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## **CHARACTERISTICS OF TRAVEL DEMAND**

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## 3. CHARACTERISTICS OF TRAVEL DEMAND

### 3.1 Transportation Surveys and Databases

#### 1) Travel Demand Related Surveys

The Study Team conducted a series of transportation surveys from June to August 2009 which were designed to obtain not only travel demand characteristics at each survey location but also comprehensive transportation demand in the study area. Surveys were conducted to obtain a comprehensive picture of the transportation demand in the study area. These surveys are as follows:

- i) **Commuter Survey:** Surveyor carried out this survey by visiting families randomly selected and interviewing the heads of the families about their personal data and commuting activities. For this survey, about 39,000 households were selected out of the almost 1.3 million households in the SMA, which consists of 839 *desa* (village).
- ii) **Trip Diary Survey:** The Trip Diary Survey aimed to get information about the daily activities within and outside the home during two weekdays, while the Commuter Survey focused only on commuting activities. The respondent households for this survey were selected from the sampled households of the Commuter Survey. About 5,000 households described their activities and the time they did them, as well as the travel modes they took if they ventured outside their homes.
- iii) **Roadside OD Interview Survey:** This survey was carried out at 24 locations in the GKS. Five locations were on a major road crossing the SMA boundary and five were located at the study area's boundary. The rest were located on a major road connecting Kota Surabaya with the adjacent area inside the SMA, and on Tanjung Perak Port. Drivers and passengers of randomly selected vehicles, including freight trucks and buses, were interviewed to obtain information on their movements.
- iv) **Weighbridge Survey:** Weighbridges are located on major roads at kabupaten boundaries to identify overloaded trucks. The survey was conducted at eight weighbridge stations within the GKS and its surrounding areas.

The coverage of these surveys is shown in Table 3.1.1.

**Table 3.1.1 Coverage of Surveys**

Type of Movement	Target Area		
	SMA	GKS	Outside
Person Trips		Roadside OD Interview Survey	
For Commuting Purpose	Commuter Survey		
For Other Purposes	Trip Diary Survey		
Freight Movement	Weighbridge Survey		

Source: JICA Study Team

## 2) Data Processing

In transportation planning, an OD matrix representing person and vehicle trip movements between areas is one of the most important elements to evaluate transportation conditions. To develop this OD matrix for GKS, the results of the OD interview survey were processed through the following steps: (i) origin and destination places were coded in number according to the zoning system, (ii) the sample was expanded to the population to represent whole travel demand, and (iii) the whole demand was calibrated by comparing with the field data obtained from the traffic count. The data processing flow is shown in Figure 3.1.1.

