

Chapter 5

Discussion

5.1. Development of Transport Network and Port Hinterland

In this chapter, some diagrams about the development of transport network and port hinterland are shown taking the case of the Kushiro port. And the remainder of this chapter consists of discussion of the characteristics of transport network and port hinterland in the era of railway dominance and truck dominance.

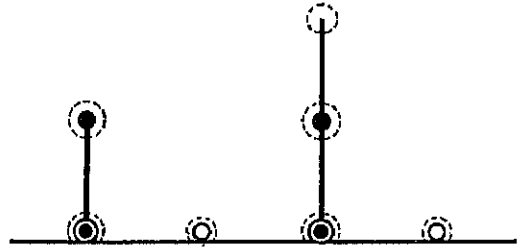
At the stage of the pre-modern traffic, small-scale fishery villages were scattered along the seacoast in the east part of Hokkaido and each of them played the role of a port. Each port had a limited hinterland, because the transport network was undeveloped and export and import goods were produced or consumed in and around the fishery village (Figure 39 (a)). Each small port was directly connected with the Matsumae port or the Hakodate port by sea network, but there were few connections between small ports. Therefore, competition between ports was not seen.

In the middle of the Meiji era the first penetration line from C port appeared with the development of mining and the installation of a prison in the interior (Figure 39 (b)). The new hinterland of C port was

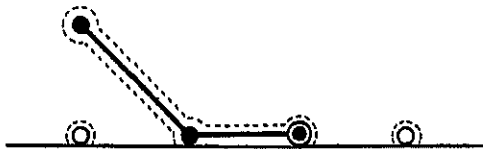
(a) Before the Formation of Transport Network
(Early in the Meiji Era)



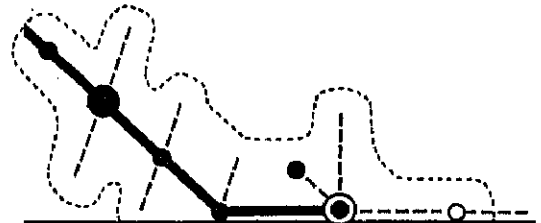
(b) Appearance of the Trunk Line
(Middle of the Meiji Era)



(c) Reformation of the Penetration Line
(End of the Meiji Era)



(d) Formation of the Feeder Lines (Taisho Era)



- | | |
|---------------------|-----------------------|
| ○ Small Scale Port | ———— Penetration Line |
| ⊙ Middle Scale Port | ———— Trunk Line |
| ⊕ Large Scale Port | - - - - Feeder Line |
| ● Node | ⋯ Port Hinterland |
| ● Inland Center | |

Figure 39 Development Diagram of Transport Network and Hinterland

restricted around the mine and the prison, because neither the mine nor the prison had a spatial extension as a hinterland. C Port, which became a starting point of the penetration line, had increased the amount of cargo and had gradually grew up to be a middle-scale port. However, this first penetration line disappeared by the closing the mine and the prison. Therefore, the first penetration line and the interior node do not necessarily continue. Especially, the first penetration line and the interior node connecting with a mine temporarily contributed to the expansion of the port hinterland, but they declined or disappeared with the depletion of the mining resource or the decrease of the price of mineral, so they were not permanent. And a peculiar character of the node depending on the prison promoted their decline.

At the latter term of the Meiji era, the penetration line from C port which was a railway of modern transportation means was formed again toward the hinterland of A port which was an agricultural region. With growth of this penetration line, C port had expanded its hinterland by depriving the hinterland of B port which had no penetration line and A port which had a penetration line of pre-modern transportation means like a river ship of no power, a packhorse, and a cart (Figure 39 (c)). On the other hand A port and B port, which lost their hinterlands, had declined to small-scale ports. The competition between ports came to appear.

The hinterland of C port had gradually extended spatially along the penetration line, because feeder lines had been formed from the penetration line to the agricultural reclaimed land and the forest area

(Figure 39 (d)). The amount of cargo of the penetration line had increased by the formation of the feeder lines and this penetration line had gradually grown up to the trunk line. A connected point with trunk line and feeder line became the collection and distribution point of the farming production goods and the wood products. And especially large-scale nodes grew up to the inland centers. And the concentration of cargo at C port, which was the starting point of the trunk line, reinforced the sea network from C port. And it accelerated the expansion of hinterland of C port further.

Figure 40 shows a diagram of the transport network around 1960 when the rail transport network was completed. In this diagram the trunk railway connects a port with inland nodes and feeder lines like a light railway, a river transport, and trucks connect inland nodes with transfer points of agricultural and forest products, and coal mines. Some nodes with feeder lines grow into inland centers like Obihiro city and Kitami city, and small nodes are formed at the transfer points of cargoes and coal mines. These small nodes are connected with the agricultural reclaimed land by trucks and with the forest area by trucks and river transports. Thus, the transportation means for each linkage copes with the amount and kinds of cargoes.

However, motorization which started around the middle 1960s, brought the development of the road network and the decline of the rail network, and new a transport network in which the truck is the main transportation means had been formed. Figure 41 shows the diagram of the transport network in the era of truck dominance. In this diagram,

