Chapter 2 Strategic Infrastructure Management That Brings About a Revolution in Productivity.

Chapter 2: Strategic Infrastructure Management That Brings about a Revolution in Productivity discusses the relationship between infrastructure development and the activities by private sector firms more specifically by presenting the efforts aimed at improving productivity and maximizing stock effects, as well as through a survey of the awareness of private businesses toward infrastructure.

First, in Section 1: Aiming at maximizing the Stock Effect, we will focus on cases in which stock effect are apparent. It mainly introduces cases that affect economic activities of private companies and lead to productivity improvement, and the approaches for visualization taken to understand various stock effects generated by infrastructure, as well as the recent administrative measures of the Minister of Land for maximizing stock effects.

Next, in Section 2: Effective Development and Operation of Infrastructure Through Public-private Partnership, it introduces the creation of new demands in private sector through the utilization of PPP/PFI and the cases of effective infrastructure development and operation, as well as the useful cases of community development and the recent administrative measures of the Minister of Land.

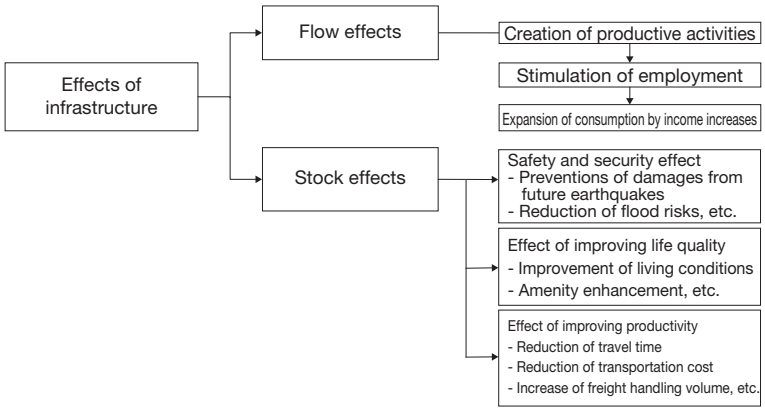
In addition, in the Section 3: The Results of Opinion Poll and Analysis of Private Businesses, in order to examine the direction of infrastructure development from the perspective of private businesses, we conducted an awareness survey (questionnaires) targeting private businesses, who are the users of infrastructure. The aim was to clarify the involvement of corporate activities related to policy issues and infrastructure such as the improvement of productivity in tertiary industry, disaster preparedness, response to an aging population society and innovation activities, as well as what is needed for both infrastructure development and users to maximize stock effects such as productivity improvement.

Section 1 Aiming at Maximizing the Stock Effect

1 Examples of the realized stock effect

As described in Section 2, Chapter 1, infrastructure investment has two types of effects: the flow effect and the stock effect. The flow effect is a short-term effect that expands the aggregate economy by the public work itself, which derivatively creates production, employment, consumption and other economic activities. The stock effect, on the other hand, is realized in the medium-to-long term when the infrastructure is accumulated and functions as social capital. The stock effect includes "safety and security effect" such as prevention of damages from future earthquakes, and reduction of flood risks; "effect of improving life quality" such as improvement of living conditions, amenity enhancement; and "effect of improving productivity" such as reduction of travel time which leads to enhancing the base of society (Figure 2-1-1).

Figure 2-1-1 Stock effects of infrastructure



Source) MLIT

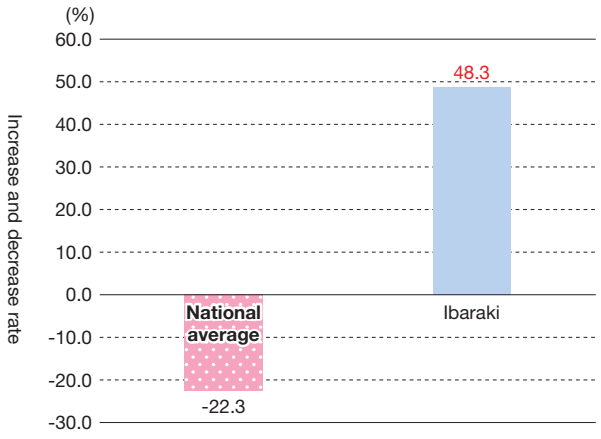
Infrastructure investment leads to development of the regional economy and improvement of the living environment. In addition, the effective use of developed infrastructure can bring about a greater impact. The Priority Plan for Infrastructure Development (Cabinet decision in September 2015) classifies infrastructure into three categories according to its main purpose and function, including growth infrastructure, safe and secure infrastructure and life infrastructure. This section introduces examples in which infrastructure mainly affects economic activities of firms and contributes to the improvement of their productivity.

(1) Growth infrastructure

■ Kita-Kanto Expressway

The Kita-Kanto Expressway runs from Takasaki City, Gunma, and the southern Tochigi to Hitachinaka City, Ibaraki. This National High-Grade Trunk Highways extends the entire length of 150 km and was completed in March 2011. In addition to the North-South axis toward Tokyo, this formed the East-West axis connecting Gunma, Tochigi and Ibaraki. From 2008 prior to the completion to 2013 after the completion, the volume of logistic transactions from Tochigi to Ibaraki increased by 48.3%, giving boost to the interaction of east and west (Figure 2-1-2).

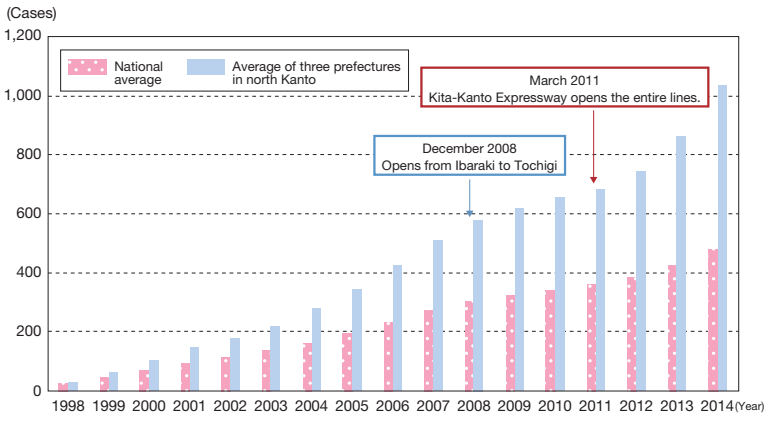
Figure 2-1-2 Changes of freight transportation volume from Tochigi (FY 2008 to FY 2013)



Source) Developed using the Freight Area Flow Statistics by MLIT

In addition, there is a rapid development of industrial parks, corporations, and logistic warehouses mainly in the vicinity of IC. In 2014, Ibaraki ranked top for the number of establishment of new business facilities, followed by Gunma and Tochigi. As for the cumulative total value for the number of establishment, the growth is nearly double of national average (Figure 2-1-3). In terms of the area of establishment, Tochigi ranked top, followed by Ibaraki while Gunma ranked 7th, indicating that three prefectures top the list.

Figure 2-1-3 Changes in the number of business location in three prefectures in north Kanto and the nation.

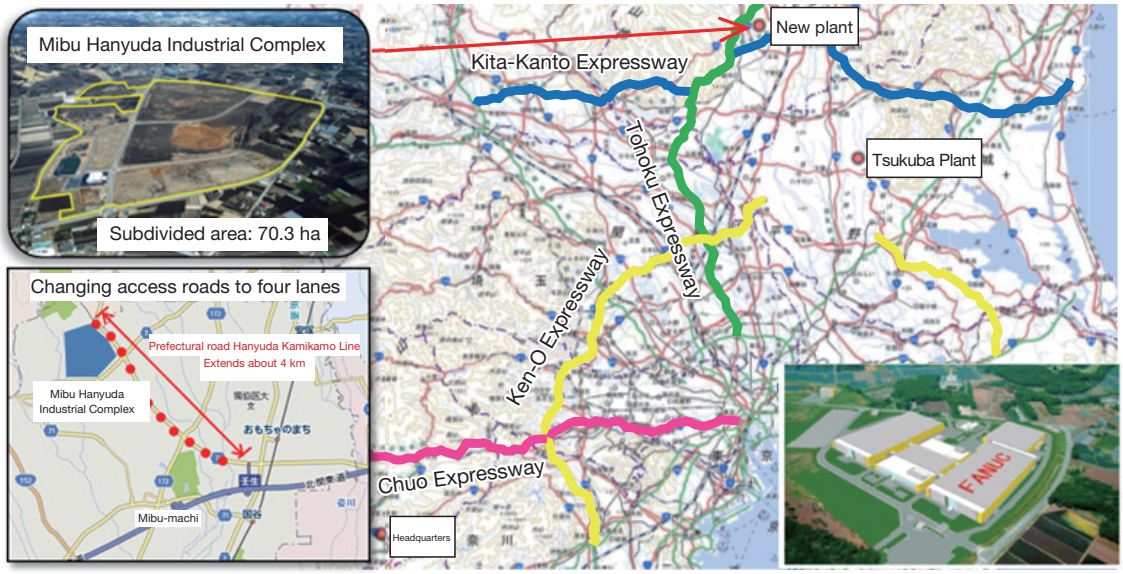


(Note) The number of locations is the average of three prefectures in north Kanto, including Gunma, Tochigi, and Ibaraki and the cumulative total of national average after 1998
Source) Developed by MLIT from the Survey of Factory Location Trends (2014), Ministry of Economy, Trade and Industry.

Such an activation of economic activities in the northern Kanto region has a major effect on the Metropolitan Inter-City Expressway (Ken-O Expressway), which the development has been in progress. The expressway bus connecting Utsunomiya City, Tochigi and Narita International Airport changed its route to pass through the Ken-O Expressway and the Kita-Kanto Expressway, leading to the shortening of time by about 30 minutes and lower fares (about ¥200). In addition, in Nikko, a tourist attraction in Tochigi, the completion of the Ken-O Expressway has an instant effect and started seeing an increased number of tourists from wide areas including Shonan and Shizuoka during the season of fall foliage in 2015.

In the vicinity of Mibu IC in Tochigi along the Kita-Kanto Expressway, FANUC Corporation, which has 50% of world shares in NC (numerical control) equipment machine tools, invested nearly ¥100 billion to build a new plant (to be opened in 2016). With the completion of Kita-Kanto Expressway and Ken-O Expressway, one of the reasons is to increase accessibility between the head office at the base of Mount Fuji, Yamanashi, and a plant located in Tsukuba City, Ibaraki. Even Tochigi has been working on developing four-lane roads in access roads to Mibu IC for the expansion of effect (Figure 2-1-4). A number of corporations building business establishments in Tochigi list the opening of the Kita-Kanto Expressway and Ken-O Expressway as a reason of expanding business, displaying a synergetic effect of developing the Kita-Kanto Expressway and Ken-O Expressway, as well as both infrastructures.

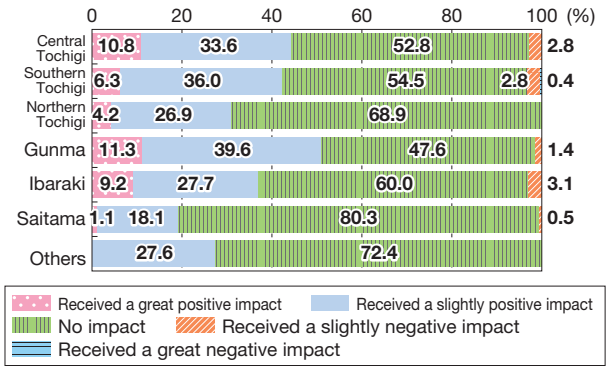
Figure 2-1-4 The vicinity of Mibu IC and a rendering of Mibu Plant of FANUC Corporation



Source) Developed by MLIT using the materials provided by Tochigi. FANUC Corporation

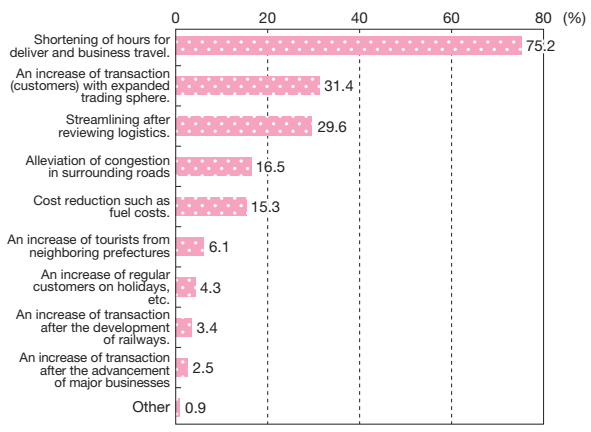
In addition, the local governments are not the only one who thought the opening of the Kita-Kanto Expressway as an opportunity for the activation of regional economy. The three banks including the Gunma Bank, Ltd. in Gunma, the Ashikaga Bank, Ltd. in Tochigi and the Joyo Bank, Ltd. in Ibaraki teamed up and held a business negotiation meeting for foods and exhibition of food and agriculture, titled Agri-Food Festival 2015 in Utsunomiya, with the aim of promoting interexchange among corporations that is centered on east and west. The survey conducted by The Ashikaga Bank, Ltd. revealed that many corporations actually feel economic effects from the completion such as shortened time and enlarged commercial sphere in local companies (Figure 2-1-5 and Figure 2-1-6).

Figure 2-1-5 Impact on the management due to the completion of Kita-Kanto Expressway (N = 1,116)



(Note) The survey was conducted targeting 1,888 businesses situated in the sales areas of Ashikaga Bank (Tochigi, Gunma, Ibaraki, Saitama, etc.) during the period of the mid-January 2013 to the early February 2013. (The number of businesses with valid response: 1,121, the collection rate of 59.4%.)
Source) The survey of Kita-Kanto Expressway after two years since the completion by The Ashikaga Bank, Ltd.

Figure 2-1-6 Specific positive impacts from the completion of Kita-Kanto Expressway (Multiple answers, N=443)



Source) The survey of Kita-Kanto Expressway after two years since the completion by The Ashikaga Bank, Ltd.

As described above, the impact of streamlining of the Kita-Kanto Expressway covers a broad range of topics. In the days to come, we can expect to see the expanded impact of streamlining by the efforts of regional economic vitalization taken by the local governments and financial institutions by taking advantage of infrastructure.

■ Hokkaido Shinkansen

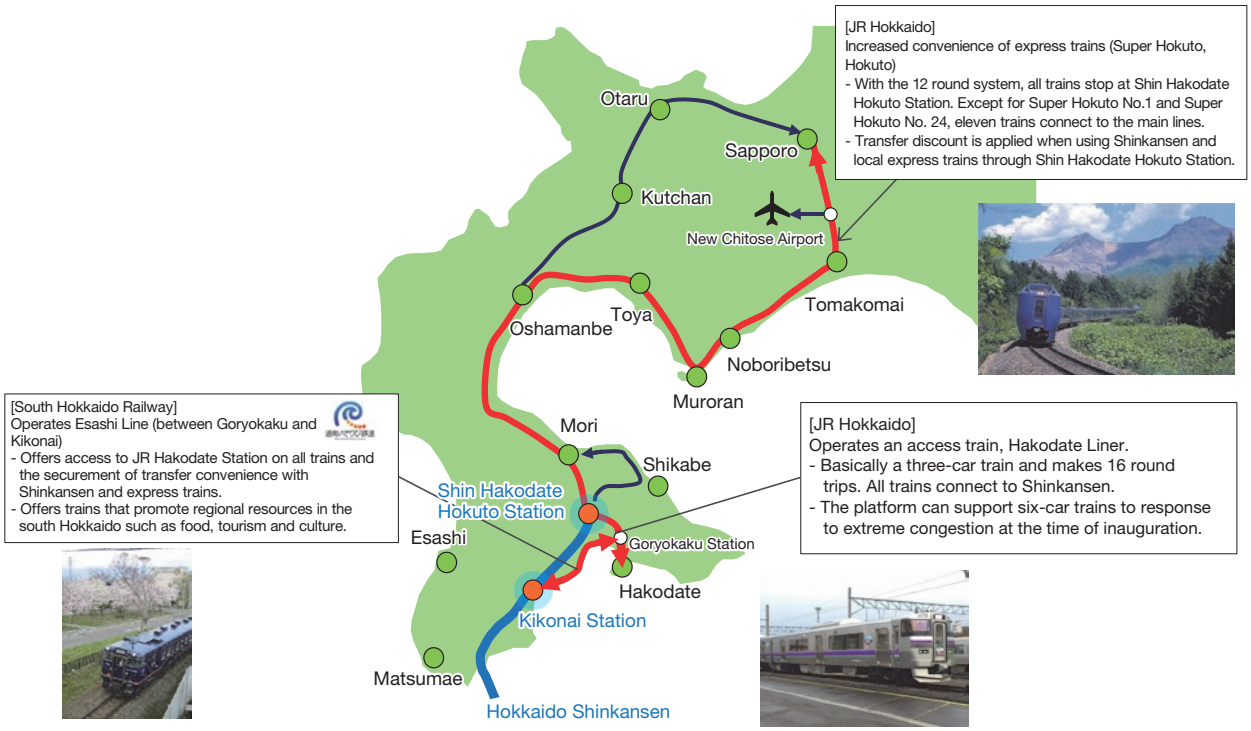
On March 26, 2016, the Hokkaido Shinkansen opened from Shin-Aomori and Shin-Hakodate Hokuto to allow traveling from Tokyo to Hakodate in nearly four hours. According to the Development Bank of Japan Inc., the economic effects of opening are calculated to be nearly ¥13.6 billion annually (published in October 2014), and the direct effects and ripple effects in tourism and business can be expected. In addition, the Seikan Tunnel (the common use started in March 1988) connecting Hokkaido and Aomori was designed with the standards in which new Shinkansen Line will run through in the future. With the completion of Hokkaido Shinkansen, this streamlining impact will be fully exerted.

Figure 2-1-7 Hokkaido Shinkansen goes through the Seikan Tunnel.

Source) Japan Railway Construction, Transport and Technology Agency

For the opening, the development of secondary transit system advanced mainly in Hakodate and Sapporo. In order to facilitate traveling from Shin Hakodate Hokuto Station, which is a new station, to the center of tourism, Hakodate Station (local line), a shuttle service connecting both stations, called the Hakodate Liner, was developed to serve all express trains in Hakodate Hokuto Station traveling to Sapporo. In addition, the South Hokkaido Isaribi Railway (Goryokaku to Kikonai) will be opened to serve tourist trains (Figure 2-1-8).

Figure 2-1-8 The railway networks for the opening of Hokkaido Shinkansen.



Source) Hokkaido

As for the development of access roads connecting within Hakodate and the surrounding areas, as well as Sapporo, the landscape improvement along the train lines and the development of Michi-no-Eki (Roadside Station) provide the environment in which travelers can make a tour easily. According to the secondary transit population survey after the opening of Hokkaido Shinkansen (September 2014) implemented by the council of the Hokkaido Shinkansen Opening Strategic Promotion consisting of Hokkaido and financial circles, the results revealed that more than 50% of travelers from outside the prefecture use rental cars and buses for traveling, pushing forward the development of traffic line for users.

Also, in Aomori, Okutsugaru-Imabetsu Station was developed as the northernmost station in mainland Japan for Shinkansen. The adjacent Michi-no-Eki (Roadside Station) was also expanded and renovated as a transit base for users and re-opened for renovation in April 2015. This allowed the number of users to bump up from 20,000 users per year before renovation to 80,000 users in about six months after renovation.

Besides the improvement of structural aspects, there is also an active effort of promoting exchange between Hokkaido and Tohoku. Each travel company utilizes the benefits of railway that allow getting off on the way to plan new tours around Hokkaido and Tohoku with the use of Hokkaido Shinkansen. In addition, with the cooperation of the local Chamber of Commerce and Industry and financial institutions, the exchange among corporations has been advancing mainly in the tourism and food industry. North Pacific Bank Ltd. in Hokkaido and The Aomori Bank, Ltd. in Aomori established the Seikan Activation Fund as the public-private partnership fund for providing growth capital for corporations in Seikan area and offering management support in May 2014 for the development of new products using food ingredients from Hokkaido and Aomori (Figure 2-1-9).

Figure 2-1-9 Hakodate Rolls, a Seikan joint plan product

Source) Hokkaido

For the inauguration of Hokkaido Shinkansen, it is expected to bring in economic effects in the tourism industry and the public-private partnership unites to brush up the regional attraction and to promote information dispatch in and out of Japan. In addition, by forming a large exchange sphere of Hokkaido and Tohoku, it is important to lead to the activation of economic activities and the improvement of regional attraction. The extension of Sapporo aims to be completed and opened by the end of 2030 [Note 36]. The effect of opening Shinkansen is expected to be maximized, giving a ripple effect throughout Hokkaido.

Note 36 According to the Handling of New Shinkansen Lines (January 14, 2015. Agreement of the government and party), the completion and opening of line between Shin-Hakodate Hokuto and Sapporo will be moved up five years from FY 2035 to aim for the completion and opening by the end of FY 2030.

Column

Collaboration between governments and regional financial institutions to manifest stock effects. ~ Hokkaido Regional Development Bureau and North Pacific Bank, Ltd. ~

The Hokkaido Regional Development Bureau and North Pacific Bank, Ltd., concluded an agreement for cooperation in November 2014. The purpose is to encourage reviving tourism and regional promotion in Hokkaido by making use of the strengths of the government and the regional financial institutions. The collaboration includes measures to expand stock effects of the infrastructure and deepen the regional understanding on the infrastructure, so it may be said that the regional financial institutions are the partners of government to manifest new stock effects. The key approaches are introduced here.

(i) Seminar to add to the attractiveness of Michi-no-Eki (roadside station)

In order to solve the issues of regional revitalization, this seminar is a measure to support local governments that are trying to revitalize their roadside stations through collaboration with National Research and Development Agencies, the Public Works Research Institute and the Civil Engineering Research Institute for Cold Regions. In the first seminar held in August 2015, issues related to roadside stations were discussed among private businesses, local governments, and relevant authorities that are invited by North Pacific Bank. At the same time, efforts are being made to introduce private businesses that are cooperating in reinvigorating roadside stations to local governments (Figure 2-1-10).

Figure 2-1-10 A photo taken during the seminar for increasing the appeal of Michi-no-Eki (Roadside Station)

Source) National Research and Development Agencies, the Public Works Research Institute, the Civil Engineering Research Institute for Cold Regions

(ii) PPP/PFI Seminar in Asahikawa

In March 2015, under the auspices of the Asahikawa Development and Construction Department of the Hokkaido Regional Development Bureau, North Pacific Bank, Ltd., and the Asahikawa Chamber of Commerce & Industry, the PPP/PFI seminar to promote PPP/PFI projects based on proposals by the private sector was held. In the seminar, following the introduction of business and stories of personal experiences by representative companies now operating PFI projects, discussions were conducted about the PPP/PFI projects, the system of proposals by the private sector from the viewpoints of private companies, and the feasibility of the projects within the jurisdiction.

(iii) Panel exhibition of stock effects of the infrastructure

In order to let a wide range of local residents know the impact of streamlining of the infrastructure, a panel exhibition is now underway using the head and branch offices of North Pacific Bank.

■ Higashi-kyushu Expressway, Nakatsu Port and Hososhima Port

Higashi-kyushu Expressway is a 436 km arterial high-standard highway, which starts from Kitakyushu-shi, Fukuoka, passes through each prefecture of Fukuoka, Oita, Miyazaki and Kagoshima, and reaches Kagoshima City, Kagoshima. Except for some sections, it is placed in service to connect seas along the highway, air traffic bases and cities of commerce and industry such as Kitakyushu City and Oita-shi to form a Kyushu's integral network along with Kyushu Jukan Expressway and Kyushu Odan Expressway.

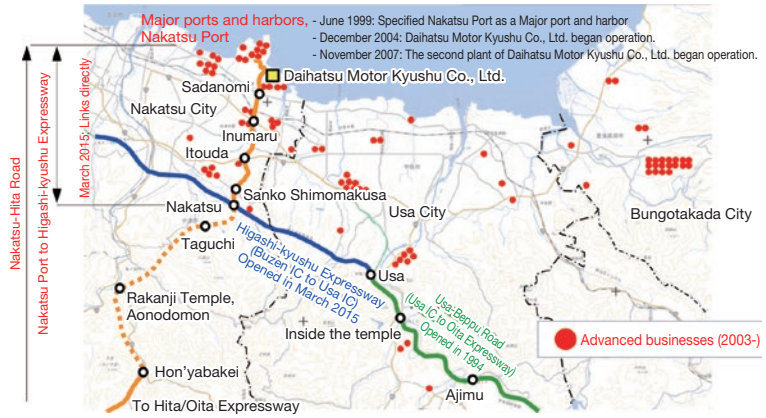
• Nakatsu Port in Oita

In the northern part of Kyushu, the automotive industry is becoming more a key industry. The Nakatsu Port in Oita plays a central part to push forward the development of ports, harbors, and access roads. In 1999, since the Nakatsu Port was appointed as a key port and harbor, the area was developed as a logistic base by improving piers and it has been placed in service since 2004. At that same time, the Nakatsu-Hita Road connecting the Nakatsu Port and Higashi-kyushu Expressway was also built (Figure 2-1-11).

With the improvement of transportation infrastructure centering the ports, Daihatsu Motor Kyushu Co., Ltd. built a plant in Nakatsu Port. In 2004, the company moved its headquarters and began production. This also attracted the accumulation of automobile related industries, and from 2003 to 2014, the cargo volume of Nakatsu Port grew by nearly eightfold and the number of households in former Nakatsu City increased by about 1.2-fold, bringing major economic effects to the area (Figure 2-1-12). In addition, surrounding cities of Oita and Nakatsu Port are putting effort into the improvement of living environment such as support for human resources development and child care in order to facilitate the supply of human resources to the accumulative businesses and the promotion of settlement.

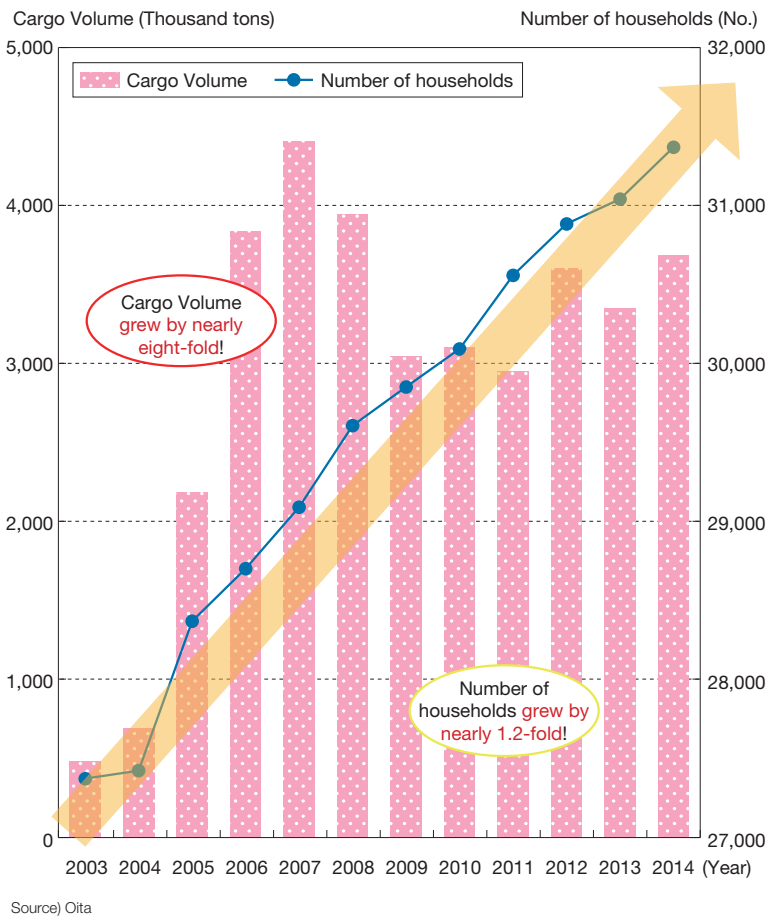
In March 2015, the Higashi-kyushu Expressway (Buzen IC to Usa IC) to directly connect the Nakatsu-Hita Road (Nakatsu Port to Higashi-kyushu Expressway), which creates an additional expectation to the development as a base of the automotive industry in Kyushu in the days to come.