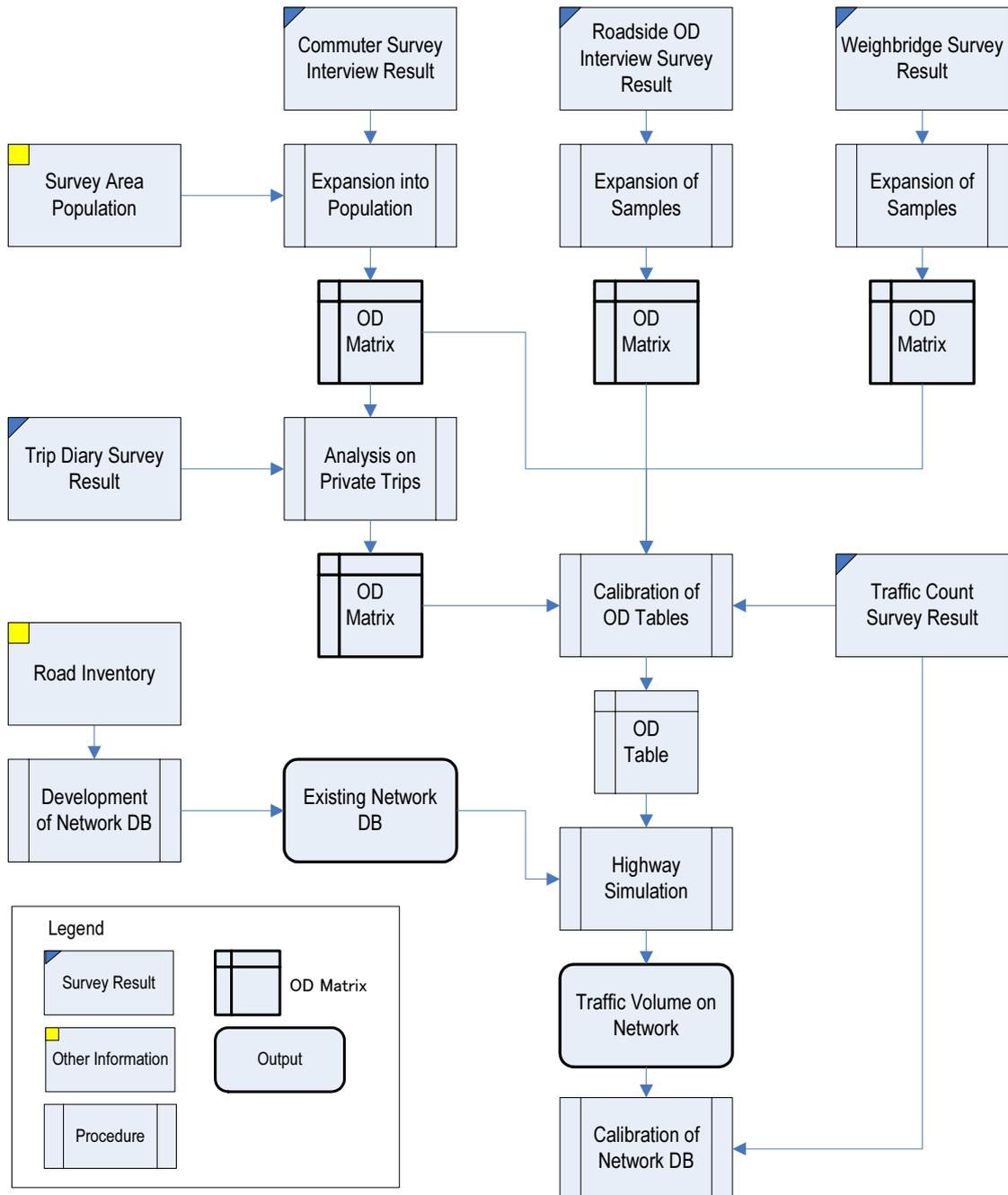


Figure 3.1.1 Data Processing Flow

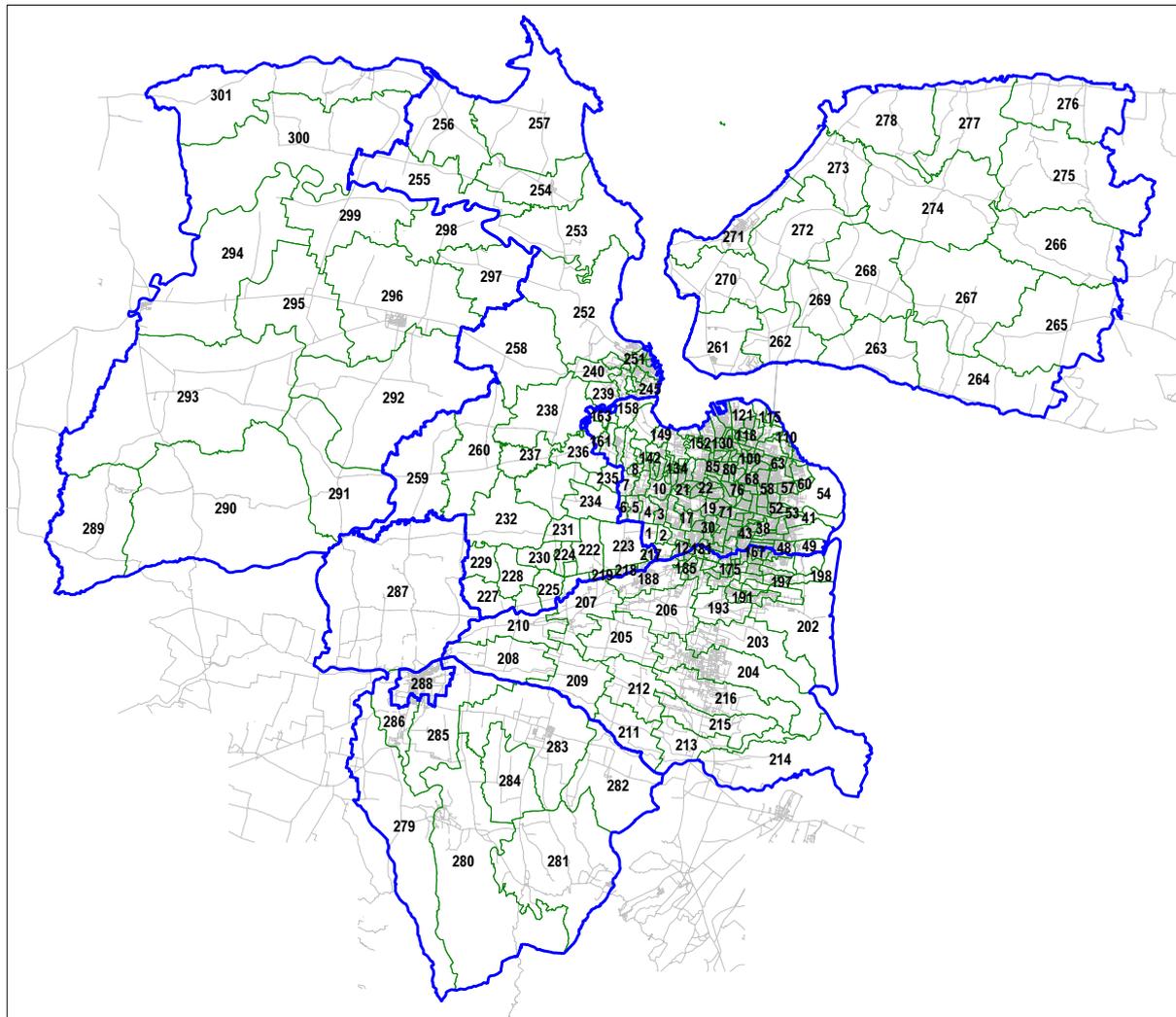
### 3) Traffic Analysis Zones

An OD matrix is a form of trip table that describes travel demand in terms of personal trips or vehicle trips, based on which the number of people or vehicles traveling between areas is calculated. The areas covered by the surveys are called traffic analysis zones (TAZs). TAZs for GKS were defined based on:

- Administrative boundary, especially *kecamatan* (district) and *desa*;
- Size to ensure the accuracy of transportation planning;

