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The Development of Timber-Related Industries and Fluctuations in Timber Supply and Demand in Hokkaido after World War II

By

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戦後の北海道における木材需給の変化と木材関連産業の展開過程

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Abstract

In this paper, the authors analyzed historically the development of Hokkaido's timber-related industries responsible for the variations of timber demand and supply influenced by forest resources and economic growth after World War II.

Their characteristics can be summarized as follows:

1. The recovery period (1945-1955) is one in which from the latter half timber consumption exceeded that for firewood and charcoal, and the main demand in timber was for building material, timber-related industries becoming increasingly active.
2. In the development period (1955-1965) with the high growth-rate economy timber consumption outstripped Hokkaido's timber supply so that re-use of timber increased, and there was an especially big increase in paper production.
3. The transition period (1965-1973) saw a further increase in the use of timber and while there was also a corresponding peak in the timber supply of Hokkaido, the imbalance caused a great increase in importation of timber and timber re-use. Further, there was a surplus lumber production, with the greater part of consumption being for paper production.
4. In the stagnation period (after 1973), the effect of the two oil shocks, Hokkaido's timber supply diminished drastically and the share of imported timber increased, and the timber-related industries declined to seriously depressed state.

In conclusion, the authors described on the rationalizing course of timber-related industries in the future.

Key words: Oil shock, Production adjustment cartel, Productivity increase plan,
Imported timber, Re-use timber

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Preface

Japan is a long narrow country that stretches north and south from about N 24 degrees latitude in the south to about N 46 degrees in the north. At this northern extreme lies the young land of Hokkaido which has been under planned development for only a century. And this island comprises one-fifth of the land area of Japan, but it is developing rapidly, with the main city of Sapporo having a population of 1.5 million. Thus, it is the focus of attention as a northern land which will play an important function in the future of Japan.

About 70 percent of Hokkaido's land area of eight million hectares is forest with 500 million cubic meters of standing trees, the greatest proportion being in natural government forests. Therefore, in spite of the fact that two-thirds of the timber demand is met nationwide by the importation of foreign timber, in Hokkaido the dependence ration on foreign timber is only one-third, making it the forestry kingdom of Japan. The contents of those forests, however, are deteriorating and it is difficult to be optimistic about their present condition.

In this paper we will discuss historically how, in the forty years since the end of World War II, the timber-related industries have changed, influenced by the variations in the forest resources and the economy, focussing particularly on the variation in timber demand. Using these for analysis, we will divide the post-war forty-year period into four parts; 1) the recovery period (1945-55); 2) the development period (1955-65); 3) the transition period (1965-73); 4) the stagnation period (after 1973), explaining the characteristics of each period.

The characteristics can be summarized as follows:

The recovery period is one in which from the latter half timber consumption exceeded that for firewood and charcoal, and the main demand in timber was for building material, timber-related industries becoming increasingly active.

In the development period with the high growth-rate economy timber consumption

outstripped Hokkaido's supply so that re-use of timber increased, and there was an especially big increase in paper production. The transition period saw a further increase in the use of timber and while there was also a corresponding peak in the timber supply of Hokkaido, the imbalance caused a great increase in importation of timber and timber re-use. Further, there was a surplus in timber production, with the greater part of consumption being for paper production.

In the stagnation period, the effect of the two oil shocks, among others, caused a reduction in timber consumption, while, because of continual over-cutting, Hokkaido's timber supply diminished drastically and the share of imported timber increased, and the timber-related industries declined to a seriously depressed state.

I. Variations in Timber Supply and Demand

1. Recovery Period

The Second World War which had involved the whole globe came to a close in 1945. The long conflict created shortages in every category of daily life and when finally released from the continued central control, the economy became violently inflationary. In 1946 wholesale prices were three times those of the previous year.

Again, the precedence of military supply coupled with war damage itself during the war resulted in a paralyzed economic situation in which the industries which would have ordinarily supported the livelihood of the people were practically non-functioning. And among these industries, timber-related industries were no exception.

There was, for example, a serious lack of housing due to the loss from war damage and from the return of many of those who had lived in Japan's far-flung empire before the war. Coal, as a principal source of energy, was being produced by the slant-bore method quickly creating a big demand for mine-shaft shoring timber. The paper industry also, lacking priority during the war, in becoming active once again, greatly increased the demand for wood pulp.

