

# Appendix 1      Transportation Surveys

Situation regarding the usage of railways and other modes by both passengers and freight transport in the Central Java region was investigated by implementing the Railway Traffic Survey, Road Traffic Survey, Travel Speed Survey, Stated Preference Survey on Railway Use and Weigh Bridge Interview Survey.

## 1.1      Railway Traffic Survey

Railway Passenger Count Survey, Railway OD Survey, and Free Ridership Survey were implemented to understand situation regarding railway usage in the Central Java region.

### (1)      Railway Passenger Count Survey

#### 1) Survey Objective

Although ticket sales data is available, railway passenger count survey was conducted to acquire accurate passenger count data and this data can be used not only for basic information to understand the railway usage situation in the Central Java region but also for calibrating origin destination table.

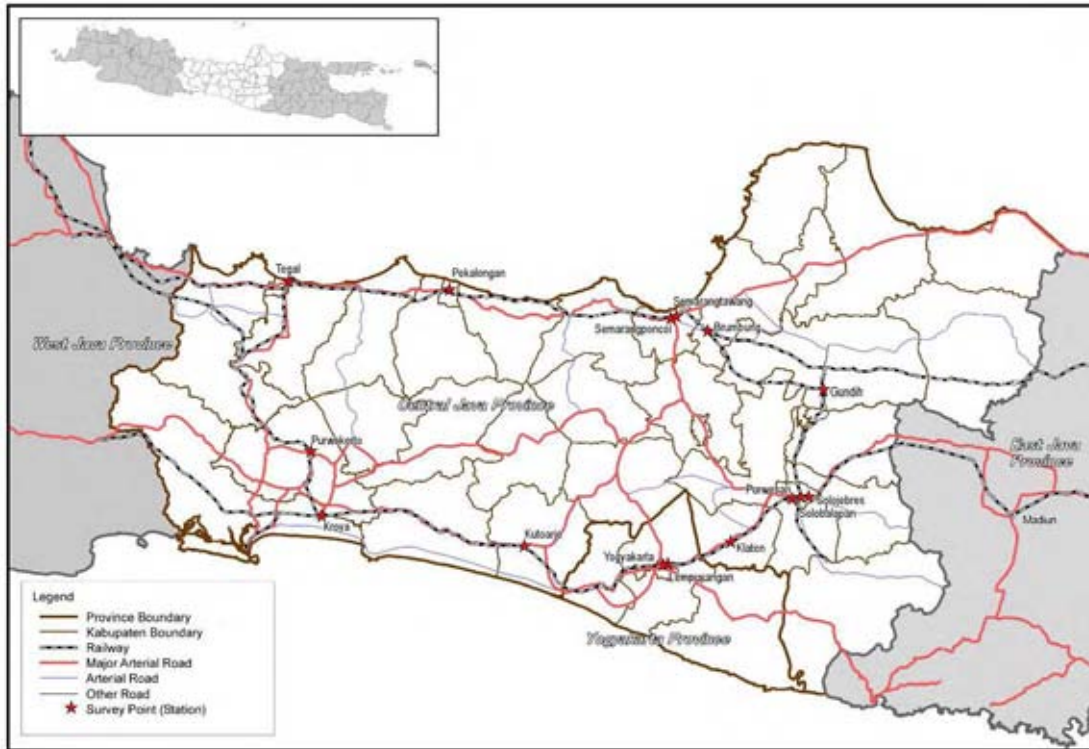
#### 2) Survey Contents

##### a.      Survey Station

The survey was conducted at 15 stations in the Central Java region. Stations are selected based on number of passengers, whether it is a branch station or terminal station of major line, or located in a major city. (See the following table and figure)

**Table 1.1.1      Railway Passenger Count Survey Stations**

Survey Station Names			
Tegal	Brumbung	Kutoarjo	Purwosari
Pekalongan	Gundih	Yogyakarta	Solo Balapan
Semarang Poncol	Purwokerto	Lempuyangan	Solo Jebres
Semarang Tawang	Kroya	Klaten	



**Figure 1.1.1 Stations Covered by Railway Traffic Survey**

**b. Survey Method**

Survey Method is counting all passengers getting on or off each train at the station. The following figure shows an example of passenger count at Solo Balapan station on March 4, 2008.



Source: CJRR Study Team, Railway Traffic Survey, 2008

**Figure 1.1.2 Railway Passenger Count Survey Situation at Solo Balapan Station**

**c. Survey Schedule**

The survey was conducted from 3rd to 18th March, 2008.

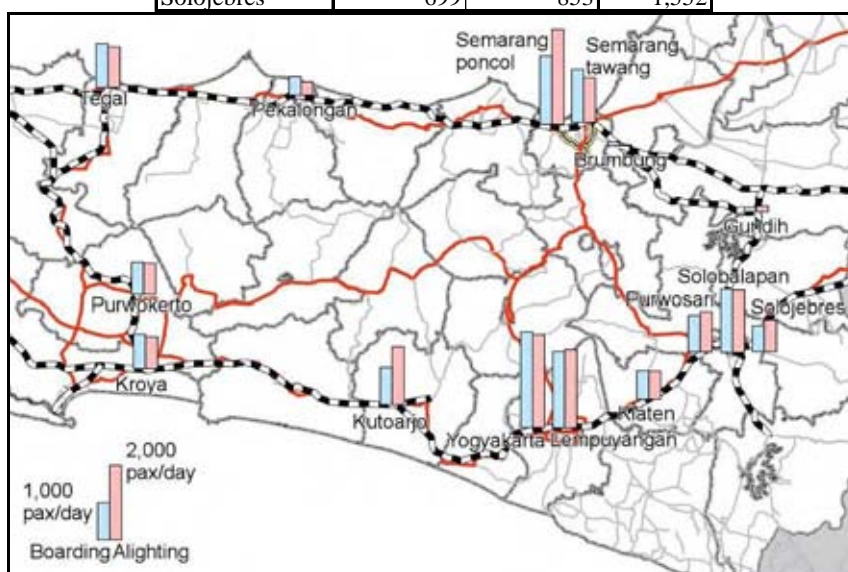
**3) Survey Result**

**a. Passenger volume by station**

Railway passenger count survey result by station is shown as follows. Semarang Yogyakarta station is the largest with 5,063 boarding and alighting passengers per day. Passenger volumes of Semarang Poncol, Solo Balapan, Solo Jebres, and Lempuyangan exceeds 3,000 boarding and alighting passengers per day.

**Table 1.1.2 Passenger Volume by Station**

Station name	Boarding	Boarding	Total
	Passengers	Passengers	
	(pax/day)	(pax/day)	(pax/day)
Tegal	1,182	1,097	2,279
Pekalongan	504	367	871
Semarangponcol	1,835	2,565	4,400
Semarangtawang	1,430	1,210	2,640
Brumbung	95	15	110
Gundih	107	152	259
Purwokerto	857	836	1,693
Kroya	928	869	1,797
Kutoarjo	992	1,553	2,545
Yogyakarta	2,567	2,496	5,063
Lempuyangan	2,055	2,105	4,160
Klaten	778	757	1,535
Purwosari	976	1,069	2,045
Solobalapan	1,684	1,658	3,342
Solojebres	699	853	1,552



Source: CJRR Study Team, Railway Traffic Survey, 2008

**Figure 1.1.3 Passenger Volume by Station**

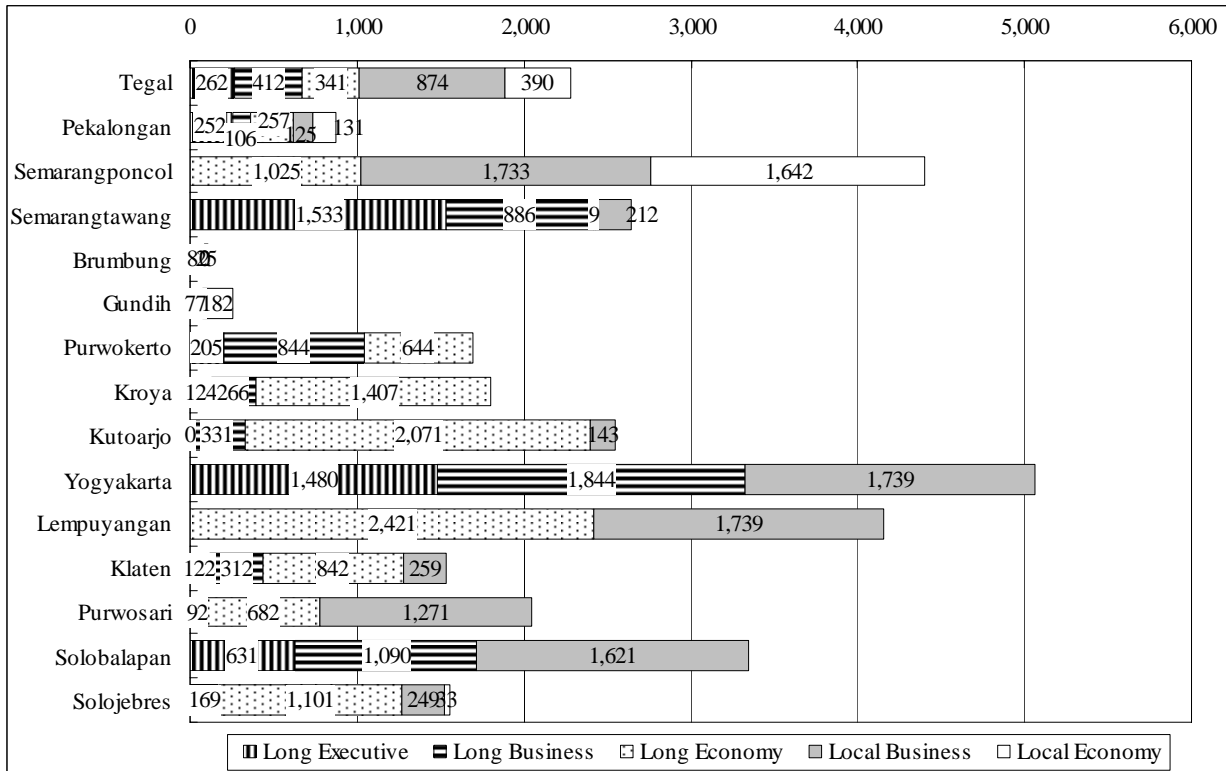
**b. Passenger volume by train type by station**

There are three classes; executive, business and economy, for long distance train and there are two classes; business and economy for short distance train in the Central Java region. Railway passenger by these train types is shown as follows. Total Passenger volume by train types are 4,609 for long distance executive train, 6,435 for long distance business train, 10,877 for long distance economy class train, 9,967 for local business train and 2,403 for local economy train respectively. Approximately 64 percent is long distance train passengers and 39 percent is economy class passengers.

**Table 1.1.3 Boarding and Alighting Passenger Volume by Train Type by Station**

Station name	Long Dist. Executive (pax/day)	Long Dist. Business (pax/day)	Long Dist. Economy (pax/day)	Local Business (pax/day)	Local Economy (pax/day)
Tegal	262	412	341	874	390
Pekalongan	252	106	257	125	131
Semarangponcol	0	0	1,025	1,733	1,642
Semarangtawang	1,533	886	9	212	0
Brumbung	0	83	0	2	25
Gundih	0	0	77	0	182
Purwokerto	205	844	644	0	0
Kroya	124	266	1,407	0	0
Kutoarjo	0	331	2,071	143	0
Yogyakarta	1,480	1,844	0	1,739	0
Lempuyangan	0	0	2,421	1,739	0
Klaten	122	312	842	259	0
Purwosari	0	92	682	1,271	0
Solobalapan	631	1,090	0	1,621	0
Solojebres	0	169	1,101	249	33
Total	4,609	6,435	10,877	9,967	2,403