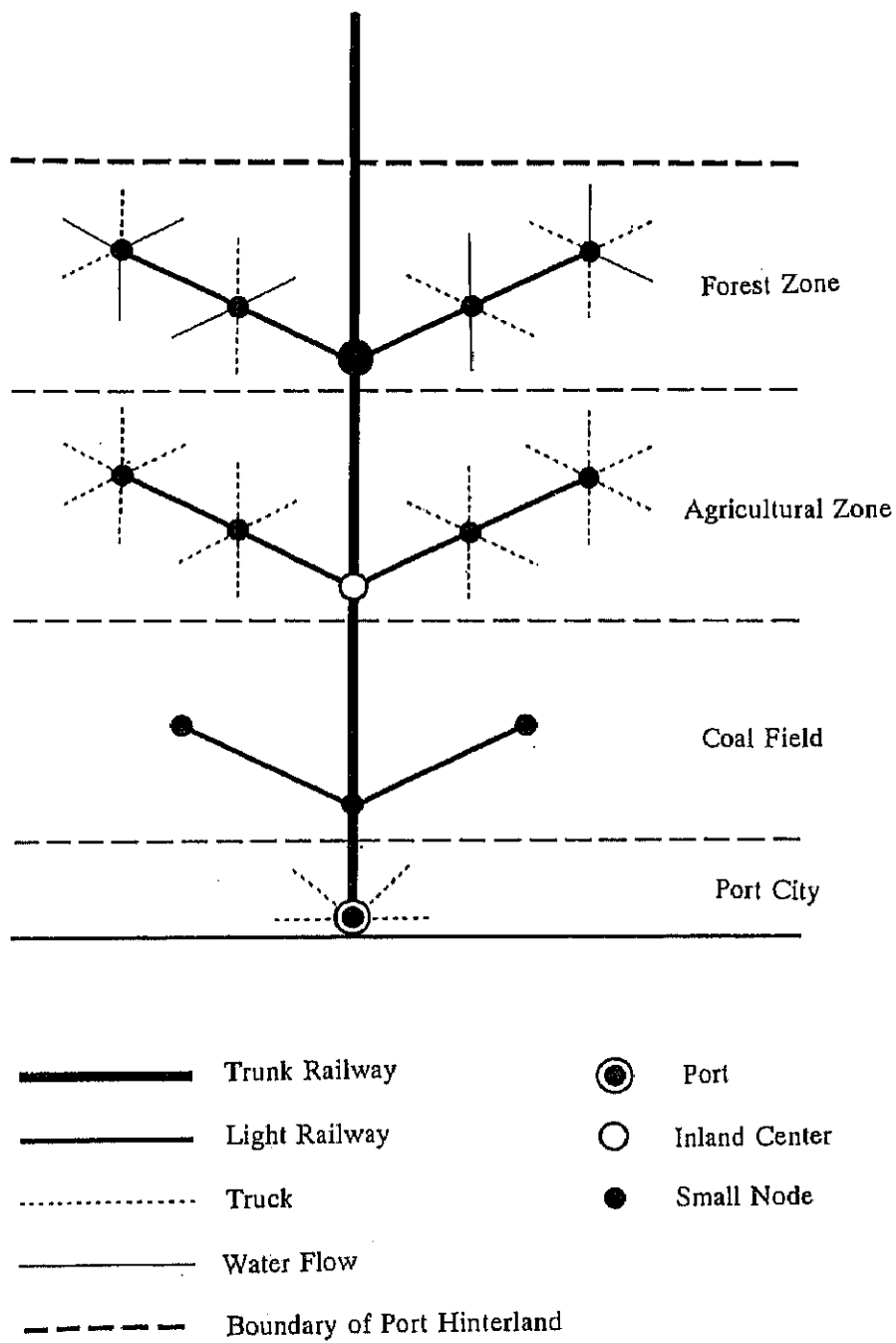


Figure 40 Diagram of Transport Network in the Era of Rail Dominance

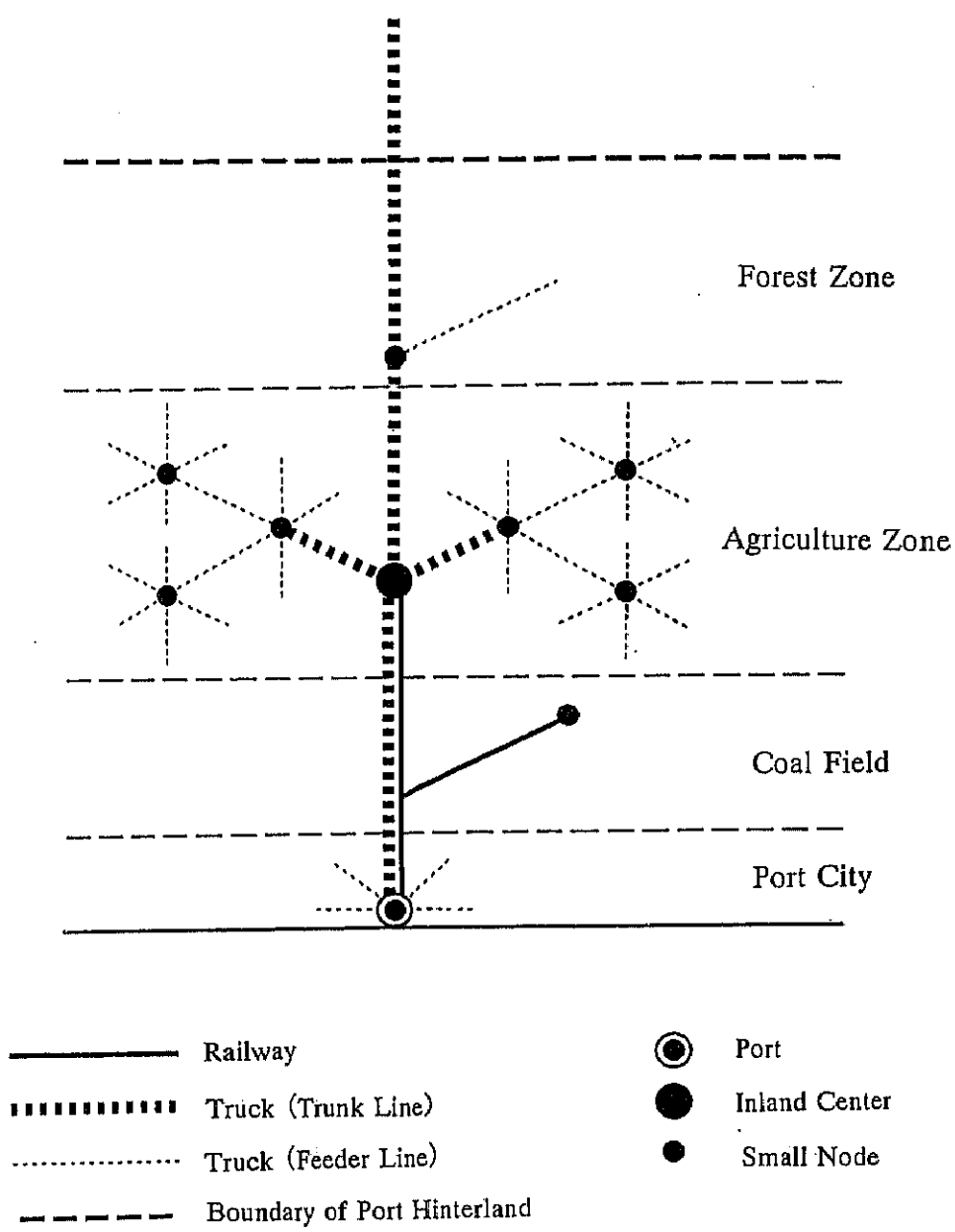


Figure 41 Diagram of Transport Network in the Era of Truck Dominance

most trucks are used for trunk line transport connecting with a port and transfer points of agricultural and forest products and are also used for the end transport. And cargoes are transported from departure points to arrival points by trucks and a cooperation with other transportation means is not seen. This truck transport network has declined in the forest area and the coal field area because of the decline of the forestry and the coal mining industry in the hinterland. On the other hand, a truck transport network has developed in the agricultural area with the progress of agricultural pioneering. And a cargo transport by rail is limited to the feeder lines connecting with ports, coal mines, and plants. The hinterland of rail transport is limited to points like a coal mine and a plant, and does not have a spatial extension. That is, it is thought that the transport network of rail cargo retreated even to the stage of “ Appearance of the penetration line ” in figure 39 (b) .

