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Highway/Freeway System, Japan

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Despite geographic constraints, Japan has developed an extensive and efficient road system. The network of expressways connects all major urban areas. Bridges and tunnels link three of the four main islands. The road system supports the travel and tourism industry by contributing to the accessibility of rural and mountainous areas. However, road travel faces competition from rail travel, which tends to be cheaper and faster. Congestion is a major problem, especially in urban areas, and social and environmental issues are becoming increasingly important. The road system is also vulnerable to extreme weather conditions and natural disasters. This entry gives an overview of the road system in Japan, including geography's impact and the expressway network's coverage. It also discusses the history of the road system, use, impact on tourism, and ongoing maintenance issues.

Geography and Network Coverage

The Japanese road system is constrained by geographic factors. The country is formed by four main islands (Honshū, Hokkaido, Shikoku, and Kyūshū) and approximately 400 other small, inhabited islands. The island of Honshū represents 60% of the area and 80% of the country's population. As 70% of the country is mountainous, the population is concentrated along the coastal areas, especially in three large, metropolitan areas located on the east coast of Honshū. Kantō (including Tokyo and Yokohama) has 35 million people, Keihanshin (including Osaka, Kyoto, and Kobe) has 18 million, and Chūkyō (including Nagoya) has 9 million.

According to the Road Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), as of April 2011, the Japanese network of expressways was 7,900 kilometers long. The network's growth has been decelerating since the late 1980s. The network increased 31% in the period from 1985 to 1990, 21% from 1990 to 1995, 16% from 1995 to 2000, 12% from 2000 to 2005, and only 5% from 2005 to 2010. The expressway length per land area is comparable with that of many developed countries, but the length per person is below the average. For example, in 2006, Japan had 58 kilometers of expressways per 1,000 people, compared to 253 kilometers per 1,000 people in the United States.

The expressway network connects all the major urban areas in the country. The network is continuous from the northern part of Honshū to the southern part of Kyūshū. The Tohoku Expressway connects the cities of Sendai and Aomori in the northern part of Honshū and the Tokyo metropolitan area. The Tōmei Expressway and Chūō Expressway connect Tokyo and Nagoya. The Meishin Expressway connects Nagoya and the Kantō area. The Sanyō Expressway and Chugoku Expressway connect the Kantō area, the southern part of Honshū (including the city of Hiroshima), and Kyūshū Island.

The expressway network coverage varies across the different regions of the country. Expressway density is relatively low in regions where population density is also low, including the west coast of Honshū, the interior of Hokkaido, the southern part of Shikoku, and the eastern part of Kyūshū. In contrast, a complex network of circular and radial routes serve the three main metropolitan areas. For example, the Shuto Expressway is a system of 24 routes covering a length of 300 kilometers in the Tokyo Metropolitan Area. The Hanshin Expressway is a system of 16 routes covering 240 kilometers in the Kantō region.

Fixed links are crucial to ensuring the mobility of people and goods between different islands. The Honshū-Shikoku bridge system is a group of three routes connecting the two islands. The island of Kyūshū is also linked with Honshū by a road bridge and a tunnel. There is no

fixed road link between Honshū and Hokkaido, as the existing Seikan Tunnel linking the two islands is used only by railways. The Tokyo Bay Aqua-Line opened in 1997, connecting Kawasaki, in the Tokyo metropolitan area, with the Chiba prefecture by a 4.4-kilometer bridge and 9.6-kilometer tunnel. It reduced travel time from 90 to 15 minutes. In addition to fixed links, an extensive network of ferry services connects the main islands and some of the smaller islands to transport people and vehicles. Ships with shorter routes usually have small capacity. There are also international ferry connections to China, Russia, and South Korea.

In addition to the expressway network, Japan has 55,000 kilometers of national roads, 129,000 kilometers of prefectural roads, and 1,020,000 kilometers of city, town, and village roads. The road networks on the smaller islands are limited. Okinawa Island is served by a 57-kilometer expressway and several highways, but most other islands have a single highway.