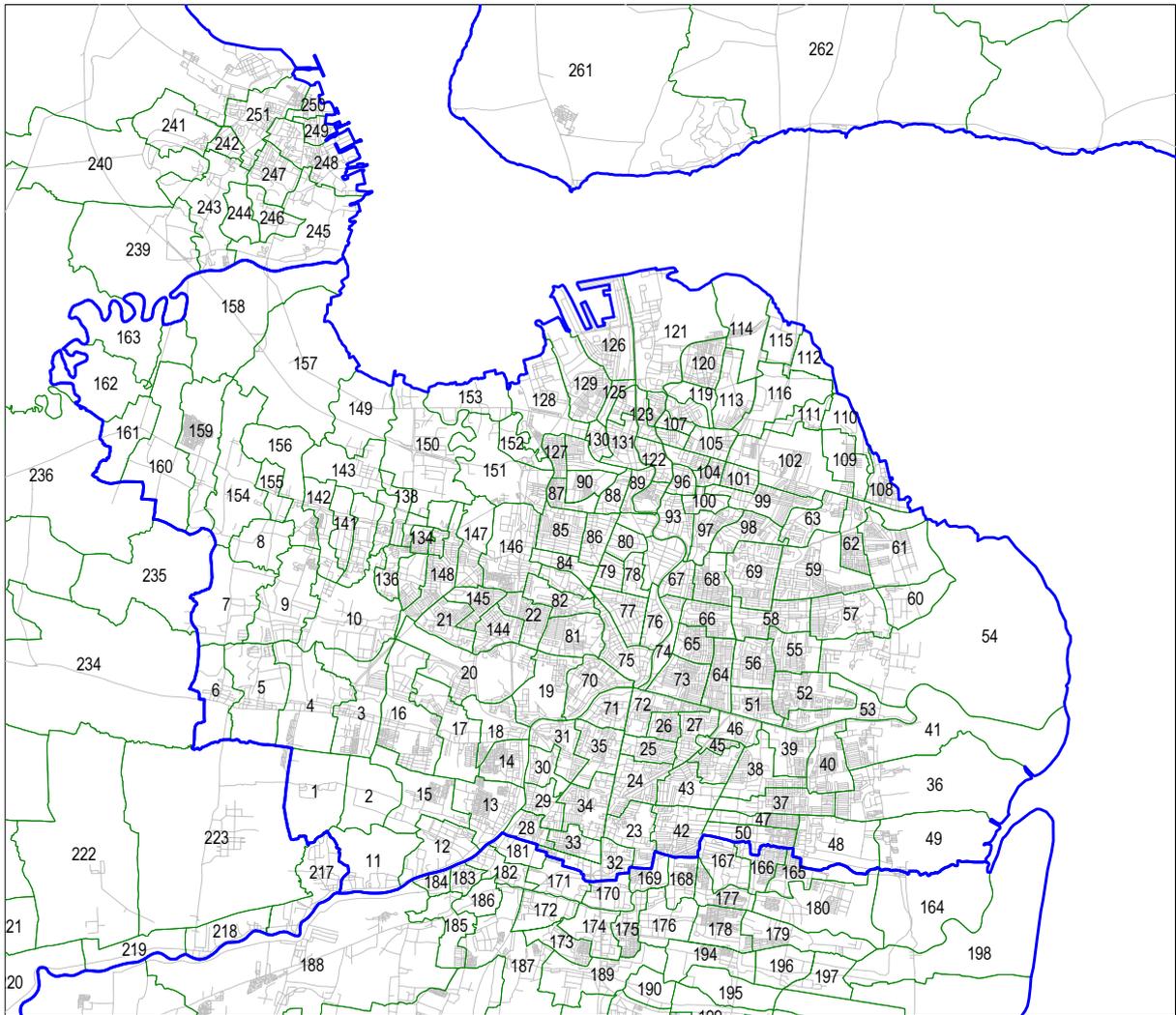
- Location of existing or planned major roads; and
- Availability of geographic data which can be used for transportation analysis.

There are 301 TAZs covering the whole GKS Zone, as shown in Figure 3.1.2 and Figure 3.1.3. The area outside the study area is grouped into 12 TAZs.



Source: JICA Study Team

**Figure 3.1.2 Traffic Analysis Zones in GKS**



Source: JICA Study Team

**Figure 3.1.3 Traffic Analysis Zones in Kota Surabaya**

## 3.2 Socio-economic Profile of Residents

### 1) Demographic Features

The target of the Commuter Survey was the population in SMA who were older than four years. This population stood at 8.1 million, while the number of target households was 2.1 million.

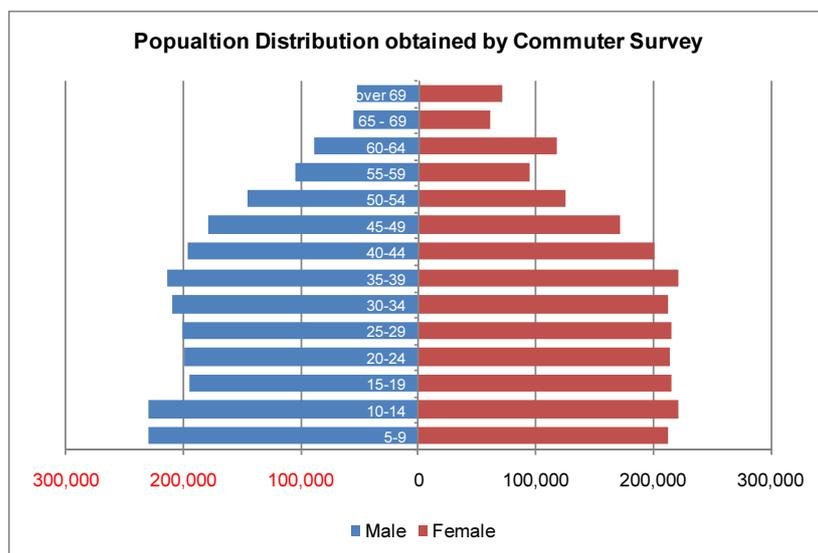
**Table 3.2.1 Household Coverage of Survey**

