11	1.9	66	64	0.3	0.3	3.0	-2.7	-55.6			
17	Austria	4.8	1.2	2.1	n.a.	0.5	258	228	4.3	3.4	1.5	2.7	56.3			
18	Thailand	4.6	1.1	4.7	18	1.2	68	97	0.9	0.7	1.1	-0.2	-3.5			
19	UK	4.6	1.1	9.8	7	2.4	154	47	1.2	1.6	6.3	-5.1	-112.1			
20	Poland	4.0	1.0	5.0	17	1.2	129	82	2.6	2.1	3.5	-0.9	-22.2			
Total: 20 nations		356.4	88.5	328.5		81.4			92.4	86.0	64.4	-				
World		402.6	100	403.6		100	56.5		110.9	102.2		-				

(Continued)

Table 11.1 (Continued)

		Pulp					Waste Paper				
Production		Export			Recycling and Trade						
<i>m</i>	<i>n</i>	<i>o</i>	<i>p</i>	<i>q</i>	<i>r</i>	<i>s</i>	<i>t</i>	<i>u</i>			
Production (million ton)	Ranking of pulp production	World Share of Pulp Production (%)	Export Amount (million ton)*	Pulp Production/ Paper Board Production Ratio (%)	Collected Waste Paper (million ton)	Consumption of Waste Paper (million ton)	Waste Paper Net Export (million ton, r-s)	Waste Paper Consumption/ Paper Board Production Ratio (%)			
China	2	9.6	0.0	17	45.43	74.48	-29.04	71			
United States	1	26.5	7.9	65	45.79	26.60	10.86	36			
Japan	7	4.8	0.5	33	21.79	16.93	4.86	65			
Germany	12	1.4	1.3	12	15.36	16.48	-1.13	74			
South Korea	28	0.3	0.0	5	9.16	10.32	-1.16	87			
Canada	3	9.5	9.8	155	4.17	2.68	1.4	24			
Sweden	5	6.6	3.7	111	1.22	1.38	-0.15	13			
India	11	2.2	0.0	38	3.43	5.96	1.02	56			
Finland	6	6.1	3.1	105	0.69	0.61	0.08	6			
Indonesia	9	3.7	3.8	64	4.06	6.25	-2.19	59			
Brazil	4	8.3	9.8	145	4.55	4.53	0.3	43			
Italy	27	0.3	0.0	7	6.06	4.71	1.35	55			
France	15	1.4	0.5	33	7.24	5.15	-1.13	64			
Russia	8	4.2	1.9	98	2.99	2.65	0.3	34			
Spain	14	1.6	1.2	46	4.26	5.14	-0.89	83			
Mexico	38	0.1	0.0	3	4.17	4.88	-0.72	101			
Austria	16	0.9	0.4	32	1.45	2.33	-0.87	48			

Thailand	1.1	22	0.6	0.0	2.5	2.89	3.71	-0.81	81
United Kingdom	0.2	36	0.1	0.0	5	7.88	3.80	4.08	83
Poland	1.2	21	0.6	0.1	29	2.19	2.05	0.14	50
Total:20 nations	161.8		89.1			194.78	200.6		
World	181.6		100.0	57.6	45	232.86	233.1		57.8

Source: The numbers of production, consumption, and trade of paper and paper board; those of the collection, consumption, and trade of waste paper are based on the data by *RISI Annual Review 2014* and *Paper Promotion Recycling Center* (Tokyo). (www.prpc.or.jp/menu05/linfile/sekainotoukei.pdf). The export value of paper and paper board, and the production and export numbers of pulp are aggregated by authors using FAOSTAT (<http://faostat3.fao.org/download/F/FT/E>). The other data are aggregated by authors using the same sources. Per capita consumption of some nations is calculated by the national consumption amount obtained from the RISI statistics mentioned above and demographic statistics by WHO.

Notes

1) 'Pulp production' of South Korea, Italy, Mexico, Thailand, UK, and Poland does not show the production amount, but the production capacity in 2013 (dissolve pulp is excluded). The global production capacity is the sum of the data obtained from FAO statistics and production numbers in China. For FAO statistics, see FAO (ed.), *Pulp and Paper Capacities, 2015* (www.fao.org/docrep/014/t22285t/t2285t00.pdf).

2) From 17.47 million tons of pulp production in China, 8.28 million ton is non-wood pulp.

The strong presence of thinly populated forest-rich nations in the northern hemisphere as regards both high self-sufficiency rates (column “g”) and export/production ratios (column “1”) is noteworthy. Finland (946%) and Sweden (599%) have exceptionally high export/production ratios, followed by Austria (228%) and Canada (190%). They hold even stronger positions in pulp production and export.

However, it is interesting that some nations enjoy a strong position on the paper markets despite their limited pulp production capacity. Germany (ranked first in the export of paper with 115% self-sufficiency rate), and South Korea (11th, 124%) are good examples.

Next, a closer look at the production and consumption of paper in each continent reveals high levels of self-sufficiency. In 2013, fairly balanced supply and demand were observed in East Asia (China, Japan, South Korea, and Taiwan) with 36.5% share in the world paper production and 102.5% of the self-sufficiency ratio, Europe (25.0% and 109.8% respectively) and North America (21.1% and 109.2% respectively). The total of these three regions accounts for 83% of the production and 78.6% of the consumption globally. In the rest of the world, other Asian regions (8.3% share in the world paper production and 74.6% of the self-sufficiency ratio) and Latin America (5.2% and 74.1% respectively) are relatively large.