5.2. Characteristics of Port Hinterland and Regulated Factors of its Field

5.2.1. Railway Transport Network and Port Hinterland

As for the railway network in Hokkaido, the framework was almost completed at the beginning of the Showa era as shown in figure 42, but the Karikachi Pass located between the eastern part and the central part of Hokkaido was a traffic bottleneck because of a steep incline. As both

coal and wood, which were main products in the eastern part of Hokkaido at that time, were heavy cargo, it was difficult to transport them passing through this pass. As for the truck transport, as the roads passing through Hidaka mountain range did not open at the beginning of the Showa era as shown in figure 43, trucks had to make a detour. Actually, as shown in figure 42, trucks kept for business were only playing a supplementary role of the rail. This was similar for private trucks. As a result, it is thought that cargoes inevitably concentrated at the Kushiro port and the whole eastern part of Hokkaido was within the hinterland of the Kushiro port.

The First Comprehensive Development Plan (1952-1962) after world war II and highly developed economic growth have rapidly increased the amount of the exports and the import in the eastern part of Hokkaido. But the construction of the Kushiro port did not make much progress, so the Kushiro port alone could not treat all cargoes to and from the eastern part of Hokkaido. Figure 44 shows the flows of cargo by transportation means in June, 1966. In this figure, as for the cargoes in the eastern part of Hokkaido, the Kushiro port was used best but some cargoes were transported to and from the Muroran port and the Otaru port. Most of the transportation means connecting with the eastern part of Hokkaido and the central part of Hokkaido was by railway and it is thought that rail transport strengthened the relations of both regions. Development of the rail network enabled this cargo transport by rail. For example, the opening of Sekihoku line of Japan National Railways (1932) made it possible to connect the Abashiri district with the

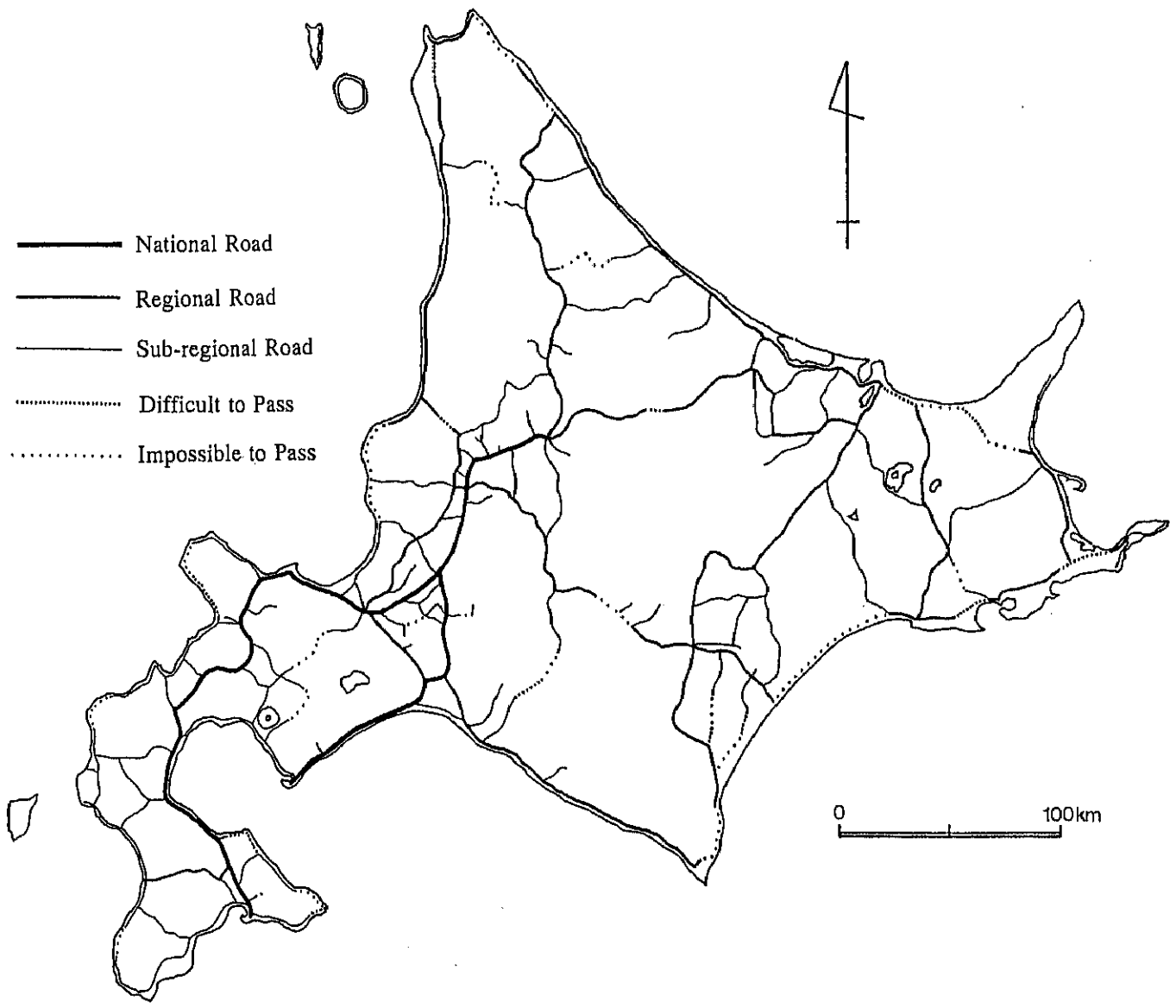


Figure 43 Road Network of Hokkaido in 1931
 Source: *Truck in Hokkaido*, 1931.