Source: CJRR Study Team., Railway Traffic Survey, 2008

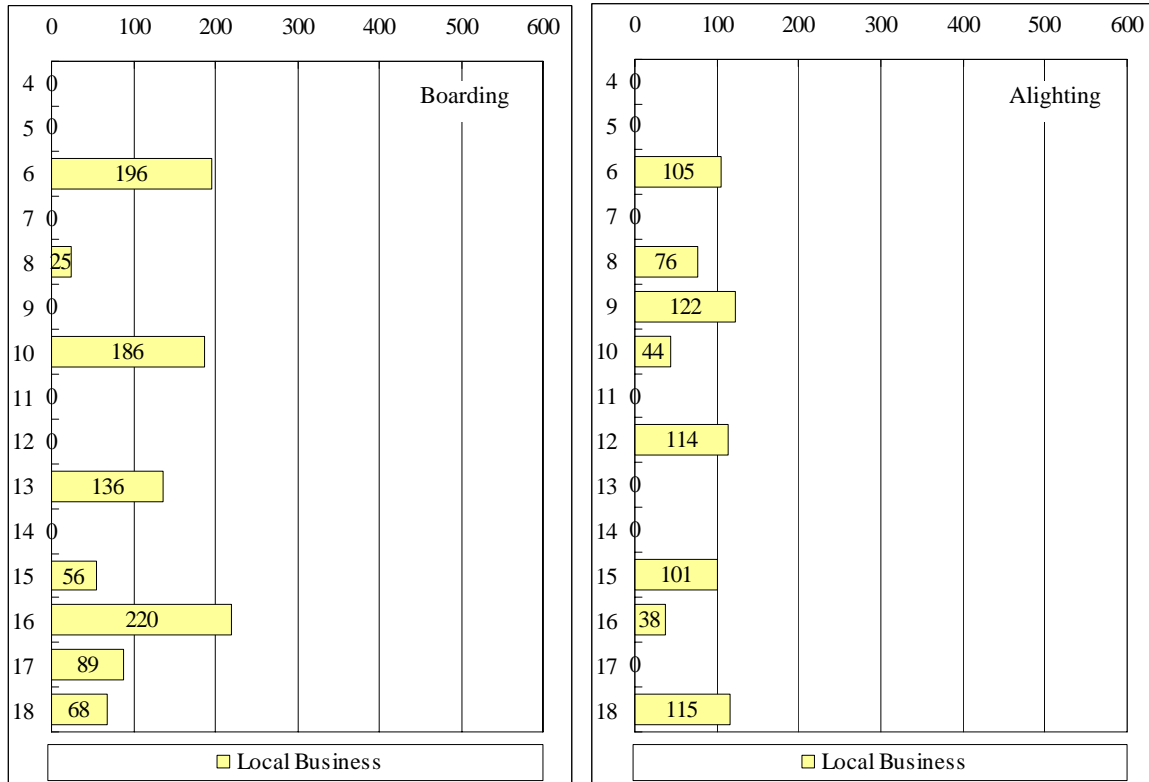


Source: CJRR Study Team, Railway Traffic Survey, 2008

**Figure 1.1.4 Passenger Volume by Train Type by Station**

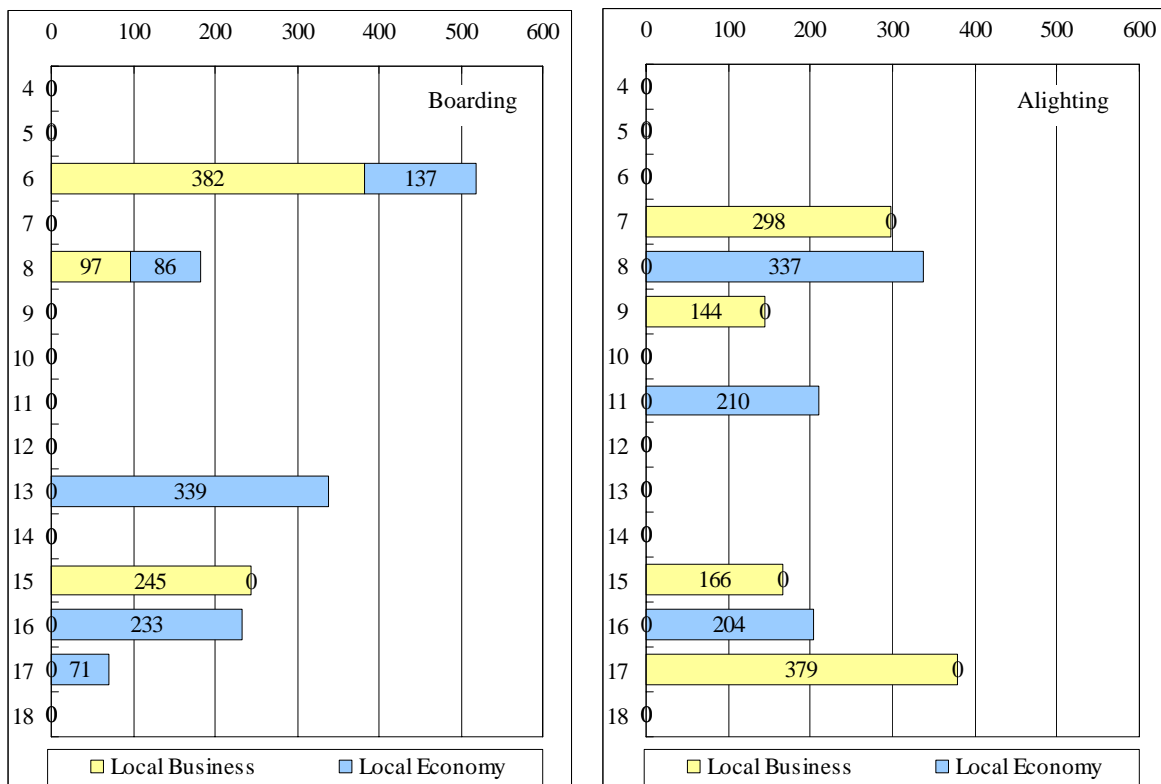
**c. Hourly Boarding Passenger volume of local train by station**

Hourly passenger volumes of Yogyakarta and Solo Balapan station are shown as follows. Although hourly passenger volumes are generally shows its peak in the morning and evening in case of local commuter train, hourly volumes in the Central Java region do not shows clear peak.



Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.15 Hourly Passenger Volume of Local Train at Yogyakarta Station**



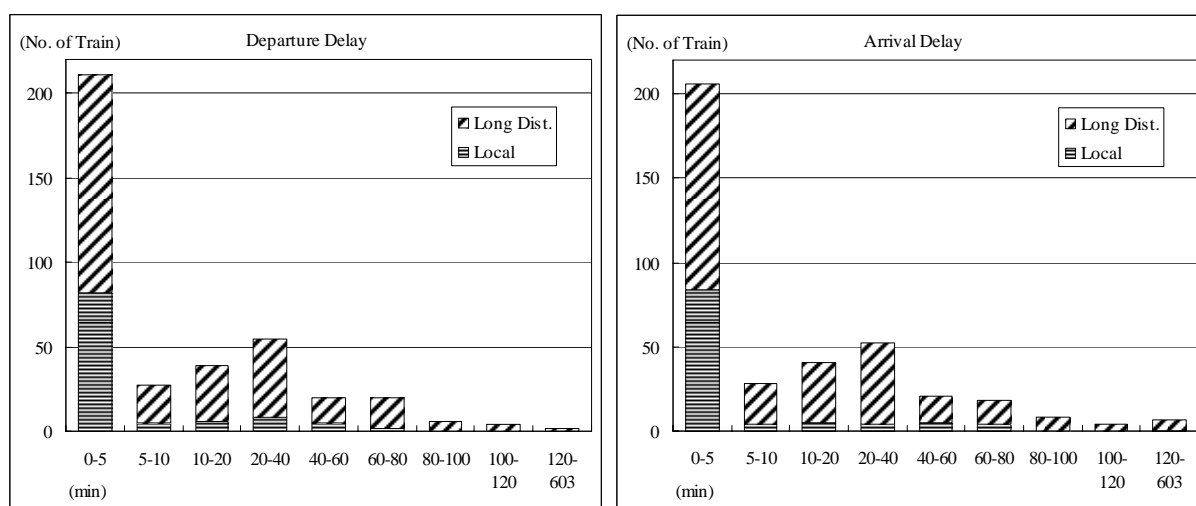
Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.16 Hourly Passenger Volume of Local Train at Semarangponcol Station**

#### d. Delay of Trains

The delay of train is also recorded during the passenger count survey (Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.7). The results are shown as follows. Almost 45 percent of the train delays. The average delay is approximately 20 minutes for arrival and 18 minutes for departure and maximum delay was 10 hours.



Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.7 Train Delay during Railway Passenger Count Survey**

## (2) Railway OD Survey

### 1) Survey Objective

A Railway OD Survey is indispensable to this Study for understanding the OD of railway users. A Railway OD Survey was most recently conducted in 2005 but Yogyakarta was not part of the study area. Furthermore, since almost 6 years have passed since the 2001 survey, a Railway OD Survey was carried out to find out the changes in usage and to make an appropriate forecast of traffic demand.

### 2) Survey Contents

#### a. Survey Station

The same 15 stations in the Central Java region selected for the Railway Passenger Count Survey (See Figure 1.1.1).

#### b. Survey Subject:

10% of boarding passengers were targeted.

### **c. Survey Method**

Obtain OD and OD station data through interviews conducted in waiting rooms and concourse area of the selected stations. The following figure shows an example of passenger count at Solo Balapan station on March 4, 2008.



Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.8 Railway OD Survey Situation at Solo Balapan Station**

### **d. Survey Schedule**

The survey was conducted from 3rd to 18th March, 2008.

### **e. Survey Questions**

Train name, class, origin location, origin station, destination location, destination station, transfer station, access transportation mode, egress transportation mode, trip purpose, alternative transportation mode, the reasons why they use railway.

## **3) Origin and Destination Table Calibration**

### **a. Sampling Ratios**

Sampling Ratios of Railway OD Survey is shown in Table 1.1.4. Average sampling ratio was 23 %. Even the smallest sampling ratio, 13.3 % at Lempuyangan station, is more than expected sampling ratio of 10%. This will increase data reliability of tabulated OD table.



**Table 1.1.4 Sampling Ratios of Railway OD Interview Survey**

Station Name	Boarding Passengers	No. of Respondents	Sampling Ratios
Tegal	1,182	326	27.6%
Pekalongan	504	176	34.9%
Semarangponcol	1,835	252	13.7%
Semarangtawang	1,430	334	23.4%
Brumbung	95	20	21.1%
Gundih	107	22	20.6%
Purwokerto	857	367	42.8%
Kroya	928	199	21.4%
Kutoarjo	992	301	30.3%
Yogyakarta	2,567	550	21.4%
Lempuyangan	2,055	273	13.3%
Klaten	778	225	28.9%
Purwosari	976	206	21.1%
Solobalapan	1,684	365	21.7%
Solojebres	699	224	32.0%
Total	16,689	3,840	23.0%

Source: CJRR Study Team., Railway Traffic Survey, 2008

**b. Origin Destination Table Calibration Methodology**

Origin and destination table of railway users in the Central Java region was calibrated by railway passenger count survey and railway OD survey results. Expansion factor by train by survey station were calculated by dividing boarding passengers of the train by the number of OD survey respondents. Since the passengers who will alight at non-surveyed stations can represent boarding passengers at non-surveyed stations, these samples with opposite OD were added for OD table.

**4) Survey Results**

**a. Origin Destination Table by Major Stations**

Daily passenger flow between major stations were surveyed in Railway Traffic Survey (Table 1.1.5). Passenger volumes from / to Jakarta is the largest amongst all stations except Yogyakarta and Solo station. In the Central Java region, Yogyakarta – Solo, Semarang – Tegal, Semarang – Cepu, Kutoarjo – Yogyakarta, Semarang – Pekalongan have larger number of passengers in order.

**Table 1.1.5 Daily Passenger Flow between Major Stations**

From/To	The Central Java Region										External Zone			Total
	Cepu	Klaten	Kroya	Kutoarjo	Pekalonga	Purwokert	Semarang	Solo	Tegal	Yogyakarta	Jakarta	Bandung	Surabaya	
Cepu	-	-	-	-	15	-	332	-	-	-	-	-	-	346
Klaten	-	-	5	1	-	4	-	66	-	81	420	39	39	656
Kroya	-	5	-	12	-	15	3	55	-	60	313	99	41	604
Kutoarjo	-	4	12	-	-	93	-	42	-	257	848	186	96	1,537
Pekalongan	15	-	-	-	-	-	100	-	63	-	239	14	52	482
Purwokerto	-	-	15	34	-	-	-	10	-	22	455	-	50	587
Semarang	332	-	-	-	116	-	-	92	508	24	1,746	39	280	3,137
Solo	-	43	26	11	5	69	39	-	9	1,514	670	251	215	2,852
Tegal	-	-	-	-	-	-	685	6	-	-	588	7	37	1,323
Yogyakarta	-	22	19	184	-	97	-	1,307	-	-	1,251	390	281	3,551
Jakarta	-	424	313	848	239	455	1,747	711	588	1,251	-	-	-	6,576
Bandung	-	39	99	186	14	-	39	251	7	390	-	-	-	1,024
Surabaya	-	39	41	96	52	50	283	215	37	281	-	-	-	1,093
<b>Total</b>	<b>346</b>	<b>575</b>	<b>531</b>	<b>1,372</b>	<b>440</b>	<b>784</b>	<b>3,228</b>	<b>2,753</b>	<b>1,211</b>	<b>3,881</b>	<b>6,531</b>	<b>1,024</b>	<b>1,090</b>	<b>23,766</b>

Note: Semarang, Solo, Yogyakarta, Jakarta, Bandung, Surabaya include all the stations in each city.