A geographical shift in the global market over time is evident. A half-century ago, in 1965, the global production share of paper and paper board were 47.9% for North America (40% in the United States; 7.9% in Canada), 37.5% for Europe (7.3% in the three Nordic nations; 4.8% in the United Kingdom), 7.9% for Japan, and 14.6% for the rest of the world. East Asia expanded dramatically, and North America and Europe saw their shares reduced.

1.2 Enterprises

How will this picture change when we focus not on nations but on enterprises? Table 11.2 shows the world’s top 20 pulp and paper-related firms (by revenue) in 2013. The composition of the listed firms reflects not only the presence of firms from North America, Europe, and East Asia but also the emergence of new players from the southern hemisphere. The top company in the United States is International Paper. International Paper and Oji Paper, the largest Japanese paper company, have kept their top positions in the world and in Japan, respectively, for longer than a century. Except for Procter & Gamble (ranked second), Kimberly-Clark, and Marubeni (a Japanese general trading company), most companies on the list have a clear focus on the pulp and paper industry.

Table 11.2 Global Top 20 Firms in the Paper and Pulp Industry (2013)

Ranking	Region	World	Revenue in paper and pulp (million USD) (a)	Total Revenue (million USD) (b)	Ratio of paper and pulp (%) (a/b)	Total Assets (million USD)	Production (thousand tons)		Employees	
							Pulp for market sales	Paper and Paper board		
North America										
1		1	International Paper (US)	29,080	29,080	100	31,528	1,700	19,600	65,000
2		2	Procter & Gamble (US)	16,790	84,167	20	139,263	n.a.	n.a.	121,000
3		7	Kimberly-Clark (US)	9,960	21,152	47	18,919	n.a.	n.a.	57,000
4		10	Rock Tenn (US)	9,077	9,545	95	10,733	392	8,116	25,800
5		15	Domtar (Canada)	5,391	5,391	100	6,278	1,445	2,957	9,400
6		16	MWV (US)	5,287	5,287	100	10,285	0	2,719	16,000
Europe										
1		3	UPM (Finland)	13,100	13,346	98	19,379	1,900	10,288	20,900
2		4	Stora Enso (Finland)	12,768	13,966	91	16,930	1,086	9,911	27,900
3		5	Smurfit Kappa (Ireland)	10,562	10,562	100	10,927	0	5,090	41,000
4		9	Svenska Cellulosa (Sweden)	9,596	13,656	70	21,825	318	5,090	34,000
5		14	Metsä Group (Finland)	8,596	6,546	87	6,855	1,409	2,576	12,200
6		17	DS Smith (UK)	5,925	6,307	83	5,525	0	2,719	21,400
Japan										
1		6	Oji Holdings (Japan)	10,190	13,651	74	19,625	581	8,733	31,000
2		8	Marubeni (Japan)	9,826	139,670	7	74,328	485	582	42,000
3		11	Nippon Paper (Japan)	8,688	11,077	78	15,171	539	6,882	13,000
4		19	Rengo (Japan)	4,767	5,359	89	6,444	0	2,478	13,000

(Continued)

Table 11.2 (Continued)

Ranking	Region	World	Revenue in paper and pulp (million USD) (a)	Total Revenue (million USD) (b)	Ratio of paper and pulp (%) (a/b)	Total Assets (million USD)	Production (thousand tons)	Employees	
							Pulp for market sales	Paper and Paper board	
Other Regions									
1	12	Mondi (South Africa)	8,596	8,596	100	8,283	535	5,283	24,400
2	13	Sappi (South Africa)	5,925	5,925	100	5,727	945	6,672	13,600
3	18	Empresas CMPC (Chile)	4,779	4,974	96	14,188	2,596	1,259	16,700
4	20	Nine Dragons Paper (China)	4,636	4,636	100	10,395	85	11,090	17,800

Sources: *Japan Paper Association* (www.jpaa.gr.jp/states/global-view/index.html#topic05).

International Paper's production volume comes close to the entire production amount in Germany, the world's fourth largest paper producing country. About half of the listed firms from developed countries are born from mega-mergers. However, the market structure is still far from a global oligopoly. International Paper's market share in the world is merely 4.9%, less than a half of the global top firm from the automobile industry (Toyota, 11.5%), and it is even smaller than that of the top firm in the steel industry (Arcelor-Mittal, 5.9%), which is known for a low degree of concentration. Although Germany is the world's fourth paper producing nation, it has only three companies in the world's top 100 paper producing firms, and none in the top 50. In other words, the size of the companies can explain the competitiveness of nations and regions only partially.

2 'Industry Specific Time and Space' of Pulp and Paper

In the introduction of the book, the author argued that each industry has its own time and space. Then, what kind of 'time and space' do the pulp and paper industry have and how did it shape the above described global landscape of the industry?

First, the industry is marked by a long time horizon. Paper is an extremely mature and stable product/commodity (Kurlansky 2016). While epoch-making innovative products create new markets every now and then, paper has always been paper. The basic principle of its manufacturing process remained unchanged over centuries: both its demand and consumption patterns have been stable, and the time-horizon of the investment is long. Drastic changes in the competitive landscape triggered by transformation of products, materials, and processes have rarely occurred (Lamberg and Ojala 2006; Kurosawa and Hashino 2016).