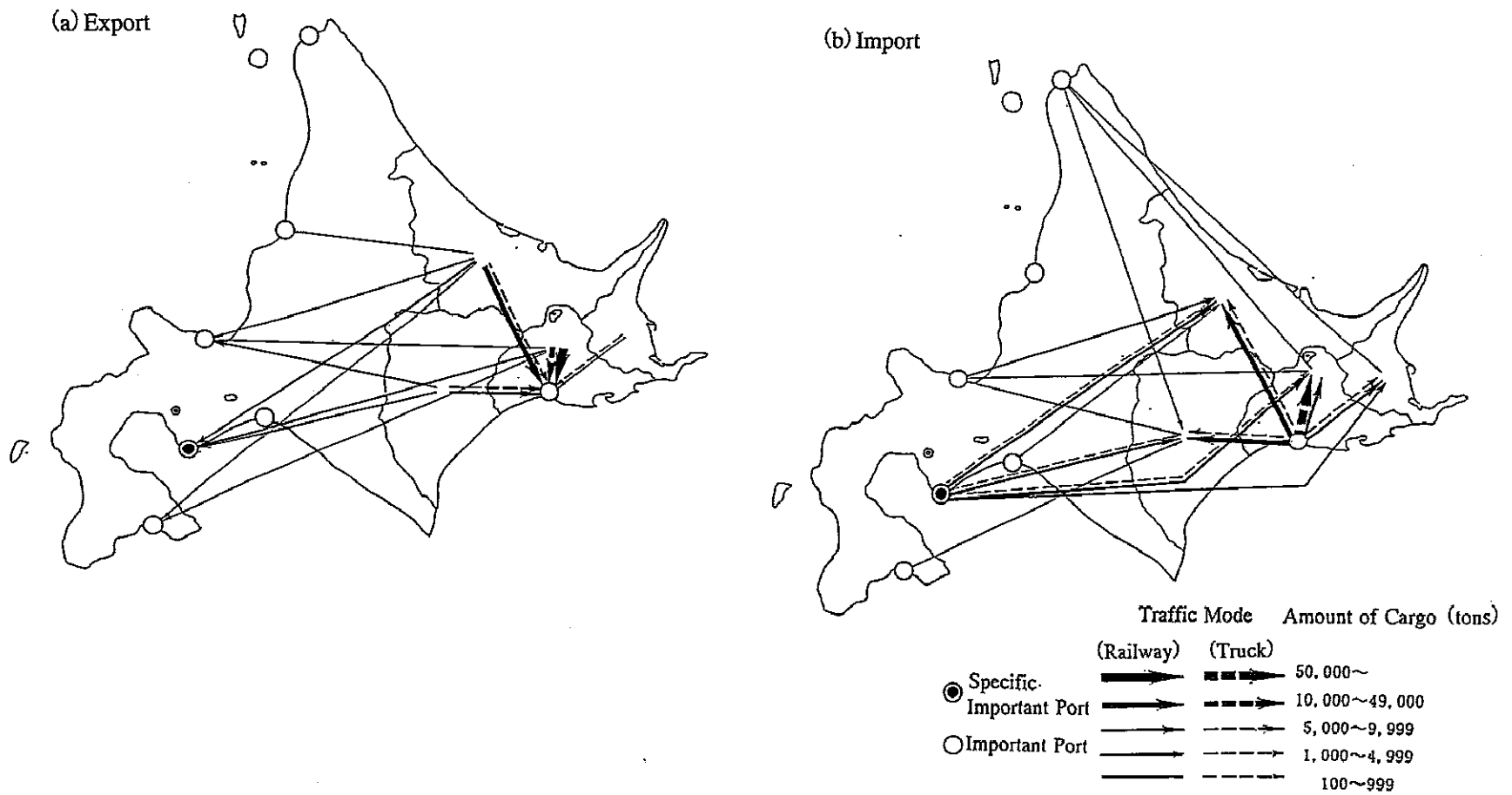


Figure 44 Cargo Movements by Traffic Mode in the Eastern Part of Hokkaido in Jun. 1966
Source: as figure 14.

central part of Hokkaido. And the advancement of the railway technology reduced the traffic bottleneck of the Karikachi Pass and strengthened the relations between Tokachi district and the central part of Hokkaido. Cargo transport using the railways is suitable for middle or long distance because rail transport is not comparatively restricted by distance. This promoted the railway use to the ports in the central part of Hokkaido. As a result, the share of the Muroran port and the Otaru port had risen in Tokachi and Abashiri district which are adjacent to the central part of Hokkaido. While the sphere of hinterland of the Kushiro port did not change, the share of the Kushiro port had lowered in Tokachi and Abashiri districts.

Figure 45 (a) (b) shows a diagram of port hinterland in the era of railway dominance. At the first term of this era, the hinterland of the Kushiro port expanded its sphere with the construction of the railways and came to be adjacent to the hinterlands of the Muroran port and the Otaru port at the Hidaka mountain range at the latter term of the Meiji era (Figure 45 (a)). At the latter term of the era of railway dominance which started at the beginning of the Showa era, some cargoes from Tokachi and Abashiri districts which were within hinterland of the Kushiro port came to be transported to the Muroran port and the Otaru port by rail. And the Kushiro port competed with the Muroran port and the Otaru port in Tokachi and Abashiri districts and the overlapping of hinterlands came to appear⁴⁴⁾ (Figure 45 (b)). Therefore, a hierarchy of ports in which the Otaru port and the Muroran port are of higher order and the Kushiro port is of lower order is evident.