Figure 2-1-11 Near Nakatsu IC/Nakatsu Port



Source) Oita

Figure 2-1-12 The Cargo Volume at Nakatsu Port and the number of households of former Nakatsu-shi



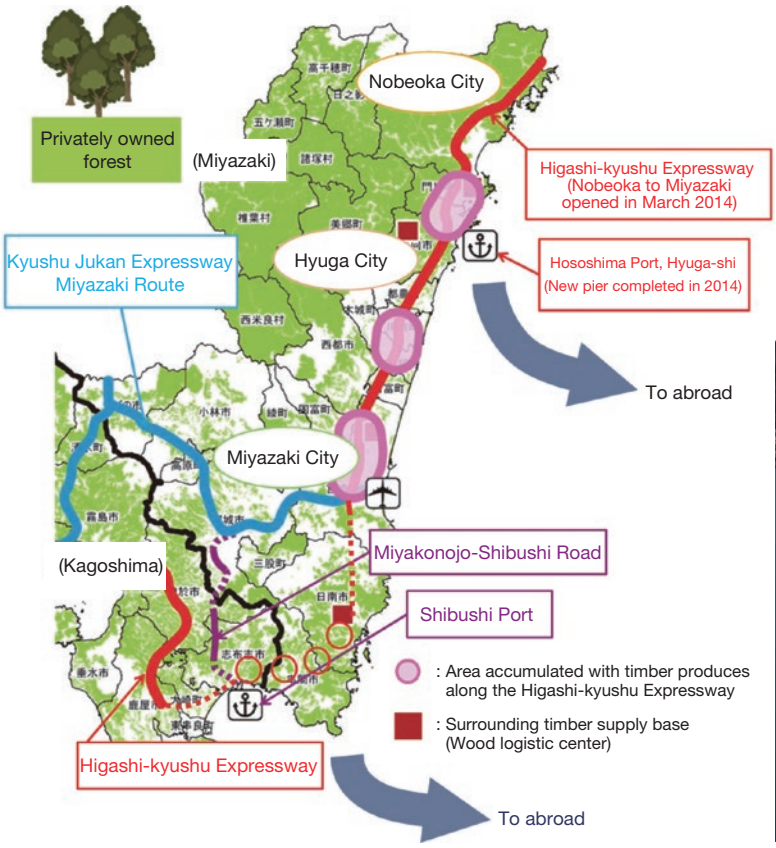
Source) Oita

• Hososhima Port, Miyazaki and major ports

There are enormous amount of forest resources in the mountains in Kyushu. Because of the recent increase of timber demands in East Asia and the correction of the tendency of rising yen, the lumber prices are on the rise to stimulate the start of new timber export businesses. Because of this situation, Hososhima Port and other ports and harbors in Kyushu see a steep increase of timber export to countries in East Asia, leading to the restoration of the forestry industry, maintenance, and creation of regional employment.

In the Hososhima Port, Miyazaki, a Japanese major lumber corporation, Chugoku Mokuzai Co., Ltd. made a foray to

Figure 2-1-13 Major infrastructures in the timber industry in Miyazaki and Hyuga Plant, Chugoku Mokuzai Co., Ltd.



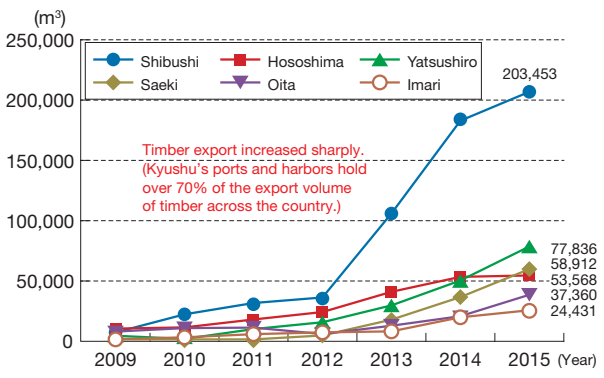
Source) MLIT

Source) The website of Chugoku Mokuzai Co., Ltd.

expand the business in December 2014 and began shipping lumber across the country. Behind this background, the construction of plants in the Hososhima Port, which is adjacent to a timber supply area, brought down the cost of logistics and enabled the securement of a plant site within the port. Other reasons behind were that the port will enable exporting products in future and the development of expressways such as Higashikyushu Expressway advanced to create a preferred environment for corporations to expand their business.

Chugoku Mokuzai Co., Ltd., utilizes timber from Miyazaki to employ a comprehensive operation of lumber, processing and biomass power generation. The total capital investment is expected to be ¥40 billion and the number of new employees will be 300. Including the forestry businesses in the related industries, the company has been making a significant contribution to the regional employment (Figure 2-1-13and 2-1-14).

Figure 2-1-14 Changes of timber export in major ports in Kyushu.



Source) Developed by MLIT from the Trade Statistics by the Ministry of Finance.

• Wide-area cooperation in Kyushu and Shikoku

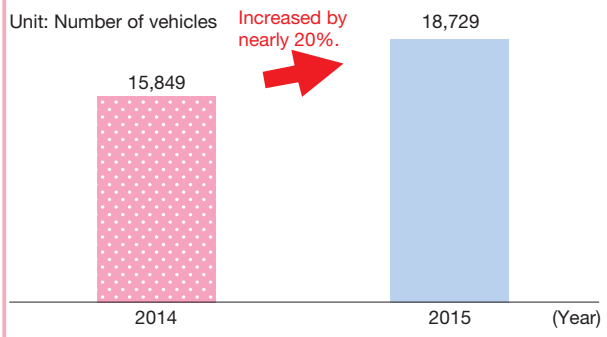
As for the tourism, the development of Higashi-kyushu Expressway activated the exchange between Kyushu and Shikoku. Travel agencies added plans to tour around Ehime from Miyazaki and Kagoshima. West Nippon Expressway Company Limited is planning on adding a free pass plan of expressways in Oita and Miyazaki for ferry users (Figure 2-1-15).

Figure 2-1-15 The driving paths of West Nippon Expressway Company Limited

Source) West Nippon Expressway Company Limited

With these efforts, the number of vehicles that used ferry between Ehime and Oita during the Golden Week in 2015 increased by about 20% from the previous year (Figure 2-1-16). In the Yawatahama Port in Ehime, which serves as an entrance on the Shikoku side, a Michi-no-Eki (Roadside Station), Minato Oasis "Yawatahama Minatto", opened in April 2013, attracting a host of users. In addition, the development of Ozu-Yawatahama Expressway, which is the access roads from Yawatahama Port to Shikoku and the strengthening of functions of Shikoku Jukan Expressway to reach Kyoto, Osaka, and Kobe, will also form a broad route that connects Kyushu, Shikoku, Kyoto, Osaka, and Kobe to stimulate the tourism and logistics industries in the future.

Figure 2-1-16 The number of vehicles on three ferry routes from Ehime to Oita during a major holiday.



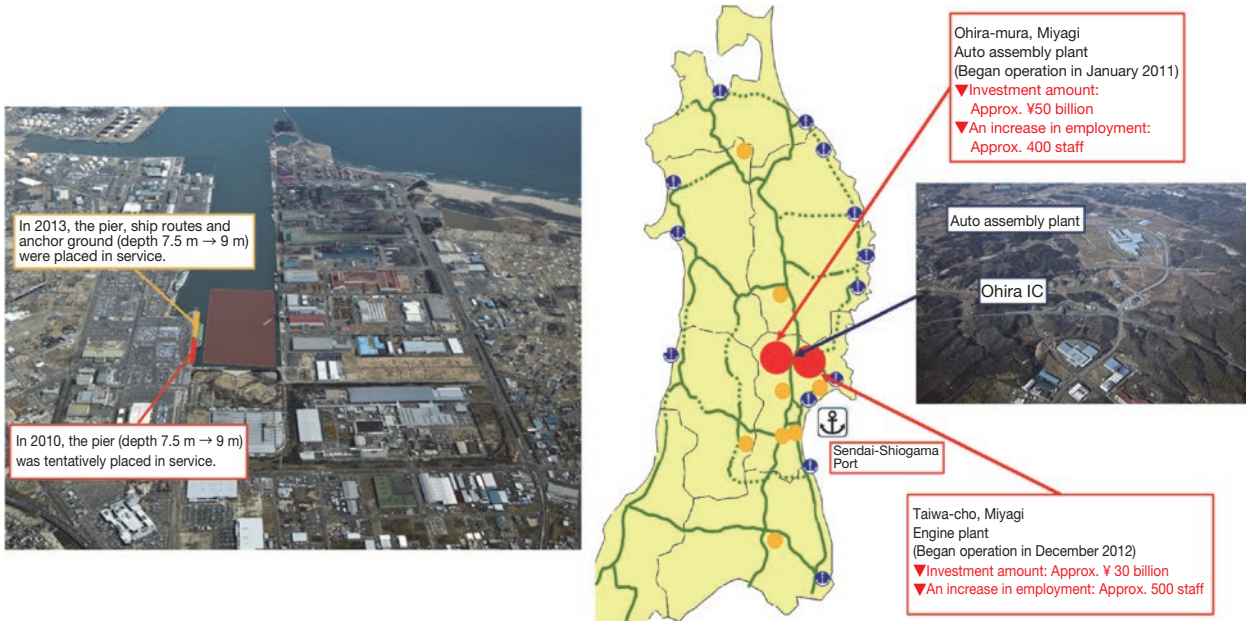
(Note) The survey period was for eight days from April 29 to May 6 in 2014 and 2015.
Source) The interview survey results of each sea route operator by MLIT

As described above, the development of Higashi-kyushu Expressway increased the location superiority of Kyushu, which is close to countries in Asia, and contributes to the economic vitalization in the Kyushu region and the enhancement of international competitiveness for domestic corporations. What is more, the development of traffic network across the country from Kyushu to Shikoku and Kansai to Kanto is expected to facilitate the exchange of tourism and logistics in broad areas.

■ Sendai-Shiogama Port and Ohira IC

The Tohoku Expressway runs through the vicinity of Ohira-mura in Miyagi to provide a home-court advantage of 30 km to the Sendai-Shiogama Port, which is the largest in the Tohoku region. Also, the placement of Ohira IC by Miyagi increased traffic convenience and attracted the investment of corporations in the area mainly by automobile manufacturers. Central Motor Co., Ltd., (current Toyota Motor East Japan, Inc.) decided to build a domestic production base of small vehicles in the area [Note 37]. With that, the piers that can correspond to larger transport vessels were developed at the Sendai-Shiogama Port (water depth from 7.5 m to 9 m) to strengthen the handling capacity of vehicles and give a boost to efficient logistics (Figure 2-1-17).

Figure 2-1-17 Sendai-Shiogama Port and the vicinity of Ohira IC

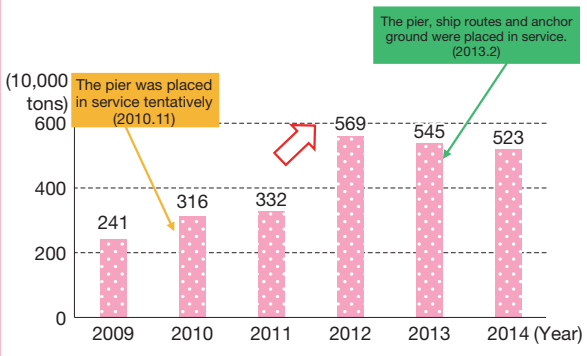


Source) MLIT

Through the impact of such infrastructure development, the production volume of vehicles in the area is on the rise. During the time of Great East Japan Earthquake occurred in March 2011, the early resumption of Sendai-Shiogama Port helped the recovery of production activities of corporations at an early date. In 2012, the handling volume of complete vehicles transport at the Sendai-Shiogama Port increased dramatically (Figure 2-1-18).

At present, the headquarters functions of Toyota Motor East Japan, Inc., moved to Ohira-mura and attracted related corporations. This brought a rise in employment and internal training facilities were built to serve as a major driving force of regional revitalization.

Figure 2-1-18 The handling volume of complete vehicles at Sendai-Shiogama Port.



Source) MLIT

Note 37 The IC is located in the center of plant that will be newly constructed in east and west of the Tohoku Expressway. Also, to adjust installation time, a waiting space for trucks was added to the adjacent of the IC.

■ Nihonkai Engan Tohoku Expressway and Keihin Port

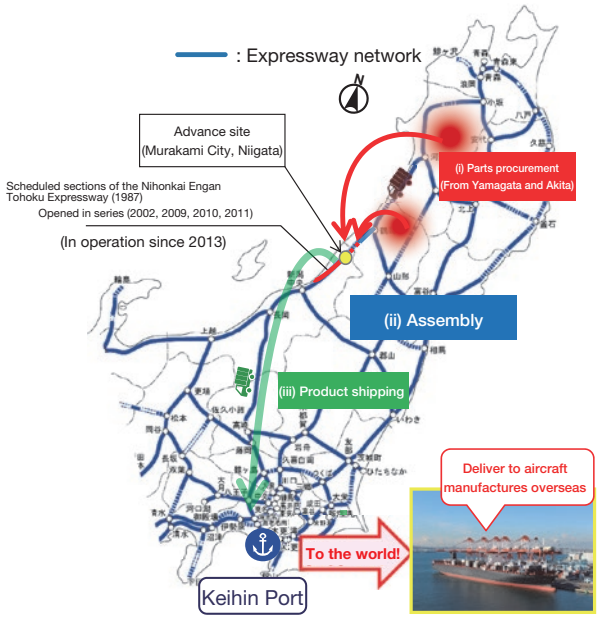
Nihonkai Engan Tohoku Expressway is a 322 km-long National High-Grade Trunk Highway that connects Niigata, Yamagata, Akita, and Aomori. The contemplated route was announced in 1987 and the roads are opening in Niigata sequentially after 2002. In prospect of the advancement in road development, in 1990, a world leading manufacture of aircraft interior, JAMCO Corporation, began the operation of a new plant in Murakami, Niigata (Niigata JAMCO Corporation). Niigata JAMCO Corporation procures parts from Yamagata and Akita for assembly and transports to the Keihin Port to ship to aircraft manufactures overseas (Figure 2-1-19). The sequentially opening Nihonkai Engan Tohoku Expressway was utilized to expand the business. The JAMCO Group's galleries (kitchen equipment) account for 30% of the share in the world and 70% of it are handled by Niigata JAMCO. Also, Niigata JAMCO handles the entire world share for the lavatories (bathroom equipment), which is 50%.

In keeping with the strong sales and anticipated demands, the company hired 250 new employees locally in 2013 and 2014, bringing the total of locally hired employees to 550 employees. In Murakami, the valid job opening-to-application ratio reached the level of about two-fold of the average in Niigata, indicating the company's contribution in creating regional employment (Figure 2-1-20). In addition, in February 2016, the company began the operation of the second plant in Murakami.

At present, the development of the missing link from Asahi Mahoroba IC (Niigata) to Atsumi Onsen IC (Yamagata) (Asahi Atsumi Road) is in progress. The traffic convenience is expected to increase with the completion of these routes, which leads to the vitalization of the local districts (Figure 2-1-21).

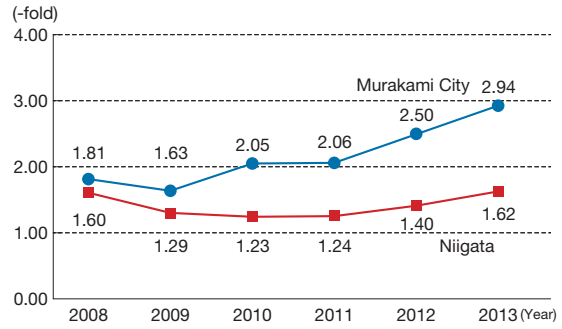
What is more, the opening of Nihonkai Engan Tohoku Expressway is expected to improve the aspect of disaster preparedness. The national route 7, which is the major trunk road in Niigata and Yamagata, has been faced with the occurrence of mudslides due to heavy rainfalls, overtopping waves and motor accidents. The mudslide occurred in July 2006 caused a complete closure for 42 hours. The improvement of Nihonkai Engan Tohoku Expressway secures a substitute road network to avoid severed road networks (the securement of redundancy), bringing in safe and secured logistic transport and residents' life.

Figure 2-1-19 Niigata JAMCO Corporation's production bases and transport routes



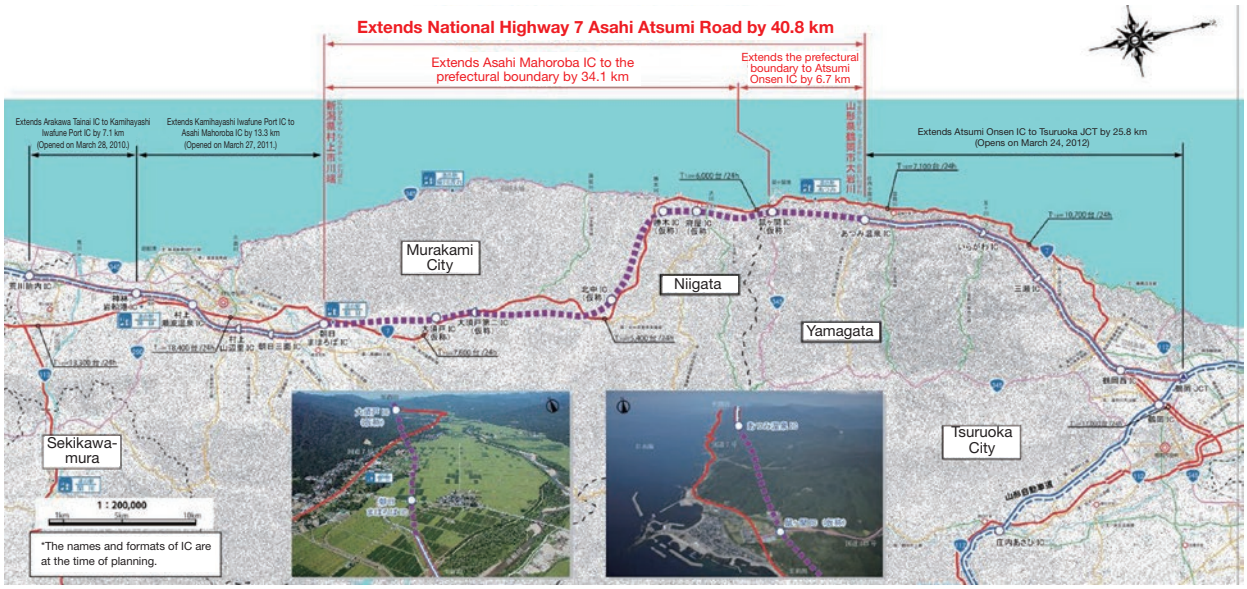
Source) MLIT

Figure 2-1-20 Changes in valid job opening-to-application ratio in Murakami-shi and Niigata



Source) Developed by MLIT based on the employment statistics information by Hello Work Murakami.

Figure 2-1-21 Asahi Atsumi Road that the development is in progress

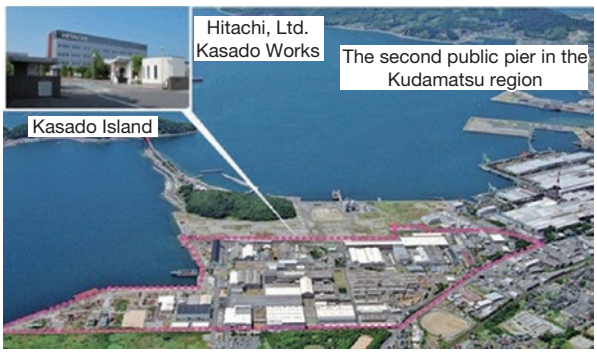


Source) MLIT

■ Tokuyamakudamatsu Port

Tokuyamakudamatsu Port (Kudamatsu Second Public Pier) is located in the vicinity of Kasado Works, Hitachi, Ltd. (Figure 2-1-22). Prior to the development of Tokuyamakudamatsu Port, due to the restrictions of port and harbor facilities, large vessels were not able to come alongside the pier. Because of this, the port was not used for marine transportation of railway vehicles for the United Kingdom manufactured at the plant. The transport form at that time was to barge from the pier alongside the plant to Kobe Port and then transship to a large vessel to transport to the U.K.

Figure 2-1-22 Tokuyamakudamatsu Port and Kasado Works



Source) MLIT

For this, in order to allow berthing of large vessels in Tokuyamakudamatsu Port, the mooring posts and fenders were added to the port (Completed in July 2015) (Figure 2-1-23). This allowed the railway vehicles manufactured at the plant to transport to the Tokuyamakudamatsu Port (Kudamatsu Second Public Pier), which is about 4 km away, to load them to a large vessel (to load with other export articles) and travel through Nagoya and Yokohama Port to ship to the U.K. In addition, the asphaltic pavements were constructed at the pier to allow temporary storage of railway vehicles before shipment to improve convenience (Figure 2-1-24).

These improvements shortened the transport days to England by eight days from 53 days to 45 days. The transport costs are also expected to reduce by nearly 20%.

We can say that this is a great case that realizes stock effects with relatively small improvement costs by reflecting opinions from private businesses.

Figure 2-1-23 Improved mooring post (right)
(The left is the existing mooring post)

Source) MLIT

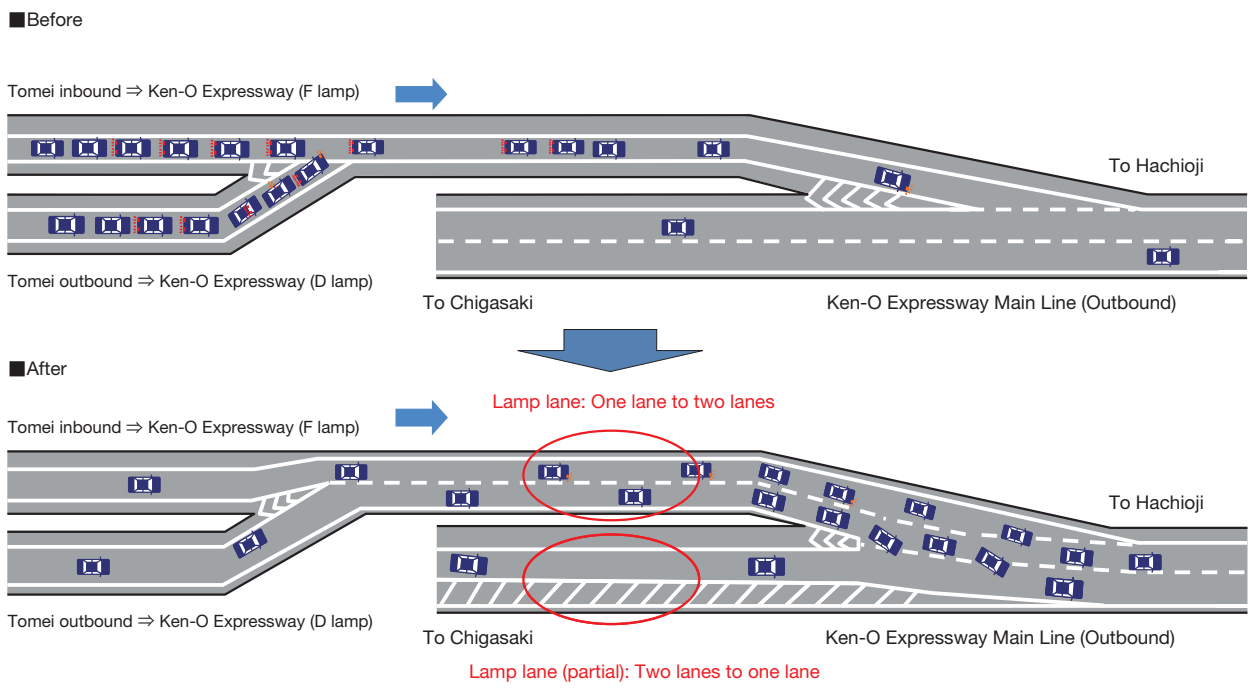
Figure 2-1-24 Paved pier sites

Source) MLIT

■ Ebina Junction of the Tomei Expressway

The lamps (external lamp) toward Tomei Expressway to the north of Ken-O Expressway often had backups at the merge points during rush hours in the morning and evening on weekdays, as well as early evenings on holidays. Central Nippon Expressway Company Limited aims to relieve backups to operate two-lane roads by tentatively narrowing down the existing lane width and shoulder width on roadway from October 30, 2015 (Figure 2-1-25).

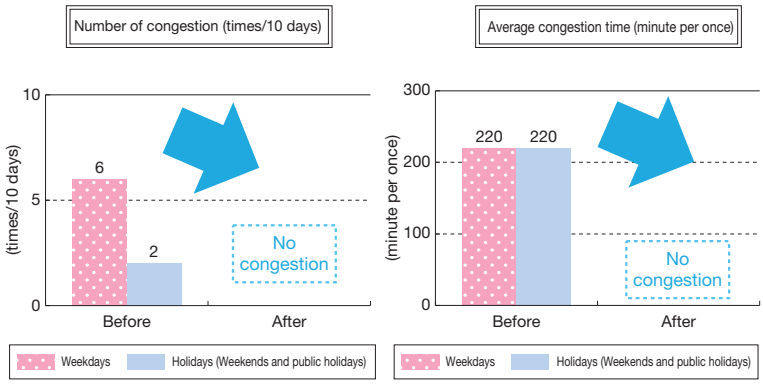
Figure 2-1-25 The improvement outline of Ebina Junction, Tomei Expressway



Source) Central Nippon Expressway Company Limited

The external lamps with such measures started seeing fewer backups (Figure 2-1-26) and with maintenance and improvement work by reducing costs, the effect of constructing traffic networks is maximized to lead to the definite tense of users and the securement of safety.

Figure 2-1-26 Changes in congestion before and after improvement



(Notes) 1 Before operation: From Friday, October 16 to Sunday, October 25, 2015. After operation: Saturday, October 31 to Monday, November 9, 2015.
2 The traffic volume on outbound lamp was about 23,000 vehicles per day before operation and about 26,000 vehicles per day after operation.
3 Congestion: The condition that cars that drive slow below 40 km per hour or repeat stop and go for more than one km or for more than 15 minutes.
Source) Central Nippon Expressway Company Limited

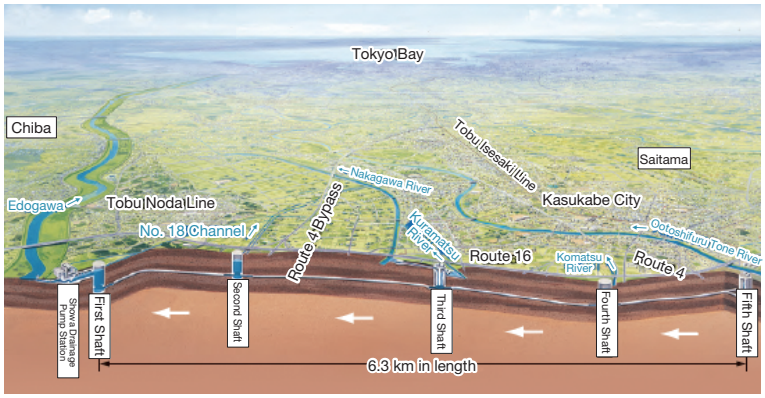
(2) Safe and secured infrastructure

■ Metropolitan Area Outer Underground Discharge Channel

Kasukabe City located in eastern Saitama has numerous rivers as the area is surrounded by Nakagawa River, Tone River, Edogawa River, and Arakawa River. The altitude is low and water tends to back up, creating an environment that easily causes floods after typhoon and heavy rainfalls in broad areas.