However, as witnessed there was a geographical shift in the global market, though it took place rather late in comparison with some other industries, and it reflected the second feature of this industry: paper is a typical product for developed economies. The demand for newsprint and printing paper postulates a literate population, and it is significantly correlated with the level of income. The market of paperboard also grew together with the emergence of the modern distribution system and marketing, and mass consumption of packaged products. Furthermore, the third market, namely the wide range of household papers for hygiene purposes presupposes the existence of consumption habits of disposable goods. For example, the peaking-out of per capita consumption of paper occurred only lately: with 264 kg/year in 2004 in the United States and 245 kg/year in 2006 in Japan (Kurosawa and Hashino 2012). As the demand expands even after the country becomes a middle income economy, it takes longer for latecomers to catch up with the size of the demand in developed countries than in other

industries with different patterns; thus limiting the effects of the ‘advantage of backwardness.’

The technological feature of the industry also defines the temporal characteristics of the industry, by making it a typical ‘installation industry,’ where decisions on investment play a vital role. The economy of scale is significant both in pulp and paper industries, and a continuous production process has its advantages. The installation of a large-scale production facility is decisive: initial investment is gigantic, and the ratio of fixed capital is very high. Although the actual operation of the plant requires special know-how, the technologies are basically embedded in the plant design, and the plant and facility are usually long-lasting. In combination with the maturity of products, both the elements of labor and product development play only limited roles. Accordingly, the focal point of the competition is investment: when and where companies build their plants, for what type of product and raw materials, and by what kind of processes.

Furthermore, material procurements of this industry also require a very long time horizon and it has to be coordinated with the investments to the facilities and plants. The payout period of investment for forestry resource is extremely long, though the recent innovations in the bio-botanical technology have dramatically shortened the cycle. The decades-long time horizon of the industry is derived not only from stability of products, technology, and consumption but also from the long lead-time of the forestry resource cultivation.

What kind of spatial feature does the industry have? First, paper is generally a low-priced product on amount of its weight and volume, meaning it can bear only a little transportation cost. This is one of the main reasons for the afore-mentioned geographical structure of the industry. Each continental region, which has sub-regions with favorable conditions for either supply or for demand, tends to have its own self-sufficient market area.

The second spatial element characteristic for this industry is the geographical distribution of the raw material, and availability of other factors/conditions, such as clean water and low cost energy. The raw material is a significant determinant for the competition, because both processes and products are largely constrained by it. The pulp and paper industry is based on the processing of biological resources, including forestry resources, agricultural residue, and waste paper. All of them are unevenly distributed geographically, suggesting that economic actors (or networks of them) that enjoys advantageous access to raw materials and/or actors equipped with high capability to control multi-step material flow can become competitive.

Unlike mineral resource industries, not only the extraction (logging) but also plantation is possible, and recycling of materials has a technological limit, making constant input of virgin material indispensable. Especially after late 20th century, the plantation capability became crucial for competition.

3 The Three Major Regions: Historical Features

3.1 *Europe: Intra-Regional Division of Labor*

The modern paper industry was born in Europe. A literate population, publishing culture, and printing industry were decisive for the rise of the paper industry. The supply of rags was crucial. Europe pioneered in the invention and application of paper machine and the introduction of the wood pulp in the 19th Century. Some paper, printing, and publishing clusters with long traditions have survived until today. In addition, most globally competitive equipment and engineering firms for the paper industry are European (e.g., Metso in Finland and Voith in Germany). Though European nations share a common history in this industry, there are major differences among various European countries.

The United Kingdom

The United Kingdom had been the largest paper producer in Europe until the 1960s. The rise and decline of the British paper industry was greatly affected by the tariff policy and the pattern of international division of labor (Owen 1999). With the exception of newsprint, it enjoyed the protective tariff of 1932. Three decades later, the industry suffered from the ‘EFTA shock’ in 1959–1960, due to the foundation of European Free Trade Association. The EFTA abolished tariffs on imports from Nordic countries, triggering massive imports. Because the United Kingdom had shifted its source of raw material to the imported market pulp from Nordic countries and Canada long before that, the industry had no cost advantage against vertically integrated factories in Nordic countries. Although some firms saw opportunities in recycled paper and packaging materials, the industry witnessed a sharp decline. The production picked up since the mid-1980s facilitated by inward foreign direct investment (FDI). However, the recovery was very limited in comparison with the once strong position in Europe (Särkkä 2012).

Germany

The history of paper industry in Germany is marked by a series of external shocks, discontinuities, and vibrant expansion after World War II (Turunen 2012). Although Germany was ranked high in paper production until World War I, it suffered damages caused by defeats in the two wars, loss of territory, and division of the land. More than half of the pre-World War II production capacity was located in East Germany. In order to offset this loss, post-war Germany pursued a steady expansion of investments. However, unlike Japan, post-war German paper industry had only a little wood pulp production. Instead, it utilized imported market pulp and recycled pulp and fully exploited the advantage of European integration.

Nordic Countries

The rise of the Nordic pulp industry started in the second half of the 19th century with the commercialization of wood pulp technology (Järvinen et al. 2012). As early as World War I, Sweden became the world's largest pulp exporter. The paper production also expanded in the first half of the 20th century, and newsprint and craft paper were exported. After World War II, the integrated production of pulp and paper grew further. During 1970s—1980s, Nordic enterprises intensified their FDI to address the European integration and the appreciation of currency. Since the 1990s, when market saturation and the decline of performance became evident, a wave of cross-border mega-mergers and consolidation took place.