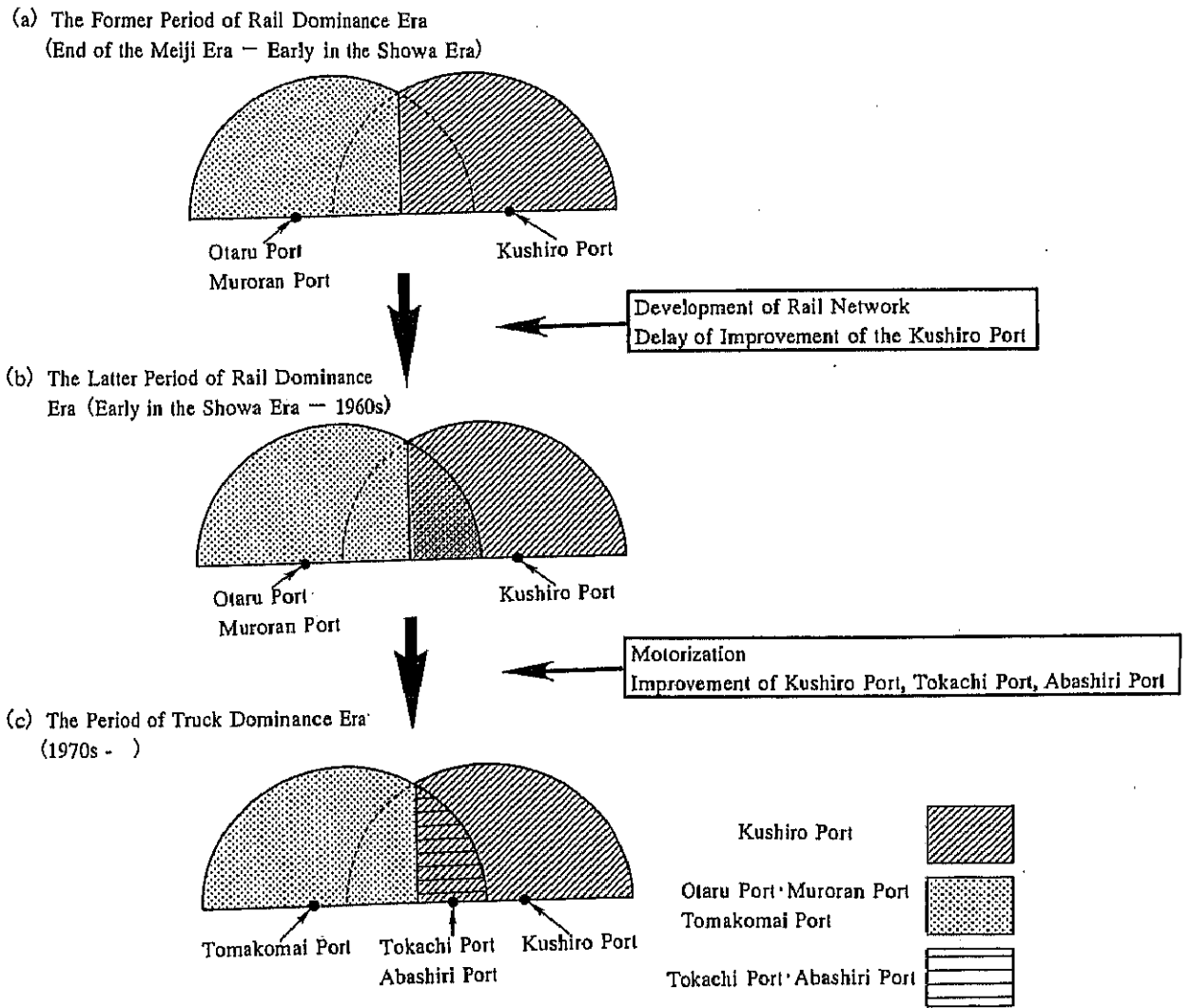


Figure 45 Diagram of the Progress of Port Hinterland

5.2.2. Car Transport Network and Port Hinterland

Kushiro, Tokachi, Nemuro, and southeast Abashiri districts are within hinterland of the Kushiro port in 1993. Compared with 1966 in the era of railway dominance, hinterland of the Kushiro port has increased its influence in Tokachi and Abashiri districts, while hinterlands of the ports in central part of Hokkaido have decreased their influences there. It seems that this is a result of the specialization of the transportation means into trucks. That is, as running distance of a truck per one day is 233 km in 1996 fiscal year, it is thought that the sphere with a radius of about 120 km, which a truck can shuttle by day trip, becomes the main factor to decide the sphere of a hinterlands. As in the case of the Kushiro port, Kushiro district, Tokachi district, southeast Abashiri district, and Nemuro district are included in this sphere. And this is almost the same area with hinterland of the Kushiro port shown in figure 23 and figure 27. But, as indicated in wheat, food industrial goods, and cement in Tokachi and Abashiri districts, some ports near starting points or arrival points are sometimes used.

Figure 45 (c) shows a diagram of port hinterland in the era of truck dominance. The east side of the Hidaka mountain range is within the hinterland of the Kushiro port and west side is within the hinterland of the Tomakomai port. Overlapping of the hinterlands in the era of railway dominance in the Showa era is not seen. On the other hand, overlapping of hinterlands came to be seen with ports located within hinterland of the Kushiro port in the era of truck dominance. For

example, it can be seen with the Tokachi port in the Tokachi district and with the Abashiri port in Abashiri district. Thus, overlapping of hinterlands was seen with the higher order ports in the era of railway dominance, while it can be seen with the lower order ports in the era of truck dominance.

By the way, neither vegetables, beans nor fishery processing products correspond to the diagram in Figure 45 (c). These goods packed in containers are mainly exported to Honshu by car ferry. Because the loading time and the sailing time are short in ferry transport, even though its fare is high. The number of trips of a ferry is set to balance the amount of cargo on both directions. As in the case of the Kushiro port, it is only two trips in three days, because the amount of cargo from the Tokyo port to the Kushiro port is small. Therefore, cargoes from the Kushiro port to the Tokyo port, which have a lot of demands, are restricted to food industrial goods produced in and around Kushiro city. Agricultural products which have a large change of the amount of shipments by season are difficult to export from the Kushiro port. So they are transported to Otaru, Tomakomai, Muroran, and Iwanai ports which have many ferry operations. And a part of fresh milk is also shipped out from the Otaru port to the Tsuruga port and the Maizuru port by ferry. Because transportation time from the Otaru port to Kansai district is shorter than that from ports on the Pacific Ocean side.

The running distance of a truck per day does not become a factor to decide the sphere of port hinterland of the ferry cargo like this. Endo (1981) reported that the expansion of hinterland was seen for the

container ship cargoes. A similar tendency is seen for the ferry cargoes.

5.2.3. Port Cargo and Port Hinterland

Different cargoes form different hinterlands. In 1993, the hinterland of coal, wood chip, paper and pulp, fishery goods, and processed fishery products are small. A port city and its adjacent area are within the hinterland. Most of them are raw materials or products of factories and they are exported to Kanto or Kansai district. That is, these cargoes have a strong relation with foreland and not with the back area of the port city. In the Kushiro port, its hinterland is almost limited to Kushiro city. These cargoes are closely related with the industries in Kushiro city and the Kushiro port as an industrial port can be seen here.

Wheat, fresh milk, food industrial goods, and cement are shipped in and out from the most adjacent major ports from the arrival and departure places. Therefore, the sphere of a hinterland for each cargo is a district (Shicho) scale. These cargoes can be shipped in the Tokachi port and the Abashiri port, because the amount of these cargoes is comparatively small and large-scale port facilities are not needed for these cargoes. And most of these cargoes have a strong relation with agriculture in the eastern part of Hokkaido. Many agricultural products and food industrial goods related to agriculture like starch and sugar are exported. Fresh milk is exported from the Kushiro port and its hinterland extends to not only Kushiro district but also Nemuro district. Because there are no major ports in Nemuro district. For wheat, food industrial

goods, and cement, the Tokachi port and the Abashiri port have a district-scale hinterland. However, for food industrial goods and cement shipped through the Kushiro port, the hinterland extends to Tokachi and Abashiri districts and overlapping of the hinterlands exists there.

Most of the oil products, heavy oil, and natural fertilizer consumed in the eastern part of Hokkaido are imported through the Kushiro port, so the Kushiro port makes the whole area of the eastern part of Hokkaido a hinterland. Because these cargoes are large in amount and demand a large-scale port with specialized warehouses and loading facilities, cargoes concentrate on specific ports which have these port facilities. Some heavy oil is handled in some ports in the eastern part of Hokkaido, but they are for fuel of fishing boats. So each port does not form a heavy oil hinterland.