Meanwhile, while the railroads had to be relied upon for transportation, by themselves they were in no condition to fulfill this role of transportation for all the materials. Consequently, while Hokkaido had an abundance of wood, coal, and other resources, it was unable to fill a nation-wide role as a source of supply, its economic activity sufficient only to meet local demand, consuming only about two million cubic meters of timber during this post-war period.

This condition bespeaks of the wartime supply and price control and the low level of production activity. As opposed to this low level of timber consumption, however, consumption of timber for firewood and charcoal reached four million cubic meters. Thus it can be said that the consumption pattern just after the end of the war was somewhat pre-modern. Viewed from the present, after the energy revolution from around 1965 when the firewood and charcoal demand practically disappeared, it seems to be an entirely different world.

It happened, in passing, that Hokkaido had received little war damage, and its industrial machinery was not so badly off so that its return to regular production was relatively rapid. Also, by 1948 its population had already topped four million. And thus,

around 1950, the timber consumption increased to around 3.5 million cubic meters. In answer to this, Hokkaido timber supply amounted to between 3.5 to 4 million cubic meters meaning that supply and demand were balanced.

Reflecting the increase in coal production, fuel wood production fell to three million cubic meters. Thus, in the space of only two years, timber consumption surpassed that of firewood and charcoal and at that point the ratios of the two types of timber use were reversed.

Furthermore, after 1950, the consumption of fuel wood fell to two million cubic meters, a condition continuing until about 1960. Thus the consumption of fuel wood was only about half that of timber around 1955, and the use pattern of timber had reached a modern configuration.

Here, in 1949, as the Dodge Line was put into effect, the former inflation overcome and a base for economic recovery established, the Korean conflict broke out which triggered economic activity with a high-volume specialized demand; and along with it the demand for timber also increased rapidly.

As a result, timber consumption around 1955 reached a level of five million cubic meters, of which over half was for building materials which occupied the chief spot in timber consumption, timber for paper making occupying only second spot as a use type.

Thus, in less than ten years after the end of the war, there was an quick escape from chaotic postwar conditions, and during the same period the average economic growth reached a level of eight to nine percent, nearly completing the economic recovery, leading to the development period in 1955. Meanwhile, as accompanying structural changes, there was an increase in timber demand and the position of being able to supply basic livelihood materials was reached.

In May and September of 1954, however, Hokkaido suffered great typhoon damage with large amounts of wind-fallen trees. The number of trees thus damaged amounted to three times the amount of annual forest cutting, and the clearing up of the damaged trees was not completed until several years later.

2. Development Period

In the ten years beginning in 1955, the economic situation varied in extremes, but, in general, economic expansion continued in what has come to be known as the "high economic expansion period". During this time from 1955 to 1957 there was what is known as the "Jimmu Prosperity", and from 1959 to 1960 the "Iwato Prosperity", and a peak was reached in 1964 with the "Olympic Prosperity".

By around 1955 the economic level had already surpassed prewar levels. In 1960 the "Income Doubling Plan" was adopted and real economic growth from 1960 to 1965 was maintained at marvelous level of ten percent. This high-growth economy created a consumers' revolution and stimulated a technical revolution as well. Naturally, under these conditions timber consumption increased and the type of consumption underwent a change. Thus, timber consumption in 1960 reached eight million cubic meters and by 1965 easily topped ten million. At the same time as the increased consumption of timber in 1955, second-hand timber began again to be utilized, increasing rapidly from 1960 until it amounted to over a million cubic meters in 1965. Because this second-hand timber is

already counted once as milled timber, it is really already contained in the milled timber figure, but, if this re-used timber figure is added, the volume of timber used in 1965 amounted to 11 million cubic meters.

The uses of this timber in 1960 included: four million cubic meters for milling; two million for paper making; one million for mine-shaft shoring; and one million cubic meters for other uses.

In 1965, however, the figures were: 4.5 million cubic meters for milling; 2.5 million for paper; 1 million each for mine shoring and plywood; with only a small amount for other uses. In these figures it should be noticed that one million cubic meters of timber for wood chips makes its appearance. These wood chips are, of course, for paper making.