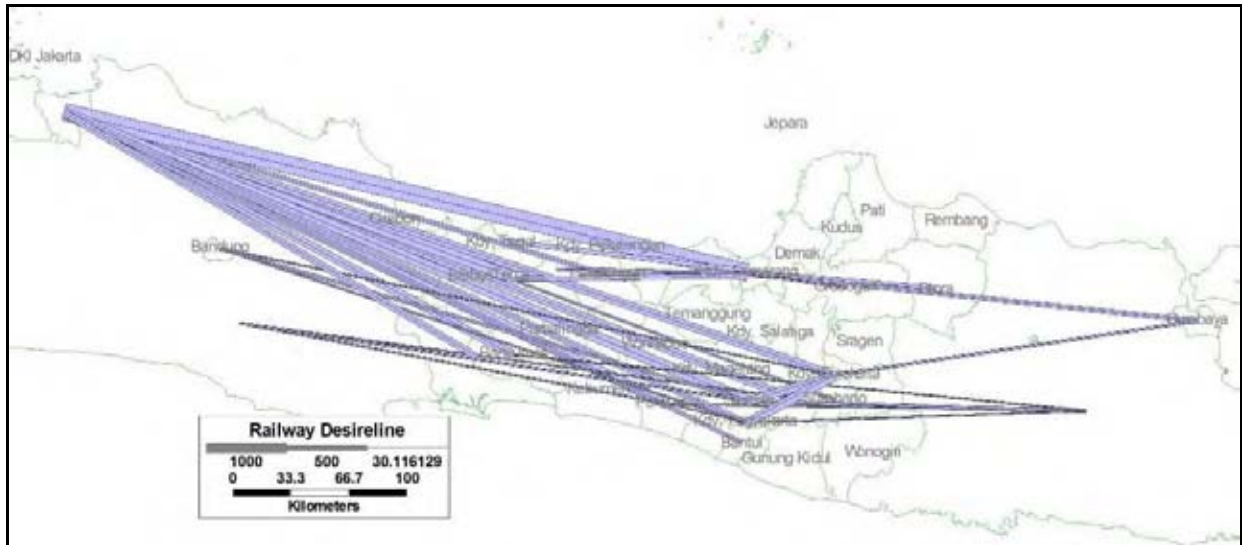
Source: CJRR Study Team, Railway Traffic Survey, 2008

**b. Desire Line of the Central Java Region**

Railway passenger boarding and alighting in the Central Java region is shown in Source: CJRR Study Team, Railway Traffic Survey, 2008

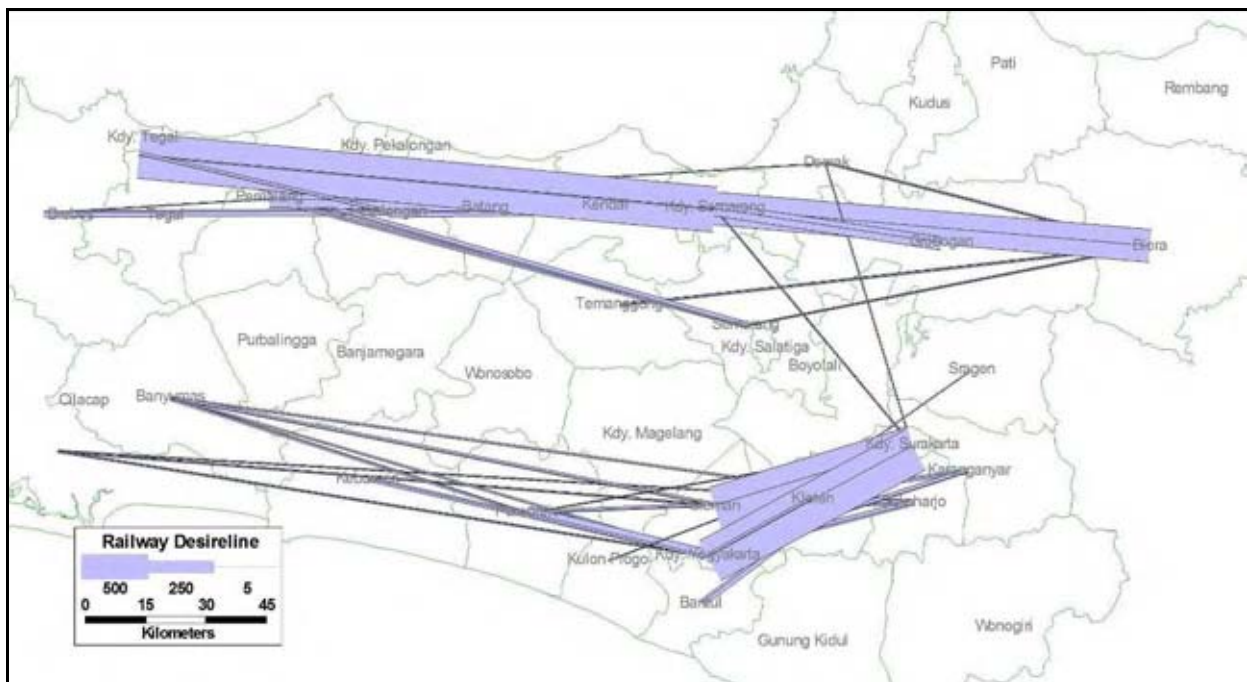
Figure 1.1.9. Passenger volume from / to Jakarta is larger than other OD pairs such as intra the Central Java region and passenger from / Surabaya, Bandung. Passenger volume of intra the Central Java region is also shown in Source: CJRR Study Team, Railway Traffic Survey, 2008

Figure 1.1.10. Although railway passenger volume of OD pairs connecting large cities in the Central Java region such as Semarang – Tegal, Semarang – Blora, Surakarta – Yogyakarta, Surakarta – Sleman exceeds 600 passengers per day (both directions), Semarang – Surakarta pair is only about 40 passengers per day for both directions.



Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.9** Desire Line of Railway Passengers Boarding and Alighting in the Central Java Region



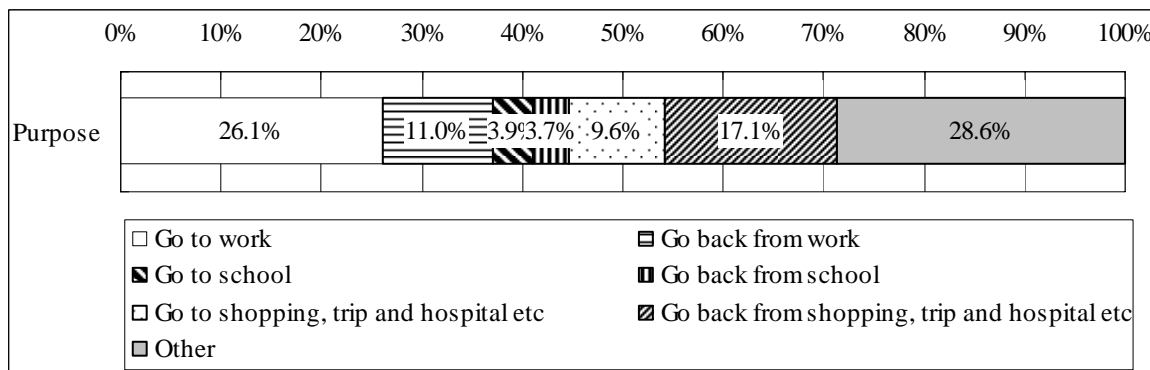
Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.10** Desire Line of Railway Passengers intra Central Java Region

**c. Trip Purpose**

Trip purpose of railway passenger is show in Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.10. Commuters (trip from / to work and school) shares approximately 45 % of total trips. Private purposes including shopping, trip and hospital has share of 26.1 %.



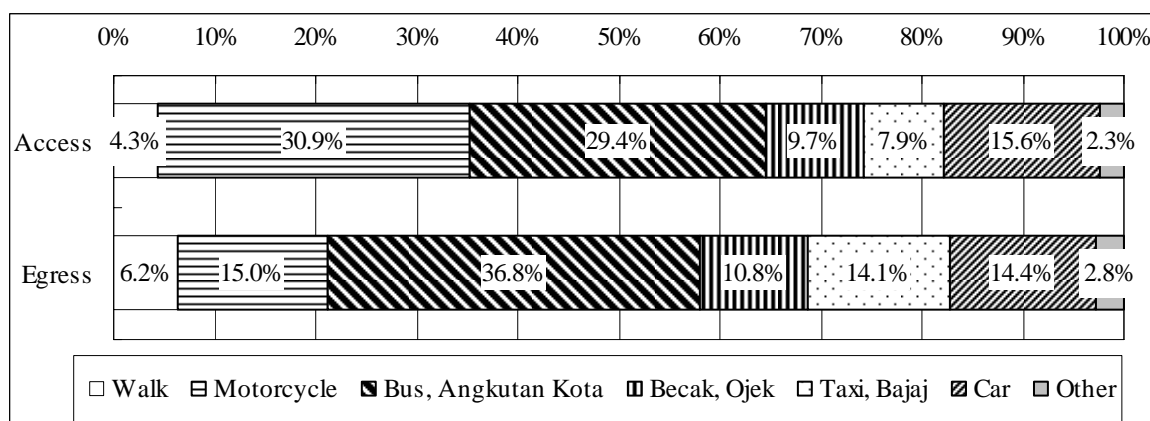
Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.11 Trip Purpose of Railway Passengers**

**d. Access and Egress Transportation Mode**

Access and egress transportation mode to a railway station was surveyed in Railway Traffic Survey (Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.12). Since the survey was conducted for boarding passengers, the shares for access transportation mode of motorcycle and bus including Angkutan Kota (small intra-city bus) are the largest, approximately 30% each. The share for egress transportation of bus and Angkutan Kota is approximately 37%. The share for egress transportation of taxi and bajaj (small taxi), walking, bus, becak (cycle rickshaw) and ojek (motorcycle taxi) is larger than their shares of access transportation mode.



Source: CJRR Study Team., Railway Traffic Survey, 2008

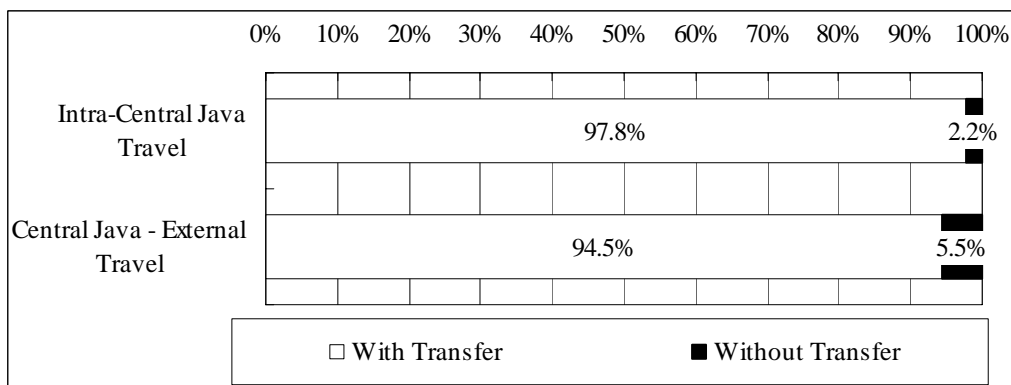
**Figure 1.1.12 Access and Egress Transportation Mode to a Railway Station**

**e. Transfer Behavior of Railway Passengers**

Train transfer behaviors were surveyed in Railway Traffic Survey (Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.13). More than 90% of passengers do not transfer when they use railway in the Central Java region. In fact, approximately 98% of passengers do not transfer when they

travel within the Central Java region.



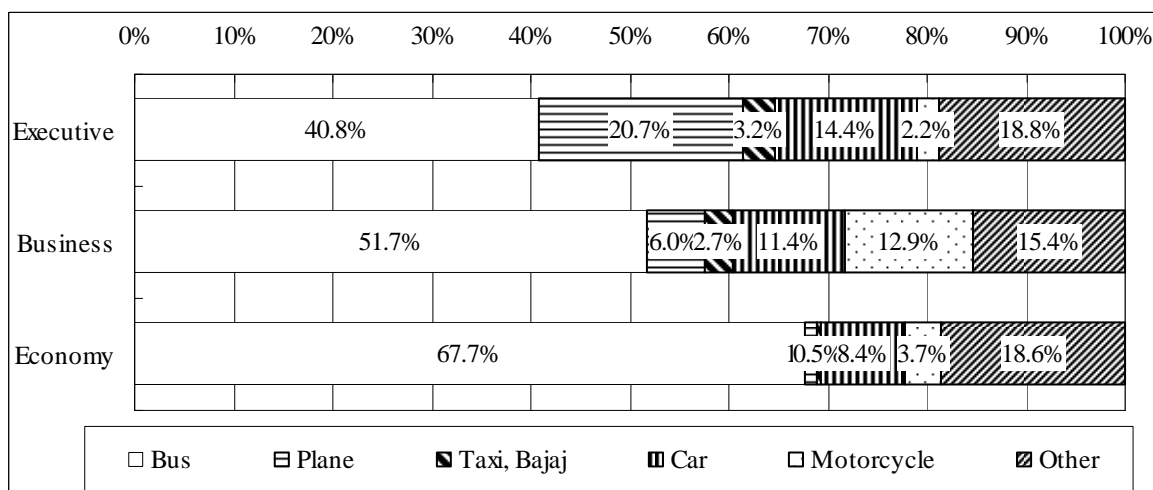
Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.13 Transfer Behavior of Railway Passengers**

**f. Alternative Transport Mode**

Alternative transportation mode for railway user was also surveyed in Railway Traffic Survey (Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.14). Although share of bus is the largest for all classes, shares of car, railway and plane are relatively higher for executive and business class. More than 65% of economy class passenger answered they would use bus if railway is not available.