3.2 North America: Resources, Investments, and Innovations

In the mid-1960s the world production of paper was approx. 100 million ton/year, about one-fourth of today's output. One half of it was produced in North America, and the United States solely had a 40% share of the world production. The preponderance after the late 19th century was brought about by multiple factors. On the supply side, the following elements were important: 1) unmatched natural resources, 2) investment in the infrastructure and dynamic expansion and shifts in paper producing regions, 3) R&D of technology for raw material use and the extensive use of economies of scale in facilities, and 4) product innovation. On the demand side, 5) income and population growth and 6) emergence of new markets through a series of product innovation were decisive. As strategic decisions to connect the supply and demand, 7) horizontal and vertical integration among firms and the formation of modern business organizations were important.

Although the modern paper industry has its origin in Europe, radical product innovations to diversify the use of paper were achieved in the United States during the first half of the 20th century (Toivanen 2012). Kimberly-Clark in Wisconsin invented cellucotton—a cotton-like absorbent material—in 1915 and created a new market of hygienic papers—a segment of consumer nondurables. In 1919, feminine hygiene products and cleansing tissue were also commercialized. In the segment of packaging, Hinde and Dauch and other companies in the Midwest took an initiative in corrugated paper for packaging use. Due to these innovations and with the modernization of the distribution system and revolutionary change in packaging and shipment, the size of this segment surpassed that of newsprint.

The formation of modern corporate organizations was observed early in the United States. The merger of 18 pulp and paper mills in the northeastern states established International Paper. During the boom years after World War II, major producers diversified their businesses into almost all segments and pursued vertical integration. The geographical expansion of leading firms integrated the national market. Consequently, a limited number of large firms with a similar business domain, behavior, and organizational structure dominated the market.

3.3 Japan: Tradition, Technology Transfer, and Self-Contained Development

The history of modern paper industry in Japan is marked by rapid and steady expansion. The first machine-made paper was produced in 1874. Subsequent expansion continued for one and a quarter century until 2001. This growth was largely self-contained. The import dependency was low from the beginning (approx. 30% in the 19th century) and dropped further (approx. 10% since the 1910s and less than 5% in the second half of the 20th century). Inward FDI was virtually absent (Suzuki 1967). The geographical and cultural distance from major paper producing countries entailed this development.

Both technology from abroad and adaptation of the Japanese production system contributed to the competitiveness of Japanese firms in the local market. Because these firms purchased the main equipment from Western engineering firms or locally produced them through licensing, there is no special technological advantage in the core technology. However, Japanese firms have been accumulating special knowledge in a variety of ways: sourcing and mixture of raw materials, customized installation of equipment, and incremental improvements in daily operations and products. These functioned as important elements for competitiveness against imports, especially because the capability of flexible manufacturing high-quality products has been very important in the Japanese market (Kurosawa and Hashino 2012).

4 Variation of Integration and Location

4.1 Consumption-pull, Resource-push, and Integrated Types

In terms of both material flow and value chain, the pulp and paper industry can be understood as a flow from biological resource (e.g., forest resource) into pulp, into paper, into a paper product, and then to the end-user. The flow from waste paper to recycled paper also derives from the abovementioned main flow. From the viewpoints of specific countries or regions, there are questions about what part of this flow is located in its territory and who controls it.

Studies on other process industries with similar conditions can provide useful insights on this issue. Akira Tanaka's analysis on the iron and steel industry and his analytical concept of the 'resource procurement system' are good examples of such works (Tanaka 2008). He categorized a widely acknowledged feature of Japanese steel makers as a 'Japanese model,' classifying it to three levels, namely *production system*, *corporate system*, and *competitive behavior* (Tanaka 2012). Although the similarity between paper and steel industry in Japan is conspicuous at all of these three levels, the *production system* provides special insights for the analysis of paper industry. Tanaka characterized production system of Japanese iron and steel industry

as follows: the investment strategy to seek state-of-the-art plants with a rational layout at a coastal location for the integrated production of iron and steel; integrated quality control for flexible and efficient multi-product/multi-specification production; the long-term-contract based raw material procurement system); This characterization of the steel industry can be applied to the pulp and paper industry in Japan with a little modification.

Furthermore, Tanaka's resource procurement system concept is highly useful to understand the abovementioned material flow in the pulp and paper industry. By using this concept, the following section tries to clarify the inner structure of the regional markets (Europe, North America, and Japan). For this purpose, the authors categorize a variety of integration and location patterns and the base of competitiveness into three types. Both North America and Europe have two types within their regional market: 1) The *consumption-pull* type, in which countries, regions, and firms have strength in the downstream of the entire value chain and 2) the *resource-push* type, in which countries, regions, and firms have strength in the upper part of the entire value chain. The post-war Japan can be classified as the third category, namely 3) the *hybrid-integration* type, in which the capability to combine advantages of the abovementioned two types contributed to its competitiveness. In this third category, the resource procurement system is similar to the one for the abovementioned 'Japanese model' in the iron and steel industry.

How can we distinguish these three types? An effective litmus test for the classification of these types is the ratio between the pulp and paper production. Table 11.3 shows ten largest paper—and paperboard—producing countries and the size of their pulp production, which is shown by index number in relation to paper production. In 1975, the index numbers in West Germany (29%), the United Kingdom (10%), and Italy (31%) were small, suggesting that these countries with relatively small pulp production that specialized in paper production belonged to the consumption-pull type. In contrast, in Canada (145%), Sweden (181%), and Finland (125%), pulp production exceeded paper production, and so these countries can be classified into the resource-push type. Brazil (145%) is also included in this type based on the data from 2013, as shown in Table 11.1. Finally, the United States (80%), China (78%), and Japan (61%) are regarded either as a mixture of these two types or the hybrid-integration type.