In order to resolve these issues, the Metropolitan Area Outer Underground Discharge Channel was built under the national route 16 crossing Kasukabe City from east to west. It was completed in 2006 (Figure 2-1-27).

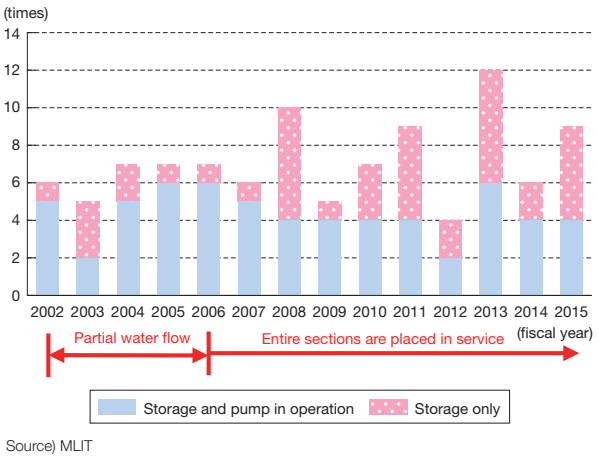
Figure 2-1-27 Illustration of the Metropolitan Area Outer Underground Discharge Channel



Source) MLIT

This discharge channel takes water from swollen rivers and discharges into Edogawa River through the underground discharge channels. After partial water flow in 2002, the number of channels in operation reached an accumulated total of hundred times by FY 2014 and more than seven times in annual average (Figure 2-1-28). By placing in service, the occurrence of floods in the Nakagawa River and Ayase River basin including Kasukabe declined dramatically. While the number of units experienced flood damage in 1990 was approximately 35,000 houses for ten years, the number dropped to 5,745 houses in ten years from 2000.

Figure 2-1-28 Operation status of the Metropolitan Area Outer Underground Discharge Channel

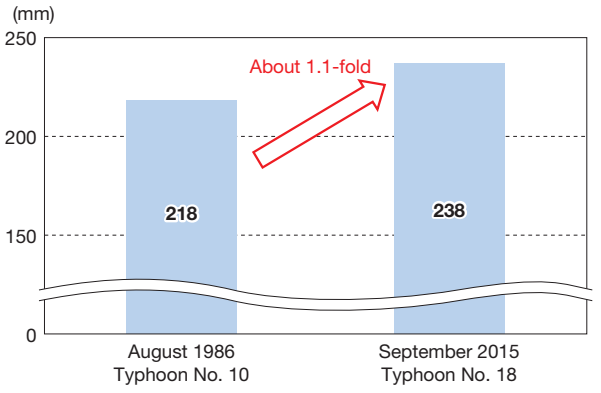


Source) MLIT

In addition, at the time of the Kanto and Tohoku Heavy Rainfall in September 2015, the water flow of discharge channels recorded the largest flow volume since the start of water flow. With this, compared to the flood in August 1986, while the rainfall was about 1.1-fold, the number of units experienced flood damage in the Nakagawa River and Ayase River basin declined from 16,874 houses to 1,849

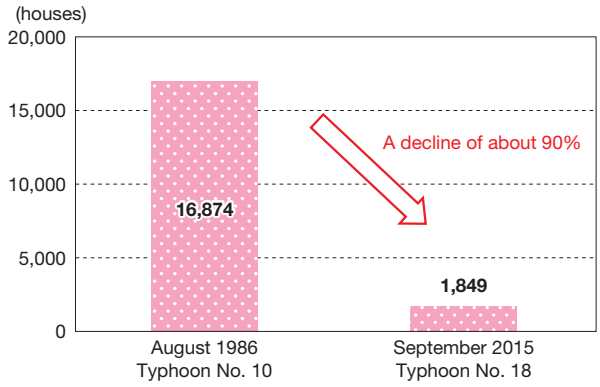
houses, which is a decline of nearly 90% (Figure 2-1-29and 2-1-30).

Figure 2-1-29 Comparison of precipitation for up to 24 hours (Koshigaya Observatory)



Source) MLIT

Figure 2-1-30 Comparison of the number of units experienced flood damage in Nakagawa River and Ayase River basin



Source) Developed by MLIT from the flood statistics and materials published by Saitama.

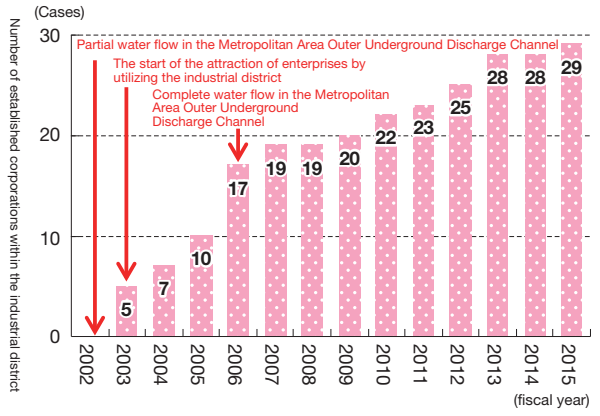
With the decline of flood risks, in 2003, Kasukabe City specified the vicinity of Showa IC as the industrial designated region in which the route 16 and the route 4 cross to promote the attraction of enterprises. Since Kasukabe is basically an area with great traffic convenience, twenty-nine corporations operating distribution warehouses and shopping centers made a foray to create the employment of over 3,000 people (Figure 2-1-31).

In addition, the appearance of surge tank received the name of underground Parthenon and attracts a host of visitors. It also gains popularity as a tourist destination and a location for shooting movies and TV shows. There are events that lead to regional promotion by the government, municipality, and citizen organizations (Figure 2-1-32).

With the development of structural aspects, Kasukabe is also putting efforts on the measures on non-structural aspects. Each year, for the preparation of floods and other disasters in the surrounding areas located on the right bank of Edogawa River and Edogawa River, the flood prevention frameworks and flood prevention constructions have been in place. Also, in December 2015, a disaster hazard map was created to include preparedness for earthquakes, floods and other disasters to raise the awareness of disaster prevention in the area.

As just described, the Metropolitan Area Outer Underground Discharge Channel are beneficial in displaying major effects on the reduction of water floods risk to make a contribution on the development of regional economy.

Figure 2-1-31 The situation of established corporations inside the Kasukabe City Industrial District



Source) MLIT

Figure 2-1-32 Surge tank of the Metropolitan Area Outer Underground Discharge Channel

Source) MLIT

■ Mount Fuji sediment control facilities project

In Fujinomiya City and Fuji City situated at the southwest base of Mount Fuji, there are frequent sediment-related disasters due to sediment discharge from the collapse of Osawa [Note 38], which makes it difficult for land use.

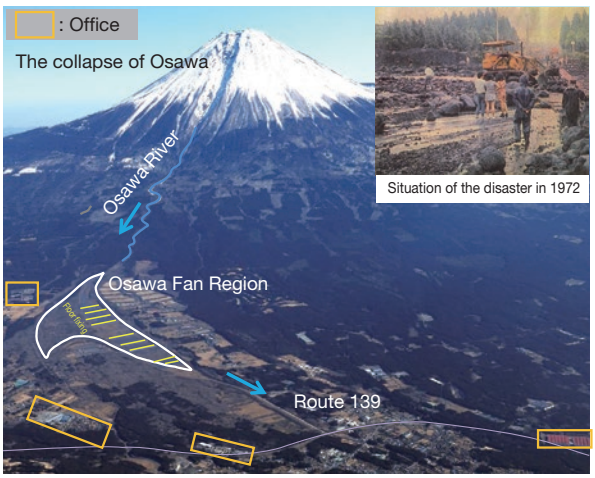
Starting in 1969, the direct sediment control facility project began and set up 77 facilities including the Osawa River sediment-retarding basins (Figure 2-1-33). With this, the sediment-related disasters caused by heavy rainfalls are prevented beforehand. When the debris flows of about 280,000 sq. meters, which is the largest one in recorded history, traveled down in 2000, the sediment control facilities trapped the sediments. The facilities also banked up the debris flows occurred in April 2015 and prevented any damages to surrounding areas.

With the decline of sediment-related disasters, the industrial parks were reclaimed to promote establishment of corporations. The number of corporations made a foray in the western base of Fujinomiya City and Mount Fuji is reaching 40 corporations at present since two corporations were established in 1986.

In addition, for tourism, the number of tourists, which was about 500,000 in 1989, has been growing continuously and reached over 2 million tourists in 2013, which is an increase of more than four-fold (Figure 2-1-34). Since the area originally has great views of Mount Fuji and surrounded with abundant nature, the progress of development leads to regional revitalization that utilizes tourist resources.

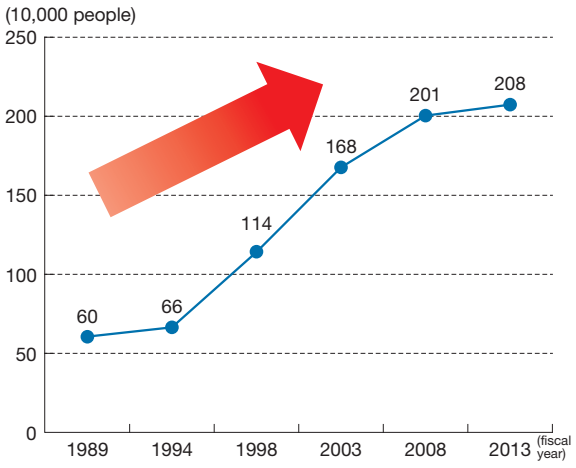
In addition, the Chubu Regional Development Bureau Fuji Sediment Control Facility Office teams up with local governments in Shizuoka to hold an observation meeting for the collapse of Osawa and participate in civil events to raise the awareness of disaster prevention among local residents and deepen the understanding of sediment-related disasters.

Figure 2-1-33 The peripheral map of Osawa Fan region



Source) MLIT

Figure 2-1-34 Changes in the tourists in the western base of Mount Fuji, Fujinomiya City



Source) MLIT

(3) Life infrastructure

■ Shinagawa Season Terrace

Shinagawa Season Terrace is a commercial building that mainly has offices and shops and opened in the Shinagawa area in May 2015. There are many facilities in the Shinagawa area, including Tokaido Shinkansen Shinagawa Station, an original station for Chuo Shinkansen for Linear Motor Cars, and the JR line new stations to be built in between Shinagawa and Tamachi, making it an area of major development in the future.

Shinagawa Season Terrace is a large eco-friendly complex building with enhanced disaster prevention functions (quake-resistant mechanism, emergency power generation, acceptance of people who are unable to return home after disasters, etc.) and numerous characteristics worthy of special mention. What it should be pointed out is the integrated development of upper space along with the update of sewerage facilities.

Note 38 It is a large erosion valley situated in the due west of Osawa River along Mount Fuji. The maximum width is 500 m and 150 m in depth. It reaches near a height of 2,200 m above sea level from the bottom of crater on the mountaintop.

In general, within the premises of the city facilities such as roads, rivers, parks, and sewerage facilities under the City Planning Act, the construction of facilities is limited one cannot develop buildings with shops and restaurants. Although the original plan was to construct a reservoir for rain that collects soiled sewage especially in the beginning of rain, the application of the vertical city planning system under the City Planning Act allowed the construction of office and commercial building (Shinagawa Season Terrace) above the sewerage facilities for effective utilization of land space (Figure 2-1-35).

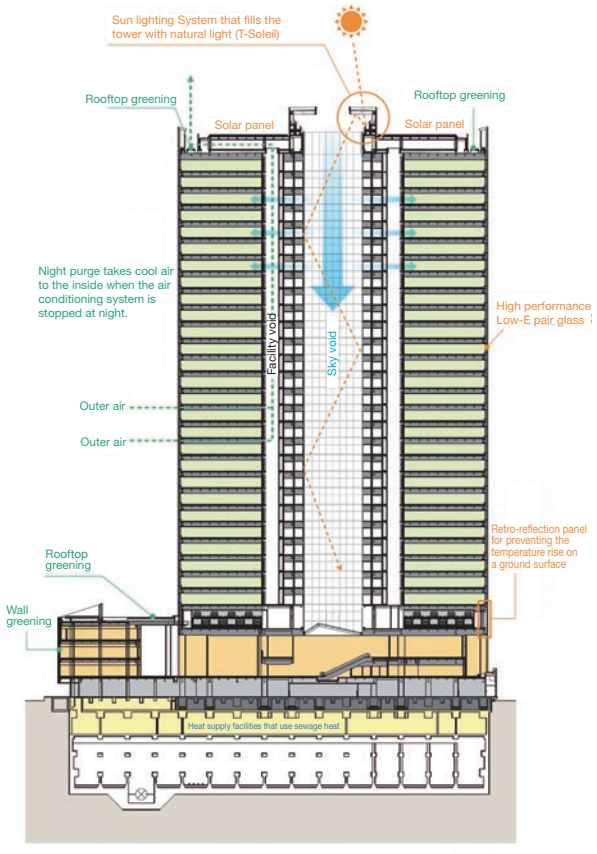
Figure 2-1-35 Before and after the development of Shinagawa Season Terrace

Source) NTT Urban Development Corporation

As for the development costs, the entire construction cost of the above-ground part of Shinagawa Season Terrace is covered by private businesses and the Tokyo Metropolitan Government that operates sewerage facilities does not bear any cost. In addition, the land lease cost paid to the Tokyo Metropolitan Government by private businesses is expected to contribute to the stable management of sewage works.

Also, as for the ingenuity of energy utilization, by making the most of being sewerage facilities, the facilities collect heat from the treated water of wastewater treatment facilities and use as recycled wastewater for toilet water (Figure 2-1-36).

Figure 2-1-36 The relation of the upper building and reservoir during rain



The conceptual diagram of utilizing natural energy

Source) MLIT

■ Kyoto Tango Railway

Kyoto Tango Railway is a railway that runs Tamba in northern Kyoto, Tango area, and Tajima in northeastern Hyogo. For many years, it was affectionately called Kitakinki Tango Railway Corporation and played a central part as a public transportation connecting regions (Figure 2-1-37).

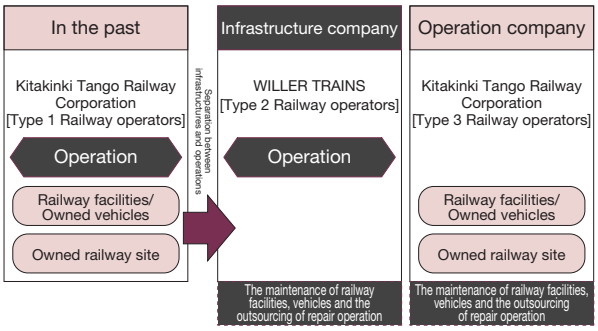
However, due to dwindling birth rate and an aging population, advanced motorization, leisure diversification and the hollowing of industries, the number of users and transport revenue declined. The number of users in 2013 dropped by about two thirds of the peak in 1993 and the management environment greatly deteriorated. With this, the local governments along the railway, which are two prefectures, five cities and two towns [Note 39], play a central part in aiming for the integration of surrounding areas and the railway for regional revitalization to determine the reconstruction of railway business.

Figure 2-1-37 Railway map of Kyoto Tango

Source) WILLER TRAINS, Inc.

In April 2015, the name was changed to Kyoto Tango Railway. Under the ownership of Kitakinki Tango Railway Corporation (third sector), the railway facilities were introduced with the system of separation between up and down lines by Willer Trains Inc (Figure 2-1-38). Willer Trains Inc. is a subsidiary of Willer Alliance Inc. which runs highway bus business and travel agency. It is expected that they will utilize management knowhow of the same group for operation.

Figure 2-1-38 The two-tiered system of Kyoto Tango Railway



Source) WILLER TRAINS, INC.

The management philosophy of Willer Trains Inc. aims to achieve the cooperation of traffic network development and town development. For the development of highly convenient traffic network, they work together with bus and tour vessel operators to set up schedule with due considerations to transit and create common free pass, as well as to work with local governments to distribute timetables for residents to promote the use by combining area maps with coupons for local restaurants.

In order to activate the interdistrict exchange, the inauguration event, Daitantetsu Festival was held in one of the three most scenic spots in Japan, Amanohashidate, in May 2015. A number of visitors used the railway to visit the event venue. While the number of passengers was 7,128 people, which is about 200% compared to the same day in previous year. Even surrounding shopping areas saw an increase in visitors to display ripple economic effects.

Note 39 Hyogo; Kyoto; Toyooka City, Hyogo; Fukuchiyama City, Kyoto; Maizuru City; Miyazu City; Kyotango City; Ine-cho; and Yosano-cho.

In recent years, a number of tourists from abroad arrive at Maizuru Port, which is the entrance on the Sea of Japan side. The areas along the port also lay stress on the promotion of inbound tourism as the sightseeing zone as part of Kyoto by the Sea. The Kyoto Tango Railway also aims to enlarge the inbound tourism and released one-day railway tickets, as well as the multilingual station symbols on station signs and in-train announcement for international travelers. For the future, they will review the railway schedule with regard to tourist traffic lines and promote exchanges inside the district by adding new train plans and information dispatch.

This is a case that private businesses enter into the management to work on restoring the existing railway business. It is expected that regions get together to realize stable operation of local public transportation and the vitalization of local district as the communities get together as one.

Figure 2-1-39 Sightseeing train Tango Kuromatsu

Source) WILLER TRAINS, INC.

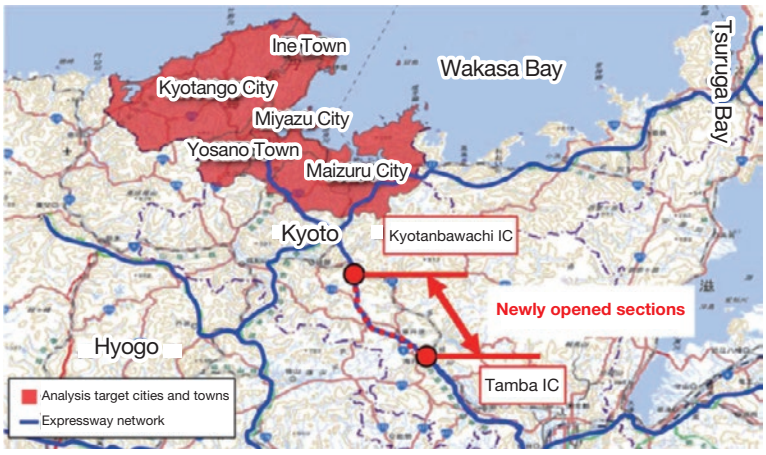
2 “Visualizing” the stock effect

While, in Section 1, we looked at the examples where the stock effect contributed to the firm production activities and regional economics, it is important for the private sector to recognize the effect and take full advantage of the effect. In this section, to clearly show various types of the stock effect brought by infrastructures to the users such as private businesses and people, we introduce examples in which big data and results of user surveys are used to detect the effect objectively.

■ The example of Kyoto Jukan Expressway –Use of big data–

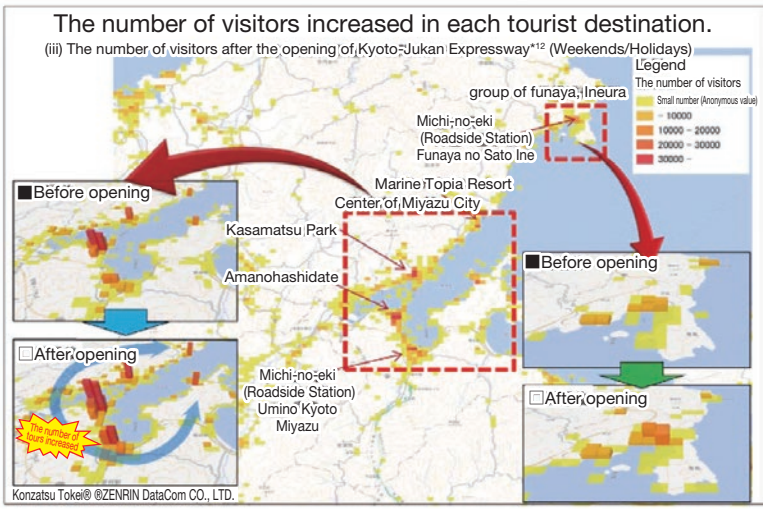
The Kinki Regional Development Bureau uses the big data of location information obtained from mobile phones to analyze the number of visitors in each tourist destination in the northern Kyoto region after Kyoto Jukan Expressway opened in July 2015. This made it possible to analyze in detail the location and the number of visitors, which revealed that the number of visitors increased in each tourist destination (Figure 2-1-40and 2-1-41).

Figure 2-1-40 Analysis target areas



Source) MLIT

Figure 2-1-41 The number of visitors and hotel guests after the opening of Kyoto-Jukan Expressway (Weekends/Holidays)



(Notes) 1 The number of users is an estimate from the data of Konzatsu Tokei® and does not match other published values.
2 Date analysis, based on the calculation of location information, estimates the situation of road use and the situation of visiting five cities and towns in northern Kyoto.
3 The locations visited are counted by the number of locations that they stay for more than 15 minutes within the 250 m mesh.
4 The period of analysis is from July 18 to September 30, 2014, before opening and July 18 to September 30, 2015, after opening.
5 The number of visitors is counted targeting those who visited for sightseeing mainly on weekends/holidays.
Source) Developed by MLIT based on the Konzatsu Tokei ® Note 40 ZENRIN-DataCom CO., LTD.

■ The example of Chugoku Odan Expressway (Onomichi-Matsue Line) –Use of survey–

The Chugoku Regional Development Bureau studied the impact of the opening of Onomichi-Matsue Line, Chugoku Odan Expressway, by conducting a survey on local establishments Note 41, a survey on road users Note 42 and other surveys. Although the surveys were implemented before the entire line opened Note 43, the survey results showed that the opening of Onomichi-Matsue Line has already helped the business activities in the region, increased the frequency of traveling and other benefits of reviving tourism. They concluded the surveys found various impacts of the infrastructure investment (Figure 2-1-42).

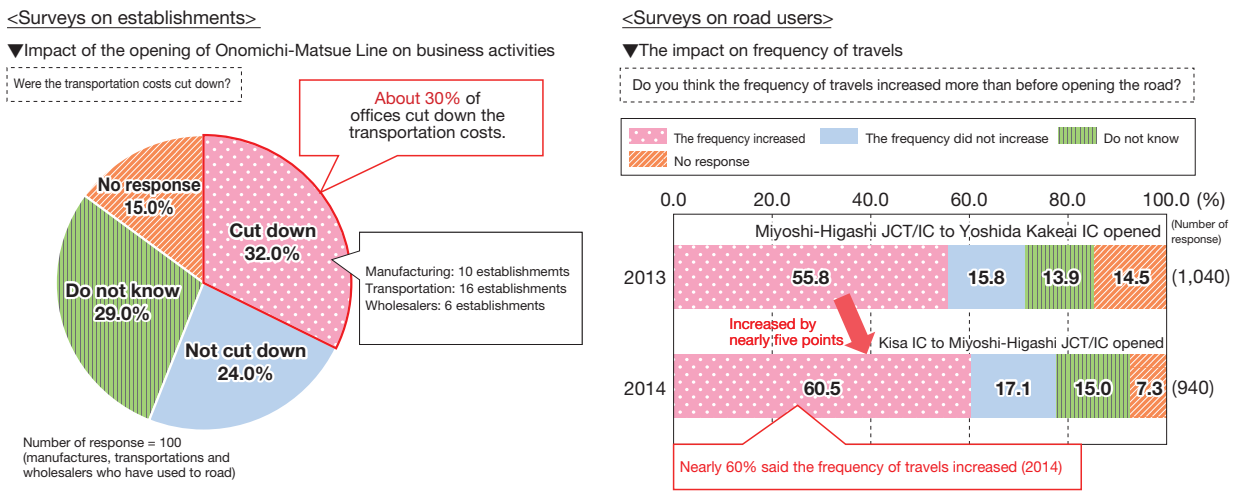
Note 40 The Konzatsu Tokei ® data is the data that holistically and statistically processed the location information of mobile phones transmitted after obtaining permission of auto GPS function users of the Docomo Map Navi service provided by NTT Docomo. The location information is GPS data (lat/long information) measured every five minutes at the earliest and does not include information that identifies an individual such as gender and age.

Note 41 The survey was conducted targeting 1,118 establishments of Shimane and Hiroshima from November 21, 2014 to December 15, 2014. The survey was mail and collected by mail. The numbers of response were 228 (response rate of 20.4%).

Note 42 The survey was conducted targeting visitors of 21 tourist facilities in Shimane and Hiroshima from October 12, 2014 to October 26, 2014. The survey was distributed by hand and collected by mail. The numbers of responses were 7,261.

Note 43 The entire routes opened on March 22, 2015.

Figure 2-1-42 The survey on the impact of the opening of Chugoku Odan Expressway (Onomichi-Matsue Line)



Source) MLIT

Column

Ripple effects of improvement in the infrastructure, and understanding of wider impacts overseas.

So far, it has been explained that various stock effects are caused by improving the infrastructure. Among these stock effects, for example, an improvement of the transportation infrastructure brings about ripple effects to the outside of traffic markets, such as production expansion and more plant sites, as well as direct effects (effects within traffic markets), such as shorter required time.

In the cost-benefit analysis underway in Japan, only the direct effects are measured on the premise that such ripple effects are all offset if the market is perfectly competitive, so the traffic market can be measured with direct effects.

In the meantime, it is known that there is actually an agglomeration effect referring to that it is more efficient to gather economic activities in a certain area than to scatter them geographically. It can be said that the improvement of the transportation infrastructure connects geographically separated sites, so it facilitates communication and exchanges among enterprises, and brings about agglomeration economies [Note].

We can also say that the markets in the actual economies are geographically separated by a certain distance, so perfect competition is not always working. For example, it is sometimes found that, while gas stations in the neighborhood in competitive cities try to lower prices, gas stations in uncompetitive depopulated areas offer high prices.

These external agglomeration economies and geographical imperfect competition attracted attention. Thus, in the past 10 years, when conducting the economic analysis of the impact of streamlining the infrastructure, initiatives to analyze effects called the *wider economic impacts*, in addition to the conventional cost-benefit analysis, have spread among governments of the United Kingdom, New Zealand, Sweden, and other countries.

Specifically, in the United Kingdom, analyses of (i) agglomeration effect, (ii) changes in production activities

Note For example, Bernard, Moxnes, and Saito (2014) states, after analyzing changes in production network of Kyushu and other areas after construction of the Kyushu Shinkansen, that even the preparation of a network that transports only passengers, not cargoes, has important effects on the sales of enterprises.

in the imperfectly competitive markets, and (iii) benefits to which tax revenue effects caused by the influence on the labor market were added. (Figure 2-1-43).

Even this measurement of *wider impacts* cannot cover all the stock effects of the infrastructure, such as the improvement in safety and security and the expansion of the diversity of consumers. However, looking to these initiatives overseas, we can say that a stance to capture effects following changes in traffic beforehand or afterward is necessary instead of always relying on figures based on a conventional cost-benefit analysis alone.

Figure 2-1-43 Benefits and costs of British Crossrail (100 million pounds)

Net cost for the government	89.6
Total cost	139.02
- Net revenue from railway	- 61.49
+ Indirect tax revenue decline	12.07
Conventional user benefits	160.93
Leisure/Commuting traffic	112.29
Business traffic	48.64
Wider impacts	71.61
Accumulated benefits (the accumulation knowledge and technology associated with increased benefits, etc.)	30.94
Incomplete competition (In the incomplete competition market, the impact of decreased travel cost is caused greatly)	4.86
Travel of workers (Tax revenue increase associated with the decline of travel costs)	32.32
An increase of labor force participation rate (Impact of increased labor force)	3.49

Source) Developed by MLIT from Economic Appraisal of Crossrail 2005, Crossrail Ltd., (2005).