The hinterland of ferry cargo is the widest and extends all over Hokkaido. However, ports that form a hinterland of ferry cargo are limited to ports that have a lot of ferry services. The Tomakomai port, the Muroran port, and the Otaru port correspond to this kind of port, but no ports correspond to it in the eastern part of Hokkaido.

Figure 46 shows a diagram of the sphere of hinterlands by cargoes based on the above-mentioned results. Ferry cargo forms the largest hinterland. And a hinterland narrows in the order of energy, feed and fertilizer, agricultural products, and industrial raw materials and industrial products.

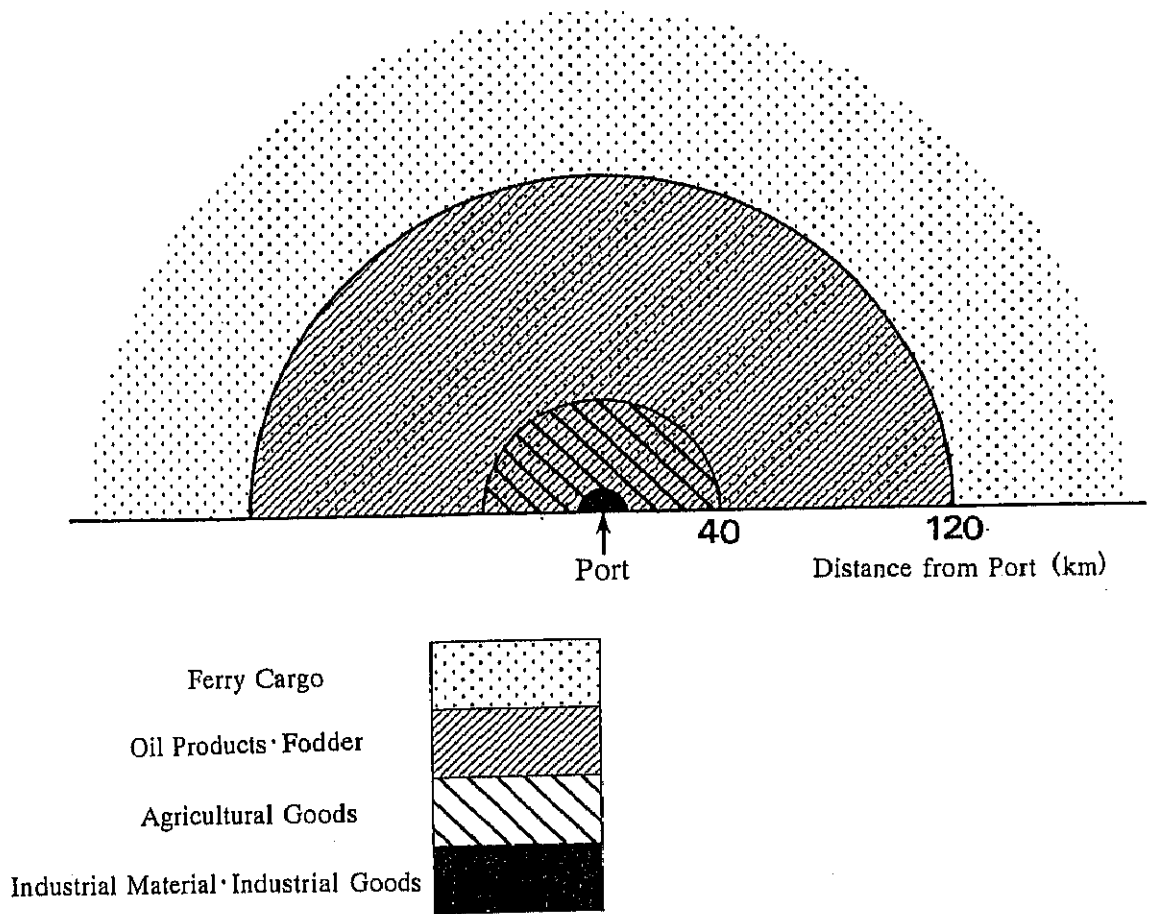


Figure 46. Diagram of Port Hinterland by Commodity

5.2.4. Other Factors of Determination of Port Hinterland

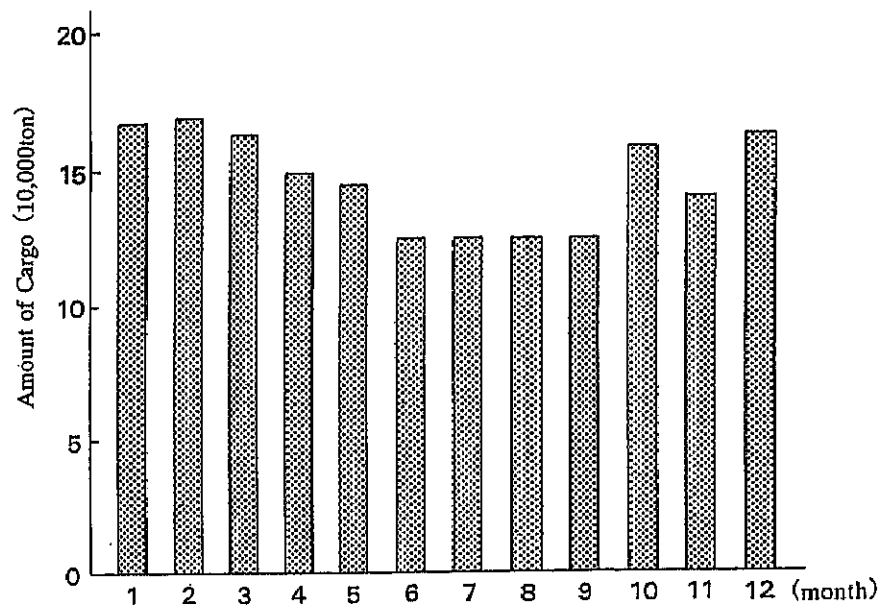
It is necessary to refer to political factors and natural factors to explain port hinterlands in the eastern part of Hokkaido. A political factor is the international relations with Russia and a natural factor is the drift ice.

At first, the international relations with Russia is referred to. The Nemuro Strait, located between Hokkaido and Kunashiri Island, is a waterway connecting with the Sea of Okhotsk and the Pacific Ocean. The depth of this strait is shallow and there are a lot of shore reefs. So cargo ships which sail through the Nemuro Strait are limited to a small-scale ship of the 499 type (1,100-1,736 weight tons) . A large-scale ship can sail through the Kunashiri Strait, but the sea route is not set, because of the relations with Russia. Therefore cargo ships which link ports located along the seacoast of the Pacific Ocean with the Abashiri port or the Monbetsu port must take the roundabout route passing through the Soya Strait and the Tsugaru Strait. Because of this, this route requires much transportation cost and time. For example, the distance between the Abashiri port and the Tokyo port is 1,004 nautical miles (1859.4 km) by way of the Soya Strait, while the distance between the Kushiro port and the Tokyo port is 604 nautical miles (1118.6 km) . As a result; many cargoes in Abashiri district come to be shipped in the Kushiro port and the Kushiro port strengthened its power in Abashiri district.