Source: CJRR Study Team., Railway Traffic Survey, 2008

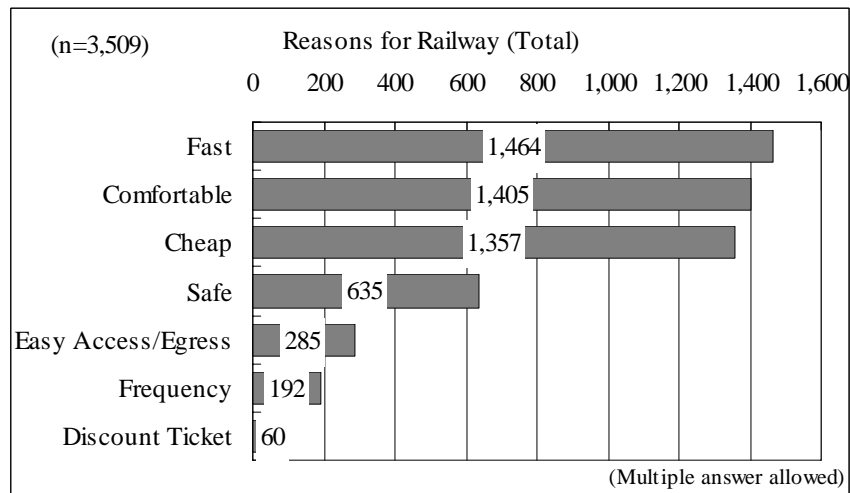
**Figure 1.1.14 Alternative Transportation Mode for Railway**

**g. Reasons for Railway Use**

Reasons for railway use were asked to railway users (Source: CJRR Study Team., Railway Traffic Survey, 2008

Figure 1.1.15). Speed, comfort and price are the three major reasons why they choose railway for more than 1,350 respondents. Another major reason is safety with about 600 respondents.

These factors are considered as showing the strength of railway transport for existing customers. On the other hand, ease of access / egress, frequency of train and discount ticket counted for less than 300 respondents.



Source: CJRR Study Team., Railway Traffic Survey, 2008

**Figure 1.1.15 Reasons for Railway Use**

### (3) Free Ridership Survey

#### 1) Survey Objective

The impact that free ridership has on Indonesian railway management has been highlighted. The aim is to quantify and analyze its impact on railway management, and to also investigate the situation in order to come up with countermeasures. The approximate free ridership number can be obtained by calculating the difference between the number of passengers and number of tickets sold at a particular station. However, since one cannot know of the number of commuter pass users or of tickets issued by places other than that station, a sample survey was carried out on one section of the train to calculate the ratio of Free Ridership.

#### 2) Survey Contents

##### a. Survey Target

Sample survey is targeting 9 trains. Trains were selected considering line, operation time, operation distance and class.

##### b. Survey Method

The surveyors go on onboard and count the number of the passengers and the free riders following the train conductor.

### c. Survey Schedule

Survey schedule of free ridership survey is abovementioned in. The survey was conducted from 10th to 15th March, 2008.

## 3) Survey Results

### a. Free Riders by Train Type

The impact that free ridership has on Indonesian railway management has been highlighted. For the purpose of understanding impact of free riders on railway management, free ridership survey was conducted at 9 major trains in the Central Java region. The number of Free Riders by train type is shown in Table 1.1.6. The average ratio of train free rider in the Central Java region is 5.2%. Free rider ratio is comparatively high for local train, longitudinal line, day train and business and economy class train. Pandanwangi, a local train connecting Surakarta and Semarang, had the highest ratio of 23.6%.

**Table 1.1.6 Free Riders by Train Type**

Train Type	# of Survey Trains	# of Pax	# of Free Rider	Free Rider Ratio
Long Distance	5	1,392	49	3.5%
Local Train	4	996	75	7.5%
North Corridor	6	1,737	51	2.9%
South Corridor	2	469	30	6.4%
Longitudinal	1	182	43	23.6%
Day Train	8	2,157	124	5.7%
Night Traing	1	231	0	0.0%
Executive Class	3	520	13	2.5%
Business Class	4	1,205	90	7.5%
Economy Class	2	663	21	3.2%
Total	9	2,388	124	5.2%

Source: CJRR Study Team,. Railway Traffic Survey, 2008

Note: Free Rider Survey Data of DAOP IV and V

## 1.2 Road Traffic Survey

Road Traffic Survey was conducted for the purpose of acquiring information on the characteristics of road users in the Central Java region. The data is used to develop and examine the current OD matrices especially in this area.

## **(1) Classified Hourly Traffic Count Survey**

### **1) Survey Objective**

For the purpose of obtaining the classified traffic count and road usage status of roads the classified traffic count survey was conducted. The results are compared with previously implemented surveys to understand the change in usage over the years.

### **2) Survey Contents**

#### **a. Survey Location**

Since the Yogyakarta – Surakarta – Semarang corridor is considered as Case Study area at the survey commencement point in time, the survey was conducted at 18 locations along the corridor. (See Figure 1.2.5)

#### **b. Survey Method**

Conduct a manual count at each survey location.

#### **c. Vehicle Classification**

In keeping with the standard used in Indonesia, the vehicle categories to be used are 10 classifications; motorbikes, passenger cars, small buses, middle buses, large buses, pickup and small 2 axles truck, large 2 axles truck, 3 axles truck, 4 axles truck and more than 5 axles truck.

#### **d. Survey Period**

In keeping with the working hours in regional cities, it was from 6:00 to 20:00, a total of 14 hours on Tuesday, Wednesday or Thursday. The survey was conducted from June to July, 2008.

## **3) Survey Results**

Traffic volumes of major road around Semarang, Surakarta and Yogyakarta city are shown in Source: CJRR Study Team., Road Traffic Survey, 2008

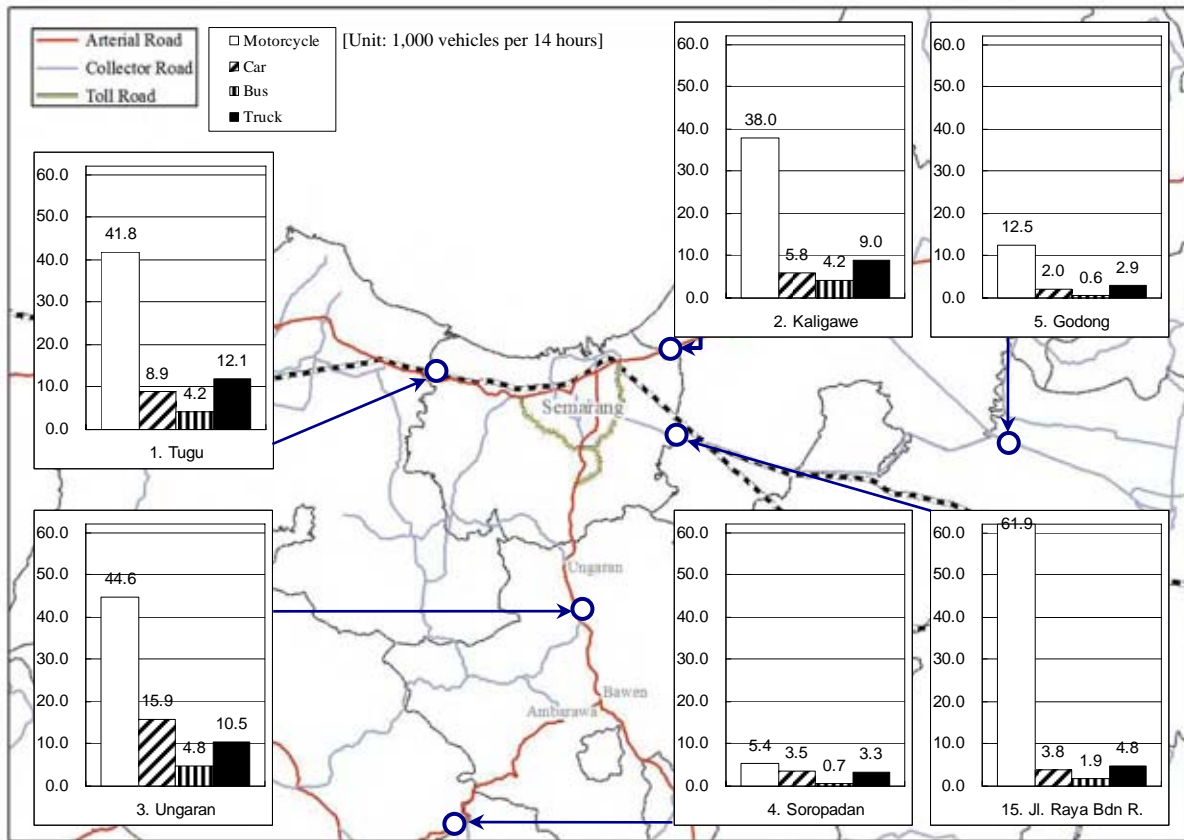
Figure 1.2.1, Source: CJRR Study Team., Road Traffic Survey, 2008

Figure 1.2.2 and Source: CJRR Study Team., Road Traffic Survey, 2008

Figure 1.2.3 respectively. Traffic volumes of motorcycle exceed more than 35,000 in 14 hours at locations close to Semarang. Traffic volumes of truck are relatively higher, approximately 10,000 vehicles in 14 hours, at national road survey locations surrounding Semarang city. Although traffic volume around Surakarta city is relatively lower than that of Semarang, more than 10,000 vehicles (excluding motorcycle) pass national roads toward Semarang, East Java and Yogyakarta. Focusing on Yogyakarta city, traffic volumes of national roads toward northern, eastern and western direction from Yogyakarta city are

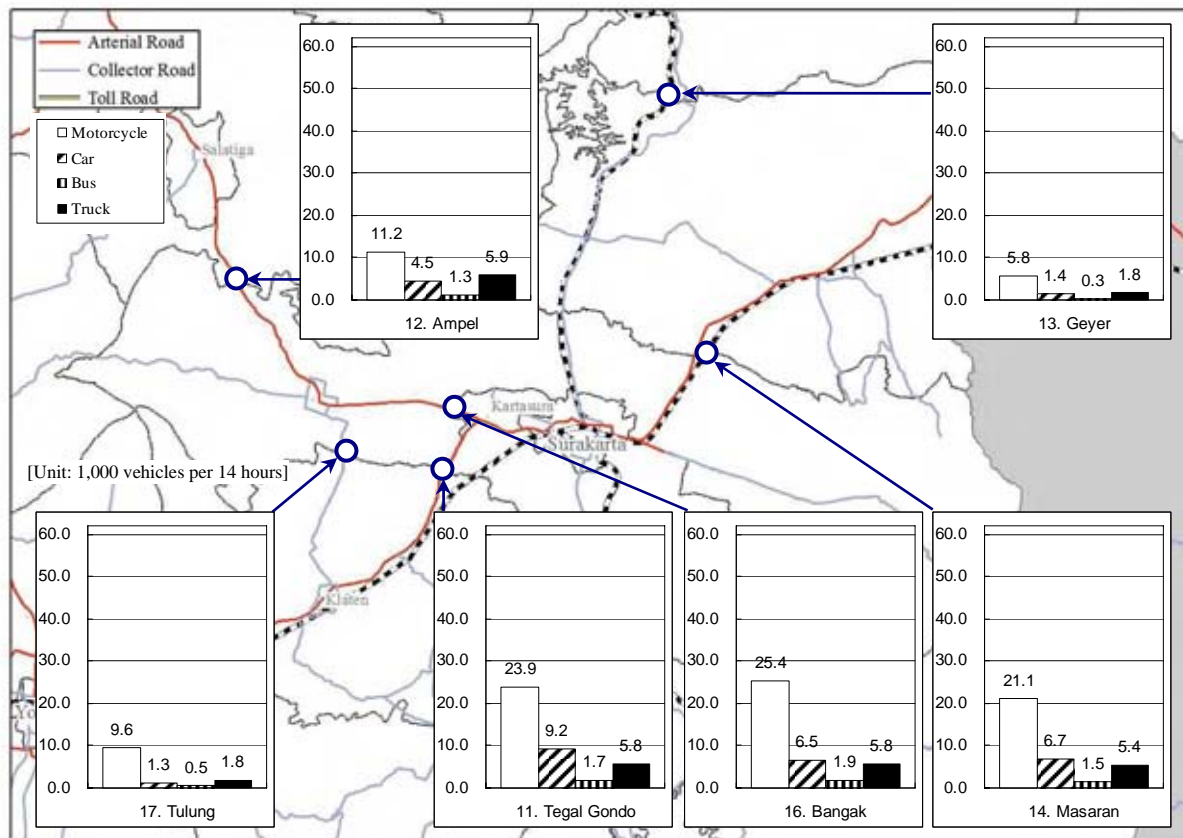


relatively higher compared with other provincial roads.