3 MLIT's approaches toward maximizing the stock effect

The fourth Priority Plan for Infrastructure Development was decided by the cabinet on September 18, 2015, which aimed at maximizing the stock effect as the first principle. Based on the plan and under strict financial restrictions, the MLIT started the infrastructure management strategy of "smart investment, smart use", which means selecting and focusing thoroughly on the projects that carry a strong stock effect and talking full advantage of the existing facilities with wise and ingenious attempts. Also, as part of assessment for the plan, the Special Working Group was established under the Traffic System Subcommittee Planning Section, the Panel on Infrastructure Development and Transportation Policy Council to discuss the efforts to maximize and "visualize" the stock effect. Its reports will be compiled around fall 2016.

As part of its effort, the MLIT and the Japan Business Federation set up a panel to encourage the dialogue of public-private partnership.

Additionally, to disseminate the efforts for amplifying the stock effect in various areas, the ministry compiled a collection of case studies about the infrastructure stock effect in each prefecture (Figure 2-1-44) and a collection of advanced case studies across the country for the efforts of "smart use" and integration and reorganization of existing facilities. The ministry and the Regional Development Bureau also hold panel exhibitions for introducing these initiatives. Besides, the Kanto Regional Development Bureau archived the records of ex-post evaluations as "Kanto Infrastructure Project Archives" Note 44 (Figure 2-1-45) to share the information for the future infrastructure projects and to plainly show the general public the efforts they made over the entire infrastructure projects.

Figure 2-1-44 A collection of case studies of the stock effect

Source) MLIT

Note 44 http://www.ktr.mlit.go.jp/shihon/index00000018.html

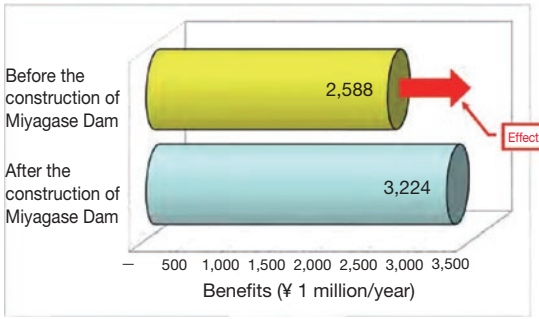
In addition, to arouse people's feeling of closeness with the infrastructure along with the local development, the ministry promotes infrastructure tourism [Note 45]. The infrastructure tourism uses bridges and dams as tourist resources to motivate users and tourists to enjoy experiencing infrastructure while offering an illustrative description of the stock effect to help them deeply understand how the effect works (Figure 2-1-46).

In sum, offering and sharing information in a comprehensive manner (namely "visualizing") allows the users to understand the stock effect easily.

Figure 2-1-45 Kanto Infrastructure Project Archives

(Article sample) Interexchange and co-exists of people with nature, urban with rural
-The outline of Miyagase Dam construction project-

○Project effect (Other effects)
- Contribution to regional promotion.
(Various events are held in cooperation with regions, and the sightseeing discharge to show the roles and functions of dam)



* The benefit is calculated based on the transportation fee from the users' residences and adjusted with economic trends, given that the number of users of Miyagase Dam in 2003 was about 1.35 million people, and the annual number of tourists in Tsukui, Aikawa and Kiyokawa before the construction of the dam was about 0.78 million people.

Figure 12: Economic effect of the development of the periphery of Miyagase Dam (counted using the Travel Cost Method (TCM))

Sightseeing discharge | Christmas tree illuminations | Lake Miyagase Exchange Cultural Festival

Figure 10: Major events around Lake Miyagase

Source) MLIT

Figure 2-1-46 Dam backstage tour (Yunishigawa Dam and Kawaji Dam)

<Inside the dam body of Yunishigawa Dam> (Tochigi)

<Kawaji Dam Cat Walk> (Tochigi)

Source) MLIT

Note 45 The MLIT opened a portal site in January 2016 for introducing infrastructure tours across the country. (http://www.mlit.go.jp/sogoseisaku/region/infratourism/index.html)

Section 2 Effective Development and Operation of Infrastructure Through Public-private Partnership

As described in Section 1, the proper development of infrastructure has an effect to promote the activation of private investment and vitalization of the local district. For the efficient and effective infrastructure development, the public-private partnership is also valid to incorporate private funds and ingenuity. With the utilization of PPP/PFI, the businesses that were previously in charge of public entities open up to the private sector to spark up new private demand. At the same time, with the utilization of the private funds, management knowhow and technical capabilities, the promotion of streamlining services and rising service levels are expected. In the latter part, we introduce the approaches of PPP/PFI.

1 Domestic PPP/PFI market

(1) The situation of PPP/PFI utilization

The PPP (Public Private Partnership) is the concept that the method of private participation is captured extensively in some way within the public service provision and there are various categories depending on the involvement of the private sector. Some of the representative examples include PFI (Private Finance Initiative) and comprehensive work consignment to private sector (Figure 2-2-1).

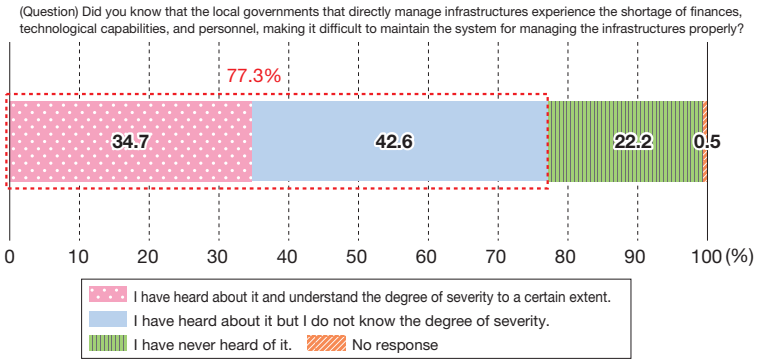
Figure 2-2-1 Major PPP methods

Methods	Summary	Basis laws	Facility ownership	Funding	Example of deployment field
PFI Method	A method to construct, maintain, manage, and operate public facilities through utilization of private finance, management abilities and technical capabilities.	PFI Act (1999)	Government/ Private	Private	Publicly owned residential and government buildings, etc.
Concession method	Concession is grant of rights to the private business to operate the public facilities that collect (usage) fees while the public entity continues to possess their ownership.	PFI Act Amendment (2011)	Government	Private	Airport, Road Sewage system, etc. (scheduled)
Designated administrator system	A system in which a designated administerator (corporations that local governments designate) acts over the management and operation of public facilities. Due to a legal reform, the management (entity) of the public facilities is opened up extensively to private businesses, NPO organization, etc.	Local Autonomy Act Amendment (2003)	Government	Government	Parks, ports and harbors, etc.
Comprehensive work consignment to private sector	Regarding management and operation duties of public facilities and the like, by refraining from determining the details of the operation of business and according to the efficiency-ordering method in which the operation is outsourced to a group of private industries, one may provide effective services that capitalize on the creativity and ingenuity of the private sector.	–	Government	Government	Sewage, etc.

Source) MLIT

In the monitor survey, when we surveyed the recognition of people about the difficulties of infrastructure management by local governments due to insufficient human resources and financial reasons, 77.3% of the respondents answered that they have heard about it (Figure 2-2-2). In addition, nearly 79.5% of the people think it is important or slightly important to user private funds for the development of infrastructure, indicating that the necessity of public-private partnership is recognized among people (Figure 2-2-3).

Figure 2-2-2 Understanding of the situation that is difficult to maintain infrastructure management system



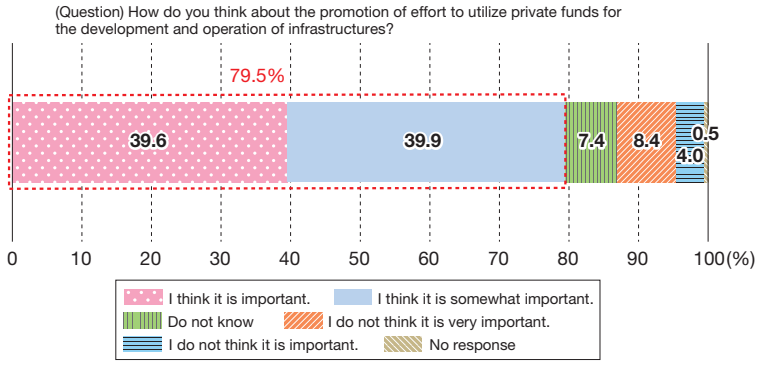
Source) Monitor survey by MLIT

The representative method of public-private partnership, PFI, is implemented by the private sector in charge of business financing. Since the formulation of the Act on Promotion of Private Finance Initiative (PFI Act) in July 1999, the number of PFI projects and project costs are on the rise year after year. In FY 2014, the number of projects was 489 and the project costs reached ¥4,501.5 billion. The results related to the Ministry of Land, Infrastructure, Transport and Tourism sum up to 151 cases as of January 1, 2016, and the number of projects implemented by local governments indicates a larger spike among business entities (Figure 2-2-4).

In the past, the related projects of the Ministry of Land, Infrastructure, Transport and Tourism using Japan's PFI are mainly government buildings and public housing, and there are a fewer cases of utilization in roads and sewage works. In addition, there are 114 cases of the service-purchase type, in which the project formats by investment recovery are that the cost of public facilities maintained by the private sector and the cost of maintenance, management and operation are paid by public entities as compensation (service purchase price), which account for 75% of all (Figure 2-2-5).

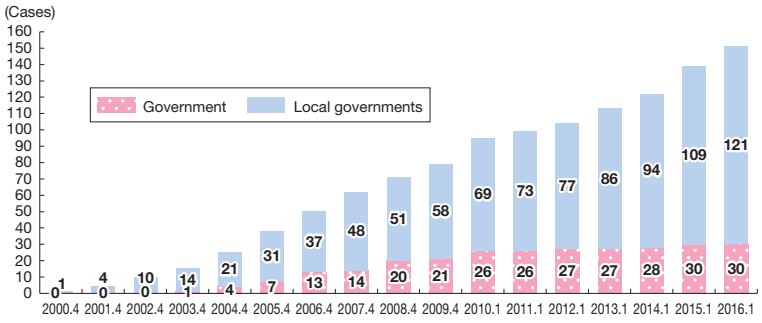
Besides the service purchase type described earlier, the business types of PFI include a financially independent type, which the funds are recovered by the revenues from the facility use and a mixed type that the funds are recovered from both service purchase cost and facility use fee. With the financially independent type, while the operation risks are borne by the private sector, they can set up use fee and service content. Compared to the service-purchase type in general, there is larger room for ingenuity.

Figure 2-2-3 The awareness of the utilization of private funds in infrastructure development



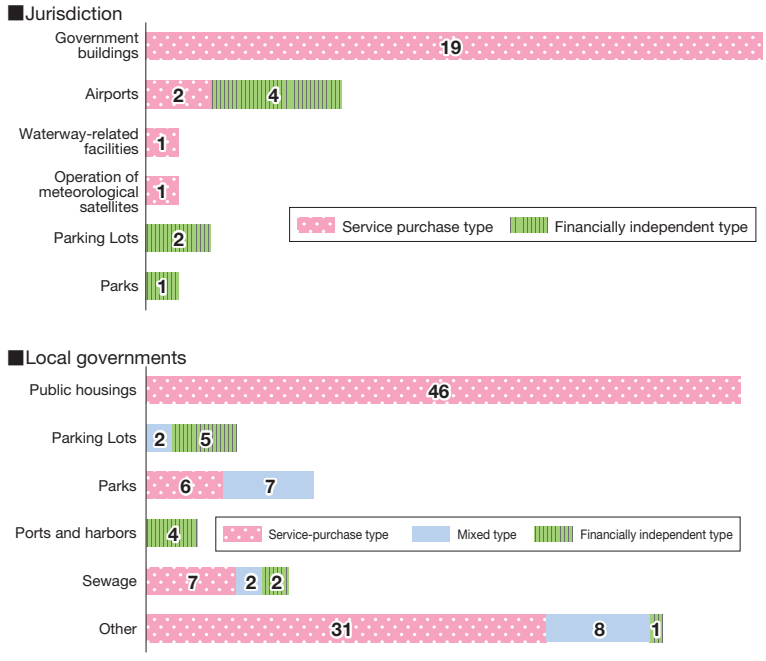
Source) Monitor survey by MLIT

Figure 2-2-4 Changes in the number of businesses (Accumulated total)



(Note) The total is counted based on fiscal year before 2009 and calendar year after 2010.
Source) MLIT

Figure 2-2-5 The number of businesses by business category (As of January 1, 2016)



Source) MLIT

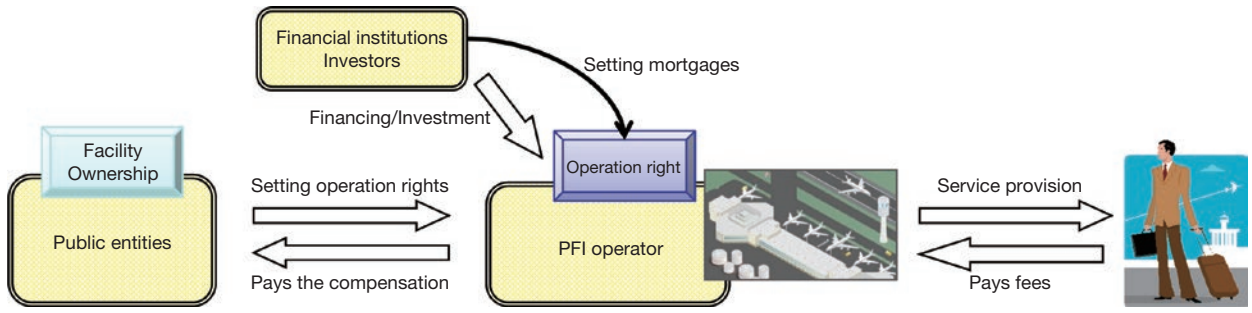
(2) Approaches of introducing PPP/PFI

With the diversification of needs for infrastructure and services, the key is to incorporate PPP method that matches with the purposes of each project and actual condition in the region. The latter part introduces a representative case of effective PFI method, called a concession method (operation right system such as public facilities) and the approaches of PPP introduction through comprehensive work consignment to private sector in rural regions.

(Concession method (the operation right system for public facilities))

The concession method is a method that was introduced by the revision of PFI Act in 2011. It is the project that the private sectors operate facilities while the public entities hold the ownership of the public facilities that collect usage fees (Figure 2-2-6). This is a financially independent type project that the funds are collected with toll revenue from facility users. Under the ownership of the public entities, while a certain level of public nature is maintained, it allows for the operation with a high degree of stability and freedom to provide high quality services that reflect the needs of users. Mainly, it is introduced in airports, sewage facilities, and toll roads.

Figure 2-2-6 The scheme of Japan's concession method

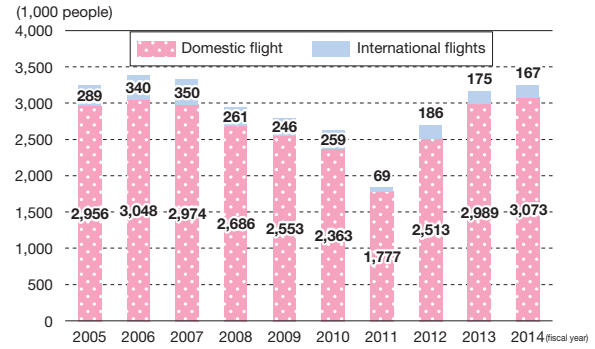


Source) Cabinet Office

■ Sendai Airport

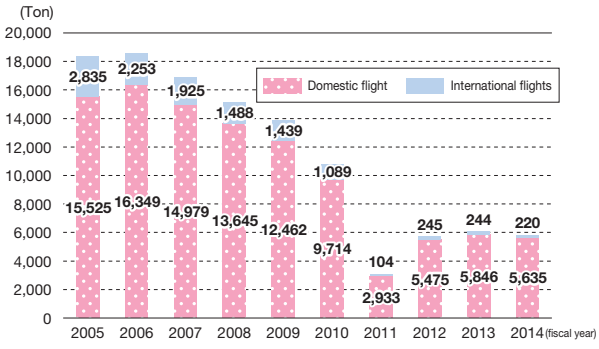
Government-managed Sendai Airport was faced with a sluggish growth of the number of passengers and the cargo handling volume after peaking in FY 2006. With the reconstruction from the Great East Japan Earthquake of March 2011 as a symbol, the expectations toward Sendai Airport were on the rise (Figure 2-2-7and 2-2-8). For that reason, while incorporating the knowhow from the private sector for airport operation, the airport, and surrounding facilities are managed comprehensively, the potentials of the Tohoku region are maximized, and by implementing the integrated operation of the region and airport, they aimed for the revitalization of the Tohoku region.

Figure 2-2-7 Changes in the number of passengers at Sendai Airport



Source) Airport Management Status Survey Report by MLIT

Figure 2-2-8 Changes in the cargo handling volume at Sendai Airport

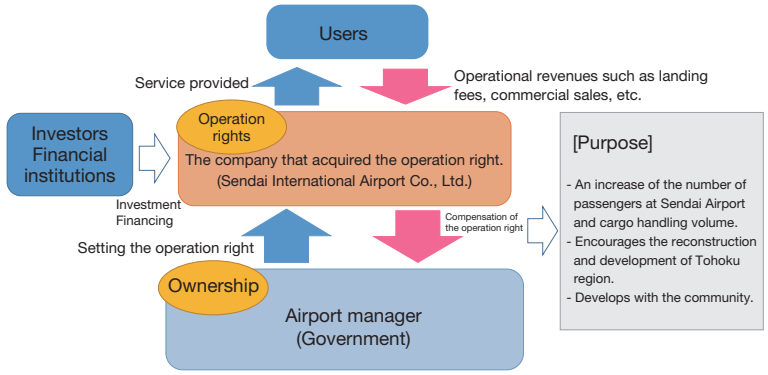


Source) Airport Management Status Survey Report by MLIT

In this project, the consideration of integration of public-private partnership began with the compellation from Miyagi around 2012. In March 2013, they formulated the future image of Sendai Airport and surround areas of the airport, which is the common principle for the public-private partnership. As the goal after 30 years from the realization of private operation entrustment of Sendai Airport, the goal was set to reach 6 million passengers annually and 50,000 tons of cargo handling volume annually. In addition, in June 2013, with the formulation of the act on the operation of national government administration airports that utilize the capabilities in the private sector, it allowed the clarification of framework for concession method in the airport, which also pushed forward discussion on a full scale. With such public-private partnership cooperation, it formulated a clear vision in operating airports and advanced the formulation of laws. In June 2014, the public invitation for the concession method began.

On December 1, 2015, up to 65 years of the operation right was given to Sendai International Airport Co., Ltd., established by the Tokyu Maeda Toyota Tsusho Group, for the first 30 years (Figure 2-2-9). The project proposal of this company was to enhance the international flights, expand the commissioned routes by the introduction of price system that motivates airlines to enter service and to enlarge the demand for air by transmitting the Tohoku brand actively. In addition, with the constructing traffic networks originated from Sendai Airport, the aim is to improve the accessibility to each part of Tohoku and the ripple economic effects (Figure 2-2-10). This case is the first project of introducing the concession method at an airport. In the future, the activation in the Tohoku region is expected by the airport operation, in which the public-private partnership and region come together.

Figure 2-2-9 The scheme of Sendai Airport's concession method



Source) MLIT

Figure 2-2-10 The business implementation policy of Sendai International Airport Co., Ltd. (Main)

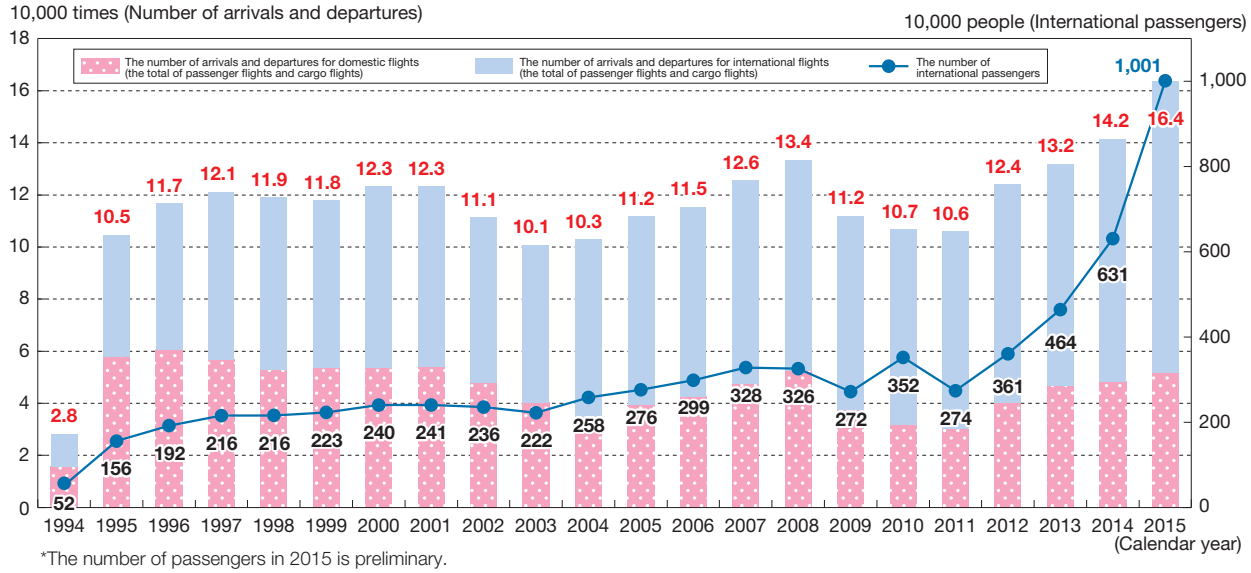
Aviation related business
- Encourages airlines to go into service by reducing the fees paid by airlines.
- Expanded aviation networks in Japan and overseas by increasing direct flights within the sphere of four hours for international flights.
- Enlarging equipment for hub airports and daily service operation to establish transport routes.
Non-aviation business
- Enhancement of commercial facilities such as goods sales and restaurants that transmit the Tohoku brands.
- Sets up an exchange plaza for local residents and arrival cafes for pickup visitors and passengers.
Other
- Congestion mitigation by increasing accessibility of railway networks and enhancing parking facilities (improved convenience of airport access)
- Cooperation of the Sendai Airport internationalization utilization promotion council and Tohoku Tourism Promotion Organization (transmission of the Tohoku brands)
- Setting up a Sendai Operation Center that specializes in comprehensive operation and safety operation of the airport and ancillary facilities. (Safety and maintenance structure)

Source) Developed by MLIT based on the outline of proposal by Tokyu Maeda Toyota Tsusho Group.

■ Kansai International Airport and Osaka International Airport

As for Kansai International Airport (KIX) and Osaka International Airport (Itami), based on the Acts on integrated and effective establishment and management of Kansai International Airport and Osaka International Airport (Act No. 54 of 2011), the aim was to utilize the concession to make the maximum use of the knowhow of private businesses to repay the debt related to the construction of KIX at an early stage and with sureness. In addition, another aim was to restore and strengthen as the international hub airport in Kansai, as well as through the proper and effective use of both airports of KIX and Itami, the entire Kansai would see an increase in demand for air transport.

Figure 2-2-11 Changes in the number of arrivals and departures at Kansai International Airport and the number of international passengers



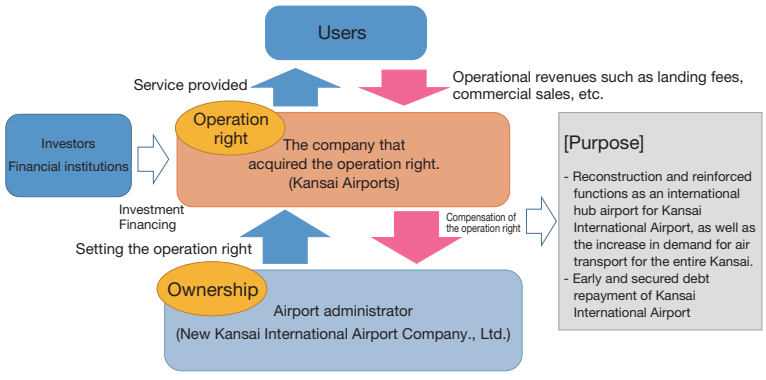
*The number of passengers in 2015 is preliminary.

Source) New Kansai International Airport Company., Ltd.

First, New Kansai International Airport Company, Ltd. was established (100% government funded) in April 2012 and in July of the same year, the management of KIX and Itami was unified. For the realization of concessions, New Kansai International Airport Company formulated the management strategy and the action plan, which is the medium-term management plan, to work on further improving the business values of both airports. In July 2014, the Implementation Policy on the Special Airport Operation of Kansai International Airport and Osaka International Airport was formulated and published to begin the procedure related to the public offering of private businesses. In November 2015, Orix Corporation and French airport operation company, VINCI Airports, were selected as the main members of the consortium with the first refusal right. In December of the same year, the operation right was set to Kansai Airports established by the consortium to conclude the implementation agreement with New Kansai International Airport Company.

The period of concession lasts for 44 years from April 2016 to March 2060. The compensations of operation right are paid each year by Kansai Airports from landing fees and airport operation revenues such as commercial sales (Figure 2-2-12). In addition, while Kansai Airports implements business in accordance with the implementation contract and the demand level indicated by New Kansai International Airport Company, without any hindrance to airport operations. On the other hand, New Kansai International Airport Company must provide monitoring to check proper airport operation is maintained.

Figure 2-2-12 The scheme of concession method of Kansai International Airport and Osaka International Airport.



Source) MLIT

According to the business implementation policy provided by Kansai Airports, by strengthening marketing function and drawing routes by setting strategic price and promoting LCC business, they aim for the rise in revenues by layout changes of commercial facilities in the non-airplane related business, to present the enlarged revenues that utilize the company's own knowhow besides strengthening the airplane related business (Figure 2-2-13).

In addition to the transport of passengers and cargo, which is the original purpose, the airport operation requires various capabilities such as the operation of commercial facilities and hotel facilities. This case is a project that overseas companies with the experience of airport operation work with Orix and other Japanese companies that are representative in the region hand in hand and allows the development of airport business with flexible ingenuity of private businesses. With this, both airports are expected to develop more than before to contribute to the increase in demand for the airport in Kansai to stimulate the enhancement of international competitiveness such as Japanese industries and tourism, as well as the activation of economy in Kansai.