In 1955 the main use of timber was for milling while in 1965 total timber volume including wood chips for paper making amounted to the same volume as that for milling, evincing the rapid growth in paper-making material characteristic of this period. Thus, timber for milling and for pulp for making paper together took up 9 million cubic meters of the total of 11 million cubic meters of utilized timber in 1965, monopolizing the greater part of Hokkaido's timber.

While timber use doubled during these ten years in response to the high growth-rate economy, fuel wood consumption, due to the revolution in heating sources, saw a rapid reduction to one million cubic meters by 1965. Thus, fuel wood, which had been the chief use of timber just after the war, was reduced to a negligible share of consumed timber.

In another direction, in timber supply, partly because of the inclusion of the wind-fallen trees in 1954, the forest cutting for 1955 was over ten million cubic meters, and with the continued retrieval of fallen trees afterwards, the cuttings in 1957 reached 12 million cubic meters. The necessity of retrieving a large volume of wind-fallen trees also quickly accelerated the mechanization of forestration operations.

In order to meet the increase in demand during this period, in 1958 the government forests put into effect a productivity increase plan by which government forests increased cuttings markedly to eight million cubic meters by around 1965 and led in afforestation operations.

As a result, timber production which had amounted to six million cubic meters in 1955, increased to nine million cubic meters by 1960. But because the annual consumption was increasing so rapidly, while there was an increase in production, it was unable to keep pace with demand, so that by the end of this period it was necessary to rely on foreign timber and use second-hand timber for wood chips to balance supply and demand.

In spite of this, the configuration of Hokkaido's timber market was one which was, for the most part, one of supplying local Hokkaido demand, maintaining its position as the king of Japan's forest reserves. Still, while Hokkaido was able to supply quantitatively the timber demand within Hokkaido, there gradually arose a qualitative unbalance which had a definite effect on the price of timber from 1955 to 1965. That is to say that, while the price fell during the period when wind-fallen trees were being retrieved, with that period as a demarcation point there arose a scarcity in supply which in turn caused a continued rise in prices, especially in coniferous species since the greater proportion of wind-damaged trees were coniferous, the price doubling between 1955 and 1965.

This insufficiency in supply and the high prices were also responsible to a great extent for the forestation of vast areas with Japanese larch and Sakhalin fir during the twenty years of the development and transitional periods.

3. Transition Period

From 1965 to 1970, the rapid economic expansion continued as represented by the so-called "Izanagi Prosperity", with the real economic growth throughout this period continuing at an average of ten percent and Japan became economically one of the strongest nations in the free world, second only to the United States.

The consumption of timber increased further over that of the development period, reaching 12 million cubic meters in 1970 and 14 million in 1973 and, while it involves including the figures twice, if the volume of second-hand timber is added, the total is 14 million for 1970 and 15 million for 1973, the peak consumption volume.

Looking at the types of use of timber for the 15 million cubic meters in 1973, for example, the ratio used for milling diminished somewhat to a level of five million cubic meters while, on the other hand, the amount used for paper making increased to eight million cubic meters, while that used for plywood and other purposes amounted to one million cubic meters each. Timber for mine-shaft shoring had amounted to about a million cubic meters in the development period, but entering this period added to the reduction in coal production, other materials began to be used in place of shoring timber resulting in a sharp decrease in this kind of consumption. Paper manufacturing was using 1.5 million cubic meters as pulp wood, and three million cubic meters as wood chips, as well as two million cubic meters of imported wood chips, and 1.5 million cubic meters of industrial second-hand timber, meeting the demand with a combination of a variety of sources.

Thus, in an epoch-making movement during this period the former dominant position of milled timber in the market was taken over by paper manufacturing.

The consumption of fuel wood also, which was barely maintaining a level of one million cubic meters in 1965, increased the precipitous slide to where, in 1973, it amounted to less than 200 thousand cubic meters.

Elsewhere, forest cuttings during this continued as in the development period to range between 11 and 12 million cubic meters.

The productivity of the government forests, which are the main source of cuttings diminished and stagnated and entering this period the volume of cutting was reduced. As a result the economic operations suffered an imbalance in income and expenses. That is to say, the government forest cuttings fell from eight million cubic meters in 1965 to six million cubic meters in 1973. To take up the slack the privately- and municipally-owned forests during this period maintained a cutting volume higher than that in the development period, reaching a level of three million cubic meters.