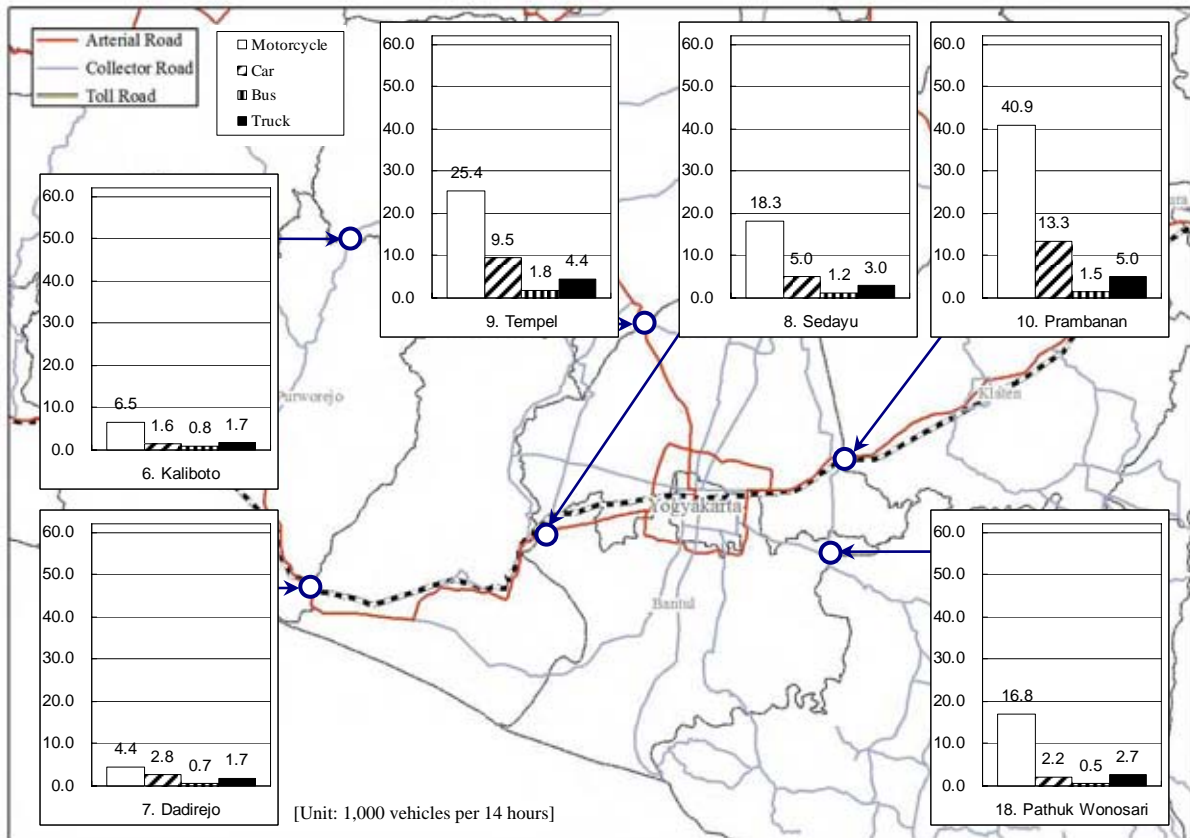
Source: CJRR Study Team., Road Traffic Survey, 2008

Figure 1.2.1 Traffic Volume of Major Roads around Semarang City



Source: CJRR Study Team., Road Traffic Survey, 2008

**Figure 1.2.2** Traffic Volume of Major Roads around Surakarta City



Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.3 Traffic Volume of Major Roads around Yogyakarta City**

Table 1.2.1 Classified Hourly Traffic Count Survey Results (1/2)

Code	Location	Date	Survey Period	Direction		Private Car										Public Transport					Cargo Vehicle					Total													
				From	To	1	2	3	4	5	6	7	8	9	10	1-2	3-5	6-10	1-10	1-10	1-10	1-10																	
R-1	Tugu	June 17th, 2008	14 Hours	A	Semarang	Kendal	21,900	4,277	880	835	547	3,297	820	949	354	183	26,177	2,262	5,033	12,142	34,042	B	Semarang	Semarang	19,897	4,670	695	864	363	3,960	818	982	497	198	24,967	1,922	6,455	13,047	32,944
				41,797	8,947	1,575	1,699	910	7,257	1,638	1,931	851	381	50,744	4,184	12,058	25,189	66,986	62,40%	13,36%	2,35%		2,54%	1,36%	10,83%	1,27%	0,57%	75,75%	6,25%	18,00%	37,60%	100,00%							
R-2	Kaligawe	June 19th, 2008	14 Hours	A	Semarang	Demak	18,508	2,978	1,440	236	274	2,477	553	791	481	168	21,486	1,950	4,480	9,408	27,916	B	Demak	Semarang	19,491	2,864	1,355	366	524	2,278	766	792	451	225	22,355	2,245	4,514	8,623	29,114
				37,999	5,842	2,795	602	798	4,755	1,321	1,583	942	393	43,841	4,195	8,994	19,031	57,030	66,63%	10,24%	4,90%		1,06%	1,40%	3,34%	2,32%	2,78%	1,65%	0,69%	76,87%	7,36%	15,77%	33,37%	100,00%					
R-3	Ungaran	June 24th, 2008	14 Hours	A	Semarang	Bawen	17,585	9,011	1,162	317	586	3,371	406	488	181	51	26,596	2,075	4,497	15,953	33,168	B	Semarang	Semarang	27,028	6,853	1,670	257	418	215	60	33,851	2,743	6,027	15,623	42,651			
				44,613	15,864	2,832	574	1,412	8,214	897	906	396	111	60,477	4,818	10,524	31,206	75,819	56,84%	20,92%	3,74%		0,76%	1,86%	10,83%	1,18%	0,52%	79,76%	6,35%	13,88%	41,16%	100,00%							
R-4	Soropadan	June 24th, 2008	14 Hours	A	Semarang	Magelang	2,541	1,819	44	28	299	1,314	113	183	35	14	4,360	371	1,659	3,849	6,390	B	Magelang	Semarang	2,894	1,655	40	42	241	1,292	132	154	42	9	4,549	323	1,629	3,607	6,501
				5,435	3,474	84	70	540	2,606	245	337	77	23	8,909	694	3,288	7,456	12,891	42,16%	26,95%	0,65%		0,54%	4,19%	20,22%	1,90%	2,61%	0,60%	0,18%	69,11%	5,38%	25,51%	57,84%	100,00%					
R-5	Godong	June 19th, 2008	14 Hours	A	Semarang	Purwodadi	6,220	1,025	110	115	104	1,325	63	119	2	2	7,245	329	1,501	2,855	9,075	B	Purwodadi	Semarang	6,241	997	72	122	125	1,199	69	82	6	5	7,238	319	1,360	2,678	8,917
				12,461	2,022	182	237	229	2,524	121	201	8	7	14,483	648	2,861	5,531	17,992	69,26%	11,24%	1,01%		1,32%	1,27%	14,03%	0,67%	1,12%	0,04%	0,04%	80,50%	3,60%	15,90%	30,74%	100,00%					
R-6	Kaliboto	June 26th, 2008	14 Hours	A	Magelang	Purworejo	3,199	808	228	74	108	682	53	100	7	7	4,007	408	829	5,244	B	Purworejo	Magelang	3,339	803	228	83	69	771	29	44	10	9	4,112	380	853	2,046	5,355	
				6,538	1,611	456	157	175	1,453	62	144	17	16	8,119	788	1,892	4,091	10,589	61,40%	15,20%		4,30%	1,48%	13,71%	0,58%	1,38%	0,16%	0,16%	76,60%	7,43%	15,96%	38,60%	100,00%						
R-7	Dadirejo	July 1st, 2008	14 Hours	A	Wates	Purworejo	2,070	1,403	94	25	270	650	72	135	44	8	3,473	389	909	4,771	B	Purworejo	Wates	2,288	1,394	95	15	212	594	77	97	52	5	3,672	322	825	2,531	4,819	
				4,358	2,787	189	40	482	1,244	149	232	96	13	7,145	711	1,734	5,232	9,590	45,44%	29,06%		1,97%	0,42%	5,03%	12,97%	1,55%	2,42%	1,00%	0,14%	74,50%	7,41%	18,08%	54,56%	100,00%					
R-8	Sedayu	July 1st, 2008	14 Hours	A	Jogja	Wates	8,432	2,440	196	190	298	1,202	115	160	49	10	10,872	684	1,536	13,092	B	Wates	Jogja	9,540	2,595	201	93	245	1,201	89	110	43	9	12,435	539	1,452	4,586	14,426	
				18,272	5,035	397	283	543	2,403	204	270	92	19	23,307	1,223	2,988	9,246	27,518	66,40%	18,30%		1,44%	1,03%	1,97%	0,74%	0,96%	0,33%	0,07%	84,70%	4,44%	10,86%	33,00%	100,00%						
R-9	Tempel	June 28th, 2008	14 Hours	A	Magelang	Sleman	10,574	4,361	348	188	420	1,705	98	148	48	6	14,935	956	1,949	17,840	B	Sleman	Magelang	14,866	5,125	308	147	431	2,243	103	38	8	19,991	886	2,495	5,006	23,372		
				25,440	9,486	656	335	851	3,948	201	195	86	14	34,926	1,842	4,444	15,772	41,212	61,73%	23,02%		1,59%	0,81%	2,06%	9,56%	0,49%	0,47%	0,21%	0,03%	84,75%	4,47%	10,78%	38,27%	100,00%					
R-10	Prambanan	July 3rd, 2008	14 Hours	A	Jogja	Klaten	20,249	6,781	159	148	534	1,972	104	160	96	14	27,030	741	2,346	30,117	B	Klaten	Jogja	20,684	6,516	177	69	486	2,161	170	29	30	27,210	732	2,608	5,548	30,548		
				40,943	13,297	336	117	1,020	4,133	283	318	175	43	54,240	1,473	4,952	19,772	60,665	67,48%	21,92%		0,65%	0,19%	1,68%	6,81%	0,47%	0,32%	0,29%	0,07%	69,41%	2,43%	6,16%	32,51%	100,00%					

Source: CJRR Study Team., Road Traffic Survey, 2008

Table 1.2.2 Classified Hourly Traffic Count Survey Results (2/2)