Figure 2-2-13 The business implementation policy of Kansai Airports (Main)

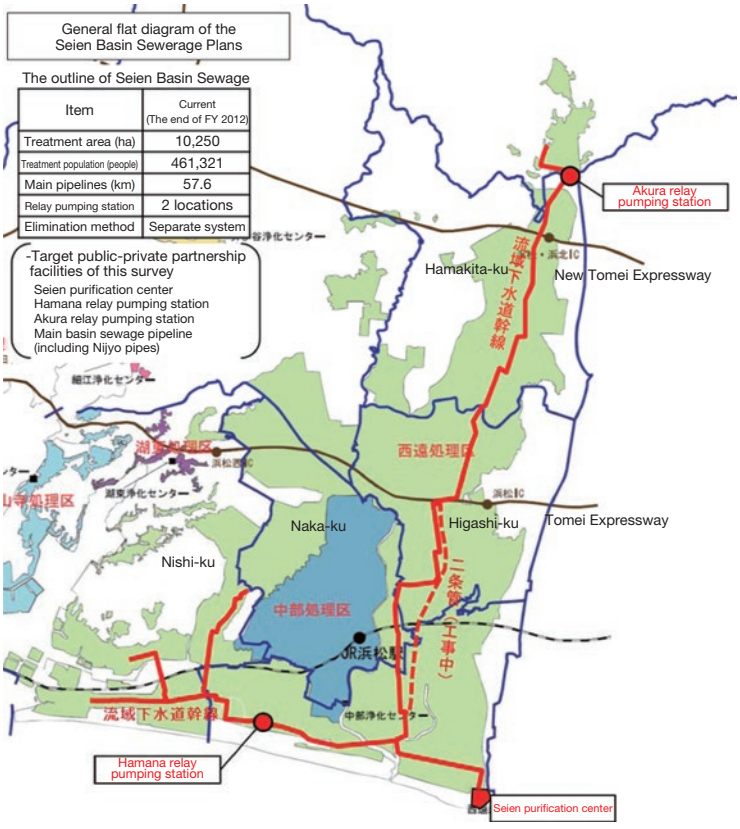
Aviation related business
- Further attraction of routes by reinforcing marketing functions
- Creating LCC centers and logistic base.
Non-aviation business
- Enlarged commercial revenues with the changes of facility layouts for customers to shop easily.
- Maintenance of aircrafts and other comprehensive and effective service provision for airlines.
Other
- Promotion of new construction of simple accommodation facilities that target passengers arriving early in the morning due to an increase in LCC flights. (increase satisfaction for passengers)
- Human resources development
- The operations previously implemented by New Kansai International Airport Company., Ltd. and the safety standard of maintenance management and secured implementation of renewed investment. (Safety Measures and capital investment)
- Promotion of activities that connect the surrounding areas and the airport (environmental measures and coexistence with the community)

Source) Developed by MLIT based on the materials provided by New Kansai International Airport Company., Ltd.

■ Hamamatsu Public Sewerage End Treatment Plants (Seien treatment district)

After the consolidation of municipalities in 2005, it was decided that the Seien basin sewage works managed by Shizuoka would move to Hamamatsu City. Although it was moved in April 2016, Hamamatsu City was faced with issues such as the transfer of maintenance and management skills due to a decline in staff. In addition, because proper maintenance update of the facilities due to aging was required, they also expected a decline in usage fee revenues due to a population decline. Because of this, they were considering the optimization of a project using public-private partnership.

Figure 2-2-14 The outline of Seien sewage in Hamamatsu City



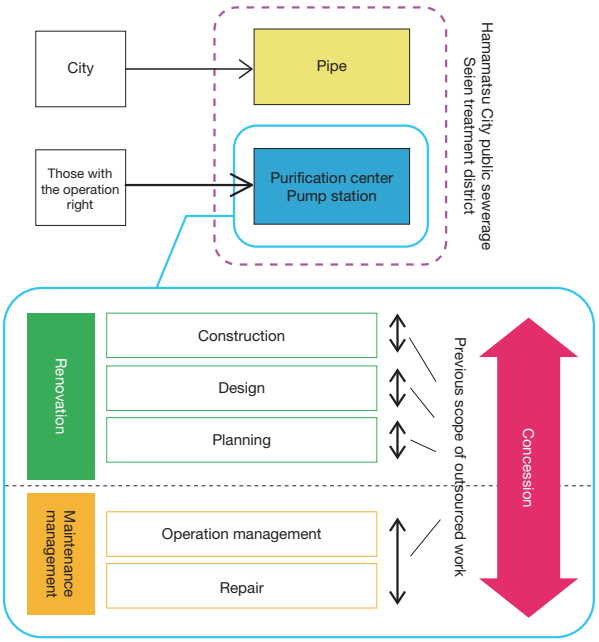
Source) Developed by MLIT based on the materials provided by Hamamatsu City

As the efficient management with a long-term contract and the operation that utilizes ingenuity of private sector were expected, they considered the introduction of concession method and in the end, they have decided to introduce partial concession that sets up operation rights for a water purification center and pump station. For the scope of work, in addition to the maintenance and management of the facilities and renovation, they recognize the financially independent project such as the introduction of new treatment process and solar power generation (Figure 2-2-15).

In addition, for renovation, based on the list up of eligible facilities set by the private sector, the city will formulate renovation plans. The renovation costs will be mainly sourced by the city from enterprise loan [Note 46] and national expenses while the private sector also bears a burden to give an incentive for suppressing project costs.

For the first two years after transfer, they subcontract and after 2018, they will begin operation under the same system.

Figure 2-2-15 The Scope of Work for those with the operation right



Source) Hamamatsu City

Japan's sewage facilities are at the point where major renovation is required due to aging. Many local governments have the similar issue as Hamamatsu City. On the other hand, sewage works have little prospect of breaking even and management and risk sharing are difficult. By utilizing the concession method flexibly, the ingenuity of private sector is incorporated to reduce the financial burden of local governments.

■ Aichi Prefectural Road Public Corporation

For the introduction of concession method for toll-road businesses implemented by the regional road corporation, the ordinary session of the Diet in 2015 established and enforced Partial Revision of the Act on Special Zones for Structural Reform that enables private businesses to operate public-managed roll roads.

Figure 2-2-16 Toll roads eligible for the project and toll collection period

Names of roads	Extension (km)	Toll collection period
(i) Chita Peninsula Road	20.9	1970. 7. 15 ～ 2028. 2. 1 (Note)
(ii) Minami Chita Road	19.6	1970. 3. 1 ～ 2028. 2. 1 (Note)
(iii) Chita Oudan Road	8.5	1981. 4. 1 ～ 2028. 2. 1 (Note)
(iv) Chubu International Airport Connection Road	2.1	2005. 1. 30 ～ 2035. 1. 29 (Note)
(v) Kinuura Tunnel	1.7	1973. 8. 1 ～ 2029. 11. 29
(vi) Sanage Green Road	13.1	1972. 4. 1 ～ 2029. 6. 22
(vii) Kinuura Toyota Road	4.3	2004. 3. 6 ～ 2034. 3. 5
(viii) Nagoya Seto Road	2.3	2004. 11. 27 ～ 2044. 11. 26
Overall	72.5	1970. 3. 1 ～ 2044. 11. 26

(Note) Four routes will be pooled on October 1, 2016, and the period of toll collection ends on March 31, 2046.
Source) Developed by MLIT by materials provided by Aichi.

Note 46 It is a long-term debt borrowed from the government to provide for the funds for the construction of pipelines, facilities, and improvement projects.

In August 2015, Aichi was specified as a National Strategic Special District and in September, the National Strategic Special District plans [Note 47] was certified. After that, the Aichi Prefectural Road Public Corporation published an Implementation Policy in October and a list of requirements in November. The scope of operation project of toll roads in Aichi is to maintain and manage the operation right for established eight routes (Figure 2-2-16) as well as its administration operations, and other operations incidental to the renovation operations and the sale of shops in existing parking area. At present, they are in process of selecting operators.

(The public-private partnership in community development)

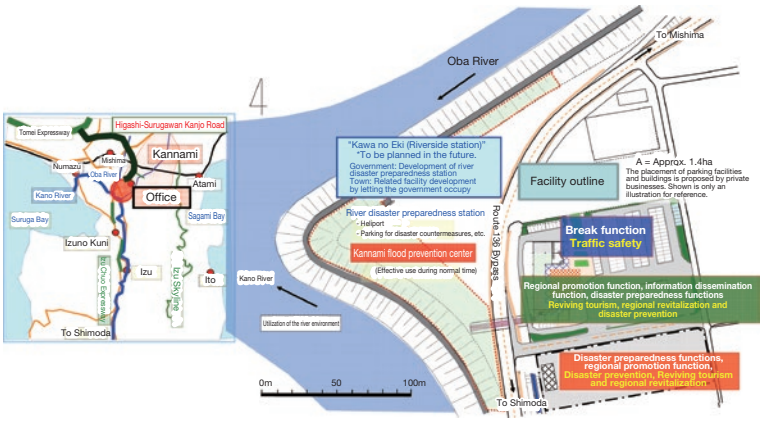
In rural cities, as a method for the response to financial restrictions and regional economic vitalization, they introduce PPP in a positive manner. Also, the forms come in variety and they introduce a method that meets regional characteristics and business purpose. In the process, the communication with private businesses and residents becomes important. The following introduces the approaches taken in each area.

■ Kannami-cho regional revitalization, exchange and disaster-prevention bases improvement project (BTO [Note 48] method, mixed type)

Kannami, Shizuoka, is situated in the north of Izu Peninsula with rich tourist resources and in FY 2013, after Higashi-Surugawan Kanjo Road extended to the Kannami Tsukamoto IC; the traffic convenience was improved from Tomei Expressway to the New Tomei Expressway. In Kannami, in time for the development of the ring road, it is assumed to serve as an entrance to the Izu Peninsula and become the overall tourist base for Izu. They were promoting city development for creating live city by adding a base for information dispatch for the eastern part of Shizuoka and the entire Izu Peninsula. Also, the area is expected to see a magnitude 8-Tokai Earthquake and Nankai Trough Mega Earthquake and the route 136 that runs through the city is positioned as emergency transport roads.

In light of such background, the city discussed on working harmoniously under the public-private partnership to maintain and operate facilities that combine traffic safety function, reviving tourism, regional revitalization function and disaster prevention functions. In FY 2012, aiming for commercialization, they took advantage of the government's pioneering PPP support projects to conduct the entrustment of investigation for the project. This allowed public-private partnership to implement risk sharing to meet the detail of disaster, business scheme for the optimization of roles in regional revitalization. Also, the mayor led the consideration of small council group for promoting the development of Michi-no-Eki (Roadside Station) and Kawa-no-Eki (Riverside Station) to decide on the implementation of the PFI method for the project.

Figure 2-2-17 The peripheral map of Kannami-cho



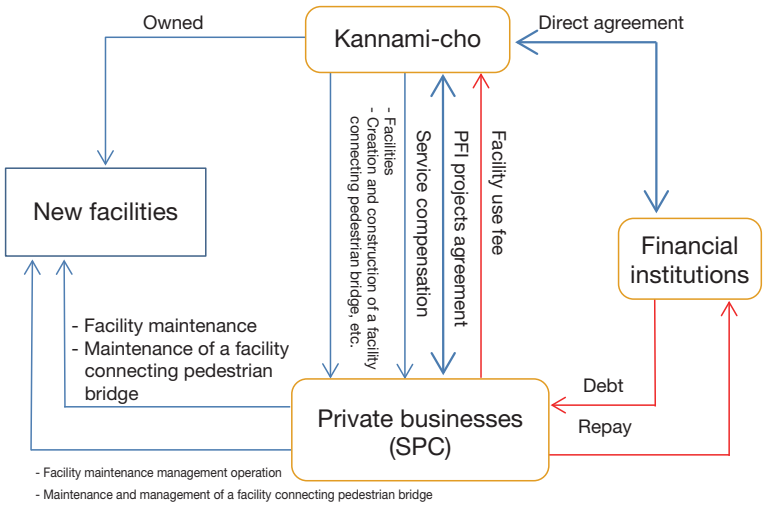
Source) Developed by MLIT based on the materials of Kannami.

Note 47 For the special measures to the regulations in the Special zone for Structural Reform, the utilization is possible by providing in the National Strategic Special District and receive accreditations from the prime minister.

Note 48 It is an abbreviated name for Build Transfer Operate. It is a business method that private businesses construct facilities, etc. and immediately after the completion of facilities, the ownership is transferred to the managers of public facilities to allow private businesses to conduct maintenance, management, and operation.

In August 2014, the implementation policy was published to adopt the BTO method for the project. The project runs from 16 years and five months from November 2015 to April 2032, and the facility development period is about a year and five months and 15 years of development, management, and operation. Although Kannami-cho pays maintenance fees, development, management and operation fees to the operators, in order that the private sector can utilize their originality, the operation business of shops and restaurants uses the Financially independent type, in which operators directly receive income from users (Figure 2-2-18). This allowed proper operational management by the government and creation of lively ambient and reactivation of industries through the use of local produce tourist resources by the private sector.

Figure 2-2-18 Kannami PFI Business Scheme



Source) Developed by MLIT based on the materials of Kannami.

For the recruitment, in order to increase the motivation of private businesses to make an entry, it raised ideas from the private sector before the announcement of implementation policy prior to publish it. For the actual screening, the interview for private businesses are emphasized to give high scores for business suggestion. In addition, while the operation comes in various forms, it allows releasing stocks between investors so that the most suited corporation can become a representative in each stage during the period of design, construction, maintenance, management, and operation for the investment of SPC consisting the project. These efforts attracted two SPCs and the operators were selected in July 2015. The selected SPC consists of local companies and the corporations in the metropolitan areas with the knowhow of PPP/PFI, which allows for efficient operation and local companies to accumulate knowhow and the vitalization of the local district.

This case increases the interest of private businesses and local residents through the dialogue of public-private partnership from the project planning stage. At the same time, the effort is expected to form an exchange base that regions work together and vitalizes the local district. At present, it is in progress for commercialization.

■ Miyazaki West Exit Renovation Project (Effective Utilization of Public Real Estate)

Miyazaki and Miyazaki City were considering the utilization of undeveloped prefectural and municipal land in front of Miyazaki Station, to build commercial facilities, resident service facilities and a traffic center that serves as a nodal point in the central urban area for the activation of central urban area. For the development and operation of commercial facilities, the method of public-private partnership method is introduced to form an implementing entity of Miyazaki Green Sphere Purpose Companies (TMK) funded by a dozen or two local companies.

Figure 2-2-19 The division of roles in private partnership

Division		Government	Private
Public facilities	Design	○ (Bus terminal, municipal bicycle parking)	○ (Inside Ichibankan, Public Space[Note])
	Construction	○ (Bus terminal, municipal bicycle parking)	○ (Inside Ichibankan, Public Space)
	Maintenance management	○ (Bus terminal, municipal bicycle parking)	○ (Inside Ichibankan, Public Space)
	Operation	○ (Bus terminal, municipal bicycle parking)	○ (Inside Ichibankan, Public Space)
Private facilities	Planning	○	○
	Design		○
	Construction		○
	Maintenance management		○
	Operation		○

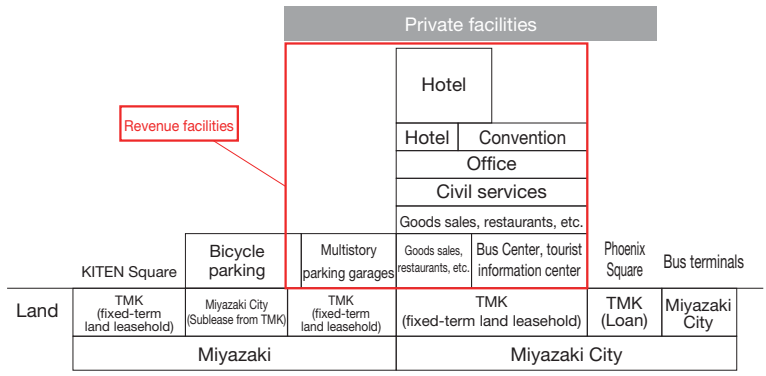
(Note) Phoenix square, KITEN square
Source) MLIT

The project period is twenty years from March 2010 to February 2030 to develop and operate facilities such as public facilities such as bus terminals and open space, and a complex that has hotels, commercial facilities, and offices, as well as private facilities such as multistory parking garages by sharing roles under the private partnership (Figure 2-2-19).

In addition, for the facilities developed and operated by TMK, a fixed-term land leasehold for businesses is set to the land owned by the city and prefecture, which serves as bottomland, and the ownership of facilities is set to TMK (Figure 2-2-20).

With these private funds and the incorporation of knowhow, it allows developing spacious space that makes consideration for local residents and facilities and planning the effective attraction of tenants for office facilities, creating new employment, and commercial ground. The effort of vitalizing the central urban area by Miyazaki City including this development, the satisfaction of citizens toward Miyazaki City's commercial environment and appeal improved after the opening of these facilities in September 2011 (Figure 2-2-21).

Figure 2-2-20 The positioning of Public Real Estate and private facilities



Source) MLIT

Figure 2-2-21 Satisfaction level of trading and industries (DI value)

Items		FY 2007	FY 2011	Increase and decrease
An attractive town that anybody wants to work		▲38.3	▲30.1	8.2
A town that offers opportunities of starting a new business		▲46.9	▲35.7	11.2
A town with many attractive stores		▲59.2	▲52.8	6.4
	An extensive selection of products	▲36.9	▲37.7	▲0.8
	An extensive selection of affordable products	▲17.8	▲12.6	5.2
	High quality products	▲4.8	▲2.6	2.2
	Do not have to worry about business hours	▲33.1	▲31.0	2.1
A town that offers common parking ticket, rental bicycle and temporary childcare.		▲41.0	▲26.9	14.1
A town that people have fun time		▲21.0	▲17.8	3.2
A friendly town that people can stop by casually.		▲5.8	▲4.2	1.6
A town that shop and business owners work together for revitalization.		▲6.0	▲4.8	1.2

(Notes) 1 The satisfaction level (DI value) is divided into five levels including "Satisfied," "Slightly satisfied," "Neither," "Not really satisfied" and "Not satisfied." The response rate was calculated based on the negative and positive degree.
(The response rate of "Satisfied" x 2 + The response rate of "Slightly satisfied") - (The response rate of "Not really satisfied" + The response rate of "Not satisfied" x 2)
2 The FY 2011 survey was conducted from February to March 2012.
Source) Miyazaki City, Miyazaki citizens satisfaction survey

In this case, the prefecture and city also obtain revenues from land rent based on a fixed-term land leasehold from the private sector. By effectively developing unused public real estate, it reduces the public entities' financial burden and leads to the creation of private demand and vitalization of the local district.

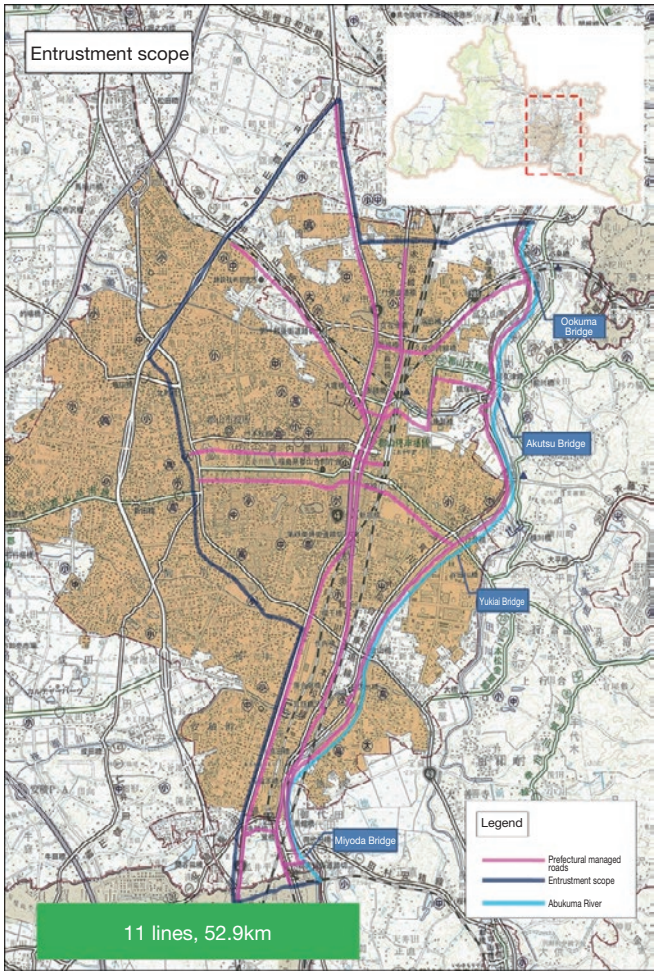
■ The maintenance management of Route 4 and prefectural roads in Fukushima (comprehensive work consignment to private sector)

For the maintenance management of infrastructure, in order to diversify the needs associated with an increase in costs due to aging and population decline in the future, Fukushima was considering it is necessary to improve productivity of maintenance management operation. Also, in April 2016, with the transfer of Route 4 from the government to the prefectural government, they considered the introduction of method that enlarges a public-private partnership such as the response to insufficient staff, effective operation, and the introduction of comprehensive work consignment to private sector.

For the basic policy of the construction of business scheme, the private sector that is in charge of maintenance management receives proper profit and makes for an attractive business by improving the sophistication of the project itself. Another element of the basic policy was to construct and introduce the mechanism that benefits each element of private partnership such as the mitigation of tasks for public workers and the reduction of maintenance management cost. Because of this, the comprehensive entrustment of operations to the private sector was considered. In FY 2016, which is the first year, the contract term is set to a year and for the part of prefectural road that crossed Route 4, they determined that the outsourcing of operations such as road maintenance, patrol, snow removal and other road-related operations in a comprehensive manner (Figure 2-2-22). For the days to come, the operation process and costs are monitored to proceed with the entrustment after the next fiscal year.

In addition, in the exchange of opinions with private businesses conducted in November 2015, the private sector passed on their opinions about the expansion of area and business scale, as well as the extension of contract term. Fukushima plans on expanding entrusted operations into other sectors besides roads such as rivers, area expansion, and introduction of a contract term to multiple years. Other opinions include the necessity of participation of corporations that are acquainted locally and their desire to establish supervisors that oversee these corporations. In respond to these opinions, Fukushima plans on determining the implementation of trial run of the comprehensive work consignment to private sector in FY 2016 to consider the possibilities of introduction and its effects (Figure 2-2-23).

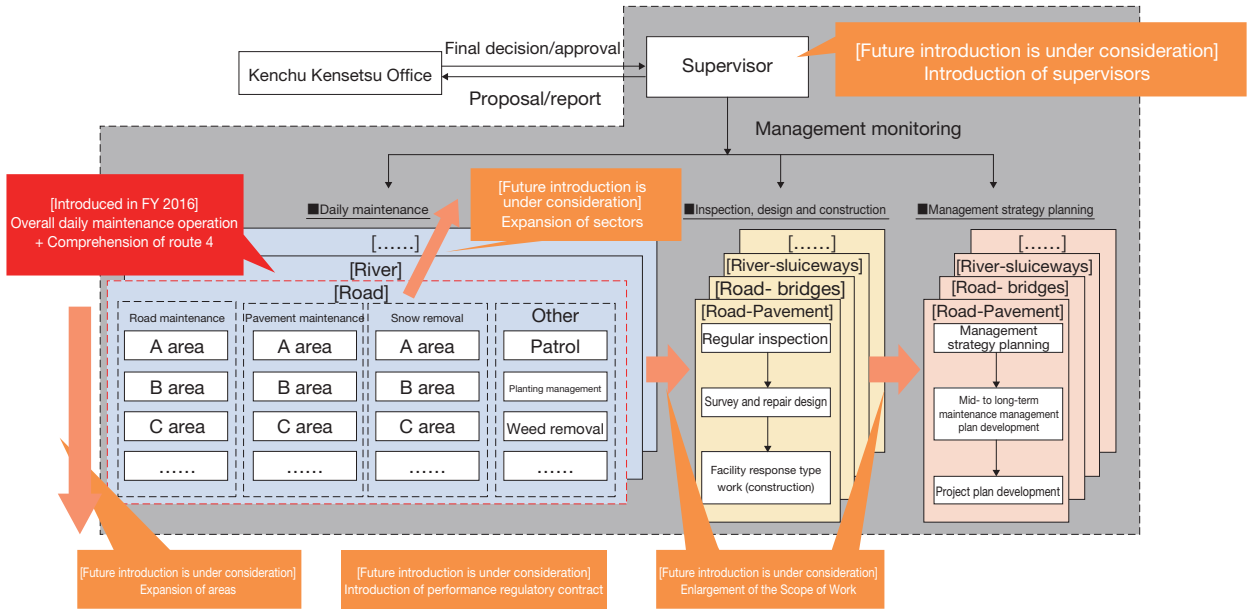
Figure 2-2-22 The entrustment scope and target lines in FY 2016.



Regular contract method	Project name
Unit price contract	(i) Road maintenance and repair operation
	(ii) Pavement maintenance and repair operation
	(iii) Snow removal operation
	(iv) Anti-freeze agent dispersal operation
Total price contract	(i) Road patrol operation
	(ii) Road plant management
	(iii) Road environment beautification operation
	(iv) Road weed removal operation

Source) Developed by MLIT based on the materials provided by Fukushima

Figure 2-2-23 The overall vision of future maintenance management considered by Fukushima



Source) Fukushima

Currently, Japan has a small number of cases that implemented the comprehensive work consignment to private sector in the maintenance management projects. Because of this, there are insufficient operation knowhow and information sharing among local governments. MLIT works with local governments for the maintenance management of Sanjo and Ube, Fukushima, aiming to realize the implementation of comprehensive work consignment to private sector so as to share various challenges and review improvement measures specifically.

As just described, in order to proceed with effective public-private partnership, the public-private partnership dialogue, and the development of scheme for a win-win relationship is essential. With this, the private demand is stimulated to enable the development and operation of infrastructure that utilizes the strength of each public-private partnership.

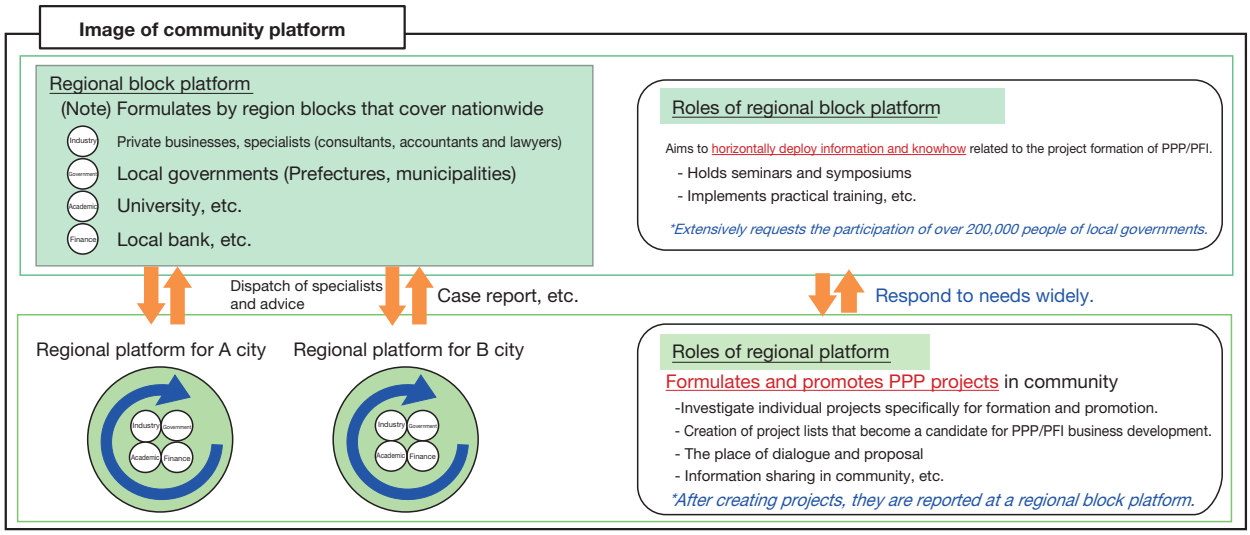
2 The initiatives of the Minister of Land administration for the promotion of PPP/PFI projects

(1) Formation of regional platform

In the Basic Policy on Economic and Fiscal Management and Reform 2015, the government aims to develop and disseminate the PPP/PFI method using the regional platform through industrial-academic-government-financial cooperation for the nationwide implementation of PPP/PFI.

Aiming to share information and knowhow for PPP/PFI of regional public-private MLIT establishes a regional platform as a place of discussion for industrial-academic-government-financial cooperation. In FY 2015, Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku and Kyushu established a core member conference (32 industrial organizations, 153 government organizations, 20 academic organizations and 61 financial organizations) and hold a seminar to introduce preferable cases in six locations (Sendai City, Hiroshima City, Tokyo, Fukuoka City, Osaka City and Nagoya City) (about 1,100 participants). In addition, the government support each local government at their request to form a regional platform to discover and implement specific PPP/PFI projects in order to solve their challenges (Figure 2-2-24).