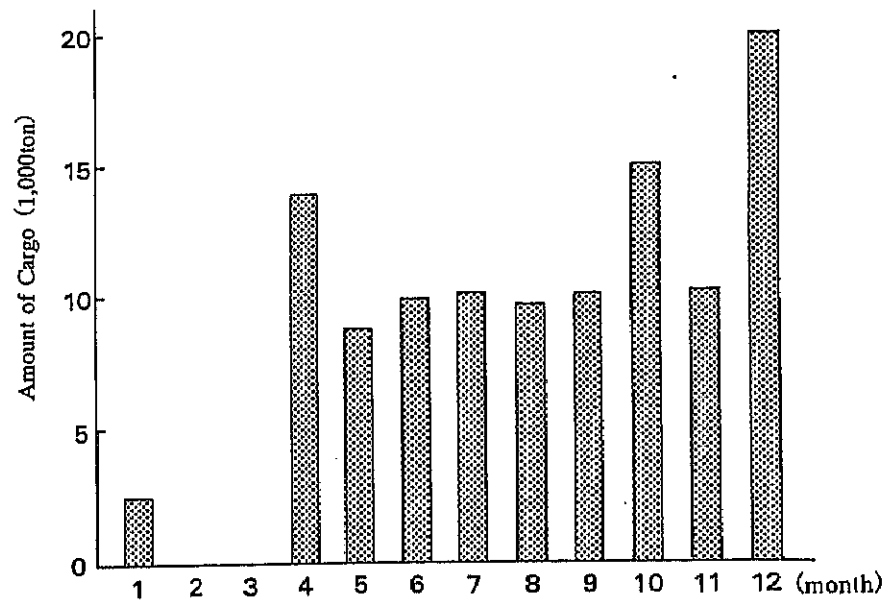
Now the influence of drift ice is referred to. Drift ice appears along

the function of the Abashiri port, the Monbetsu port, and the Nemuro port for 40 days to 80 days. During this period most of the cargoes loaded in these ports are transported to and from the Kushiro port which is a non-freezing port and the Kushiro port strengthened its power in Abashiri district. The case of oil products is shown here. Figure 47 shows the amount of the import oil products in the Kushiro port and the Abashiri port by month. The amount of the import oil products in the Abashiri port from January to March is zero or considerably less than that of other months. But the amount of the Kushiro port increases during these three months. Therefore, it is assumed that the hinterland of the Kushiro port expands into Abashiri district during the drift ice period. The influence of the drift ice on the flow of oil products is referred to by taking the case of Idemitsu Oil Co. which has oil tanks in the Abashiri port.

Idemitsu Oil Co. has oil tanks at the Kushiro port and the Abashiri port in the east part of Hokkaido. 24,177 kl of oil products are shipped from the Kushiro oil tank, and 17,725 kl of oil products are shipped from Abashiri oil tank in October, 1999. Oil products are transported from the Kushiro oil tank to Kushiro, Tokachi, and Nemuro districts and from the Abashiri oil tank to Abashiri district⁴⁵⁾. On the other hand, the oil products are shipped from only the Kushiro oil tank in January, 1999 when drift ice appears. The total amount of oil products shipped from the Kushiro oil tank are 35,865 kl. 10,930 kl are transported to Abashiri district and 24,935 kl are transported to Kushiro, Tokachi, and Nemuro districts. The hinterland of the Kushiro port in January expands to



(a) Kushiro Port (1990)



(b) Abashiri Port (1995)

Figure 47 Amount of Import Oil Products in the Kushiro Port and the Abashiri Port by Month
 Source: Compiled from data in Kushiro Port Statistics Annual Report and Port Section in Abashiri City Office

Abashiri district like this. Influences of drift ice can be seen not only for oil products but also heavy oil and cement which are the main cargoes of the Abashiri port.

Suspension of the port functions by drift ice makes it impossible to operate a year-round operation of the port enterprises. This limits the establishment and the expansion of the port enterprises like the port shipping business, land transportation business, marine transportation business, and warehouse business to the Abashiri port, the Monbetsu port, and the Nemuro port. And also this promotes the concentration of these enterprises to the Kushiro port.

5.3. Relation between Port Space and Port Hinterland

In this chapter, changes of the port space are considered chiefly in relation to industry and the transport network in port hinterland.

The hinterland of the Kushiro port was limited to in and around Kushiro from the Edo era to the beginning of Meiji era and the relation with the interior was weak. The functions of the Kushiro port were specialized to the export of fishery goods and the import of commodities. But at that time as the amount of cargoes was small, cargoes were loaded at the trading beach. Settlements behind the port had a character of the fishing village and the trading beach also played the role as the fishing port.

The sulfur mining business in Kawayu-Iozan added the area for

sulfur export to the Kushiro port. Tracks for sulfur and coal transport, and warehouses were constructed adjacent to the trading beach, but the port itself did not have any modern facilities. Because it takes enormous expense to construct breakwaters and quays, it seems to be judged that the economic effect coping with the investment could not be expected. Though the sulfur mining business by Yasuda financial clique was closed ten years later from the opening of the mine, it built an economical base in Kushiro and also strengthened the role of the Kushiro port as a gateway.

The National Railway Kushiro line expanded the hinterland of the Kushiro port and also brought industrial development and population growth in the hinterland. This brought the increase of cargoes to the Kushiro port. As the past trading beach could not cope with a large amount of rail cargoes, the loading efficiency for rail transport was demanded for by the port. Then in the Kushiro port a quay for barges was constructed adjacent to the freight terminal of the National Railway.

Wood and coal became the main exports after the Taisho era. Wood and coal were transported by private freight cars or private ships, and apart from general cargoes, because they were heavy bulk cargo. Therefore, private quays were constructed one after another. These private quays produced an industrial space into port space like the construction of a sawmill and a wood-working plant around Tenneru Freight Station. These private quays, which were constructed on the assumption of rail transport, brought the integration of rail and port. But the loading ability reached the limit, because mother ships could not

come alongside quays, no breakwaters at the port entrance were completed, and cargoes were only loaded at the riverside of the Kushiro River. It is thought that this is a primary factor to decide the productivity in a hinterland. It seems that this factor was remarkable before early in the Showa era when the Karikachi Pass was the traffic bottleneck.