Code	Location	Date	Survey Period	Direction		Private Car										Public Transport					Cargo Vehicle					Total		
				From	To	1	2	3	4	5	6	7	8	9	10	1-2	3-5	6-10	1-10	1-10								
						Motor Cycle	Sedan, Jeep, Kijang, Taksi	Small Bus	Medium Bus	Large Bus	Pick-up, Truck2 Axle	Truck2 Axles	Truck3 Axles	Truck4 Axles	Truck5 Axles and More	Private Car	Public Transport	Cargo Vehicle	Fourwheel Vehicle	Total Vehicle								
R-11	Tegal Gondo	July 8th, 2008	14 Hours	A	Klaten	11,319	4,406	305	77	481	2,467	138	248	78	16	15,725	883	2,947	8,216	19,535								
				B	Klaten	12,608	4,812	311	89	455	2,203	287	99	455	2,203	287	99	17,420	855	2,834	8,501	21,109						
R-12	Ampel	June 17th, 2008	14 Hours	A	Solo	5,775	2,326	146	178	307	2,527	178	233	126	16	8,101	631	3,080	6,037	11,812								
				B	Solo	5,433	2,214	133	126	439	2,087	236	309	113	25	7,647	688	2,170	5,682	11,115								
R-13	Gejer	Julye 8th, 2008	14 Hours	A	Purwodadi	48,899	19,809	7,222	1,333	3,283	20,124	1,817	2,369	1,048	0	68,699	1,329	5,850	51,719	100,009								
				B	Purwodadi	2,935	680	43	18	87	784	38	48	0	0	0	0	3,615	148	870	1,698	4,633						
R-14	Masaran	July 3rd, 2008	14 Hours	A	Sragen	2,846	674	45	13	106	847	41	47	0	0	3,520	164	935	1,773	4,619								
				B	Sragen	5,781	1,354	88	31	193	1,831	79	95	0	0	0	7,135	312	1,805	3,471	9,252							
R-15	Jl. Raya Bandung Rejo KM.12	June 10th, 2008	14 Hours	A	Klaten	62,487	14,639	0,956	0,344	2,099	17,638	1,039	1,039	0,009	0,009	77,122	3,372	19,517	37,592	100,009								
				B	Klaten	11,732	4,022	236	95	440	2,218	192	312	106	17	15,754	771	2,845	7,638	19,370								
R-16	Bangak	June 12th, 2008	14 Hours	A	Klaten	9,400	2,720	199	81	410	1,893	193	312	133	18	12,120	690	2,549	5,959	15,359								
				B	Klaten	21,132	6,742	435	176	850	4,111	385	624	239	35	27,874	1,461	5,394	13,597	34,729								
R-17	Tulung	June 11th, 2008	14 Hours	A	Purwodadi	60,856	19,471	1,256	0,516	2,485	11,849	1,116	1,809	0,699	0,109	80,266	4,211	15,539	38,159	100,009								
				B	Purwodadi	33,941	1,827	821	141	121	2,109	81	111	37	10	35,768	1,083	2,348	5,258	39,199								
R-18	Pathuk Wonosari	June 10th, 2008	14 Hours	A	Klaten	27,910	2,017	594	153	98	1,582	649	109	55	37	29,927	845	2,432	5,294	33,204								
				B	Klaten	61,851	3,844	1,415	294	219	3,691	730	220	92	47	65,695	1,928	4,780	10,552	72,403								
R-19	Jember	July 1st, 2008	14 Hours	A	Klaten	12,440	3,367	347	270	499	2,137	222	371	145	36	15,807	1,116	2,911	7,394	19,834								
				B	Klaten	12,932	3,066	260	228	298	2,152	260	279	148	21	16,028	786	2,860	6,742	19,674								
R-20	Jember	July 3rd, 2008	14 Hours	A	Klaten	64,227	16,369	1,549	1,226	2,029	10,869	1,659	0,749	0,149	80,899	4,871	14,617	35,789	100,009									
				B	Klaten	4,745	629	148	48	8	839	45	27	0	1	5,374	204	912	1,745	6,490								
R-21	Jember	July 1st, 2008	14 Hours	A	Klaten	9,561	1,254	333	109	12	1,638	80	44	6	4	10,815	454	1,772	3,480	13,041								
				B	Klaten	73,371	9,622	2,556	0,844	0,099	12,569	0,617	0,349	0,099	0,039	82,939	3,469	13,559	26,699	100,009								
R-22	Jember	July 1st, 2008	14 Hours	A	Klaten	8,211	1,070	117	36	78	1,450	23	25	1	0	9,281	231	1,499	2,800	11,011								
				B	Klaten	8,638	1,120	132	42	99	1,159	25	28	1	0	9,758	273	1,213	2,608	11,244								
R-23	Jember	July 1st, 2008	14 Hours	A	Klaten	16,849	2,190	249	78	177	2,609	48	53	2	0	19,039	504	2,712	5,406	22,255								
				B	Klaten	75,717	9,849	1,722	0,359	0,809	11,729	0,229	0,249	0,019	0,009	85,859	2,269	12,119	24,299	100,009								
R-24	Jember	July 1st, 2008	14 Hours	A	Klaten	0	0	0	0	0	273	40	67	25	0	0	0	0	405	405								
				B	Klaten	0	0	0	0	0	178	41	53	35	0	0	0	0	307	307								
R-25	Jember	July 1st, 2008	14 Hours	A	Klaten	0	0	0	0	0	451	81	120	60	0	0	0	0	712	712								
				B	Klaten	0	0	0	0	0	63,349	11,389	16,859	8,439	0,009	0,009	100,009	0,009	100,009									
R-26	Jember	July 1st, 2008	14 Hours	A	Klaten	0	0	0	0	0	349	35	62	30	0	0	0	0	466	466								
				B	Klaten	0	0	0	0	0	713	64	114	37	5	0	0	0	933	933								
R-27	Jember	July 1st, 2008	14 Hours	A	Klaten	0	0	0	0	0	1,062	99	166	67	5	0	0	0	1,399	1,399								
				B	Klaten	0	0	0	0	0	75,971	7,089	11,879	4,799	0,369	0,009	100,009	0,009	100,009									

Source: CJRR Study Team, Road Traffic Survey, 2008

## (2) Roadside OD Interview Survey

### 1) Survey Objective

To understand the traffic flow between cities and create an OD table of automobile users for use as basic data for forecasting traffic demand.

### 2) Survey Contents

#### a. Survey Location

This Survey is carried out at 14 locations along Yogyakarta – Surakarta – Semarang corridor at trunk road locations at kabupaten/kota boundaries. The Traffic Count Survey was also be conducted at the same locations as the Roadside OD Interview Survey to obtain total volume data as well. (See Figure 1.2.5) Cargo traffic was surveyed at Weight Bridge Station (or *Jembatan timbang*) in case of Location No. 7 and No. 10.

#### b. Survey Method

Interviewer made vehicles traveling along the Survey points stop by the road side with the cooperation of a police officer to ask the drivers about trip purpose, OD, etc. The approximate number of bus passenger by bus sizes were also counted for the purpose of grasping the number of passengers who pass through kabupaten/kota boundaries.



Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.4 Roadside OD Interview Survey Situation**

**c. Vehicle Classification**

In keeping with the standard used in Indonesia, the vehicle categories to be used are 7 classifications; motorbikes, passenger cars, pickup and small 2 axles truck, large 2 axles truck, 3 axles truck, 4 axles truck and more than 5 axles truck. Since bus passenger OD data can be obtained from Bus Passenger OD Interview Survey, bus was not a target of this survey

**d. Survey Period**

Survey period was the same as the Traffic Count Survey; 6:00 to 20:00, a total of 14 hours on Tuesday, Wednesday or Thursday. The survey was conducted from June to July, 2008.

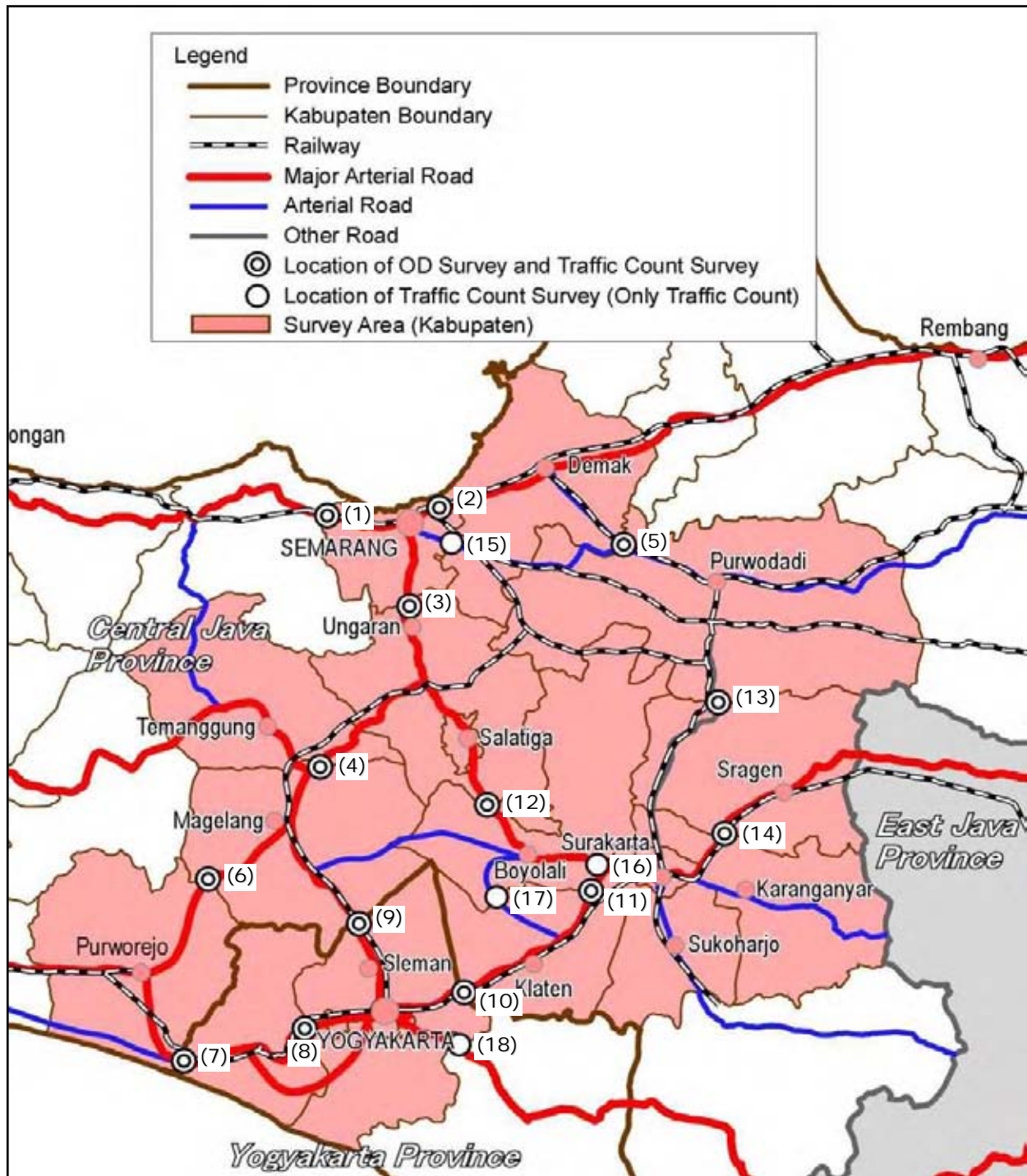


Figure 1.2.5 Map of Road Traffic Survey Locations

### 3) Origin Destination Table Calibration and Analyses for Passenger Transport

#### a. Sampling Ratios

Since traveling vehicles are forced to pull over and stop for the Roadside OD Interview Survey, it is necessary to minimize the impact on traffic flow. The hourly sampling is shown as follows.



**Table 1.2.3 Sampling Ratios of Road Side Interview Survey (Pax. Car and Motorcycle)**

[Unit: Number of vehicles / 14h]

Code	Location	Direction		Passenger Car			Motorcycle		
		From	To	RSI	TC	Sample R.	RSI	TC	Sample R.
R-1a	Tugu	Semarang	Kendal	380	4,277	9%	537	21,900	2%
R-1b	Tugu	Kendal	Semarang	341	4,670	7%	396	19,897	2%
R-2a	Kaligawe	Semarang	Demak	594	2,978	20%	707	18,508	4%
R-2b	Kaligawe	Demak	Semarang	525	2,864	18%	1,020	19,491	5%
R-3a	Ungaran	Semarang	Bawen	480	9,011	5%	788	17,585	4%
R-3b	Ungaran	Bawen	Semarang	488	6,853	7%	1,533	27,028	6%
R-4a	Soropadan	Semarang	Magelang	460	1,819	25%	626	2,541	25%
R-4b	Soropadan	Magelang	Semarang	496	1,655	30%	780	2,894	27%
R-5a	Godong	Semarang	Purwodadi	314	1,025	31%	845	6,220	14%
R-5b	Godong	Purwodadi	Semarang	275	997	28%	686	6,241	11%
R-6a	Kaliboto	Magelang	Purworejo	381	808	47%	592	3,199	19%
R-6b	Kaliboto	Purworejo	Magelang	415	803	52%	789	3,309	24%
R-7a	Dadirejo	Wates	Purworejo	709	1,403	51%	907	2,070	44%
R-7b	Dadirejo	Purworejo	Wates	602	1,384	43%	893	2,288	39%
R-8a	Sedayu	Jogja	Wates	462	2,440	19%	1,604	8,432	19%
R-8b	Sedayu	Wates	Jogja	467	2,595	18%	1,802	9,840	18%
R-9a	Tempel	Magelang	Sleman	932	4,361	21%	1,011	10,574	10%
R-9b	Tempel	Sleman	Magelang	705	5,125	14%	1,305	14,866	9%
R-10a	Prambanan	Jogja	Klaten	458	6,781	7%	1,883	20,249	9%
R-10b	Prambanan	Klaten	Jogja	321	6,516	5%	1,884	20,694	9%
R-11a	Tegal Gond	Kartosuro	Klaten	979	4,406	22%	1,335	11,319	12%
R-11b	Tegal Gond	Klaten	Kartosuro	842	4,812	17%	1,754	12,608	14%
R-12a	Ampel	Semarang	Solo	383	2,326	16%	408	5,775	7%
R-12b	Ampel	Solo	Semarang	427	2,214	19%	506	5,433	9%
R-13a	Geyer	Sragen	Purwodadi	247	680	36%	919	2,935	31%
R-13b	Geyer	Purwodadi	Sragen	344	674	51%	771	2,846	27%
R-14a	Masaran	Sragen	Karanganyar	692	4,022	17%	841	11,732	7%
R-14b	Masaran	Karanganyar	Sragen	561	2,720	21%	1,076	9,400	11%

Note: RSI: The number of Roadside Interview Survey samples, TC: The number of vehicle counting survey result  
Sample R.: Sampling Ratios

Source: CJRR Study Team., Road Traffic Survey, 2008

### b. Methodology

Origin and destination table of vehicles in Central Java region was calibrated by classified hourly traffic count survey and roadside OD interview survey results. Expansion factor by vehicle type for each survey location were calculated by dividing the number of vehicle by the number of OD survey respondents, and vehicle OD tables for each survey location were manipulated. Vehicle OD table was manipulated by summing up vehicle OD table of each locations avoiding duplication. Since the roadside OD interview survey was conducted during 14 hours, vehicle OD tables were expanded by multiplying a 24h/14h factor which was estimated based on the survey results conducted in “Study of Economic Partnership Projects in Developing Countries in FY2006”. 24h/14h factors by vehicle type are shown below.