Figure 2-2-24 Image of community platform



Source) MLIT

(2) Pioneering PPP support projects

As for the introduction of PPP/PFI, it requires various studies and information maintenance regarding business methods and the division of roles for public-private partnership. Because of this, the MLIT grands the costs related to the research of introduction possibilities for local governments considering the utilization of advanced PPP/PFI method to support the formulation of projects. The contents of support are divided into two support types: the first is the business method consideration support type, which supports research funds for the introduction and implementation of advanced PPP projects for the types of facilities, project scale, patterns, and methods, and the second is information improvement support type, which supports research costs for the maintenance of necessary information to determine the introduction of PPP projects. These are used in the research of Sendai Airport that introduced the concession method and Seien basin sewage works of Hamamatsu-shi that is in progress of this method. For the days to come, the dissemination of the area's PPP/PFI will be advanced as part of the support projects.

Section 3 The Results of Opinion Poll and Analysis of Private Businesses

As described in section 1 of this chapter, the prioritization of investment in businesses with high stock effects is sought after and it is important to have the viewpoint of smart investment and use, which the infrastructure development is utilized to gain benefits by putting in small investment and the existing infrastructure is ingeniously used.

From these viewpoints, as we consider that it is necessary to grasp the needs of private businesses that conduct business activities that actually use infrastructure in order to determine the direction of infrastructure development and utilization for the future, we conducted a survey targeting private businesses across the country.

In this section, to study the awareness on the infrastructure of private businesses, we analyzed the awareness and needs related to the infrastructure development for each industry of private businesses centering on the results of business survey of the MLIT [Note 49], which was implemented in February 2016, with the aim of introducing the awareness of business environment surrounding the private businesses.

Note 49 Implemented in February 2016. The survey targeted 10,000 private businesses by mail. (The number of businesses responded: 2,276)
Business categories surveyed: Agriculture, forestry and fishery, mining, construction business, manufacturing industry, wholesalers, retailers, restaurants and lodging industries, medical, public welfare, transportation and communication industries.
Infrastructures surveyed: Expressways, general roads, high-speed railways (Shinkansen, express trains), airports (including air transport), ports and harbors (including marine transportation), levees, dams, local public transportation (bus, tram, local lines, subway, etc.) and others (sewage works, parks, etc.)

1 General theory: Diverse types of awareness among private businesses

Speaking of private businesses, depending on the difference of business category, facility function, business scale, and location, there should be a variety of needs and awareness toward the infrastructure of private businesses such as the business activity process, strategies for maintaining and growing business and business activities.

In order to prioritize the investment to businesses with high stock effects, as well as to induce private demand, it is important to strengthen the cooperation with private businesses. Although it is not realistic to consider and reflect all of the diverse needs for private businesses that are analyzed and introduced in this section, the key is to make an adjustment of priority and time axes with our eyes set on maximizing the stock effect by which the supplier understands that there are various needs among consumers.

(1) The importance of infrastructure by business category and facilities

We surveyed the difference in infrastructure needs for each business category and facility. The following casually introduces distinguishing results (Figure 2-3-1).

(Roads)

The results show that the importance of roads is the highest in all industries. In particular, the business categories that are assumed to move products and materials in a broad area show a high degree of importance in mining, construction business, manufacturing industry, wholesale, retail, transportation, and communication.

(Local public transportation)

The results showed that there are high needs in the tertiary industry, which is the service industry (restaurant and lodging industry, medical and public welfare).

(Levee/Dam)

The results showed that the importance in the agriculture, forestry and fishery is nearly twice higher than in other industries.

(Ports and harbors)

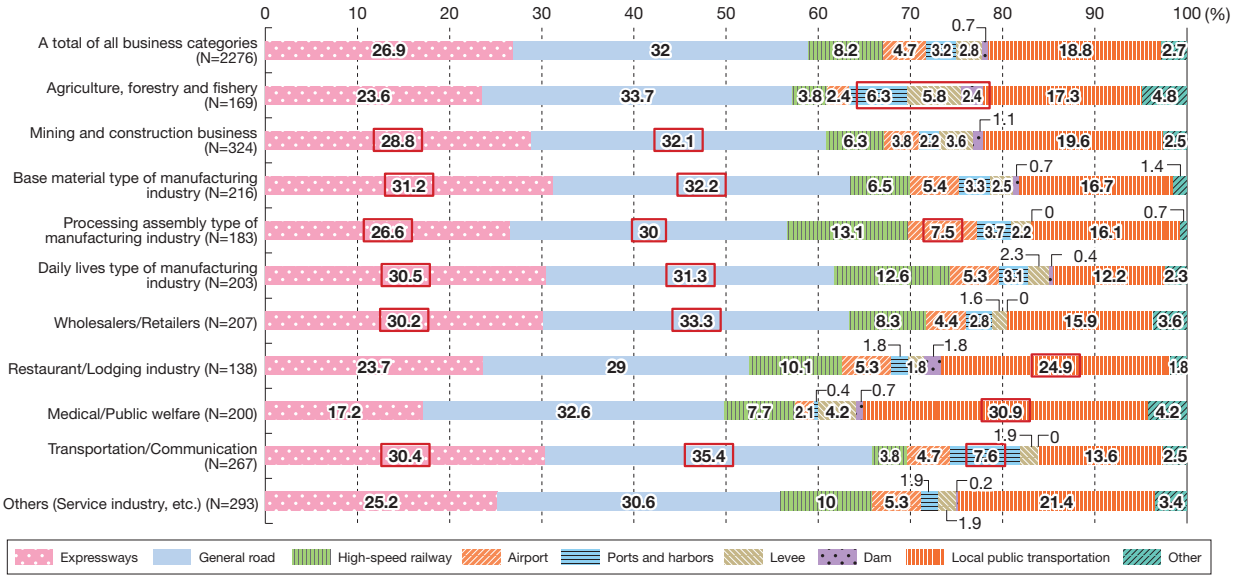
The results showed that the importance in the transportation, communication, agriculture, forestry, and fishery is higher. The transportation and communication are the industries that indicate the highest importance for ports, harbors, and roads.

(Airports)

The processing and assembly industries/Manufacturing industry showed a higher importance than other industries. The unit price per weighy of products and low general-purpose properties might also affect the results.

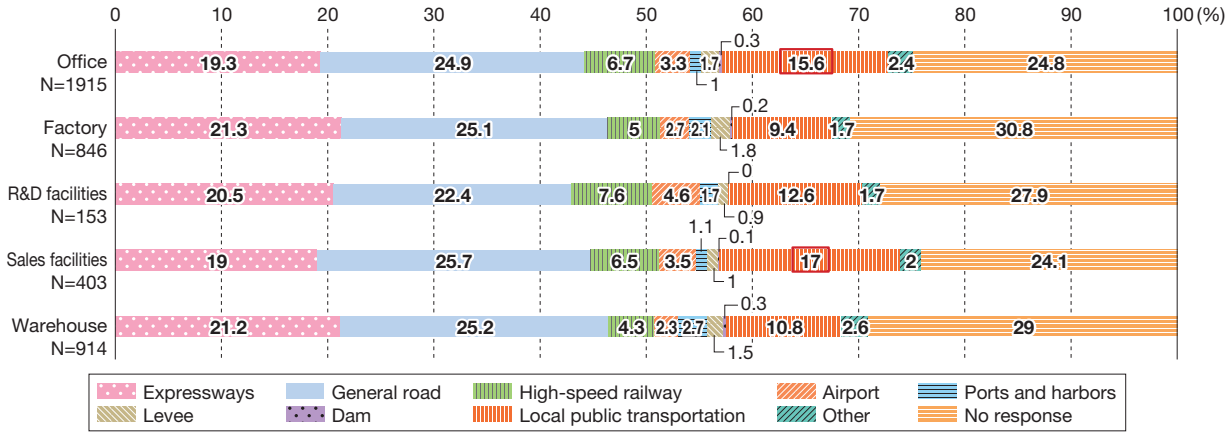
In addition, while the difference of facilities (such as office, plant, research and development center, shops and warehouse) did not indicate major distinction and the office, sales facilities show a higher need for local public transportation (Figure 2-3-2).

Figure 2-3-1 The importance of infrastructures by business categories



(Notes) 1 Analysis was done excluding No response.
2 The comparison of the total number of infrastructures (top three) that are thought to be important for business activities in each industry.
3 A total of all business categories includes 76 businesses that could not be categorized.
Source) Business Survey by MLIT

Figure 2-3-2 The importance of infrastructures by facilities



(Note) The comparison of the total number of infrastructures (top three) that are thought to be important for each facility.
Source) Business Survey by MLIT

(2) Other distinctive consciousness

The businesses survey by MLIT offered separate individual interviews to contractors (implemented in 2015) and the willingness to invest in infrastructures in accordance with the business plan (promotion early development by bearing development costs partially) and the will for contributing the regional disaster prevention by offering the company's own facilities at the time of disaster (offering the rooftop facilities as an evacuation site at the time of floods, etc.), showing diverse types of awareness.

(3) Satisfactory survey

We surveyed a satisfaction level of each infrastructure. While the results vary by the subjective views of businesses, the location of businesses and the characteristics of business categories, we introduce some of the distinctive results just as a reference.

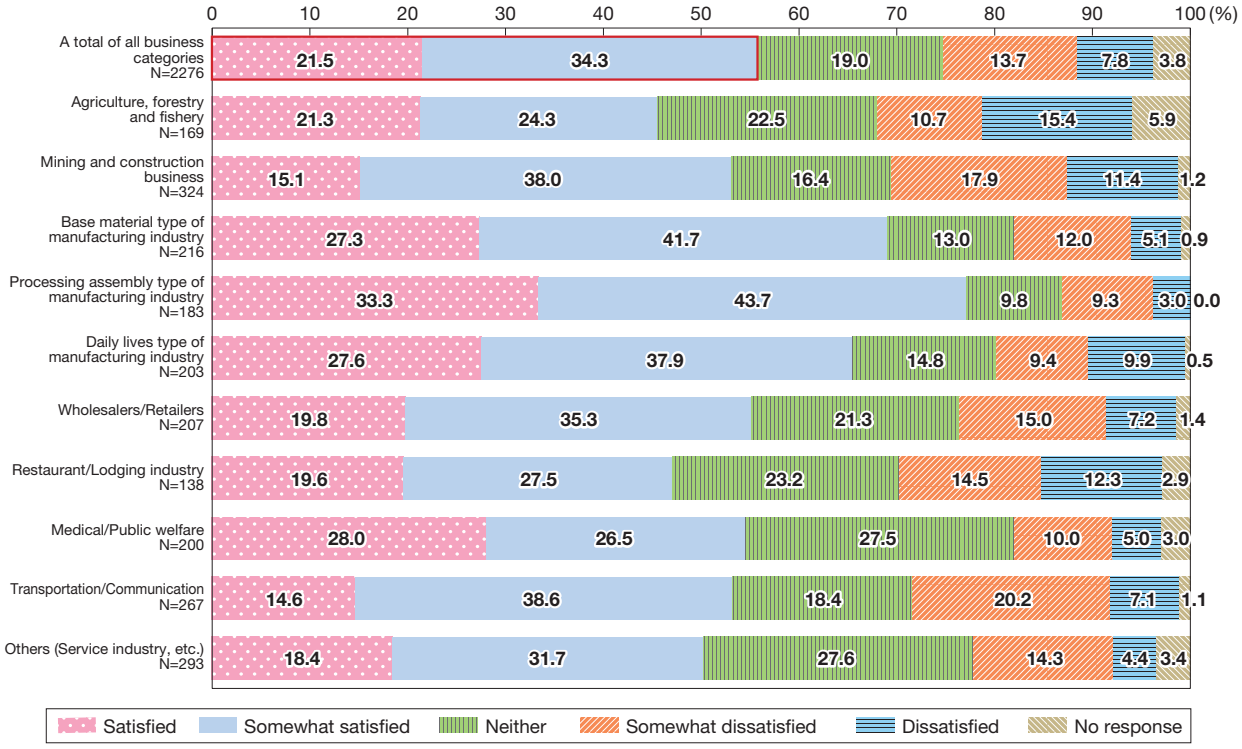
(Expressways)

Expressways are the only infrastructure that the total of "Satisfied" and "Somewhat satisfied" accounts for over 50% among the entire business categories, and a certain satisfaction level was confirmed (Figure 2-3-3).

By business categories, the total of "Satisfied" and "Somewhat satisfied" accounts for over 50% in most of the business categories. In particular, the satisfaction level of the manufacturing industry reaches over 70%. However, the agriculture, forestry and fishery and restaurant/the lodging industry went below 50%.

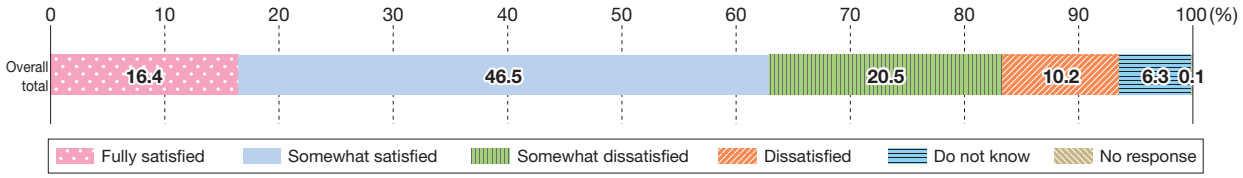
Also for the monitor survey [Note 50], we saw a relatively high satisfaction level (Figure 2-3-4).

Figure 2-3-3 Satisfaction level for expressways



(Note) A total of all business categories include 76 businesses that could not be categorized.
Source) Business Survey by MLIT

Figure 2-3-4 Satisfaction level for expressways (Monitor survey)



Source) Monitor survey by MLIT

(High-speed railway)

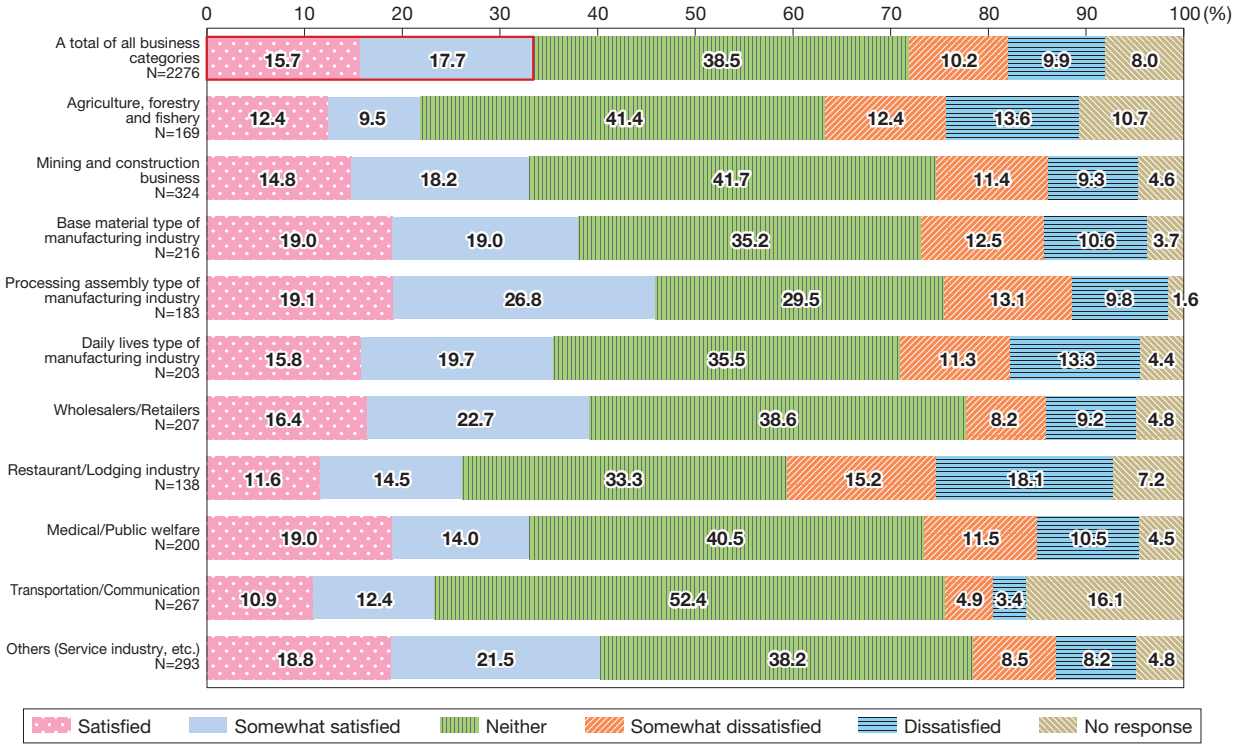
The total of "Satisfied" and "Somewhat satisfied" accounts for just below 40%, which we confirmed a certain level of satisfaction followed by the expressways. By business categories, the mining, construction business, manufacturing industry, wholesale and retail industries showed a relatively high satisfaction. On the other hand, agriculture, forestry and fishery, restaurants, lodging industry, transportation and communication industry showed lower satisfaction (Figure 2-3-5).

Note 50 The survey, titled the awareness survey on infrastructures and infrastructure development, was conducted targeting 1,098 male and female aged 20 years and older living across the country during the period of Monday, February 8, 2016 to Monday, February 22, 2016. The numbers of response were 914 (Male: 484, Female: 430).

Although it is not necessarily appropriate, the results suggest there are possibilities that the size of business activity area has an impact. It leaves an impression that the business categories that seem to have a relatively high use frequency among business activities have a high satisfaction and there might be a correlation between use frequency and satisfaction level.

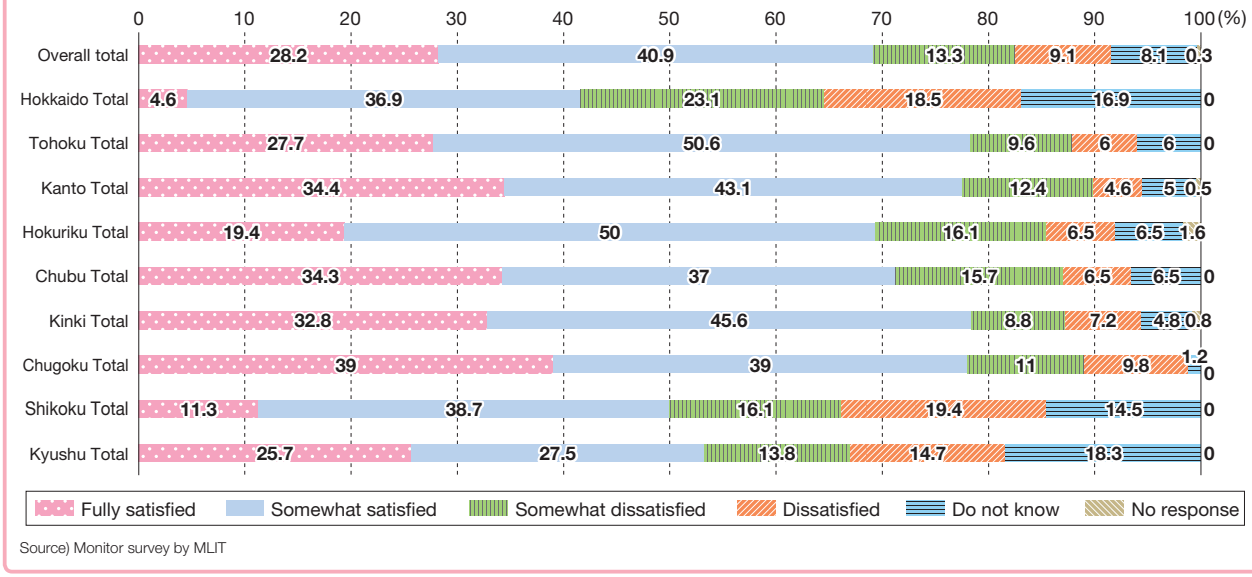
On the other hand, the satisfaction level reached about 70% in the monitor survey and there is the major difference of the satisfaction level between business and private use. In addition, the results of monitor survey have major regional difference and as of the survey, the areas without Shinkansen railways showed a low percentage in Hokkaido, Shikoku and a part of Kyushu (Figure 2-3-6). After the opening of Hokkaido Shinkansen in March 2016, we expect that the satisfaction level will increase in Hokkaido.

Figure 2-3-5 Satisfaction level for high-speed railways



(Note) A total of all business categories includes 76 businesses that could not be categorized.
Source) Business Survey by MLIT

Figure 2-3-6 Satisfaction level for high-speed railway (Monitor survey)



Source) Monitor survey by MLIT

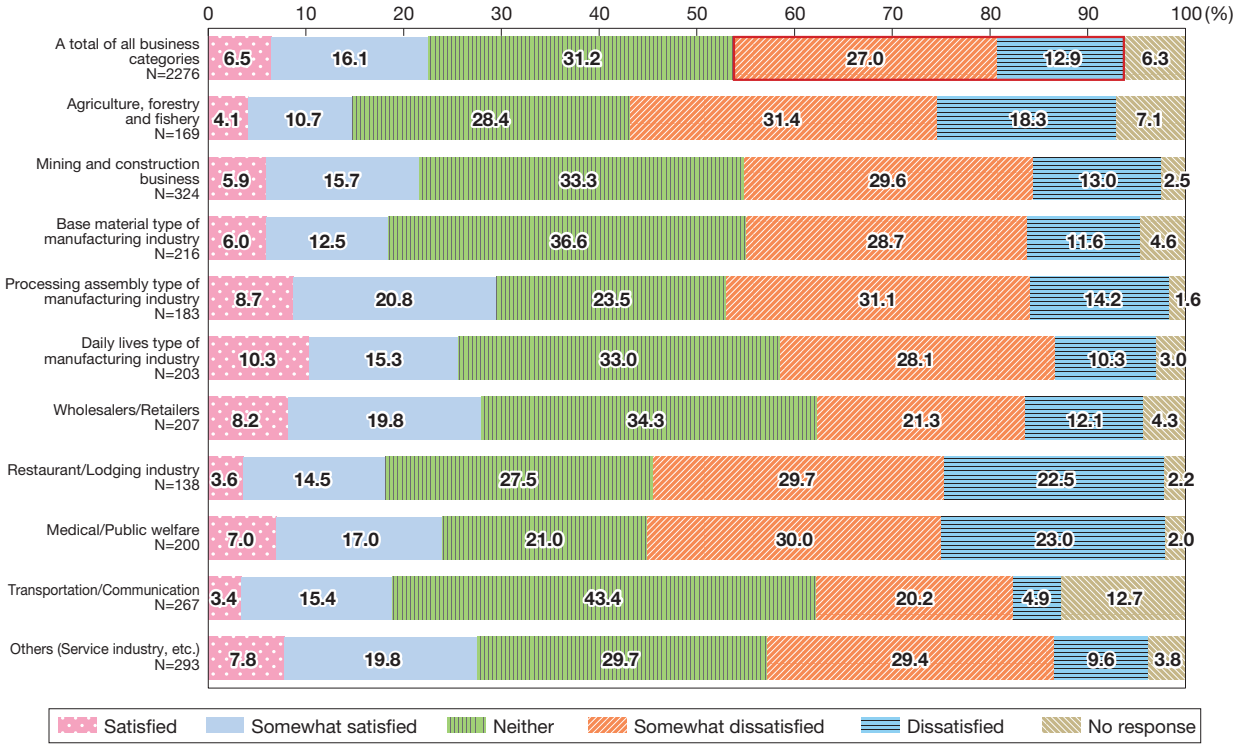
(Local public transportation)

Compared to other infrastructure, the results showed that the dissatisfaction level is the highest (Figure 2-3-7).

We can assume that this is because it relates to daily living more closely than other infrastructure and people are likely to feel convenience and the level of demand is high. Although people are also familiar with the general roads (it was followed by the local public transportation), it is possible that there is gap with local public transportation because services are not involved with the general roads.

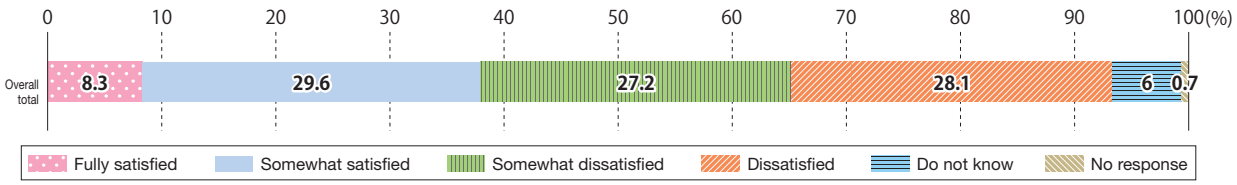
The results of monitor survey also showed that the dissatisfaction level is high (Figure 2-3-8).

Figure 2-3-7 Satisfaction level for local public transportation



(Note) A total of all business categories include 76 businesses that could not be categorized.
Source) Business Survey by MLIT

Figure 2-3-8 Satisfaction level for local public transportation (Monitor survey)



Source) Monitor survey by MLIT

2 Each theory: Consciousness toward the infrastructure of private businesses for each policy issue

(1) The productivity of tertiary industry

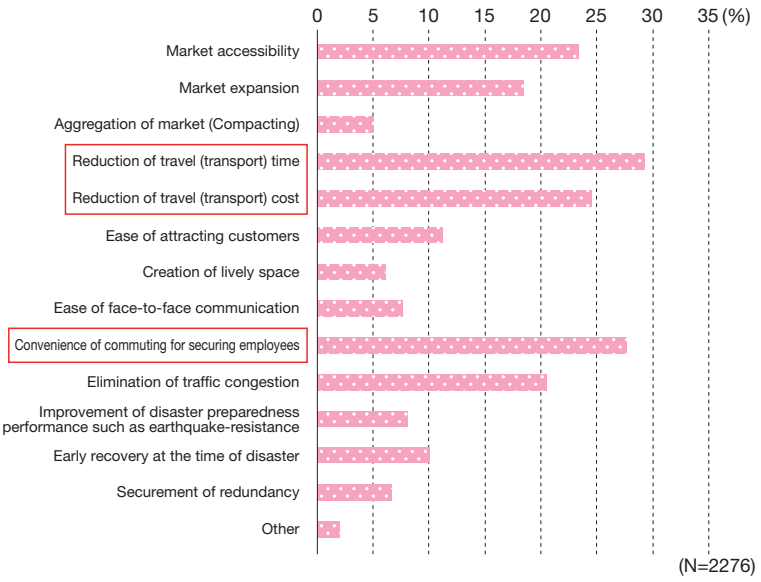
As described in Section 1, Chapter 1, Japan has been seeing an increasing proportion of tertiary industries due to the changes of industrial structure after the war to present year by year. In recent years, while the ratio of tertiary industry for all industries exceeds 70%, the productivity of Japan's tertiary industry is considered low. The improvement of productivity for the tertiary industry is a major issue in order to achieve Japan's economic growth.

In this section, as the tertiary industry, the retail industry, restaurants, medical and public welfare industries are used for analysis.

(Consciousness toward the improvement of productivity in tertiary industry)

First, we checked what businesses expect from infrastructure for the improvement of productivity in all business categories (Figure 2-3-9). Next, by comparing their expectation in tertiary industry and other business categories, we confirmed gap in both cases.