As a result, lumber production reached a postwar peak of about ten million cubic meters but the difference between supply and consumption widened, leading to an increase in imported and second-hand timber. That is, two million cubic meters of imported timber, two million cubic meters of imported wood chip products, and one million cubic meters of second-hand timber were used to balance the demand for timber in 1973.

Because of this the Hokkaido timber supply was only able to meet two-thirds of the timber demand and the ability for self supply weakened while the reliance on foreign timber grew stronger. Still, considering that the nation as a whole is only able to fill one-third of the demand with domestic timber, Hokkaido still maintained its position nationally as number one in forestry.

It cannot be denied, however, that the forests of Hokkaido are growing poorer both quantitatively and qualitatively. For example, in the first half of 1960 Hokkaido forest reserves held an estimated 550 million cubic meters, while at the end of this period they had fallen to 520 million cubic meters, and due to continued overextended forest cutting the remaining forests are smaller and poorer in quality.

4. Stagnation Period

The previous long period of rapid growth came to an end with the first oil crisis of 1973, crumbling away quickly as oil-dependent Japan received a strong economic setback. The real economic growth immediately after the oil "shock" was an unheard of low level of one percent and the economy entered a period of stagnation.

Again, after being visited by the second oil crisis in 1978, Japan began an unexpectedly long period of economic readjustment. Even though recently the economy is said to have entered a period of recovery, the real growth of the economy is only three to four percent, remaining at a comparatively low level.

The stagnation of the economy and the inflationary trend in prices occasioned by the double oil shocks had a strong effect on timber consumption. In 1973-4 and 1980 the price of timber rose steeply causing a move away from timber use, after which there was a sudden drop in timber prices, but the trend toward less use of timber continued and there was hardly a shadow left of the former timber "boom".

Concretely, lumber use as of the rather recent date of 1983 was on the scale of 11 million cubic meters, including four million cubic meters of milled lumber, six million for paper manufacturing, one million for plywood. Paper manufacturing includes one million cubic meters of pulp wood, just under three million cubic meters of wood chips, and just over two million cubic meters in imported wood chips. If another million of second-hand industrial timber is included, however, the total reaches seven million cubic meters.

As for fuel wood, the consumption diminished to such a low level that the figure has been erased as a category from the general statistics.

In another direction, the forest cutting for 1983 amounted to eight million cubic meters. That figure is only slightly higher than that in 1945 at the end of the war, and shows how, as a result of forty years of cutting, the productivity of the forests has weakened and returned conditions to the point of departure.

Looking at the situation from the point of view of forest reserves, the totals now and at the end of the war are about the same at a little over 500 million cubic meters, but there is a big difference in the contents of that figure. First of all, it must be noticed that planted forests, negligible at the end of the war, now total 80 million cubic meters of the reserves, meaning that natural forest has diminished by that amount. And furthermore, planted forests are mainly coniferous small-diameter trees denoting the fact that there has been a big reduction in the number of large-diameter coniferous trees of natural forests.

Moreover, the reserves of broad-leaf trees which cannot be relied on to grow well in planted forests, have diminished only slightly, but the those high-quality broad-leaf large-diameter trees for which Hokkaido was known, the white oak, castor Arabia, birch, etc. have been cut in large volume so that, compared to forty years ago, the present reserves show a qualitative loss with many low-quality small-diameter trees.

Again, a special characteristic of the present situation is that the reserves forty years ago included 400 million cubic meters of government forests, which today have steeply declined to just a little over 300 million. As opposed to this, private and municipal forests have grown with the progress in afforestation more than making up for the loss in government forests.

As a result of all of this, the three-million-cubic-meter difference between the eight million cubic meters supplied by Hokkaido timber in 1983, and the 11 million cubic meters of timber consumed, was supplied by one million cubic meters of foreign timber and two million cubic meters of foreign wood chip products. In other words, in spite of the fact that timber consumption has diminished, Hokkaido timber supply has also diminished, so that the situation remains in which importation must be relied upon to find a balance in supply and demand.

And so, with the rapid move toward planted forests mentioned above, of the 5.6 million hectares of Hokkaido's forests, planted forests now take up 1.4 million hectares largely of Japanese larch where the trees from thinning have just barely reached marketable size. And of the eight million cubic meters of Hokkaido timber supply, one million is Japanese larch from planted forests.