**Table 1.2.4 24 Hours / 14 Hours Expansion Ratio by Vehicle Type**

Motorcycle	Passenger Car	Small Bus	Medium Bus	Large Bus
1.15	1.22	1.17	1.17	1.34

Pick Up	2 Axles Truck	3 Axles Truck	4 Axles Truck	5+ Axles Truck
1.22	1.39	1.51	1.58	2.19

Source: CJRR estimation based on road traffic survey of “Study of Economic Partnership Projects in Developing Countries in FY2006” (JETRO)

Finally vehicle OD tables were converted by multiplying average passengers. According to the roadside interview survey, average passengers of motorcycle is 1.39 per vehicle and 3.24 for passenger cars.

### c. Origin and Destination Table by Analysis Zone

The OD tables of passenger car and motorcycle are shown below.

**Table 1.2.5 Passenger OD Table of Passenger Car in the Central Java Region by Analysis Zone**

[Unit: passengers per day]

	Bo	De	Es	Kl	Ku	Ma	Pu	Sa	Sm	Sr	Su	Ws	Yo	Total
Bo		79	263	677	19	121	164	1,540	1,160	115	89	395	748	5,370
De			93	18		22	181	343	3,413	28	137	750	311	5,296
Es	241	31		778	173	653	102	646	4,825	194	4,118	4,842	5,377	21,981
Kl	679	29	850		283	613	33	286	996	311	6,449	1,471	9,565	21,564
Ku	117	22	272	198		86	13	0	155	22	117	522	5,237	6,761
Ma	71	33	702	525	64		37	713	2,005	64	647	2,317	9,867	17,045
Pu	93	244	136	77		98		186	1,177	163	418	237	402	3,231
Sa	1,780	334	879	457	8	673	297		7,062	32	1,371	1,187	1,447	15,526
Sm	1,078	3,057	5,074	903	119	2,606	1,099	8,474		396	3,857	9,550	4,145	40,358
Sr	161	65	207	248	23	52	142	23	179		6,674	464	578	8,816
Su	86	162	2,630	4,651	131	1,102	502	1,560	3,288	4,896		2,546	6,963	28,517
Ws	505	368	5,551	1,378	616	2,587	301	1,942	9,731	261	3,381		7,886	34,508
Yo	879	189	3,691	9,321	4,099	10,472	293	996	3,653	428	8,020	7,473		49,514
Total	5,689	4,612	20,348	19,232	5,534	19,086	3,163	16,710	37,644	6,910	35,278	31,753	52,527	258,486

Analysis Zone: Bo = Kab. Boyolali, De = Kab. Demak, Es = Eastern Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Kl = Kab. Klaten, Ku = Kab. Kulon Progo, Ma = Kab. Magelang and Kota Magelang, Pu = Kab. Grobogan, Sa = Kab. Salatiga and Kota Salatiga, Sm = Kota Semarang, Sr = Sragen, Su = Kota Solo (Sulakarta) and Kab. Kranganyar, Ws = Western Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Yo = Kab. Sleman, Kab. Bantul and Kota Yogyakarta

Source: CJRR Study Team, Road Traffic Survey, 2008

**Table 1.2.6 Passenger OD Table of Motorcycle in the Central Java Region by Analysis Zone**

[Unit: passengers per day]

	Bo	De	Es	Kl	Ku	Ma	Pu	Sa	Sm	Sr	Su	Ws	Yo	Total
Bo		79	128	1,923	14	79	283	3,447	1,521	153	168	279	742	8,817
De	57		147	29		42	1,152	209	15,261	35	134	630	119	17,815
Es	41	155		490	149	267	224	350	3,553	235	1,498	887	1,405	9,257
Kl	2,193	26	515		228	448	89	309	713	299	10,264	460	23,755	39,299
Ku	17		154	129		169		18	92	28	78	771	11,679	13,134
Ma	97	52	233	280	102		29	788	1,289	11	177	3,375	10,070	16,504
Pu	188	1,337	277	58		13		187	1,569	643	707	90	169	5,237
Sa	3,685	740	544	407	17	635	546		14,249	12	1,040	1,073	519	23,466
Sm	624	16,600	4,691	467	32	914	1,540	7,236		212	1,110	11,177	1,194	45,797
Sr	201	46	228	407		22	480	62	514		13,887	42	580	16,466
Su	274	111	1,452	8,410	193	252	607	823	1,313	10,150		629	4,027	28,242
Ws	146	564	871	383	946	3,478	153	1,070	12,207	91	440		4,810	25,159
Yo	671	93	1,254	17,279	10,260	14,165	119	543	1,133	567	4,077	4,439		54,600
Total	8,193	19,802	10,494	30,263	11,941	20,485	5,223	15,041	53,415	12,437	33,580	23,851	59,068	303,792

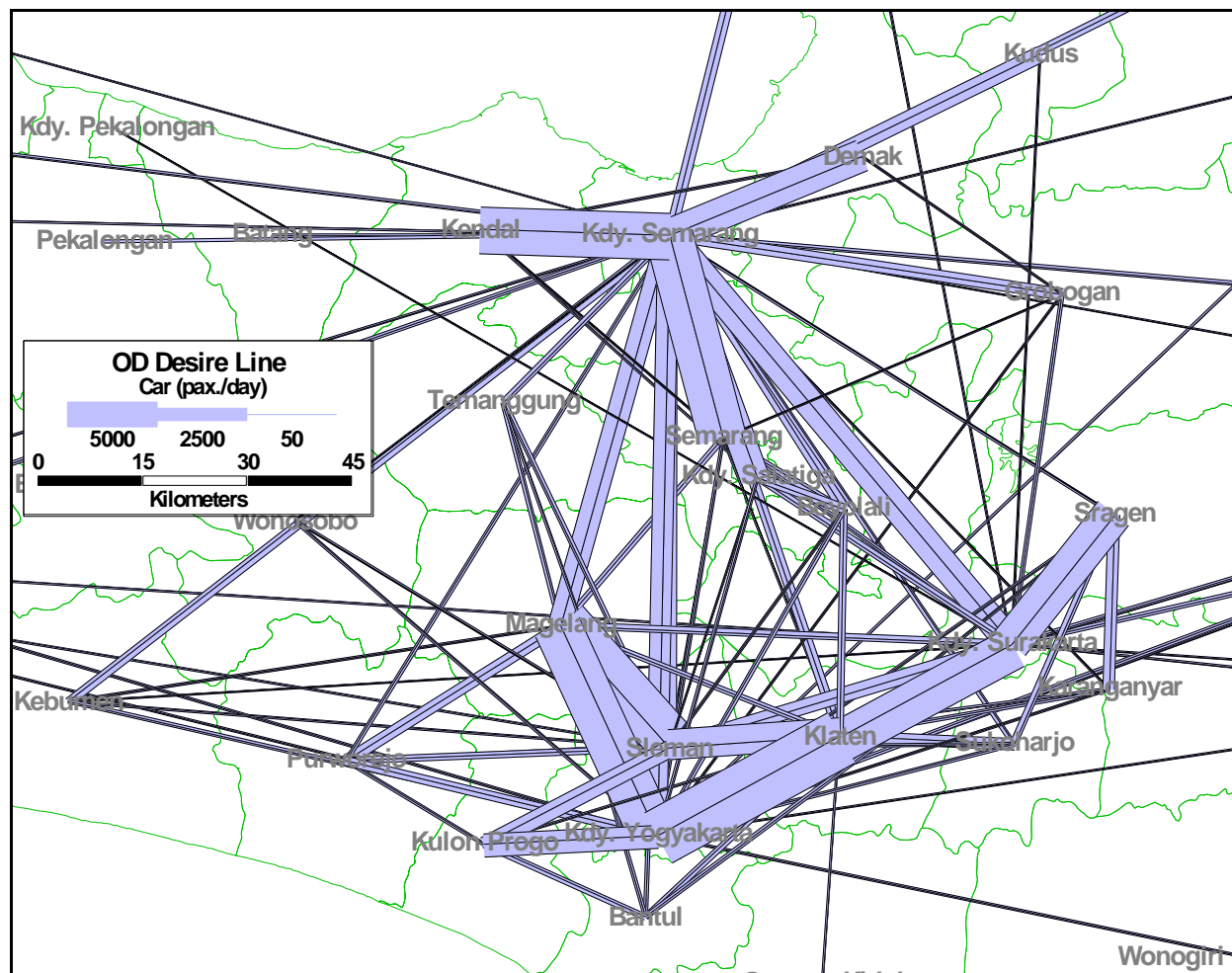
Analysis Zone: Bo = Kab. Boyolali, De = Kab. Demak, Es = Eastern Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Kl = Kab. Klaten, Ku = Kab. Kulon Progo, Ma = Kab. Magelang and Kota Magelang, Pu = Kab. Grobogan, Sa = Kab. Salatiga and Kota Salatiga, Sm = Kota Semarang, Sr = Sragen, Su = Kota Solo (Sulakarta) and Kab. Kranganyar, Ws = Western Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Yo = Kab. Sleman, Kab. Bantul and Kota Yogyakarta

Source: CJRR Study Team, Road Traffic Survey, 2008

#### d. Desire Line by Kabupaten

Based on the road traffic survey conducted by the study team in 2008, desire line of car passengers in Semarang – Solo – Yogyakarta corridor is depicted in Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 1.2.6. There is a number of car passenger trips such as Kota Yogyakarta – Klaten, Sleman – Magelang, Kota Surakarta – Kota Yogyakarta, Kota Yogyakarta – Magelang, Kota Semarang – Kendal, Kota Semarang – Kabupaten Semarang. Middle distance trips, trips with zonal distance is approximately 50 – 100 km, such as Kota Semarang – Kota Surakarta, Kota Semarang – Kota Yogyakarta, Kota Semarang – Magelang are major traffic flow along the corridor.

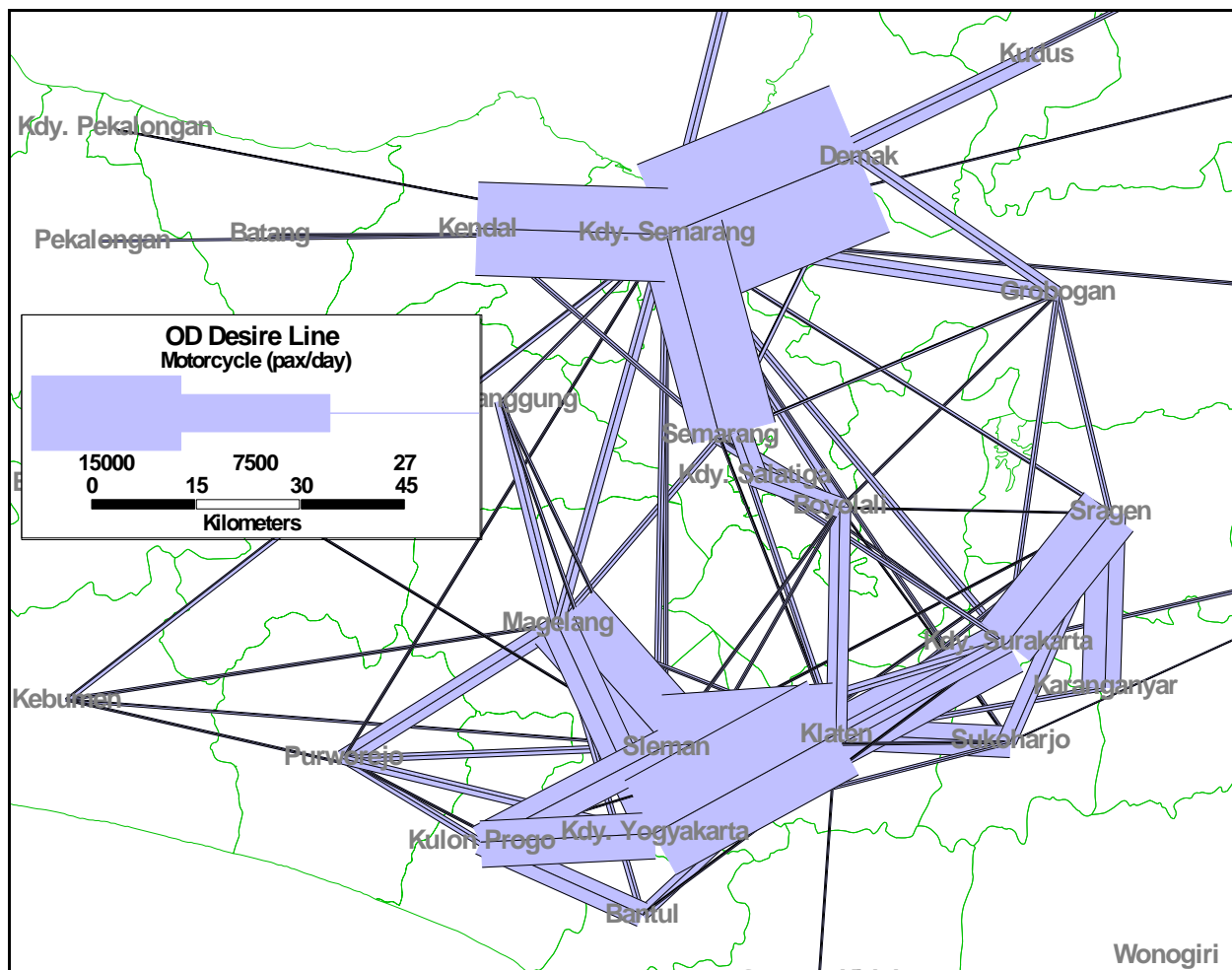


Note: Desire lines which have less than 200 passenger /day for one direction are excluded.  
Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.6** Desire Line of Car Passengers in Semarang – Solo – Yogyakarta Corridor

Based on the road traffic survey conducted by the study team in 2008, desire line of motorcycle passengers in Semarang – Solo – Yogyakarta corridor is depicted in Figure 1.2.7. In contrast with car passengers, The number of the middle distance travel is relatively limited while trips to adjacent kabupaten/kota such as Kota Semarang – Demak, Kota Semarang – Kendal, Kota Semarang – Kabupaten Semaran, Kota Yogyakarta – Klaten, Sleman – Magelang, Kota Surakarta – Sragen is approximately twice or triple of car passengers.