Figure 2-3-9 Expectations on infrastructures for the improvement of productivity (A total of all business categories)



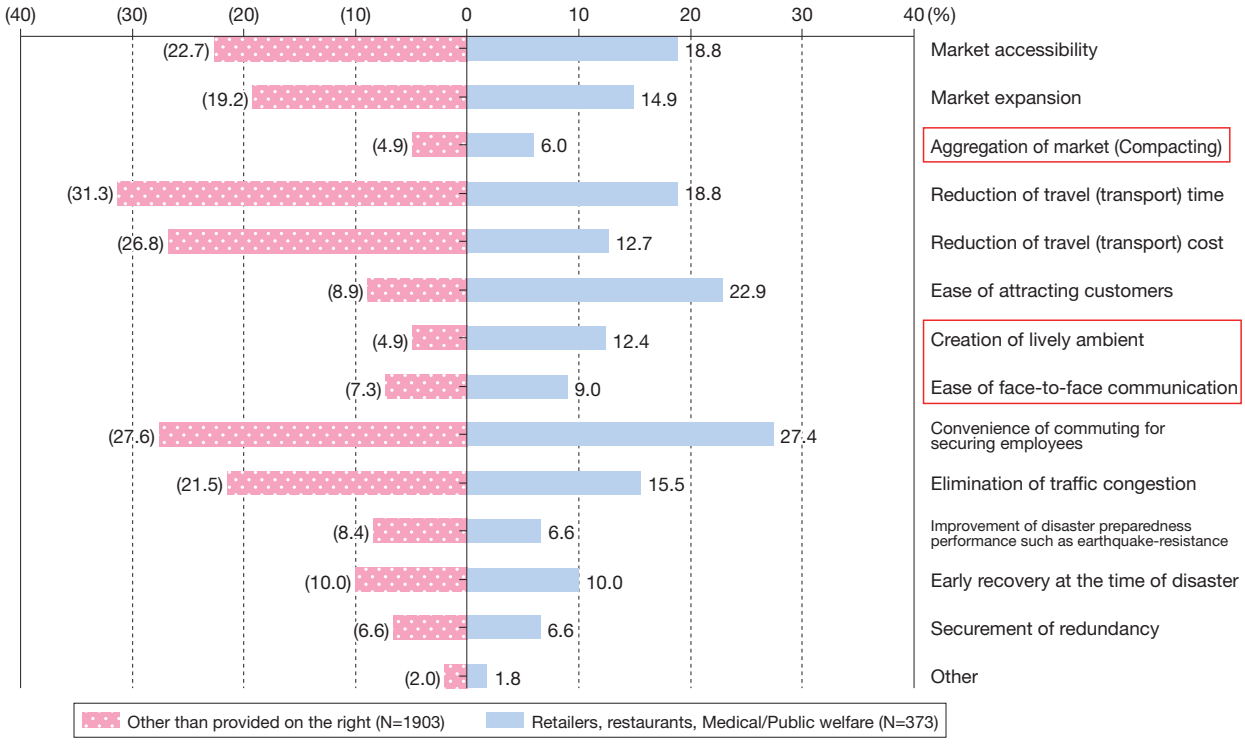
(Note) Comparing the total number of expectations for infrastructure at each business development (market expansion, improved productivity for corporate activities, innovation, and their expectations).
Source) Business Survey by MLIT

For all business categories, people have high expectation on the traveling (transport) time and cost reduction, followed by the convenience of commuting in order to secure employees. On the other hand, the tertiary industry is often B to C (Business to Customer), which is the business for individual customers, and has a higher interest in the item related to attracting customers. Because of the characteristic of B to C business, this result is obvious. However, let us look at the item of "the aggregation of market (compacting)". When comparing the tertiary industry with other business categories, while we could not confirm the difference that directly leads to attract customers, such as "the ease of attracting customers" and "the creation of lively space", the results showed that "the productivity improvement by market" is high (approx. 6.0% for the tertiary industry and approx. 4.9% for other industries than the tertiary industry: approx. 5.0% of the average of all business categories) (Figure 2-3-10).

This is perhaps seem to be the orientation leading to "compacting and network". We expect to see the possibility that the direction of future community development in Japan that is faced with population decline, and the direction of improving productivity in private business will match.

At present, although the gap is small, if the awareness of "the aggregation of market leads to the improvement of productivity" spreads within the tertiary industry in relating to the expectation toward infrastructure, it is possible that the gap will become more significant with other industries in the future.

Figure 2-3-10 Expectations to infrastructures for the improvement of productivity (Tertiary Industries: Retailers, restaurants, medical/public welfare)

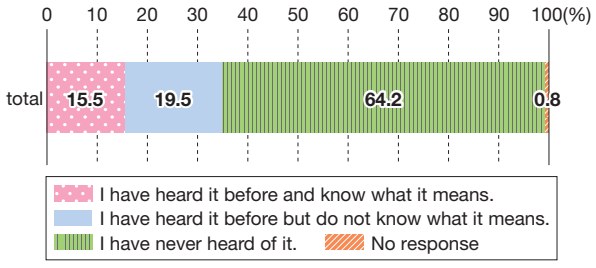


Source) Business Survey by MLIT

Here, let us introduce the results of awareness survey by monitor survey about the compacting and network. While the recognition level is low, when asked about the importance after showing the detail, a large percentage of people said it is important (Figure 2-3-11 and 2-3-12).

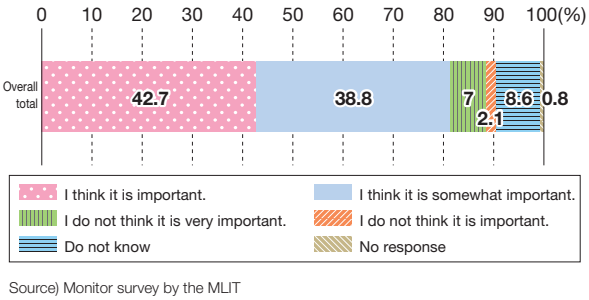
These results indicate the necessity of activity for understanding the importance of community development that is suitable for the time by spreading the idea of compacting and network.

Figure 2-3-11 Recognition level of the idea of compacting + network.



Source) Monitor survey by MLIT

Figure 2-3-12 The idea of compacting and network (questioned after giving an explanation of the detail.)



Source) Monitor survey by the MLIT

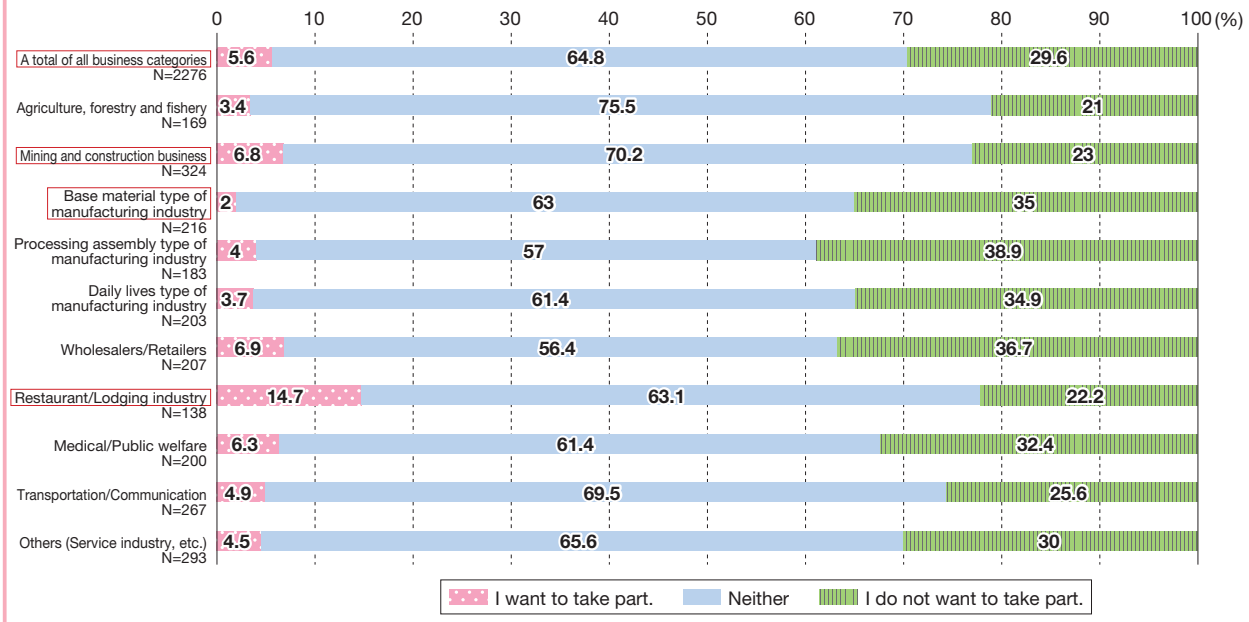
(2) Willingness to show ideas for the effort of smart use

As we consider that the private businesses using the infrastructure (infrastructure users) possibly have various opinions and ideas toward the ingenuity of operating facilities (smart use), we surveyed their willingness to show ideas for the effort for smart use.

Overall, the businesses who answered they wanted to participate fell below 5%. However, the results show that the restaurants and lodging industry prominently account for a large portion (approx. 15%) and the base material type manufacturing industry accounts for extremely small (approx. 2%) (Figure 2-3-13). When looked at more detailed business categories, the lodging industry accounts for over 20% and we can see that there is willingness to differentiate by the efficiency of business activities and the improvement of services by utilizing existing facilities.

Besides the analysis for each business category, it is necessary to notice the level of willingness to participate as a whole. One of the reasons (low willingness) is that they are not familiar with such an effort in the question and some people might feel that they take infrastructure as given. It is desirable that the response of "Neither" that occupies nearly 65% this time will change to "Want to participate." To do this, it is necessary to introduce stock effects that the smart use of infrastructure increases productivity in an easy-to-understand manner and continue effort to encourage people to understand that the infrastructure relates closely to their own corporate activities and make it a target for taking part in the utilization.

Figure 2-3-13 Willingness to participate in the effort for smart use.



(Notes) 1 We asked a question after explaining the toll setting that does not rely on a route, the flexible operation of facilities as an example of the effort for smart use of infrastructures.
2 For the analysis of trends, it is displayed by excluding "other" and "No response".
3 A total of all business categories include 76 businesses that could not be categorized.
Source) Business Survey by MLIT

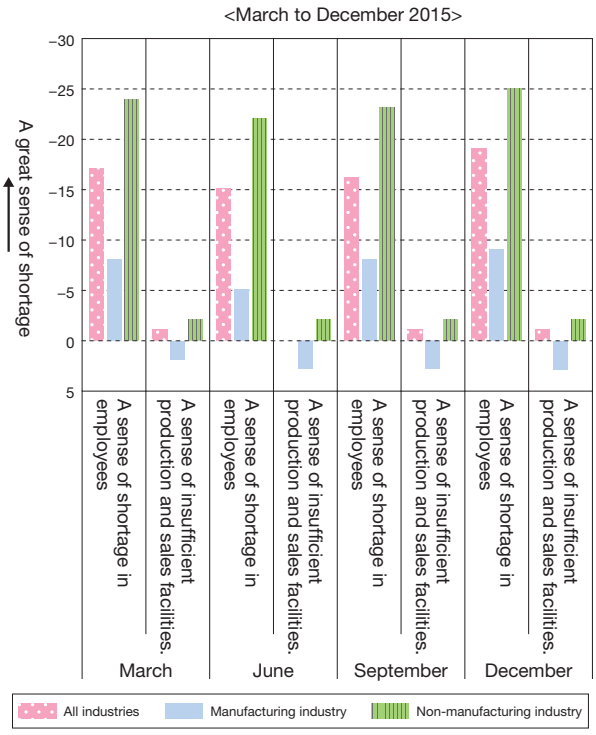
(3) Consciousness of bearers in logistic industry (Transport and communication industries)

(Situation of labor shortage)

In order to make a survey of the current situation of labor shortage in private businesses, with reference to the DI of the Short-term Economic Survey of Enterprises in Japan (Tankan) by the Bank of Japan [Note 51], it indicates the shortage of personnel is larger than the shortage of facilities (Figure 2-3-14). What is more, according to the results of other survey, we can confirm that the medium-sized enterprises (Below ¥1 billion of capital) especially in non-manufacturing industry experience a major shortage of labor (Figure 2-3-14, 2-3-15, and 2-3-16).

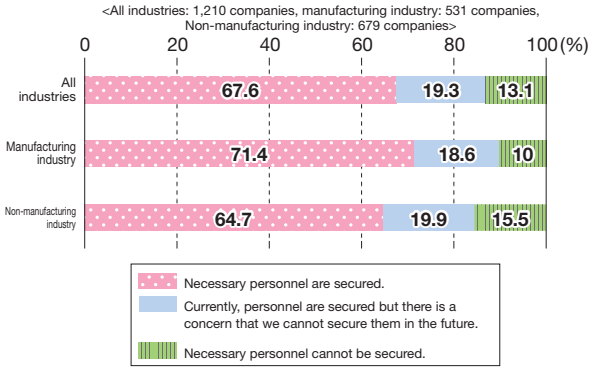
The Business survey by MLIT showed that for the question whether or not they attach weight on the countermeasures of logistic efficiency, many contactors answered the countermeasures for labor shortage. Generaly, the above results were obtained in all industries, although with little difference, securing human resources has been a issue for private businesses. In particular, the survey on the transportation and communication industries indicates more marked results. Next, there were opinions that the improvement of working condition is viewed as a problem, shedding light on a sense of insecurity toward the securement of bearers (Figure 2-3-17).

Figure 2-3-14 A sense of shortage in employees and insufficient production and sales facilities.



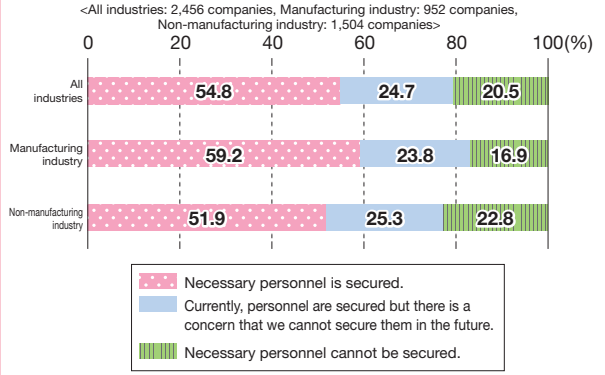
Source) Developed by MLIT based on the website of Bank of Japan.

Figure 2-3-15 The status of securing temporary and immediate personnel (major corporations over one billion yen of capital)



Source) Developed by MLIT based on the website of Development Bank of Japan Inc.

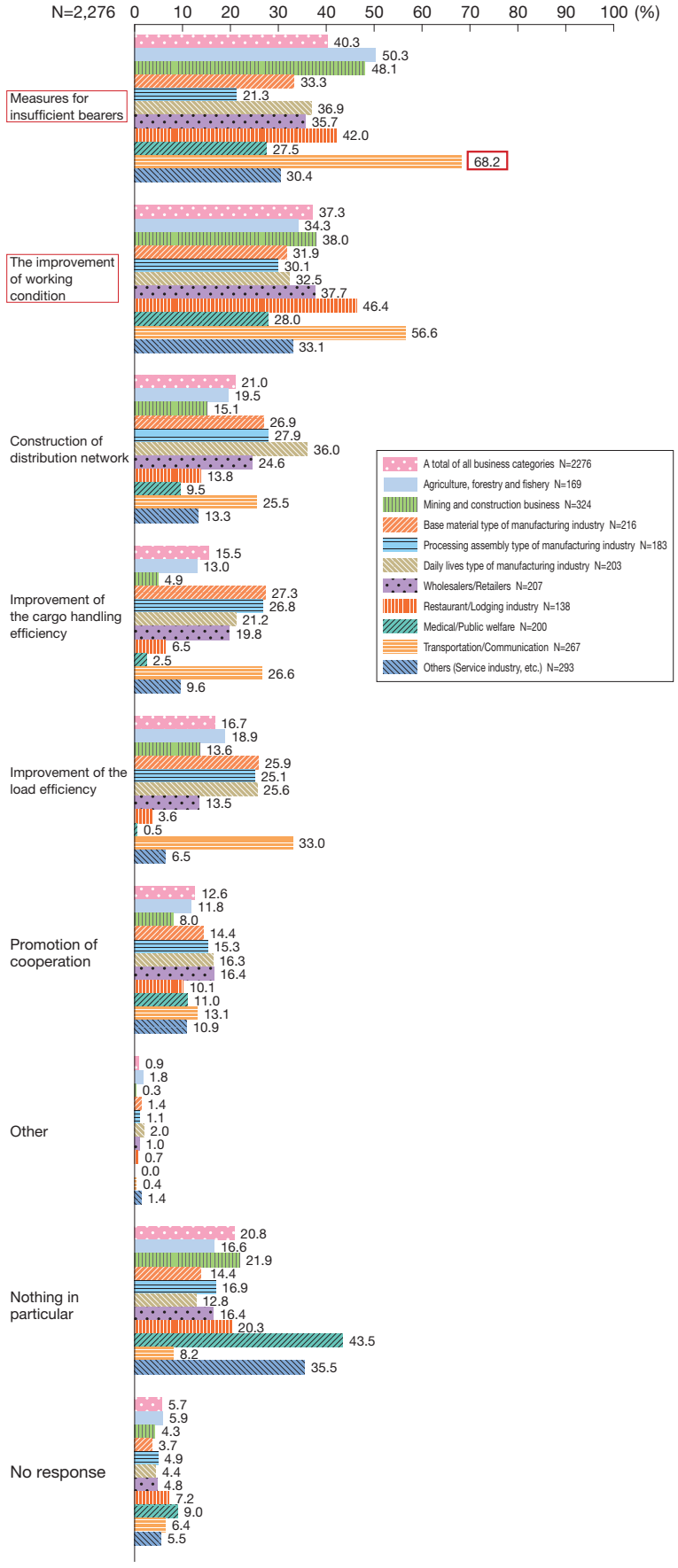
Figure 2-3-16 The status of securing temporary and immediate personnel (medium-sized corporations below one billion yen of capital)



Source) Developed by MLIT based on the website of Development Bank of Japan Inc.

Note 51 It is an abbreviated name of Diffusion Index, which is an indexation of various determination elements such as corporations' business condition and the excess and deficiency of facilities and employees.

Figure 2-3-17 What they place emphasis on measures for the streamlining logistics.

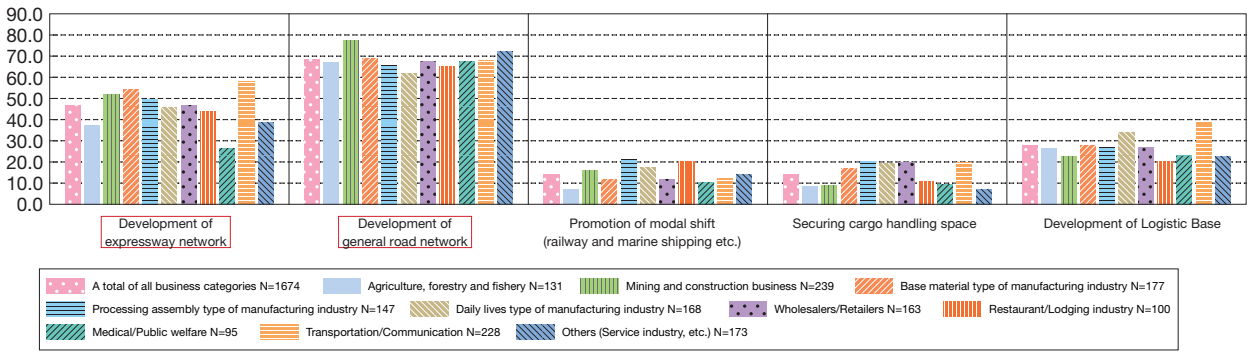


Source) Business Survey by MLIT

■ Future development

In order to achieve logistic efficiency, when we surveyed what people expect from infrastructure, the development of regional road network (about 69%) and the maintenance of expressways (about 47%) topped the list, indicating their desire to further enhance the road network (Figure 2-3-18).

Figure 2-3-18 Expectations on infrastructures for the improving of logistic efficiency

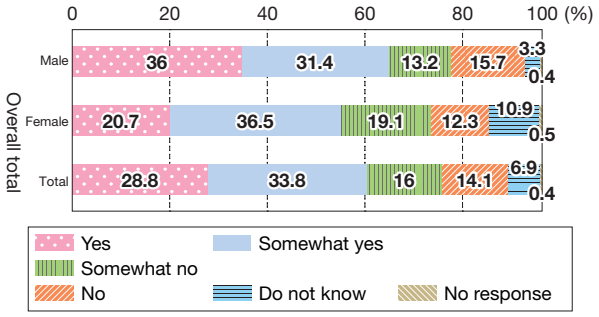


(Note) A total of all business categories include 57 businesses that could not be categorized.
Source) Business Survey by MLIT

On the other hand, of the transport and communication industries, the issue of the shortage of bearers especially in the logistic industry causes a number of problems to be solved in soft aspects such as a decline of truck loading ratio, occurrence of waiting time, unnecessary redelivery of package delivery services and the improvement of working condition. For that reason, with the cooperation of various parties concerned from cargo owners to logistic companies, these problems can be solved to make logistics efficient and sophisticated. It is also necessary to lead to efficient use of the existing transportation and logistics infrastructure. In addition, the introduction of new technologies such as the automatic operation, automatic platoon running of trucks, low floor flat car for railway transportation and package delivery using drones, which are currently under development and determination, are considered effective measures.

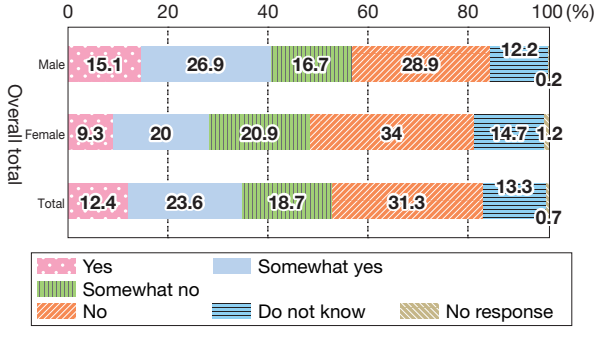
In addition, to introduce the results of monitor survey for reference, over 60% answered they want to use the automatic driving and over 30% answered they want to use a package delivery service by drones (including "somewhat want to use") (Figure 2-3-19and 2-3-20).

Figure 2-3-19 Thoughts on automatic driving



Source) Monitor survey by MLIT

Figure 2-3-20 Thoughts on the use of drones for package delivery



Source) Monitor survey by MLIT

(4) Creation of new businesses and services (Innovation)

(Necessity of innovation)

While there are various definitions of innovation, the definitions do not limit to simply technological innovation and a new approach that gives impact to the economy and society.

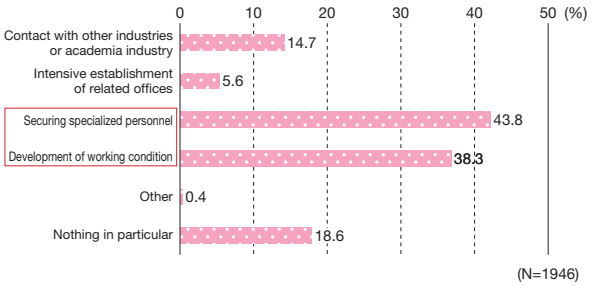
Based on these definitions, it is not only the manufacturing industry, but also necessary approaches in all industries. While Japan has a tendency of population decline, the reduction of demand associated with population decline is a major problem. With the innovation, it is extremely important to create new services and values in order to increase the demand.

What are the efforts taken by businesses to create innovation? The following introduces survey results.

(Consciousness toward the securement of advanced human resources)

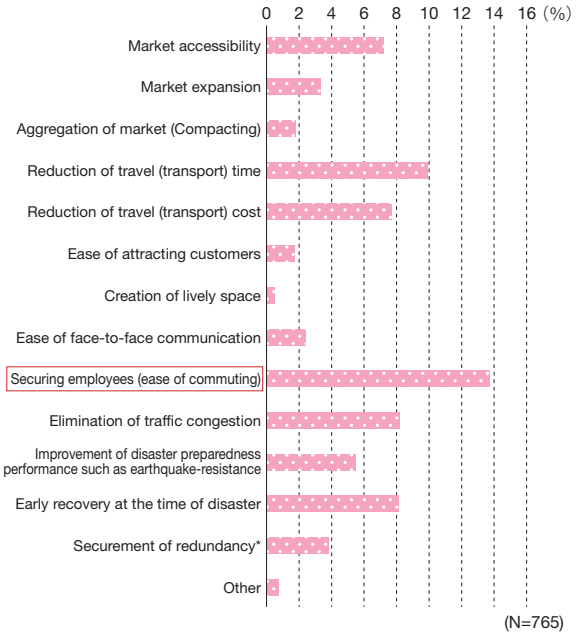
The results of business survey by MLIT indicate that the businesses place the most importance on the securement of human resources (the securement of specialized personnel and improvement of working condition) for the creation of innovation. This indicates that they have a strong awareness of securing advanced human resources that become the source of innovation (Figure 2-3-21).

Figure 2-3-21 What they place emphasis on improving productivity by creating innovations



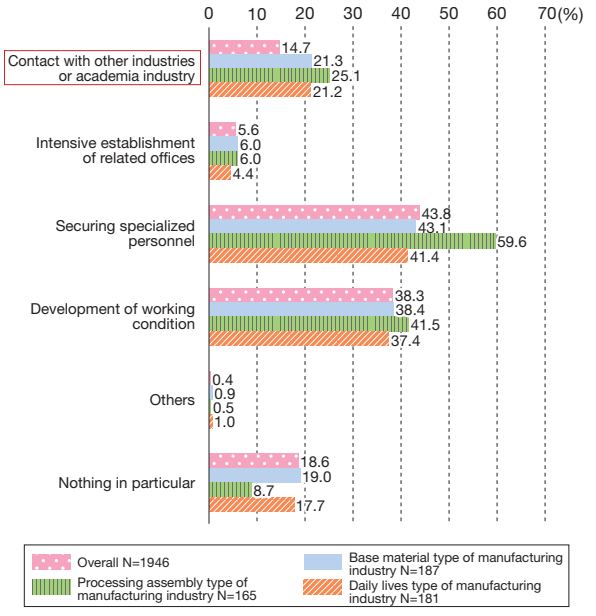
Source) Business Survey by MLIT

Figure 2-3-22 What is focused on research and development center



Source) Business Survey by MLIT

Figure 2-3-23 What they place emphasis on increasing productivity by creating innovations. (manufacturing industry)



Source) Business Survey by MLIT

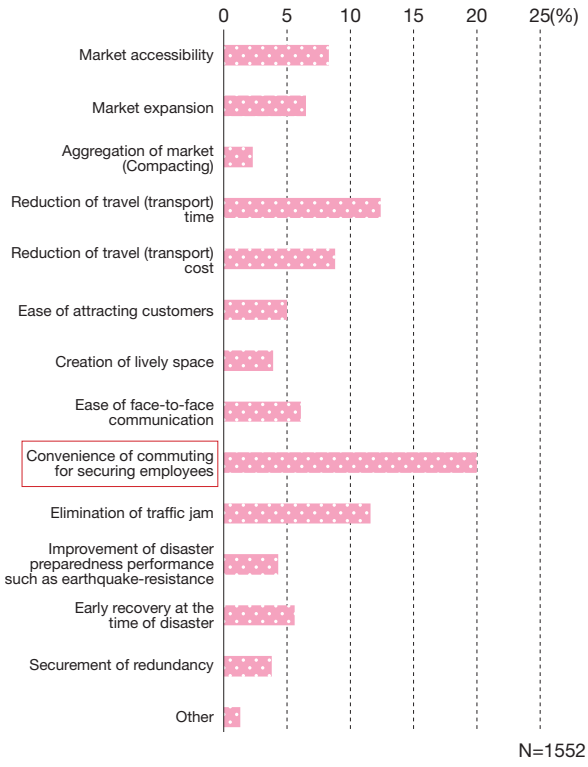
In addition, although the innovation is not equal to research and development, when we conducted a survey by focusing attention on the research and development that operate as part of innovation, the securement of human resources is one of the top reasons for considering the location of a research and development center after all. This also indicates the awareness of private businesses toward the securement of advanced human resources (Figure 2-3-22).