The topography of the country constrains road alignments and, in many cases, forces the construction of bridges and tunnels. This increases road construction and maintenance costs. The Japanese road network includes 12,643 kilometers of bridges and 3,815 kilometers of tunnels. The 11-kilometer Kanetsu Tunnel, in the northwestern part of Honshū, is one of the longest tunnels in the world.

With regard to road quality, 62% of the road networks are classified as improved, 40% of which are wider than 5.5 meters. Paved roads represent 91% of the national highways, 63% of the prefectural roads, and 19% of the city, town, and village roads. Expressway capacity is variable. Most expressways have four lanes, but sections in urban areas may have six lanes and sections in rural areas may have two lanes.

History

The Japanese road system structure can be traced back to the Taika Era (645–650 CE) and the establishment of a central government, which created a network of seven roads centered in Kyoto. Road network development was delayed due to the mountainous geography of the country and the availability of water transportation. The modernization process started during the Meiji Era (1868–1912) gave priority to railway development, to the detriment of the road network. The impact of World War II also contributed to the deterioration of the country's road infrastructure. An often-cited 1956 report by an economic adviser to the Japanese government highlighted the poor state of the roads, which he said were more neglected than any other industrial nation.

The period of fast economic growth from the 1950s to the late 1980s increased demand for the ownership and use of private vehicles. This provided conditions for an investment in the road network. The Road Construction and Improvement Act was enacted in 1952, allowing the government to borrow funds. It also introduced a toll system to provide revenue to repay the investment. The option was introduced in 1953 earmarking revenue from fuel and vehicle taxes for the construction of new highways. This provided financing for unprofitable projects. The first of a series of 5-year plans for road development started in 1954. The Japan Highway Public Corporation was created in 1956 and took responsibility for the construction of new roads. Other public corporations were later established to construct expressways in urban areas. Several projects were completed during this period, including the Kanmon Roadway Tunnel linking Honshū and Kyūshū in 1958, and the first section of the Meishin Expressway in 1963.

The Japanese economy slowed in the 1990s. In 2001, the MLIT took responsibility for

planning the road network. The highway public corporations, which had accumulated a large amount of debt, were privatized in 2005. The Japan Expressway Holding and Debt Repayment Agency took over the assets and debts. Six new companies were created to operate the infrastructure. Since 2008, funding for new projects comes from general tax revenues. However, prefectures and municipalities have some responsibility over the local road networks and can collect taxes to finance road projects. The expressway network is only 80% complete. There are ongoing projects in all the main islands, including large projects such as the Tokyo Outer Ring Road.

Road Use

One of the distinctive features of the passenger transport sector in Japan compared with other countries is the importance of rail travel. According to 2009 data from the Policy Bureau of the MLIT, rail accounts for 28.7% of all passenger kilometers per year in the country, compared with 51.9% for cars, 6.3% for buses, and 5.5% for air. The share of car kilometers per year increased 10% from 1980 to 2000, but has remained stable during this century and is still much lower than in the United States (87%). Car ownership is also low compared with countries with the same level of development. According to data collected by the Organization for Economic Cooperation and Development (OECD), the number of private vehicles per 1,000 people in Japan (460) is below the OECD average (490), and considerably lower than the United States (740). However, this number grew 62% in the period 1990–2011, compared with an OECD average of 30%.

Public Transportation's Influence on Road Use

Rail travel has a competitive advantage over road travel in Japan due to its efficiency. The Shinkansen (also known as the "bullet train") is one of the fastest trains in the world and links all the major urban areas in the country. The conventional rail network reaches most areas in the countryside. In the large majority of cases, train stations are located in the center of cities and towns. In comparison, road travel is subject to delays and parking restrictions. Most expressways charge tolls, and these tend to be more expensive than in other countries. The overall cost of car travel tends to be higher than the cost of train travel, when including fuel, tolls, and maintenance costs. A trip from Tokyo to Osaka (564 kilometers) takes about 6.5 hours and costs an estimated ¥20,000 by car, compared to 4 hours and ¥14,500 by train. Rail pass availability for students and foreign tourists increases the competitiveness of rail travel, compared with car travel.