Area	Population Aged over 4yrs (1,000) <sup>1)</sup>			No. of Households (1,000) <sup>2)</sup>
	Male	Female	Total	
Sidoarjo	784.1	842.7	1,626.8	41.27
Kab.Mojokerto	441.0	469.4	910.3	266.8
Lamongan	528.6	580.7	1,109.2	301.0
Gresik	521.4	539.6	1,061.1	268.5
Bangkalan	387.2	474.4	861.6	216.7
Kota Mojokerto	50.1	53.6	103.7	29.5
Kota Surabaya	1,168.3	1,242.3	2,410.6	618.0
GKS Total	3,880.7	4,202.5	8,083.2	2,113.2

Source: 1) National Socio-Economic Survey (SUSENAS) 2007

2) Village Potential (PODES) 2006

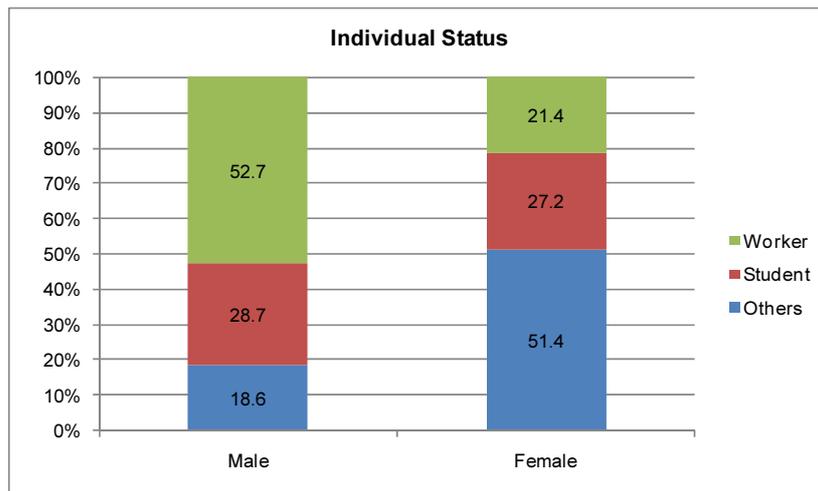
The population structure estimated based on the Commuter Survey is illustrated in Figure 3.2.1. The largest age group is from 10 to 14 years old, representing about 10% of the total target population. About 71% belong to the working generation, ranging from 15 to 59 years old, while 9.6% consists of people aged 60 years and older.



Source: 2009 Commuter Survey, JICA Study Team

**Figure 3.2.1 Population Structure**

Figure 3.2.2 shows the individual status of both male and female respondents. The shares of working people are 52.7% males and 21.4% females. The total number of workers in GKS was estimated at 2.9 million by applying these ratios with the population aged over 4 years. The share of the gainfully employed population, which was calculated as the number of workers divided by the number of population ranging from 15 to 59 years old, was estimated at 51.2%.