4.2 Consumption Pull: Diverse Outcomes

In the consumption-pull type, the downstream part of the value chain drives the expansion of the industry. Most countries in this category do not have a large pulp industry and have a trade deficit in paper products (Tables 11.1 and 11.3). On the other hand, this type has a favorable procurement condition of waste paper, being the location for the final consumption of paper (Table 11.3 shows the recycled paper ratio in 2005 [marked by “*”]).

Table 11.3 Pulp and Paper Production Ratio: Index of Pulp Production of Ten of the World's Largest Paper Producers, When Paper and Paperboard Production Is Taken to Be 100

	1956	1975	1995	2005				
1	US	70	US	70	US	65	*54	
2	Canada	124	Japan	61	Japan	37	China	*36
3	UK	n.a.	Canada	145	China	86	Japan	*72
4	W. Germany	50	USSR	95	Canada	136	Germany	*66
5	USSR	101	W. Germany	29	W. Germany	13	Canada	*14
6	Japan	86	Sweden	181	Finland	92	Finland	*5
7	France	41	China	78	Sweden	111	Sweden	*13
8	Sweden	260	Finland	125	France	33	S. Korea	*67
9	China	35	UK	10	S. Korea	8	France	*58
10	Finland	186	Italy	31	Italy	9	Italy	*55

Source: The number for 1975–2005 is calculated by authors using data from the Food and Agriculture Organization of the United Nations Statistics Division (<http://faostat3.fao.org/download/F/FOE>). Data for 1956 are based on Toyo Keizai Shimpo 1966, 'Kami-parupu no jissai chishiki' [Handbook of paper and pulp industry], Tokyo. The index of the United Kingdom in 1958 was four, and there is good reason to guess that it was less than six in 1956.

Note: The numbers with ‘*’ in 2005 show the ratio of recycled paper production against paper and paperboard production.

Accordingly, many of these countries increased the ratio of recycled paper, especially after the 1970s, and some even became net-exporters of paper and/or waste paper.

In the formation process of vertical integration, the pattern ‘from downstream to upstream’ dominates the consumption-pull type. Two groups of firms, namely those that belong to the user industry of paper—such as newspaper companies and consumer goods producers—and paper companies that became the main players in paper production enter the market not through pulp production but with papermaking. Then, they integrate the upstream process into their business to ensure stable procurement of intermediate goods and raw materials. The vertical integration takes place in multiple forms and scopes: 1) integration of paper production by paper users, 2) integration of pulp production by paper makers, 3) integration of forestry by players based in the downstream, and 4) integration spanning more than two sections of the value chain (e.g., paper use to pulp production). As for location, the main actors of this type usually originate from densely populated, high-income regions. Proximity to the users and logistics centers are often crucial.

Which countries belong to the consumption-pull type? Except for Nordic countries, most European countries belong to this type, as indicated by the import dependency ratio (import/consumption) of paper. The numbers in 1964, 1975, and 1984 were, respectively, as follows: the United Kingdom, 48%, 44%, and 60%; (West) Germany, 30%, 35%, and 41%; France, 15%, 24%, and 37%; and Italy, 14%, 10%, and 30%. The figures stayed generally high and increased gradually.

The consequences of the ‘consumption-pull’ development are diverse. The United Kingdom is a conspicuous case, in which the consumption-pull type of industrial structure worked as a negative condition for competitiveness. In this country, considerable numbers of paper mills were founded and owned by paper users, such as newspaper publishers and producers of consumer goods (cigarettes, foods, toiletry, etc.). In the 1960s, when Nordic countries and Canada emerged as competitive paper exporters, these companies—for which paper-production is not the core-business—switched from in-house production in the United Kingdom to procurement from abroad, either by shifting the production to their overseas factories or by sourcing from other companies. The export of the end products of these user industries stagnated, due partially to declining competitiveness of the whole manufacturing sector and the delay in the United Kingdom’s entry into the European Communities/European Union. In short, the United Kingdom lost its competitiveness in two ways: it suffered not only from unfavorable conditions in the upstream (supply side) but also dysfunction of their linkage with the related industries in the downstream, which could have been an advantage of the consumption-pull type.

On the other hand, the case of Germany shows that the consumption-pull type can improve its competitiveness significantly and even achieve

‘export-pull’ growth. The domestic procurement of pulp, the integrated production of pulp and paper, and the full-lineup strategy were not the priority of German paper producers. Instead, they pursued the utilization of imported market pulp and recycled paper and adopted a specialization strategy on the premise of international division of labor. The existence of user industries with a strong export activity worked positively. The German paper industry comprised of small and medium-sized enterprises (SMEs), and these firms supplied their customized products to wide-ranging SMEs (including highly localized newspaper, printing, and packaging firms) in each local market. In sum, the German paper industry kept its strong competitiveness not through vertical integration or economies of scale but through optimization of their scope to utilize their ties with specialized customers.