The increase of the productivity in the hinterland and the limit of the loading ability with barge transport after World War II demanded the Kushiro port some wharves where mother ships can come alongside. Some new wharves were constructed with the reclamation of the sea in front of the town, so the loading sites went away from the town. Some vast railway lands occupied in and behind the wharves, because the wharves were constructed on the assumption of mass transport by rail. Therefore, the port went away from the town more. And also facilities related to coal came to be remarkable in port space of those days. That is, the promotion of loading efficiency according to the development of the port enabled the export of a large amount of coal from the Kushiro port and brought the growth of the coal industry in the hinterland. Especially the exports of coal had increased after the completion of the North Wharf in 1950, and this brought the vast coal yard and freight lines for coal into port space. In figure 17 showing the Kushiro port in 1968, coal yards and freight lines were the most remarkable land use for port space. Port space integrated with railway was one of the characteristics of the Kushiro port before 1960s. The Central Wharf, constructed in 1968, was more advanced than the North Wharf. For example, port facilities were arranged in order of quay, apron, shed, and warehouse from coast toward

inland. And sheds and warehouses, which had enlarged their size compared with the past, were linked with freight lines. Quays had from 9 to 10m in depth and coped with large-sized cargo ships (10,000-15,000 weight tons). At the same time, the Central Wharf had the structure that could cope with the truck transport like a container yard instead of sheds. The Central Wharf was a wharf of the shifting period from rail transport to truck transport and the influences of the motorization gradually appeared in port space.

The construction of the Kushiro port was going to finish with the completion of the Central Wharf. But when the Central Wharf was constructed, port facilities of the Kushiro port could not already accommodate the advancement of motorization and the change of industrial structure in the hinterland, so some new counter-plans had to be considered. Wrenn showed "Port expansion by the reclamation of a front sea area of an existing port" and "Construction of a new port" as new counter-plans. The Kushiro port coped with it by constructing a new port adjacent to the old port. Containerization was a factor of the new port construction in the diagram of Wrenn, but in the case of the Kushiro port it is thought that the changes of transportation means and industrial structures in the hinterland were the main factors.

At first, the change of transportation means in the hinterland is discussed. Motorization has advanced from the middle 1960s and freight transport has gradually been transferred from rail to truck. Trucks from or to the past port move on the public roads. This brings many problems like a decline of city functions according to the traffic jam, a

deterioration of city environment by waste gas, vibration, noise, and an increase of traffic accidents. It is difficult to construct the new roads in the existing town or to widen the existing roads as counter measures of truck transportation. In addition, truck transportation demands a vast space behind a port like a trailer yard, delivery center, and a container yard which have more space than rail related space in the era of railway dominance shown in figure 36. Therefore, it is difficult to obtain a vast space for truck transportation from existing port space.

Next, the changes of industrial structures in the hinterland are discussed. High economic growth, starting from about 1960, had greatly changed the industrial structures in the hinterland of the Kushiro port. The decline of the coal industry and growth of the oil industry according to the energy revolution, growth of the dairy farming industry, and structural changes of the paper manufacturing industry are representative examples of this. Port facilities related to coal, which were the energy supply base to the foreland were the most representative land use of the Kushiro Port. However, the Kushiro Port came to have a role of an oil supply base to the hinterland instead of a coal supply base to the foreland because of the decline of the coal industry and the energy conversion to oil. The main energy changed from coal to oil and its flow changed from "hinterland to port" to "port to hinterland". So port space was requested to cope with them. Dairy farming in the eastern part of Hokkaido had gradually grown up since Showa 30s. But because of the lack of self-support fodder according to the expansion of production scale of dairy farms, the import of fodder came to be needed. Then, port

facilities related to the import of fodder and the export of dairy products were newly requested to the port. As for the paper manufacturing industry, paper plants in Kushiro city were located near the raw material producing area. So the role of the port was only to export their products. Typhoon Toya in 1954 produced a lot of fallen trees and the amount of material wood supply from Hokkaido decreased. And also paper plants started to use cheap imported wood chips. They requested to port to have facilities related to the import of wood chips. The port was also requested to have facilities related to coal import, because paper manufacturing companies came to construct a thermoelectric power station in their plants according to the expansion of the production scale⁴⁶⁾.

As a result, the West Port was newly constructed. Truck yards, a delivery center, and container yards are located in and behind the wharf and the roads in the port have enough width for large-scale trailers. By-pass roads were constructed so that trucks didn't have to pass through downtown. And instead of the former public roads, the auto-roads connecting the port with the hinterland are being planned or under construction. Each wharf of the West Port is specialized to cope with each industry in the hinterland. That is, the back of the South Wharf and coal pier of the First Wharf are specialized for the oil industry and the oil pipes connecting oil tanks with oil pier are constructed. The First Wharf is specialized for the paper manufacturing industry. A quay for chip ships, a chip yard and belt conveyers for wood chips are constructed. Paper and pulp are chiefly exported from this wharf. A paper manufacturing plant is located behind the First Wharf and this brought the First Wharf a

specialization for paper manufacturing industry. The chip yard in the East Port was abandoned in 1985 by the operation the wood chip yard of the First Wharf. The Second Wharf is specialized for the dairy farming industry. A quay for grain ships, silos for fodder, mixing fodder plants, and belt conveyers for fodder connecting with these facilities are constructed. The Second Wharf has not only the distribution function but also the production function like a mixing fodder plant. In the Third Wharf, coal for the thermoelectric power station is imported and fresh milk is exported, but it does not specialize to a specific industry.

As mentioned above, port space of the Kushiro port is deeply related with the industries of the hinterland. But as mentioned in the preceding chapter, agricultural goods produced in Tokachi and Abashiri districts were not transported to the Kushiro port. A few industries in the eastern part of Hokkaido are not reflected in the space of the Kushiro port.

Finally the containerization which is taken up as a factor of the new port construction in the model of Wrenn is discussed. In general, transport by container is effective to improve transportation efficiency. Therefore, construction of a container wharf is a center of the port plan in many large-scale ports. However in the Kushiro port, container ships travel between Kushiro and Tokyo or Osaka about five services a week. According to "Research Data of Port Hinterland" in 1993, container cargo occupies only 1.2% of the total cargo in the Kushiro port⁴⁹⁾. There is a container yard in the Second Wharf, but its scale is small and also no container cranes are set up. As for this, the following are thought as factors. (1) A lot of bulk cargoes such as coal, oil products, wood chip,

and grain which are unsuitable for the container transport are shipped in the Kushiro port. (2) Containers are often used for international general cargo transport, but this kind of cargo is shipped only a little in the Kushiro port. (3) Container cargo exported from the Kushiro port is much in demand, while container cargo imported to the Kushiro port is only a little in demand. This unbalanced demand brings an increase of transportation cost. (4) Enormous expense is needed to construct a container wharf with a container crane. Therefore, it can be said that the new port in the Kushiro port was constructed for bulk cargo, not for container cargo.