Table 1. Timber supply and demand in Hokkaido

(Unit: 10 thousand m³)

Year	Supply					Demand							Shipment	Total
						Consumption in Hokkaido								
	Timber produced in Hokkaido		Imported timber		Total	Lumber	Pulp and peper		Veneer and plywood	Mine-shaft shoring	Other uses			
	Log	Re-use timber	Log	Chip			Timber including chip	Re-use timber						
1955	598	(-)	1	—	599	262	144	(-)	22	49	34	74	585	
1960	813	(44)	15	—	828	385	249	(44)	45	72	58	56	865	
1965	897	(120)	61	1	959	453	374	(120)	79	72	59	28	1,065	
1970	1,053	(185)	134	100	1,287	500	534	(185)	112	48	43	29	1,266	
1973	1,042	(152)	231	216	1,489	517	649	(152)	136	26	57	10	1,395	
1975	853	(137)	170	278	1,301	487	581	(137)	106	26	62	5	1,267	
1980	835	(130)	173	406	1,414	460	678	(130)	94	26	63	7	1,328	
1983	780	(128)	121	238	1,139	431	590	(128)	80	22	46	6	1,175	

Footnote: 1. Calculated by Hokkaido forestry statistics.

2. The figures in brackets are excepted from total.

II. Developments within Timber-Related Industries

1. Recovery Period

As pointed out in the previous section, in the recovery period after the war timber consumption was mainly that for milling and this condition continued until the end of the development period. First of all then, we should look at the trends in the milling industry.

In the first half of this period the number of lumber mills was not that much different from that during the war, stationary mills numbering between 800 and 900, with temporary mobile-type mills amounting to between 400 to 500; for a total of about 1,300, mainly small-scale mills. In 1955 the electrical consumption of the equipment of these mills amounted to about fifty thousand kilowatts.

The stationary mills in Hokkaido are concentrated in the northeastern part of the island in Abashiri and Kamikawa sub-prefectures, and this situation prevails down to the present. This is because the milling industry is one which is closely connected to the materials used and naturally concentrates in the area of its resources.

At that time milling production amounted annually to about a million cubic meters. The main use of lumber is for building and it is estimated that new housing at that time amounted to about 30 thousand yearly.

Towards the end of the war the veneer and plywood industry, being militarily useful, developed a base for production, and while with the postwar deflation policy of 1949-50 it experienced a temporary decline, with the establishment of the Enterprise Rationalization Promotion Act of 1953 which specified plywood as an especially important industry and with the adoption in the same year of a policy of especially promoting its export, plywood entered into its golden age.

During this period there were about twenty veneer factories and veneer production amounted to about ten million square meters. At the same time there were over twenty plywood factories and plywood production gradually increased to the point where around 1955 on the order of ten million square meters were produced.

There were five factories owned by two paper manufacturing companies at the end of the war. In 1949, the occupying American Army General Headquarters ordered the dispersement of the Oji Paper Company as a monopoly of the paper making industry in Japan. Four companies with five factories resulted. Then, to alleviate the paper shortage that had existed since the war, production was increased sharply to where in 1955 the pulp production was about 400 thousand tons and paper production reached a level of nearly 300 thousand tons.

Since the coal industry as a basic recovery resource industry adopted the slanted mining system to increase production, producing ten million tons of coal around 1949 and developing the basis with which to produce an annual tonnage of 13 million in 1955, the supply of shoring timber was given great importance.

The production of charcoal, as of 1955 considered an important item for daily life, was naturally increased, production reaching a level of 100 thousand tons. As a consequence there were some six thousand charcoal kilns, two thousand of whose owners depended entirely upon charcoal production while the other four thousand had other

sources of income.

2. Development Period

At the beginning of the high economic growth period the timber-related industries were very active, enjoying a special prosperity. The milling industry, as of 1961, had reached a peak of 1,400 factories and by 1965 factories were consuming 70 thousand kilowatt-hours of power. Lumber, which had housing as its main source of demand, increased with the surge in housing construction. In 1965 there were 60 thousand new houses built, twice the number ten years previously.

In lumber, in the ten years before and after the peak year of 1955 in which there was 180 thousand cubic meters of consumption, inch-board maintained a production level of 100 thousand cubic meters, enjoying the limelight with plywood as a prime export item of Hokkaido. There was a difference however in that inch-board was primarily exported to Britain and continental Europe, while plywood was mostly exported to America.

