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Transportation statistics that can contribute to policies and social infrastructure development aimed at ensuring the healthy growth of cities and providing support for smooth economic activity

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ABSTRACT

This paper aims to discuss the use of city- and transportation-related statistics in the formulation of transportation policies, focusing primarily on ensuring the healthy growth of cities and providing support for smooth economic activity in developing countries. For governments in developing and newly industrialized Asian countries, alleviating road traffic congestion represents one of the most pressing transportation policy needs. In Indonesia, for example, measures aimed at combating road traffic congestion in Jakarta were a key issue in last year's presidential elections.

After detailing the close relationship between cities and transportation, this paper uses several case studies to explain the different statistical standards in developed, newly industrialized, and developing countries. The paper then discusses the statistics and analysis methods that play roles in proposing and evaluating policies and looks at the optimal performance indicators and statistics for policies, using case studies to offer concrete examples.

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1. Introduction: Cities and transportation

Cities and transportation are essentially two sides of the same coin. One of the defining concepts of transportation is the idea of "derived demand"—demand that occurs as a result of the demand for other

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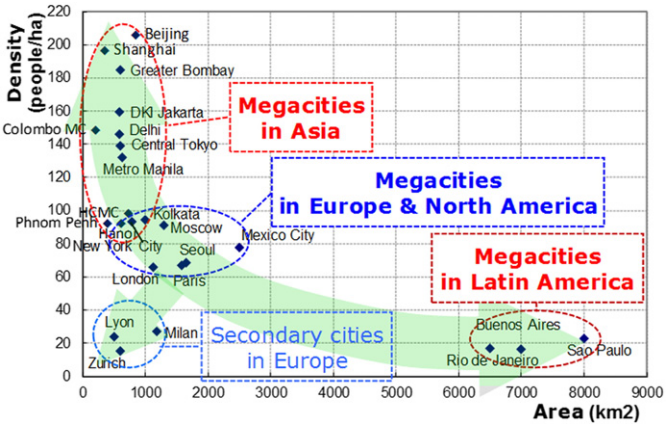

Fig. 1. Area and density in metropolitan areas. Sources: (1) Lyon, Milan & Zurich: Bonnel P. [1994]. *Urban car policy in Europe*, paper presented at the Conference on Car Free Cities, held in Amsterdam. (2) Paris: OCOTRAM. *Study ordered by UITP*. (3) Central Tokyo (23 Wards): Government of Japan. *National Census*. (4) Beijing, Shanghai, Colombo MC, HCMC, Hanoi, Phnom Penh: JICA & other study reports. (5) Others: UNEP & WHO [1992]. *Urban Air Pollution in Megacities of the World*. © Seiichiro AKIMURA, 1995 & 2015.

activities in society. In the context of actual transportation, derived demand accounts for the vast majority of all demand; "elemental demand," or the demand for simply moving things from point A to point B, amounts to a small fraction of the total. When comparing the transportation conditions in multiple cities (zones), one can thus compare city-related statistics like size and population to get a basic idea of how the transportation conditions in the target cities differ.

One example of this approach is the visualization in Fig. 1, which plots the world's major metropolitan areas according to two sets of statistical data: urban zone area and population density. The major Asian metropolitan areas (zones) appear in a group in the top-left portion of the graph, indicating large numbers of people living in small urban zones. This group of cities thus has higher levels of derived demand in the form of traffic volume per unit area than other groups do, which makes them more susceptible to road traffic congestion.

Transportation conditions also depend on city (zone) structure. Fig. 2 shows the population density distribution in the 23 wards of Tokyo (central Tokyo) and the city of Beijing, China. As the data illustrates, the high-population-density ring around the center of central Tokyo spreads out further than its counterpart in Beijing. This is largely due to the fact that the metropolitan area itself is home to several different urban bases like the Tokyo, Shinbashi, Shiodome, Ebisu, Shibuya, Shinjuku, Ikebukuro, and Ueno areas, most of which serve as terminals for public transportation. This decentralized pattern helps mitigate the concentration of traffic in the zone.

The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan has created the "Transport Planning Manual for Large-Scale Development Areas," for your information [1].