Public transportation accounts for a very small share of the number of vehicles and passengers using Japanese roads. According to the Road Bureau of the MLIT, buses and coaches represented only 0.9% of the total vehicle kilometers per year in 2011, compared to 71.1% for passenger cars and 28% for commercial vehicles. Buses and coaches represented 9.1% of the total passenger kilometers per year and cars represented 90.9%.

The Road Network's Impact on Tourism

The road network's wide coverage is a positive factor for the travel and tourism industry, as it contributes to the accessibility of rural and mountainous areas, where rail services are sparse. Roads tend to be in good condition and equipped with facilities, including a total of 970 rest areas. Bilingual road signs promote usability by foreign visitors. However, travel distances are usually long, due to the long and narrow shape of the country. This decreases the

attractiveness of driving compared to air travel and overnight trains and ferries. Road network use in large, urban areas is subject to delays. They may also pose problems for some drivers due to the complexity of the system. In addition, road access to major airports tends to be slow, especially at Narita International Airport near Tokyo.

Congestion and Speed

Road congestion is a major problem on Japanese roads. This is due to the concentrated population and activities, as well as the fact that many national roads cross through the central areas of small cities and towns. As car ownership increases, use has aggravated road congestion. According to the MLIT, the average speed on inter-urban road trips in Japan is 59 kilometers per hour, well below the speeds in France (88 kilometers per hour) and Germany (90 kilometers per hour). This is partly explained by the high levels of congestion in some sections of the network. For example, the average speed on some roads in the Tokyo and Osaka metropolitan areas is lower than 40 kilometers per hour.

Safety

Japan's road safety record has improved considerably over the years. According to data from the Institute for Traffic Accident Research and Data Analysis, the number of fatalities per billion vehicle kilometers decreased from 96.4 in 1970 to 7.2 in 2012. The number of fatalities per 100,000 inhabitants decreased from 21 to 4.1 during the same period. Despite the improvement, road safety is a growing policy concern due to the ageing Japanese population. Individuals over 65 years old are involved in 55% of vehicle fatalities in Japan, well above the share in Europe (30%) and in the United States (14%).

Social and Environmental Concerns

Social and environmental concerns are becoming increasingly important in transportation policy. Large road construction has contributed to the reduction of agricultural land in rural areas and green spaces in urban and suburban areas. In addition, a lack of space in the central parts of cities has led to the construction of elevated roads. The dominance of roads in the urban environment, the high density of buildings and other infrastructure, a lack of large pedestrian-only spaces, and the levels of air pollution and noise, all affect the quality of the experience offered to residents and visitors in large cities.

The use of intelligent transport systems to manage the road network is increasing. Japan was one of the first adopters of the Vehicle Information and Communication System (VICS) in 1996. VICS transmits information in real time about congestion and traffic restrictions. Electronic toll collection systems were introduced in 2001, contributing to the reduction of congestion at toll gates and ferry boarding.

Maintenance

Most Japanese roads are well maintained. However, a large part of the road infrastructure was developed within a short period of time and is now approaching 50 years old. This infrastructure's renewal and maintenance is a challenge, as it requires the allocation of a large amount of resources.

The frequency of floods and landslides during the rainy season, and heavy snowfall in winter

in mountainous areas, pose challenges for road maintenance in many parts of the country. The system is also vulnerable to natural disasters, such as earthquakes, typhoons, and tsunamis. The Great Hanshin earthquake (or Kobe earthquake) in 1995 destroyed several roads, including sections of the Hanshin Expressway. The Great East Japan Earthquake and Tsunami in 2011 caused damage to many roads in the northeastern part of Honshū Island. An estimated 2.1 tons of road infrastructure materials were lost. The restoration and repair of the infrastructure lost and damaged in the region affected, and policy implementation to prevent future disasters, are two of the main priorities of the MLIT. Measures to increase the resistance of roads, bridges, and tunnels to earthquakes are essential in order to reduce the risk of fatalities and property damage.

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See alsoAccessible Issues in Travel and Tourism; Japan; Natural Disasters; Tokyo; Travel Trends in Asia & Pacific

Further Readings

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