North America as a whole is featured as ‘resource-push’ type. Canada has a huge export of pulp and newsprint. The United States is the world’s largest producer of pulp (Table 11.1) and fulfills approx.70–80% of the domestic consumption. However, it is also possible to find elements of consumption-pull in the United States, with the exception of its southern states. The utilization of wood pulp was pursued to address the expansion of newsprint demand and chronic scarcity of raw material, and thus it could be considered consumption-driven development. The leading actors of this process were newspaper publishers that established integrated mills, tracing the value chain from downstream to the upstream. After the import tariff repeal in 1913 on newsprint, American newspaper publishers procured their newsprint from factories in Canada, which were owned mostly by American paper companies or American newspapers. Another feature of the consumption-pull is the aforementioned product innovation. While the expansion of the market was first brought by innovative actions on the supply side, the subsequent expansion of demand necessitated the enlargement of the supply base.

In East Asia, South Korea can be classified into this type. Korean paper producers mainly use imported pulp and export proportionally large amounts of paper products. Similar to Germany, South Korea transformed itself from a consumption-pull type into an export-pull type by capitalizing on the international division of labor.

4.3 Location-based Resource Push: Advantages and Limits

Paper producing nations of the ‘resource-push’ type emerged with the commercialization of wood pulp. Nordic countries, Canada, and more recently major pulp producers in the southern hemisphere typify it (Ojala et al. 2006). Southern states of the United States have similar features to some extent. It also exports diverse forestry products (timber, lumber, wood chips, and wood boards).

In these resource-push type of countries, the establishment of a pulp industry often preceded that of the paper industry, and the forestry industry

had started even earlier. The majority of paper factories are integrated pulp and paper factories and often connected with sawmills (forestry cluster). Firms on the upstream took the initiative for integration, though many cases of inward FDI (from the United States to Canada, FDI to South America) can be seen as important exceptions.

Canada is a good example of the competitive advantage of the resource-push type and its limits. The development of the Canadian paper industry was historically based on the following elements: 1) availability of low-cost and high-quality raw material (softwood) and proximity to the large market (the United States); 2) access to the world market, including the Commonwealth; 3) inward FDI; and 4) support by the government (e.g., favorable forest and water use concessions). After World War II, while pulp export expanded, the attempted diversification of paper production from newsprint to other products largely failed (Kuhlberg 2012).

Since the 1970s, the Canadian pulp and paper industry witnessed growing difficulties. Industrial decline of nearby Midwest of the United States dampened the demand. The inflation and rising labor costs discounted the cost advantage, and the environmental movements and cessation of government support worsened it. Since the 1990s, the newsprint market shrank dramatically after the information technology revolution. Finally, in the 21st century, competition with the newly emerged pulp producing nations intensified. A series of large-scale M&As did not improve its performance. A few firms such as Cascades and Domter survived by shifting their core businesses from traditional segments to new ones, including hygienic paper in the European market and recycled-paper products.

The high-quality and low-cost forestry resources are accessible also to outsiders through inward FDI. Which means, the competitive advantage of the raw material is 'transferrable.' However, the advantage of the resource itself is inseparable from the location, because the forest is irremovable. As rare as it may be, if the raw material of such a region loses its competitiveness, the advantage of that location will be lost. Such a once-in-a-century kind of upheaval has been occurring since the late 20th century with the rise of the southern hemisphere based on short-growth-cycle species, silvicultural innovation, and high yield plantation.

5 Japan as the Hybrid-Integration Type

5.1 Hybrid Integration as the Third Type

It might be possible to position post-war Japan as a mixture of the above-mentioned consumption-pull and resource-push types. However, it is more appropriate to classify it as the third category ('hybrid-integration' type)² for the following reasons. Despite its constraints in forest resources, Japanese firms pursued integration in production by expanding pulp production capacity and adopting the coastal location strategy. This pattern is different

from both coastal locations for product exports, which can be observed in some forest-rich (resource-push type) countries and user proximity in consumption-pull type countries. In the hybrid-integration type, wood chip and not market pulp is procured globally with the uniquely developed infrastructure (e.g., the specially designed gigantic wood-chip carriers and port facilities). This is a conspicuous feature of the Japanese pulp and paper industry even today. Although the pulp and paper production using imported raw material can also be observed elsewhere, the scale of investment and consistency of strategy in Japan are outstanding.

This ‘hybrid-integration type’ is inherently universal and not necessarily bound to a specific country. However, there are two reasons to associate this type with the aforementioned Japanese model in the iron and steel industry defined by Tanaka. First, it exemplifies a new pattern of world trade in the post-World War II era: new regions for raw material supply (e.g., Latin America) and new paper-making/consuming population-rich countries (Japan) emerged hand-in-hand, becoming a prototype for today’s global shift of industries to East Asia and its industrial hinterland. Furthermore, once we focus on other process industries in post-war Japan, this imported material based integrated production on the coast is a familiar setup. For example, in both Japanese steel and petrochemical industries, not the intermediate goods (pig iron or oil products) but primary raw material and energy (iron, coal, and crude oil) are imported from abroad through long-distance shipping. The characteristics of the Japanese paper industry—global resource procurement, coastal location, production across multiple processes, systematic and coherent investment strategy, and utilization of know-how of the so-called Japanese production system—are widely shared features for most process industries in post-war Japan.

5.2 Why and How Did the Hybrid-Integration Type Emerge?

Why and how did this unique type emerge and become the standard in Japan? Before World War II, Japan had both consumption-pull type and resource push type in its territories. Similar to Europe and North America, the commercialization of wood pulp transformed the softwood-rich northern land into the production base of pulp and paper. Since the 1910s, a dozen integrated pulp and paper factories with state-of-the-art equipment were built in Hokkaido and Southern Sakhalin, which supplied newsprint and other mass-market-oriented products to densely populated Honshu. Three major players—merged into Oji Paper in 1933—invested massively into these northern islands, enjoying the favorable concessions of forest and water. As a result, the self-sufficiency ratio of pulp in Japan jumped from 62% (1913) to 87% (1921) (Kurosawa and Hashino 2012).