Concerning veneer and plywood production towards the end of this period, there were about thirty each of veneer and plywood factories. The veneer factories were usually small. The equipment including two or three rotary lathes and one dryer. In the plywood factories, however, there were usually three rotary lathes, three presses, and one or two dryers.

The products of the veneer factories were almost all used as basic materials by plywood factories located in Hokkaido, indicating that there were many veneer factories which were within the company networks of the plywood factories.

In 1965 the production volume of veneer was on the order of 60 million square meters and the plywood production 50 million square meters. Seventy percent of this plywood production was for exportation to America, totalling five billion yen in 1960, and reaching 9.6 billion yen in 1965, playing a large role in acquiring foreign currency reserves.

During these ten years, five new paper manufacturing plants made their appearance, bringing the total to ten in 1965. Pulp production was 1.6 million tons while paper production volume was one million tons of paper and 400 thousand tons of paper-board, for a total of 1.4 million tons, showing a continual rise in production. Pulp consisted mainly of kraft pulp (KP) and ground pulp (GP) and two-thirds of the paper was for newsprint, most of the paper-board going for cardboard-box material.

There was a technical revolution involved in this surge in paper and paper-board production which resulted in a move from coniferous to broad-leaf tree raw materials and from logs to wood chips.

Entering this period there appeared the wood chip factory as an extended facility of the lumber mill. At first the leftovers from the lumber mill were used, but gradually the leftover timber from forest land and small-girth trees were used as raw materials, and in 1965 there were more than two hundred wood chip factories in operation. And so, through these wood chip factories the connected lumber mills came under the domination of the paper manufacturers.

Coal production was also very active, reaching a 20-million-ton total at its peak around 1965. The consumption of shoring timber continued to increase accordingly.

As opposed to this the production of charcoal decreased sharply due to the use of oil

and other thermal materials in what may be called a revolution in fuel sources, to the extent that by 1965 production had fallen to the 20-thousand-ton level. Consequently, the number of charcoal kilns dropped to only 900, 500 of whose operators depended entirely on charcoal production while the other 400 were operated by those having other sources of income, mainly farmers.

3. Transition Period

This period continued within the high-growth economy until the oil crisis of 1973 but there were prosperous and depressed timber-related industries according to type, a period which can appropriately be labeled the "Transition Period".

First of all, the number of lumber mills fell to less than one thousand after 1971. Thus the lumber milling industry, even within the expansionary economy, was already losing some of its attraction, resulting in the reduction in number and increase in average age of its employees. This was due to the fact that government forests, which dominated Hokkaido forestry, experienced a lessening of productivity after the disposal of the wind-fallen trees, turning to a frugality in cutting in which the expenses threatened to outstrip income. A turn to reliance upon foreign timber caused a loss in raw materials for the lumber mills which were dependent on materials from the government forests back in the hills, and of necessity resulted in a reduction in the number of mills from a sort of survival-of-the-fittest process.

To obviate this a reduction in employees and rationalization of equipment was carried out, the power output of the remaining mills increased across the board to where, in 1973, it reached 90 thousand kilowatts.

In order to alleviate this situation the Hokkaido Mill Employees Union was founded in 1965 and afterwards there were repeated renovations of the conditions in the lumber mill industry. The peak production years for the industry came in 1972 and 1973 when there were 3.3 million cubic meters produced.

This means that a contradictory situation derived in which, while on one hand the number of mills diminished during the period, the mills which remained in the local areas increased production.

The reason that lumber mill production reached its highest point in 1972 and 1973 is that new housing in 1972 was 110 thousand homes, and 120 thousand in 1973 for the biggest building rush since the end of the war.

Veneer and plywood factories amounted to about forty apiece. The production of both veneer and plywood reached their peak during this period, with veneer attaining some 170 million square meters in 1972, and plywood 140 million square meters in 1973.

Characteristic of this period, however, is that after the peak year of 1965, the plywood exports' share of the American market dropped precipitously to the extent that by 1973 it occupied only 20 percent of that market.

This was due to the rapid entrance into the market by the developing countries of Korea, Taiwan and southeast Asia which took over the share. The factors which were weapons in this invasion were the cheap labor and cheap raw materials, etc., putting these countries in a superior position to Japan in securing American markets.