Also, "the exposure with other industries or academia" account for 14.7% of the overall business categories, which did not show a high level of awareness. However, the analysis of the same item by narrowing down in the manufacturing industry indicates that the percentage is over 20%. In the manufacturing industry, it was confirmed that they have a greater consideration on "the importance of communication with other companies" though it is smaller compared to other industries (Figure 2-3-23).

(What is expected to the infrastructure for the improvement of productivity by innovation)

As for the innovation, the results show that "the convenience of commuting for securing employees" is higher than "reduction of traveling time" and "reduction of traveling cost" for what they expect to infrastructure. This suggests that in order to produce new products and services, they are sharply conscious of securing human resources (Figure 2-3-24).

Figure 2-3-24 Expectations on infrastructures for innovation.



(Note) The comparison of the total number of responses (top five) on their expectations to infrastructure on innovation.
Source) Business Survey by MLIT

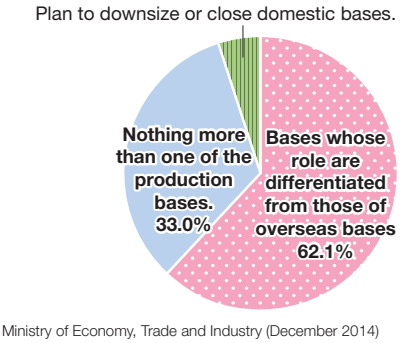
(Example of an approach by a large enterprise)

■ The domestic bases are mother plants and innovation base

The 2015 White Paper on the manufacturing industries by the Ministry of Economy, Trade and Industry also reports that they consider domestic facilities as a base to differentiate with overseas bases (mother plants and innovation base) (Figure 2-3-25).

The results of interviewing the major cosmetic manufacturer, which decided to make a capital investment (the construction of research center and factory) domestically, indicate the following awareness and various types of awareness toward innovation base and mother plants.

Figure 2-3-25 Roles of domestic production bases in the future



Source) Ministry of Economy, Trade and Industry (December 2014)

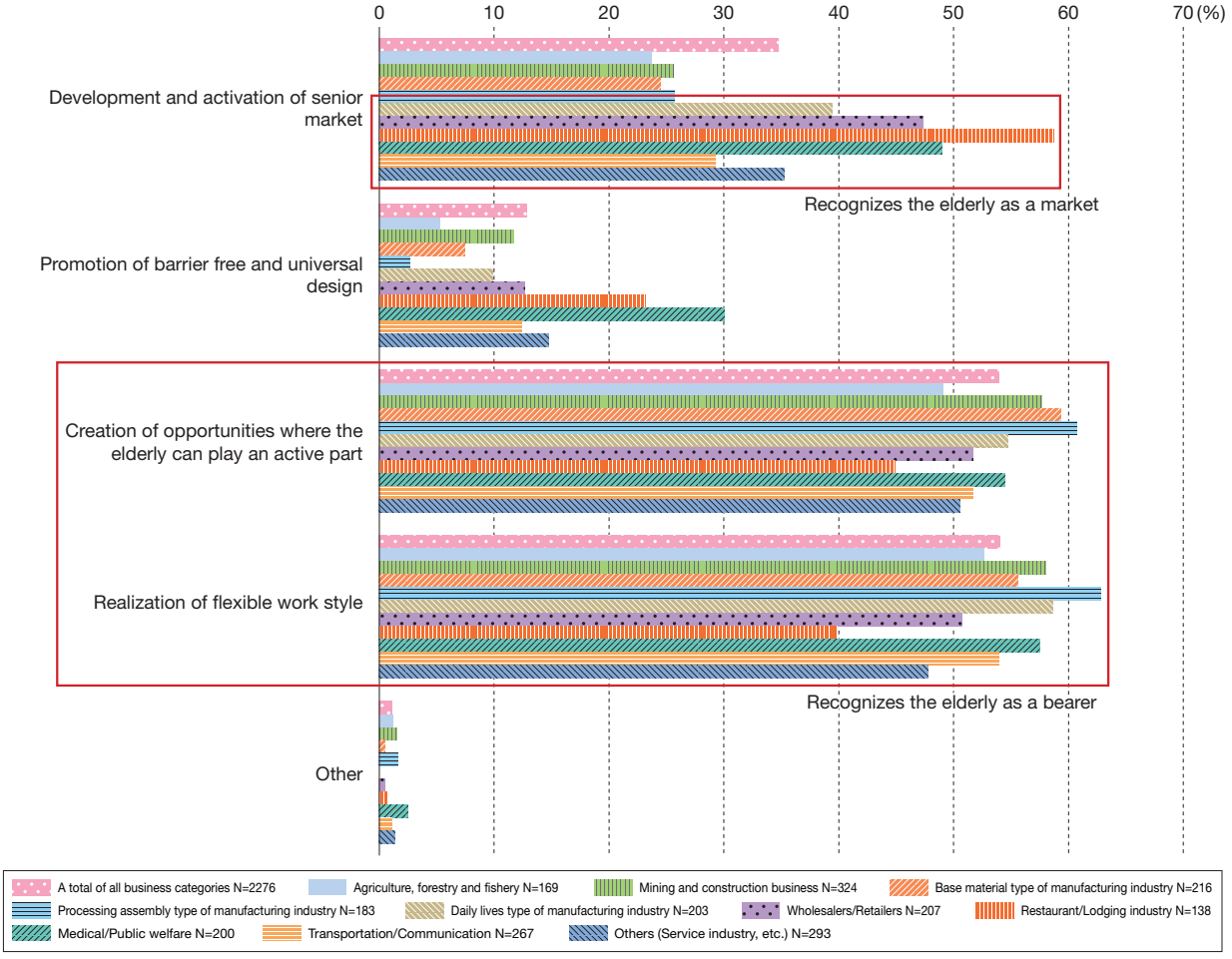
- An emphasis on the accessibility of location site with lively space and surrounding environment (research center)
- In consideration with traveling abroad, an emphasis is placed on the accessibility to airport (research center)
- In addition to the function as a mother plant, Locating Plant together with the logistics facilities makes possible to dramatically reduce the number of days when shipping to stores. (Plant)

(5) Response to the aging society

When we surveyed how the businesses are aware of the response to the aging society, the overall results showed that they focus on the social participation of the elderly (they recognize the elderly as a bearer). On the other hand, the percentage of the answer about the activation of services for the elderly (they recognize the elderly as a market) is about 60% to the answer seeing their social participation.

The analysis by business categories indicates that daily lives type of manufacturing industry, wholesalers and retailers, restaurant and lodging industry, medical and welfare and other (service industry) have a strong tendency to consider the elderly as a market compared to other industries.

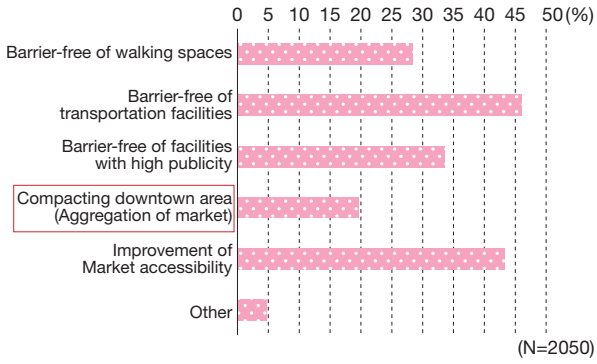
Figure 2-3-26 What they place emphasis on the response to aging society.



(Note) A total of all business categories includes 76 businesses that could not be categorized.
Source) Business Survey by MLIT

Next, when we survey what they seek for the infrastructure to response to aging society, while they indicate a strong awareness toward barrier-free and improved accessibility (30% to 50%), they have a relatively lower expectation toward service efficiency with compacting and network (nearly 20%) (Figure 2-3-27). Even so, as described in (1) the improvement of productivity in tertiary industry, the awareness on compacting and network (improving efficiency with the aggregation of market) accounts for about 11%, which is on a high note, giving an impression that they started to recognize compacting and network as a response to aging society to a certain degree.

Figure 2-3-27 What People seek for the infrastructure to response to aging society



Source) Business Survey by MLIT

(6) Information provision for infrastructure development

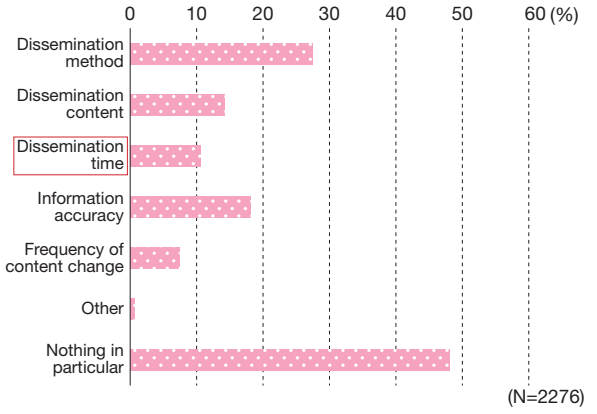
In order to maximize stock effects, it is desirable for private businesses to understand the infrastructure development information to consider business strategy.

To that end, as the result of surveying what private businesses feel dissatisfied with the information provision of infrastructure development, the most common answer was "Nothing in particular", which comprises about half (Figure 2-3-28).

They are dissatisfied with "the method of dissemination", which is the most common answer, followed by "information accuracy" and "disseminated contents". As for "the time of dissemination", the results account for about 10%, giving the impression that they feel appropriate to a certain extent.

When we asked for their opinions about information provision, their answers include:

Figure 2-3-28 Dissatisfaction on information provision for infrastructure development



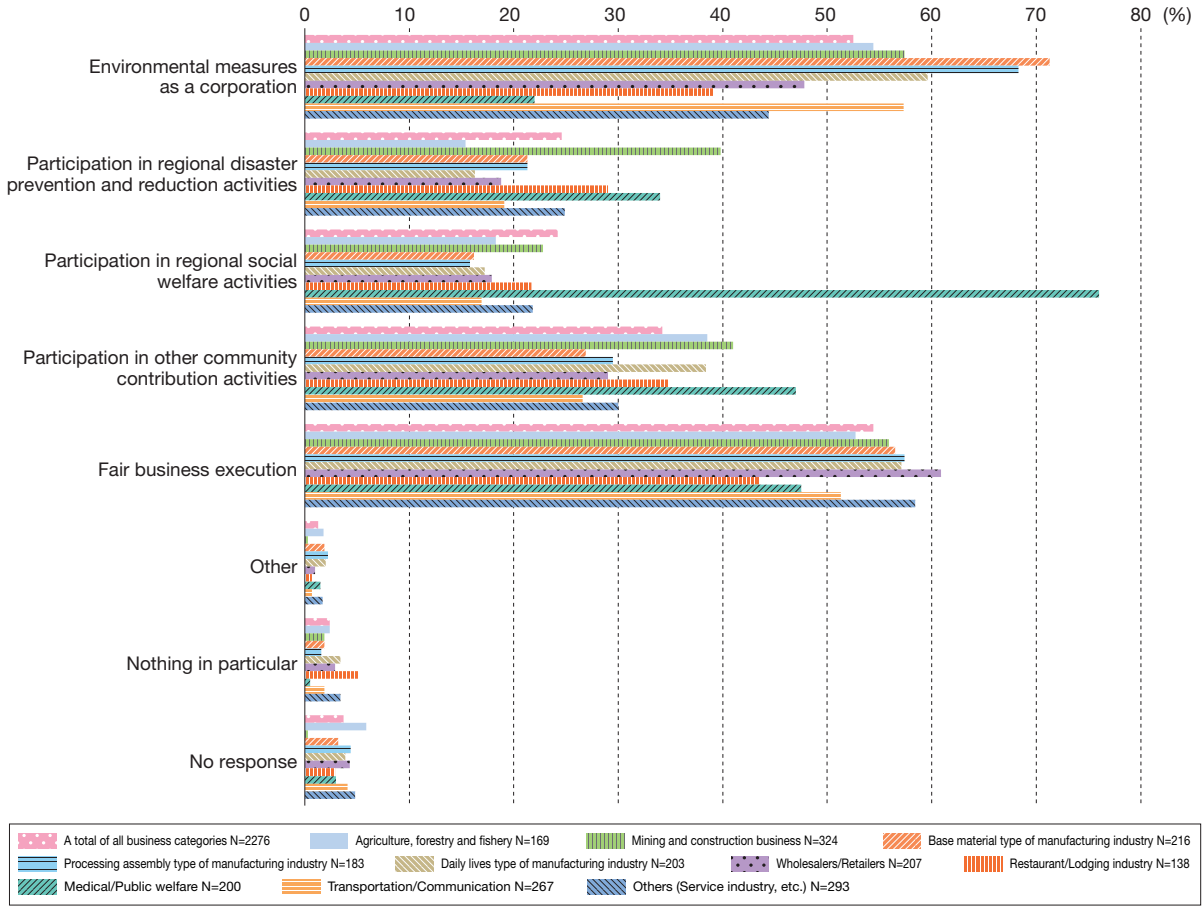
Source) Business Survey by MLIT

- It is difficult to understand information on websites (agriculture)
- I do not know how to obtain information (manufacturing industry).
- I prefer using social networking services (SNS) and emails for dissemination (manufacturing industry)
- Presentation at train stations, etc. (manufacturing industry)

(7) Awareness of social responsibilities

The survey results on the awareness of CSR (corporate social responsibility) among businesses showed their strong awareness on environmental measures and fair business execution. On the other hand, the analysis by business categories indicates that the manufacturing industry and transport and communication industries are particularly conscious of "environmental measures" and the mining and construction businesses are particularly conscious of "regional disaster prevention and reduction activities" while the medical and public welfare industries are especially conscious of "regional disaster prevention and reduction" and regional social welfare activities, indicating unique consciousness by each business category (Figure 2-3-29).

Figure 2-3-29 What they place emphasis on corporate social responsibilities.



(Note) A total of all business categories includes 76 businesses that could not be categorized.
Source) Business Survey by MLIT

(The elimination of traffic jam and the promotion of modal shift)

According to the Contractor Survey of the Ministry of Land, Infrastructure, Transport and Tourism, their expectations on infrastructures to take measures for corporate social responsibilities include the elimination of traffic jam (nearly 50%) and the promotion of modal shift (about 18%) (Figure 2-3-30). While a relatively small number of respondents mentioned the promotion of modal shift, compared to other items, the logistic industry in particular is promoting the effort to streamline logistics such as joint transportation and modal shift, which contribute to the elimination of traffic jam through the coalition of cargo owners and logistic companies, in order to response to the shortage of bearers, besides environmental measures.

In addition, some corporations are promoting the streamlining of logistics such as more advanced modal shift. By introducing these utilization cases, it is necessary to disseminate their efforts widely to promote such efforts among a wide range of businesses concerned.

■ Cases of modal shift

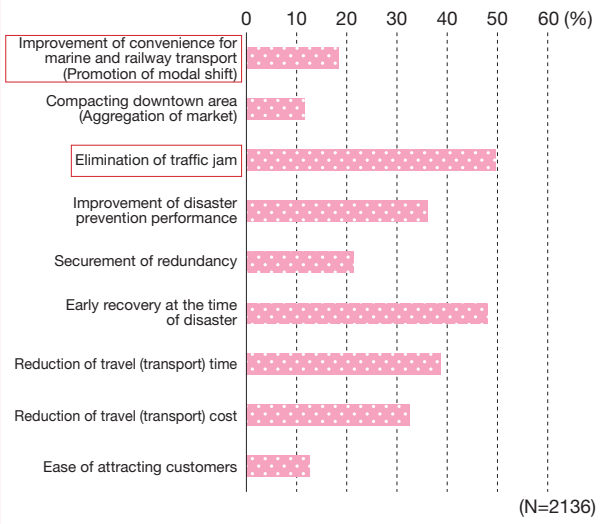
• Nestle Japan Ltd., Zenkoku Tsuun Ltd. and Japan Freight Railway Company, etc.

While the companies are making modal shift to railways and coastal shipping, they are promoting the standardization of palletizing operation (the standardization of cargo handling method, which products are loaded on pallets) and the promotion of utilizing diverse human resources such as women through the release of external drivers of childcare facilities, as well as environmental measures and countermeasures for the shortage of long-distance drivers in a comprehensive manner.

• SHIMAMURA Co., Ltd., Nohhi Logistics Co., Ltd., Japan Express Logistics Corp., etc.

After unpacking and unloading import cargos, the companies converted the empty marine containers for domestic cargos and switched the transport of clothing and bedding from truck to railway. In addition, they load machinery on empty containers as export cargos and transfer to Tokyo by railway for export.

Figure 2-3-30 Expectations on infrastructures for corporate social responsibilities.

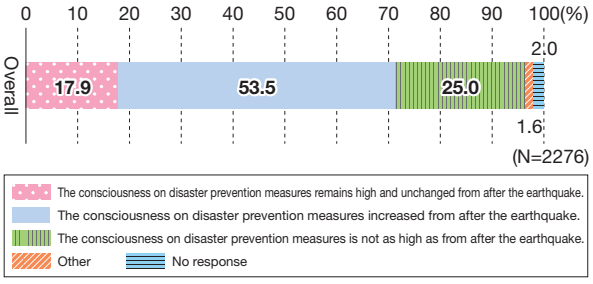


Source) Business Survey by MLIT

(8) Awareness on disaster prevention measures

Since five years have passed from the Great East Japan Earthquake, we surveyed the consciousness of the current disaster prevention measures. As the result, nearly 70% of the average of all business categories responded that they are still highly conscious or they raised their consciousness, compared to the consciousness immediately after the earthquake (Figure 2-3-31). After all, even five years have passed after the earthquake, the businesses still strongly remember the Great East Japan Earthquake. Also, after the Great East Japan Earthquake, there seems to be an impact of major disasters such as sediment-related disasters and heavy rainfall/floods.

Figure 2-3-31 Their consciousness on the disaster prevention measures after five years from the Great East Japan Earthquake.

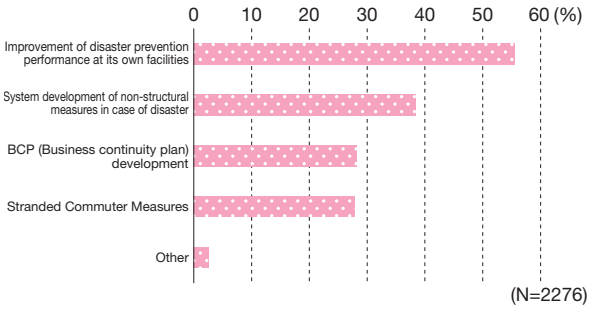


Source) Business Survey by MLIT

Next, the survey on the awareness of corporate activities on disaster prevention measures revealed that they are conscious of the promotion of disaster prevention performance of their own company's facilities, followed by the system development of non-structural measures and the development of BCP (Business Continuity Plans) (Figure 2-3-32).

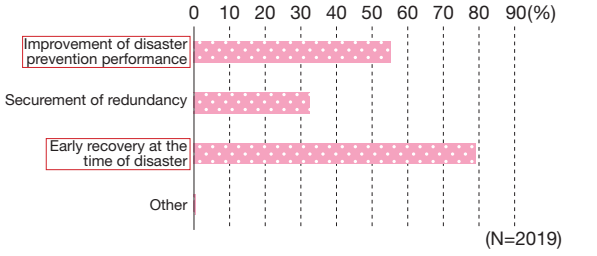
On the other hand, as for the survey on what they seek from the infrastructures as a countermeasure for above, the response, "the early recovery at the time of disaster" exceeded "the promotion of disaster prevention performance" (Figure 2-3-33).

Figure 2-3-32 What they place emphasis on disaster prevention measures.



Source) Business Survey by MLIT

Figure 2-3-33 Their expectations to the infrastructures for disaster prevention measures



Source) Business Survey by MLIT

We can infer that this shows the consciousness of private businesses that they experienced major disasters such as the Great East Japan Earthquake and they are somewhat prepared for unavoidable disasters and seek early recovery after disasters.

(9) Expectations on inbound tourism

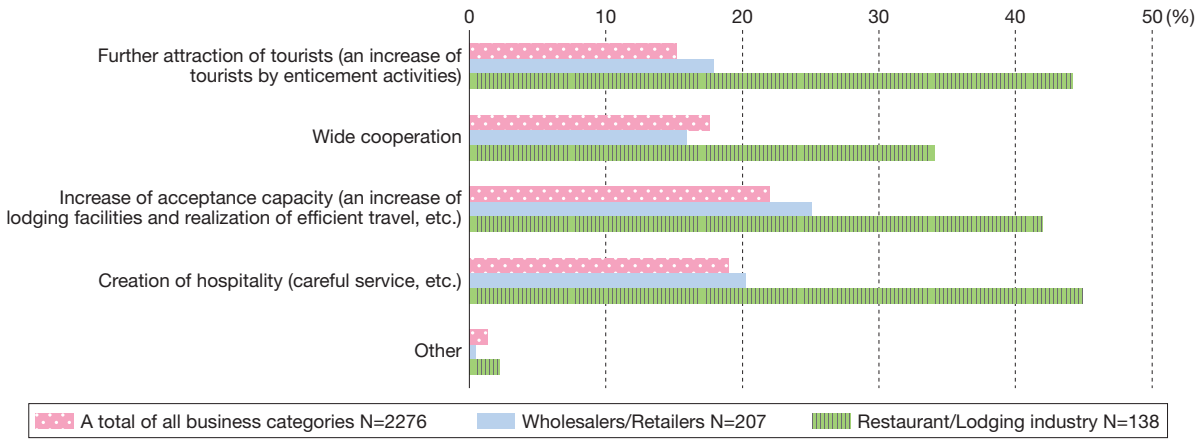
The number of tourists visiting Japan from abroad is increasing yearly and people's expectations on the economic front are on the rise. To that end, we surveyed what they place emphasis on corporate activities for inbound tourism.

The business category that indicated the most active awareness was the restaurant and lodging industries. As an expectation on so-called binge shopping, although we also anticipated that the wholesalers and retailers show a high expectation, the results were not so different from the total of all business categories (Figure 2-3-34).

Here, the analysis of their expectations on infrastructures indicates that they are seeking the construction of broad sightseeing routes, the functional enhancement of traffic facilities (improvement of transfer convenience) and the enhancement of information provision for foreigners (Figure 2-3-35).

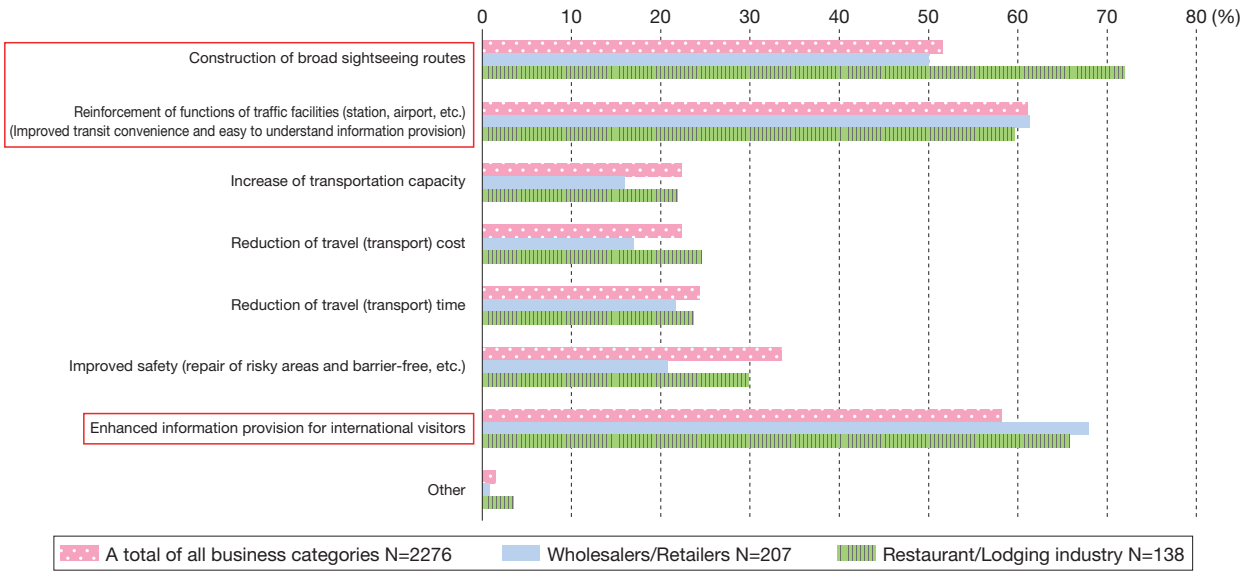
Abobe expectations are stronger than the increase of transportation capacities and the reduction of travel costs. Other than increasing capacities, the results indicate their awareness that they have not been able to fully lead foreign tourists to all over the country.

Figure 2-3-34 What they place emphasis on the response to inbound tourism.



Source) Business Survey by MLIT

Figure 2-3-35 What is sought for infrastructures to respond to inbound tourism



Source) Business Survey by MLIT

Summary

According to the questionnaire survey on the private businesses, who are the users of infrastructures, we confirmed that they have high expectations on infrastructures, such as traveling (transport) time and the reduction of costs [Note 52], for increasing the productivity of corporate activities, indicating diverse and close relation with the infrastructures. On the other hand, for the proposal of a smart use of infrastructures, not many private businesses take an active stance indicating their willingness to participate [Note 53] and many answered "Neither."

In addition, According to monitor survey targeting citizens (individuals), as for the maintenance management of infrastructures through resident participation, more than 60% of the citizens wish to take part, indicating a high level of willingness to participate [Note 54].

From a historical angle, during the Edo period, it was often that residents developed bridges on their own for utilization to support their economic activities. For instance, 90% of bridges in Osaka were built by residents, which are called town bridges. The 808 Bridges of Naniwa supported the residents' economic activities and played a important role in supporting the development of daily lives and cities [Note 55]. In the Osaka city surrounded with many waterways, the bridges are required infrastructures. It is thought that the merchants at that time had good understanding of the functions, make the best of functions, supported economic activities and contributed to the development of a mercantile city, Osaka.

At present, there are many cases similar to Edo period, such as the location of a new plant by FANUC Corporation in Tochigi, the construction of a new plant by Daihatsu Motor Kyushu Co., Ltd. in Nakatsu Port in Oita and the transfer of headquarters in the same area, as well as the advancement of Niigata JAMCO to Murakami, Niigata. The private businesses build new plants, etc. in order to utilize the convenience in a proactive manner [Note 56], by keeping with or expecting the development of transportation infrastructures such as roads, ports and harbors.

Although historical backgrounds vary, the above cases share a common ground that the private entities recognize the functions of infrastructures to make maximum use of infrastructures, and as a result, it leads to increase economic activities and corporate activities.

In this way, if the corporations focus attention on stock effects by infrastructure development to make maximum use of the effect, it would appear that it leads to increase in the productivity of corporations. For the administration, it is important to approach the visualization of seeing and showing stock effects.

For instance, as introduced in Section 1, Chapter 2, with the use of big data, questionnaires and other various methods, we can expect that the stock effects are understood objectively as much as possible to make available to the public ("visualizing") and by providing stock effects more effectively to share with users (namely "visualizing"), the users of infrastructures can realize the stock effects much further.

For the future, based on the perspectives above, it is required to increase social-based productivity and contribute to sustainable and strong growth by putting effort into strategic infrastructure development, such as "smart investment and use" and "visualizing" the stock effects.

Note 52 By narrowing down to the Tertiary Industry in particular, the results show that they have a higher expectation to the ease of attracting customers, lively space and the aggregation of markets than other industries.
Note 53 By industries, the restaurants and lodging industries score prominently high and the basic material type manufacturing industry scores extremely low.
Note 54 Refer to Section 2-1, Chapter 1.
Note 55 Source: The website of Osaka-shi
Note 56 Refer to Section 1-1, Chapter 2.