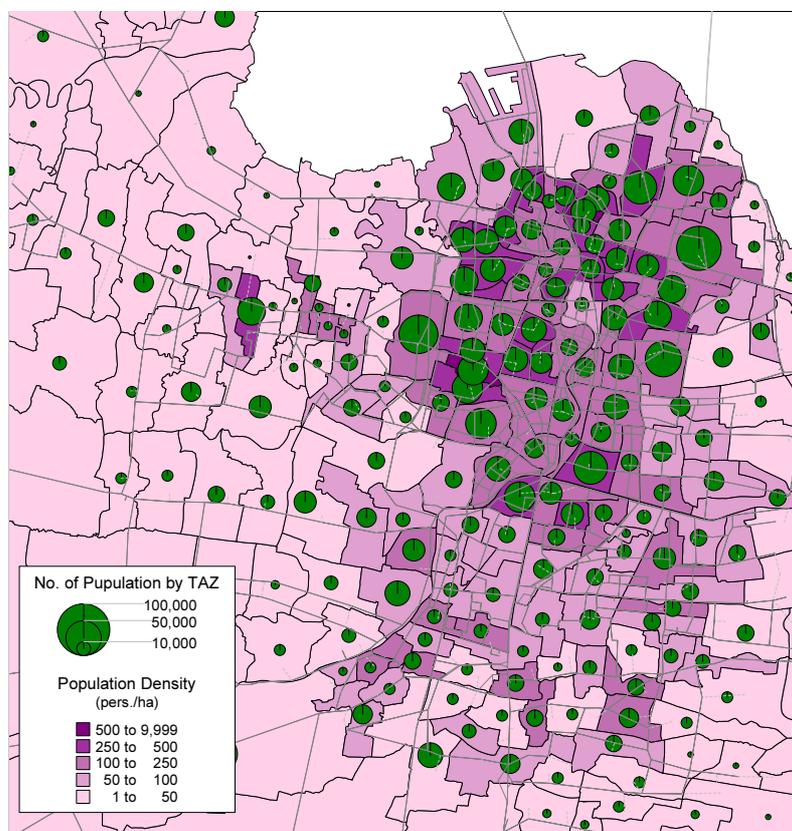
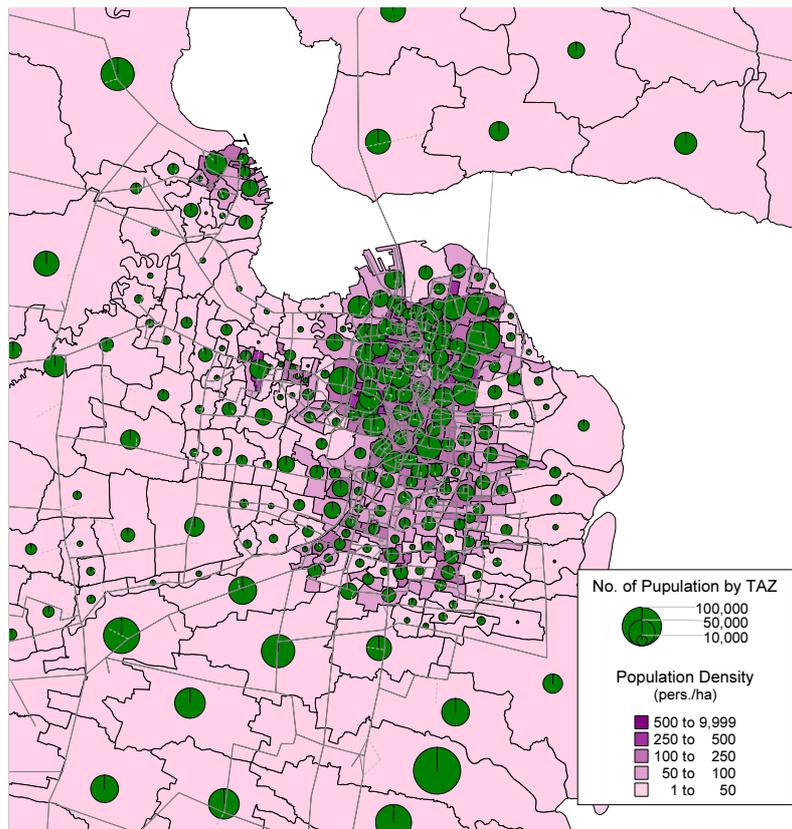


Source: 2009 Commuter Survey, JICA Study Team

**Figure 3.2.2 Status of Population**

Figure 3.2.3 illustrates the distribution of population and the population density by traffic analysis zone. The density was calculated by dividing the population with the area of each TAZ. Outside Kota Surabaya, there are several TAZs with more than 100,000 residents. However, their population density is quite low at 50 persons per hectare at the most.

Inside Kota Surabaya, the most populated TAZ is Kecamatan Tambaksari, followed by Kecamatan Sukomanunggal, although their densities are not so high. High-density TAZs are likely to be oval-shaped surrounding central Kota Surabaya, and their density indicates more than 500 persons per hectare.



Source: 2009 Commuter Survey, JICA Study Team

Figure 3.2.3 Population and Density by TAZ