On account of this, the Hokkaido plywood manufacturers turned to different types of

plywoods; plywood for concrete forms, outdoor-use plywood, etc., working to develop special forms of plywood, meanwhile turning from aiming at exports as they had in the past to putting their efforts into selling in the other districts of Japan, etc., setting out to open up mainly domestic markets. Truly this period had the characteristic of forcing transition across the board.

In the paper industry during this period, the number of factories fell to nine, losing one factory. In 1973 pulp production was 2.9 million tons, paper 1.9 million tons, paper-board 0.9 million tons, for a total of 2.8 million tons, showing a continuing tendency toward increase. This was apparently promoted by a rise in the cultural level arising from the increase in leisure time generally, and the penetration of artistic and recreational activities due to an increase in the level of standard of living.

Consequently, wood chip factories, which supplied raw materials for paper making, numbered 1,100 at the peak in 1969, and the wood chip production in 1972 was 4.7 million tons, this too a peak. Foremost, however, was the fact that raw material for paper manufacture was in under-supply and, after 1965, wood chip products began to be imported, reaching 2 million tons in 1973.

Coal production also reached a peak around 1965 and diminished thereafter, falling to the 12-million-ton level in 1973, which of necessity caused a drastic reduction in consumption of shoring timber.

Charcoal production also, after the beginning of this period, experienced a particularly large reduction to where it amounted to only 7 thousand tons in 1973 when charcoal kilns numbered no more than 150.

4. Stagnation Period

The twin oil shocks of 1973 and 1978 had a very great effect on the timber-related industries and created a very serious situation for them.

The lumber mills truly entered an era of suffering. Beginning in 1981 a depression cartel was put into effect and, as a result, voluntary reduction in output has continued. At the time of the oil shock the price of lumber rose dramatically, but that contrarily led to an alienation from lumber, inviting the introduction of substitute products. Thus the demand dropped and afterwards the price of lumber also, a situation which prevails to this day.

In 1983 the number of lumber mills finally fell to the 700's, half that of peak times, while at the same time the increase in factory equipment seemed to have no ceiling, reaching an output on the level of 100 thousand kilowatts after 1980.

The volume of lumber production from 1975 onwards fell below three million cubic meters, and amounted to only 2.6 million cubic meters in 1983. This could probably be attributed to the lack of advance in new housing, the biggest consumer of lumber, after 1980.

Next, there was a notable reduction in the number of veneer and plywood factories after 1975. In 1983 there were only a little over twenty veneer factories, and somewhat over thirty plywood factories, resulting in a production volume in the 60-million-square-meters level of veneer in recent times, with plywood production continuing at a level of 100-million-square-meters after 1975.

As a result, from 1975 onwards a production adjustment cartel, that is, limitation in production, was repeatedly tried. Also, from the transition period a policy of promotion of the modernization of the smaller businesses was continually carried out to rebuild the plywood industry. But in spite of the fact that as a counter-recession measure a policy of promoting local production of plywood was put into effect from 1980 onwards, no effective recovery path was discovered, and the recessionary conditions persisted.

The paper industry diminished by one factory in 1983 resulting in eight factories to date. The production of pulp in 1983 amounted to 2.2 million tons, and paper production to 2.4 million tons, with paper-board at 0.7 million tons, showing a volume stagnant at 3.1 million tons.

Under these conditions, after 1975, a paper-board and kraft-paper recessionary cartel went into effect. The reorganization of the paper industry was being carried out while reduced management through adjustment of production and employment was being carried out.

Chip wood factories diminished to the level of the 800's in 1983, and chip wood production continued a trend towards a level of less than 4 million cubic meters after 1975. The reduction in the number of chip wood factories was due, to a large amount, to the reduction in the number of lumber mills, the result of the fact that chip wood factories are often connected with lumber mills. The stagnation tendency in chip wood production reflects, of course, the stagnant situation in paper production.

As far as coal production goes, from 1979 and after, a level of 10 million tons prevailed, half of what it was at the peak, or the same as that of 1949. At that time, though, there were more than 150 mines, while at present there remain only 20, an extreme decline.