On the other hand, the rest of Japan’s pulp and paper industry had consumption-pull type features. There were two types of suppliers: 1) small and medium-sized producers of machine-made *Washi* (Japanese paper)

that used indigenous and local raw materials and 2) medium-sized makers of Western paper and paperboard that used mainly rice straw pulp and imported pulp. While these ‘non-Oji’ firms were excluded from access to the forestry resource in the northern islands, they could utilize their proximity to the users.

At the end of World War II, Japan lost Southern Sakhalin, where 44% of pulp capacity of Japan was located. The monopolistic Oji Paper was divided under the occupation and its monopoly came to an end. Accordingly, the dualism of the two models weakened significantly. Under the scarcity of foreign currency through the 1950s, import of pulp was impossible. Together with pine and a variety of hardwood in the main islands, indigenous non-wood fibers and recycled materials became important for pulp production.

The combination of pulp production and paper-making was realized from 1945 to the 1950s through intensive mutual entries—by both pulp producers and paper producers—into the upstream and downstream. As early as the 1950s, both groups became almost identical in their business portfolios and strategies.

The procurement of raw material for pulp from abroad shifted to a high gear in the 1960s, when the domestic supply was no longer sufficient. The use of wood chips—an eminent indication of the hybrid-integration type—launched in early-1960 and virtually replaced the use of timber in the 1970s. Toyo Pulp was the world’s first mover to deploy a specially designed wood-chip carrier, and its Japanese rivals soon followed suit. In 1973, Japan had 51 carriers owned by 16 firms to import wood chips from 10 countries. Wood chips was the second largest imported item by volume in Japan after crude oil (Daishowa-Seishi 1991). Even in 2015, approx. 75% of wood-chip carriers in the world were under control of Japanese paper producers (World Resources International LLC 2015). Other features, such as long-term procurement contracts with overseas suppliers (usually local forestry firms), plantation at home and abroad, and optimal global procurement became indispensable aspects of this raw material procurement system. In this model, unlike the resource-push one, paper producers can reshuffle their sources to profit from the emergence of new forestry countries, as long as they have the capability to reorganize the network.

6 Global Structural Change in the 21st Century

In the 21st century, the global paper industry entered a new phase. First, on the demand side, emerging economies with a large population increased their presence. In particular, the expansion of the Chinese market was dramatic. Due to the demand at home, China became the world’s second largest paper producer in 2000, and the largest in 2007, surpassing the United States. Today, it produces more than a fourth of the total paper output in the world (Table 11.1).

The features of Chinese paper industry present both similarities and contrasts with Japanese ones. The similarities are obvious: the growth was achieved by rapid expansion of demand, under significant constraints in domestic raw material supply (i.e., the consumption-pull element). Despite this drawback, the dependency on imported wood pulp was very low in China until 2009, and it is relatively limited even today. However, there are noticeable differences. In the case of China, not wood chip but waste paper—another internationally tradable good—is imported massively and used for pulp production. This became possible only after the establishment of paper recycling infrastructures abroad. Rich countries with high per capita paper consumption (especially the United States and Western-Europe) became its major suppliers. The variety of raw material is extremely wide in China, and the use of indigenous low quality material (e.g. agricultural residue such as bagasse) continues even in the 21st century. The basic elements of the competitiveness of the hybrid-integration type, namely integrated production of pulp and paper, coastal location, and extensive exploitation of economies of scale, are still limited in China. Above all, organizational capability for the optimized global sourcing of high-quality virgin material—another hallmark of hybrid integration—is largely missing.

Second, the structural upheaval on the supply side also changed the competitive landscape of the global paper industry. In addition to the worldwide expansion of paper recycling, the following changes brought about fundamental impacts: the emergence of new forestry countries in the southern hemisphere and tropics; increasing importance of planted forests and use of fast-growing, high yield species; and impact of bio-technological and silvicultural innovations. These three elements are mutually related, and they are affecting the over-a-century-long advantage of the northern forest-rich countries (Lima-Toivanen 2012).

Third, new dynamics can also be observed on the level of firms. While existing paper producers intensified their multinational characteristics, new players from the emerging markets expanded their presence (Kurosawa and Hashino 2016).

In Europe, Nordic companies like UPM (Finland) and Stora Enso (Finland/Sweden) consolidated themselves and improved their positions through successive acquisitions in Central and Eastern Europe. Although both these companies are active in FDI toward China and South America, sales in Europe still account for 70–90% of their global sales. In this respect, they are still European firms, rather than global ones.

Likewise, North America is trending toward consolidation to cope with the dramatic contraction of paper consumption after the digital revolution. In 2015, Rock Tenn and MWV were merged into West Rock. Similar to Europe, a truly global firm has not appeared yet. For International Paper, the largest paper producer in the world, the sales share of North America is still dominant at 72% (Europe and Russia, 13%; Asia, 7.2%; and Latin America, 5.9%) in 2015.

Japan also witnessed a series of M&As at the turn of the century to address similar difficulties. Since then, two top makers (Oji Paper and Nippon Paper, each with approx. 25% share), together with the second group comprising four companies (each with approx. 10%), account for approx. 90% of the domestic market.