2. Developed and newly industrialized countries: Transportation statistics-based classification

City-related statistics alone do not provide enough information to reach an accurate understanding of transportation conditions; one first needs to have a grasp of the characteristics that define the transportation in a given country. To illustrate this concept, Fig. 3 shows how different means of transportation account for varying proportions of all transportation in the United States, the United Kingdom, and Japan. In the United States, a car-oriented society, cars are the primary means of transportation for traveling distances of up to 1,200 km. In the United Kingdom, too, despite its once being dominated by rail travel, cars are the most common means of transportation for distances of up to 500 km; airplanes account for the largest share of trips longer than 500 km. In Japan, meanwhile, railroads represent the main means of transportation for distances of up to 1,000 km. The presence of the Shinkansen network is likely one of the main reasons why rail plays such a dominant role in Japan.

Next, Fig. 4 plots several developed and newly industrialized countries based on the respective shares of railroads and buses/minibuses in the overall transportation picture. The visualization shows three groups in the bottom-left section of the graph, which include the United States, the United Kingdom, and Japan and conform to the connotations of Fig. 2, but also contains two other groups in the top-right and bottom-right portions of the graph.

City (zone) size and other attributes also affect transportation characteristics, even among cities in the same country. Fig. 5 demonstrates this idea by classifying cities (zones) in Japan and France according to the shares of public transportation and cars in each city's transportation environment. According to the graph, cities fall into three basic groups:

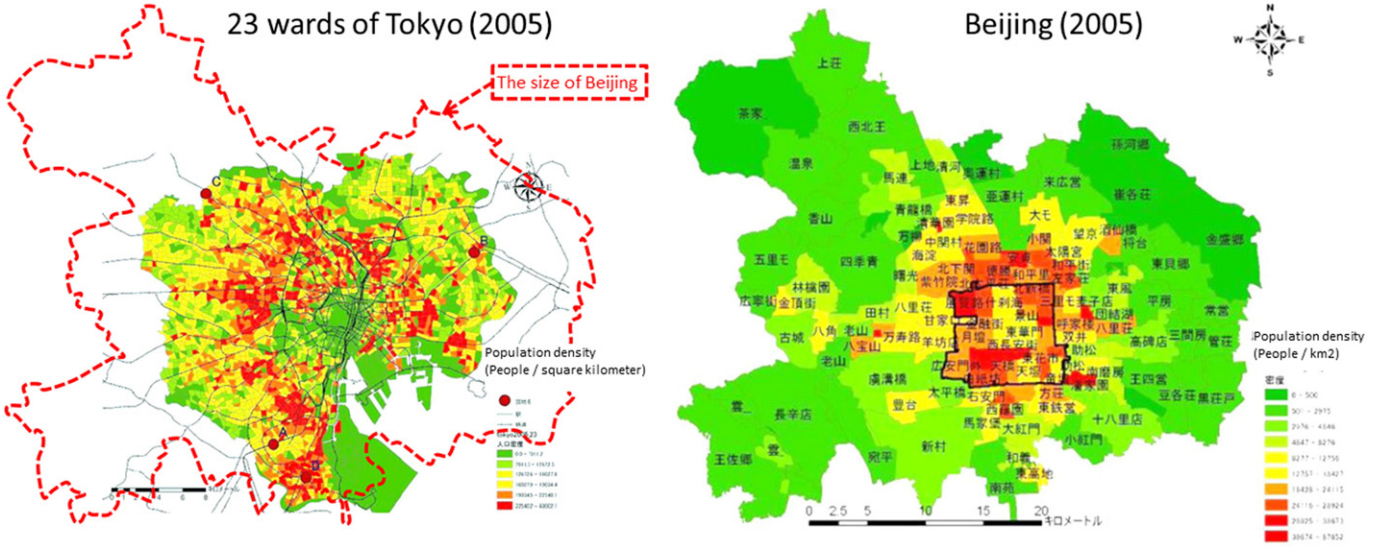

Fig. 2. A comparison of population density distribution (23 wards of Tokyo and Beijing). Source: Yingqui Zhang, "A Study of Resident Purchasing Behavior and Automobile Dependency in New Housing Developments in the Beijing Area" March 2010.