Table 2. Productions classified by timber-related industries

Year	Lumber mill			Veneer factory		Plywood factory		Chip mill		Pulp and paper mill			Charcoal maker	
	Number	Power output (thousand kw)	Production (10 thousand m ³)	Number	Production (million m ²)	Number	Production (million m ²)	Number	Production (10 thousand m ³)	Number	Pulp production (10 thousand ton)	Paper production (10 thousand ton)	Number of kiln	Production (hundred ton)
1955	1,291	46	150	20	17	20	14	—	—	5	39	30	6,334	986
1960	1,371	58	229	30	28	26	30	182	59	9	74	61	2,920	618
1965	1,272	70	282	34	65	33	54	867	217	10	163	145	925	229
1970	1,022	74	317	41	131	35	116	1,052	429	10	258	246	300	112
1973	939	92	332	40	135	40	143	1,053	438	9	288	277	154	75
1975	906	96	308	39	121	42	109	1,037	368	9	237	243	136	60
1980	820	105	287	35	74	39	109	929	395	9	250	304	100	33
1983	719	106	265	29	68	34	107	847	397	8	219	305	97	30

Footnote: 1. Calculated by Hokkaido forestry statistics, except only the figures of pulp and paper production depending on Hokkaido trade and industry statistics.

2. The figures of veneer and plywood productions are calculated on the basis of the 1 mm-thick and 4 mm-thick board, respectively.

The production of charcoal, also, by 1983 had declined to 3,000 tons, and the number of kilns producing charcoal to 100.

Conclusion

In the forty years since the end of the war conditions have changed rapidly. In this background the authors have focussed on Japan's northernmost area, Hokkaido, and, while examining the trends in timber-related industries responsible for the variations in timber supply and consumption, has pointed out the characteristics of the various periods.

The reason for studying the variations undergone is to serve as a guide for Japan in the future in which the economy should undergo a revolution in which the ultimate needs of the consumer change from that of large volume consumption to that of placing importance on qualitative, original and varied products. For the forests of Hokkaido, the tendency for the share of timber supply from mainly small-girth trees from planted forests has increased, there being a great difficulty in reliance upon large-girth trees from natural forests as heretofore. As a result, timber-related industries to meet the demand of the consumers, will have to put into effect higher level processing through introduction of more modern techniques, etc., being compelled to renew attitudes toward wood to bring out its beauty. Those that can win this race will be those that remain. Thus the rationalization and trend toward bigness will undoubtedly continue.

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摘 要

本論文は森林資源の変化と経済成長に影響されて変動した北海道の木材関連産業について、またこれらの結果を反映して推移した木材の需給関係に焦点をあてて、第2次大戦終結以降の40年間について歴史的な分析を試みたものである。なおここでいう木材関連産業には製材・パルプ・チップ・合板・坑木・木炭などのすべての業態を含んでいる。

以上のような分析視角にもとづき、戦後の40年間を、復興期(1945-1955)、発展期(1955-1965)、転換期(1965-1973)、停滞期(1973以降)に4区分し、各期の特徴をのべた。各期の特徴点を要約すれば以下のとおりである。

1. 復興期は後半以降、用材消費が薪炭材消費を上廻り、その用材中製材用が依然主体をしめ、木材関連産業も生産活動を次第に活発化した時期である。

2. 発展期は経済の高度成長に伴い用材消費が道材供給を上廻ったため廃材利用が進み、木材関連産業の生産は旺盛となり、とくに製紙工業の生産が急増した時期である。

3. 転換期は用材消費が一層増大し、それにあわせて道材供給もピークに達したが、一方、両者の不均衡は拡大し、輸入材と廃材利用に依存することになった。また製材工業は過剰状態になり、用材消費の首座を製紙用が占めた時期である。

4. 停滞期は2度のオイルショックの影響などから用材消費が減少し、また道材供給は過伐の連続から急減するなかで、輸入材のウェイトが高まった。さらに木材関連産業は不況で深刻な経営状況に落ちこんだ時期である。

結論では今後の合理化の方向についてふれ、消費者ニーズが質的な面を重視し個性的で多様化した製品へと指向しており、一方供給は集積された人工林からの小径木を主体とした原木供給へと変っている挟間にあって、これに対応した技術革新の必要性を強調した。さらに、このような方向性のなかで木材関連産業の合理化・大型化は益々すすむものと述べている。