In the high-income economies, the structural change in the last three decades is well exemplified by the growth of firms that specialized in recycling, recycled paper, and packaging materials. DS Smith (ranked sixth in Europe) is a good example. Since the 1990s, the company expanded its European business through a series of M&As in the continent and green-field investments in Southern Europe. Smurfit Kappa (ranked third in Europe) has its roots in the Irish box maker, Jefferson Smurfit. The company made FDI in the United States in 1964 and merged with Kappa, a Dutch packaging material maker with pan-European business, in 2005. Both examples reflect not only industrial integration in Europe but also the success of the strategy to exploit consumption-pull type market conditions (i.e., [neutralization of] the disadvantage in wood-pulp sourcing and advantage in recycled paper).

The most impressive change is the rise of firms with backgrounds in emerging economies. In particular, South Africa has two globalized firms that grew through M&As in the northern hemisphere. One is Mondi (ranked 12th in the world) that expanded its business through a series of M&As in Eastern Europe since the 1990s. Its regional composition of sales is now 60% in Europe, 30% in North America, and 10% in South Africa. Another example is Sappi (ranked 13th in the world), founded in 1936 in South Africa. After the 1990s, it expanded in Europe and North America via a series of M&As. Nowadays, its proportion of sales in Europe, North America, and South Africa are 2:1:1. Both South African multinationals combined the advantage of their home country in the south (forestry and pulp) and focused on products to maximize the condition of their targeted market in the north (recycled paper and packaging material as well as coated paper).

The advantage of the newly emerging supply-push growth in the southern hemisphere, as well as the continent-wide integration, are exhibited by the rise of Empresas CMPC (ranked 18th in the world), which was founded in Chile in 1920. This company pioneered in the plantation of radiate pine and eucalyptus and became the first pulp exporter from Chile. Since 1991, it has acquired many firms in Latin America and became a major player in forestation, lumbering, and pulp and paper production.

In Asia, Asian Pulp & Paper (APP) is a representative of the newly emerging MNEs, with its home in Indonesia and FDI in China. The firm has its origin in a pulp and paper plant in Java, a joint venture between a local Chinese-Indonesian entrepreneur and a company from Taiwan. In 1992, the firm became the first foreign paper producer in mainland China and is now listed on the Singapore Stock Exchange. Reflecting respective raw material

supply conditions, it uses wood pulp in Indonesia and recycled paper pulp in China.

Conclusion

In the paper industry, not only the geographical distribution of production and consumption but also the competitive landscape directly reflects the product features of paper and the characteristics of the industry. On the demand side, countries with large consumption (mostly rich nations) also have dominant positions in production when the global structure is observed with a bird's eye view. In comparison with other products with smaller transportation costs, the geographical concentration of paper production to a specific nation is limited. In that sense, global competition is less intensive in this industry.

Despite the considerable inter-continental trade, Europe, North America, Japan, and China can be largely regarded as self-sufficient regional markets for paper, possessing their own suppliers and consumers. Each region has built up organizational capabilities to fulfill its demand for paper. In contrast, in the trade of raw materials (wood chips and waste paper) and semi-finished products (pulp), these markets are more integrated globally due to strong material flow from forest-rich regions (especially the Americas) to regions with large populations and high purchasing power (China and Japan).

The competitive landscape and sources of competitiveness in this industry have been stable due to the stability of the product and longer time horizon of the industry. The material flow and value chain that run from forestry resources to paper consumption are the key to understanding the competitiveness. Access to raw material and the consumption market, as well as the capability to connect these two, have been crucial for the competitiveness. This chapter demonstrated how three analytical concepts, namely resource push, consumption-pull, and hybrid integration can explain the historical dynamics of the industry.

However, this analysis does not suggest any determinism. There have been many nuances in the story and enough room for innovative actions. Both the emergence of hybrid integration and the different trajectories of Germany and the United Kingdom exhibit not only the significant role of historical contingency but also the importance of organizational capability to overcome the initial condition. In addition, the new reality in the 21st century suggests that the century-long framework of competition is changing in both raw material supply and consumption.

The industry-level analysis of this chapter can be easily connected to firm-level analysis. Historically, enterprises based in Europe, North America, and Japan have been the major players, and newcomers from the emerging markets are joining up. The top companies in the industry engage in world-wide activities, and transnational, pan-continental companies have emerged,

especially in Europe. However, most of these firms are still regional (European or North American) or national (Japanese) rather than truly global, except for their material procurement networks.

Finally, the methodological implication of this chapter should be mentioned. The chapter tried to clarify the industry-specific features in order to determine the crucial determinants for competitiveness. The abovementioned three categories ('types') are the most important outcome of these steps of analysis. In addition, inter-industrial comparisons were made by applying an analytical concept developed by studies on other industries with similar characteristics. We argue that conscious application of inter-industry comparison will enrich studies on individual industries.

Notes

- 1 Each country has its own way of categorizing pulp and paper industries. Those with strong pulp industry tend to use the term "pulp and paper industry" and analyze them together. In Japan, the sequence of words is reverse ("paper and pulp industry"). In countries where pulp industry is weak, these two industries tend to be analyzed separately.
- 2 The authors once categorized this type as a 'Japanese model' (Kurosawa and Hashino 2012). This chapter avoids the use of this term, considering the universal nature of this model to other places. "Hybrid" implies not only the combination of "consumption-pull" elements and "resource-push" ones, but also this has its original advantages (e.g. exchangeability of raw material sourcing areas). Integration means that the vertical integration of multiple processes (pulp and paper making) is the essential feature of this model.

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