It is not negligible that some passengers choose motor cycle as transportation mode for the middle distance travel. For instance, the number of trips between Kota Semarang – Kota Surakarta, Kota Semarang – Kota Yogyakarta, Kota Semarang – Magelang are more than 1,000 passengers per day while the number of passengers are smaller than cars.



Note: Desire lines which have less than 500 passenger /day for one direction are excluded.  
Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.7 Desire Line of Motorcycle Passengers in Semarang – Solo – Yogyakarta Corridor**

#### 4) Origin Destination Table Calibration and Analyses for Freight Transport

##### a. Sampling Ratios

Since traveling vehicles are forced to pull over and stop for the Roadside OD Interview Survey, it is necessary to minimize the impact on traffic flow. The hourly sampling is shown as follows.

**Table 1.2.7 Sampling Ratios of Road Side Interview Survey (Trucks)**

[Unit: Number of vehicles / 14h]

Code	Location	Direction		2 Axles Truck			3 Axles Truck			Truck with More than 4 Axles		
		From	To	RSI	TC	Sample R.	RSI	TC	Sample R.	RSI	TC	Sample R.
R-1a	Tugu	Semarang	Kendal	568	4,117	14%	152	949	16%	52	537	10%
R-1b	Tugu	Kendal	Semarang	639	4,778	13%	75	982	8%	57	695	8%
R-2a	Kaligawe	Semarang	Demak	827	3,030	27%	113	791	14%	127	659	19%
R-2b	Kaligawe	Demak	Semarang	657	3,046	22%	137	792	17%	73	676	11%
R-3a	Ungaran	Semarang	Bawen	677	3,777	18%	76	488	16%	32	232	14%
R-3b	Ungaran	Bawen	Semarang	474	5,334	9%	34	418	8%	22	275	8%
R-4a	Soropadan	Semarang	Magelang	598	1,427	42%	96	183	52%	23	49	47%
R-4b	Soropadan	Magelang	Semarang	551	1,424	39%	43	154	28%	41	51	80%
R-5a	Godong	Semarang	Purwodadi	682	1,378	49%	56	119	47%	-	4	0%
R-5b	Godong	Purwodadi	Semarang	471	1,267	37%	30	82	37%	1	11	9%
R-6a	Kaliboto	Magelang	Purworejo	428	715	60%	66	100	66%	13	14	93%
R-6b	Kaliboto	Purworejo	Magelang	408	800	51%	14	44	32%	3	19	16%
R-7a	Dadirejo	Wates	Purworejo	-	722	-	-	135	-	-	52	-
R-7b	Dadirejo	Purworejo	Wates	-	671	-	-	97	-	-	57	-
R-8a	Sedayu	Jogja	Wates	404	1,317	31%	37	160	23%	11	59	19%
R-8b	Sedayu	Wates	Jogja	343	1,290	27%	29	110	26%	17	52	33%
R-9a	Tempel	Magelang	Sleman	559	1,803	31%	51	92	55%	17	54	31%
R-9b	Tempel	Sleman	Magelang	654	2,346	28%	23	103	22%	14	46	30%
R-10a	Prambanan	Jogja	Klaten	-	2,076	-	-	160	-	-	110	-
R-10b	Prambanan	Klaten	Jogja	-	2,340	-	-	158	-	-	108	-
R-11a	Tegal Gondo	Kartosuro	Klaten	816	2,605	31%	59	248	24%	37	94	39%
R-11b	Tegal Gondo	Klaten	Kartosuro	517	2,490	21%	70	236	30%	18	108	17%
R-12a	Ampel	Semarang	Solo	595	2,705	22%	37	233	16%	36	142	25%
R-12b	Ampel	Solo	Semarang	557	2,323	24%	67	309	22%	18	138	13%
R-13a	Geyer	Sragen	Purwodadi	343	822	42%	15	48	31%	-	-	-
R-13b	Geyer	Purwodadi	Sragen	526	888	59%	14	47	30%	-	-	-
R-14a	Masaran	Sragen	Karanganyar	783	2,410	32%	96	312	31%	78	123	63%
R-14b	Masaran	Karanganyar	Sragen	616	2,086	30%	106	312	34%	56	151	37%
R-7-JTa	Kulon Progo	Wates	Purworejo	140	313	45%	38	67	57%	13	25	52%
R-7-JTb	Kulon Progo	Purworejo	Wates	111	219	51%	37	53	70%	24	35	69%
R-10-JTa	Depok	Jogja	Klaten	260	384	68%	28	52	54%	16	30	53%
R-10-JTb	Depok	Klaten	Jogja	331	777	43%	48	114	42%	25	42	60%

Note: RSI: The number of Roadside Interview Survey samples, TC: The number of vehicle counting survey result, Sample R.: Sampling Ratios

Source: CJRR Study Team, Road Traffic Survey, 2008

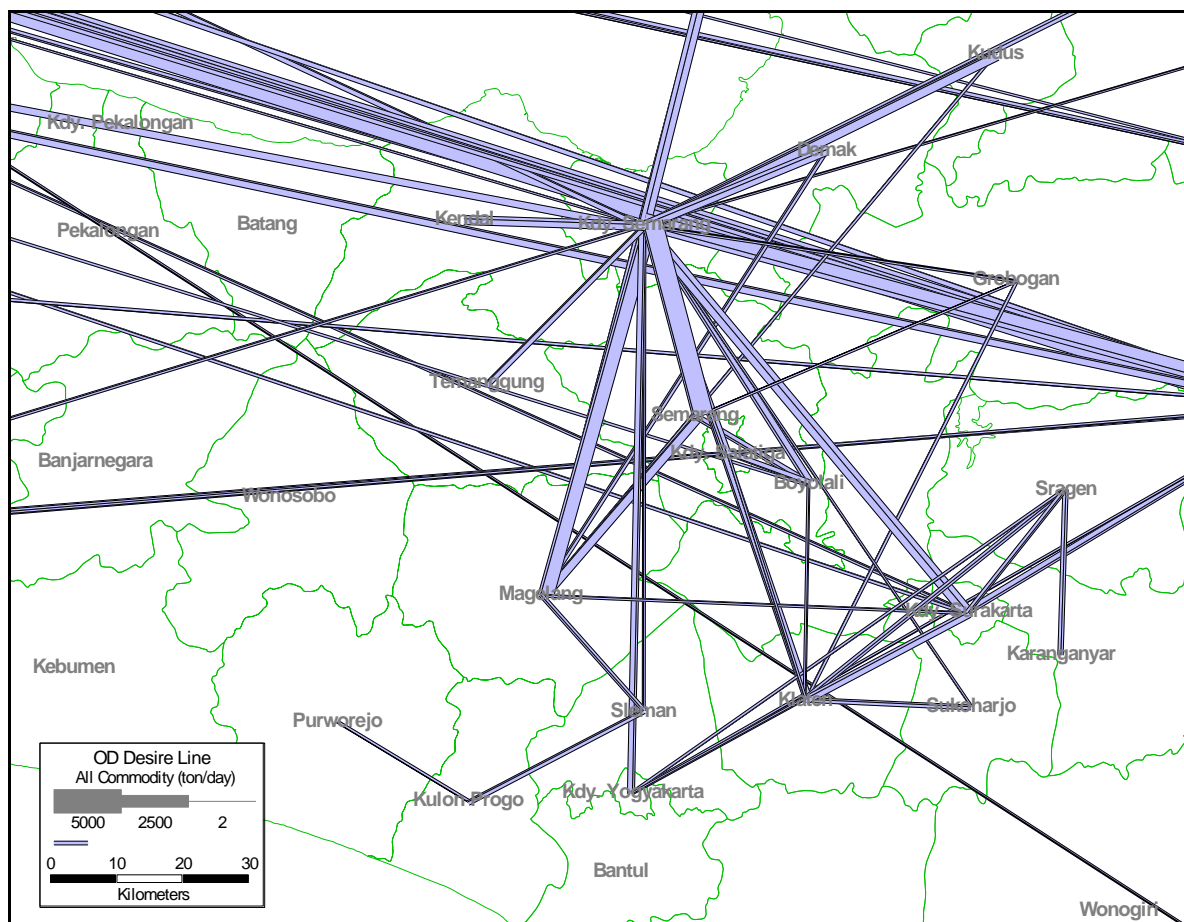
##### b. Methodology

Methodology is almost as same as passenger vehicles (a car and a motorcycle) except the point that final output for freight transportation is cargo weight OD tables instead of passenger OD tables. Cargo weight of each truck was used to manipulate cargo weight OD table by commodity types.

##### c. Weight Origin Destination Table and Desire Line by Analysis Zone

The following figure depicts the desire lines of commodity flow along Semarang – Solo – Yogyakarta corridor. East-West commodity flow, which connects west and east Java through North Java Corridor (or *Pantura*), is the major traffic corridor within the region. Radial commodity flows from / to Kota Semarang are also massive such as Kabupaten Semarang, Magelang and Surakarta. Since the flow pattern varies by commodity type, the flow patterns

by commodity type are discussed individually in the following subsection.



Source: CJRR Study Team, Road Traffic Survey, 2008

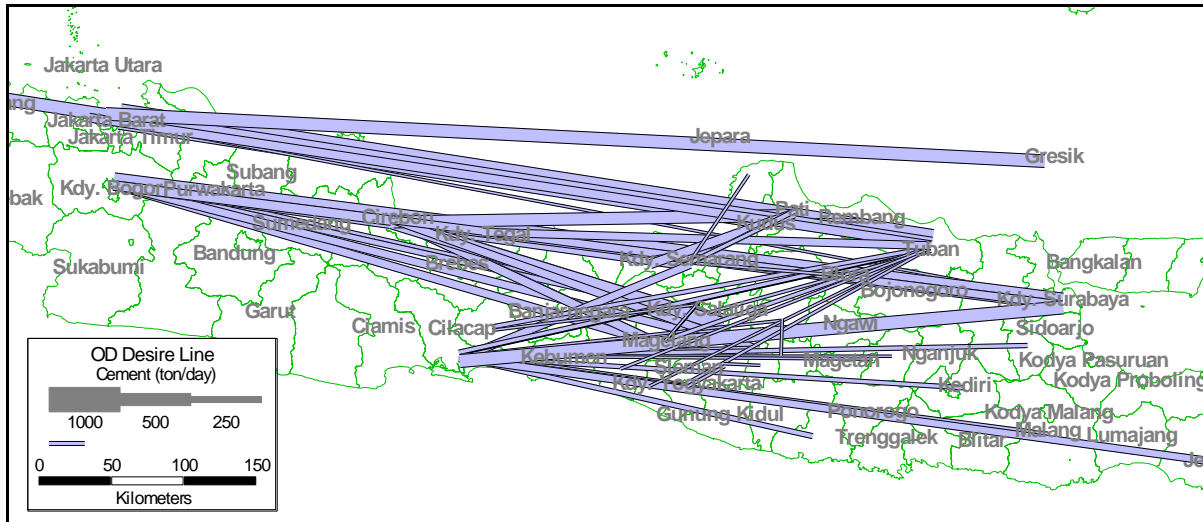
**Figure 1.2.8** Desire Lines of Freight Transport in Semarang – Solo – Yogyakarta Corridor

**d. Freight Traffic Weight Desire Line by Commodity Type**

**Cement**

Based on the Road Traffic Survey conducted during the Study in 2008, daily flow of cement which departs, arrives and passes through Semarang – Solo – Yogyakarta corridor is depicted in the following figure. Cement flows originate in cities such as Gresik, Tuban and Cirebon where major cement plants are located, and are destined for major cities such as Jakarta, Surabaya, Semarang and Solo.

While cement is a bulky cargo, it is transported by truck for long distances which exceed 500 km. Examples include Gresik – Jakarta, Tuban – Jakarta, Jakarta – Surabaya and Cilacap – Surabaya.



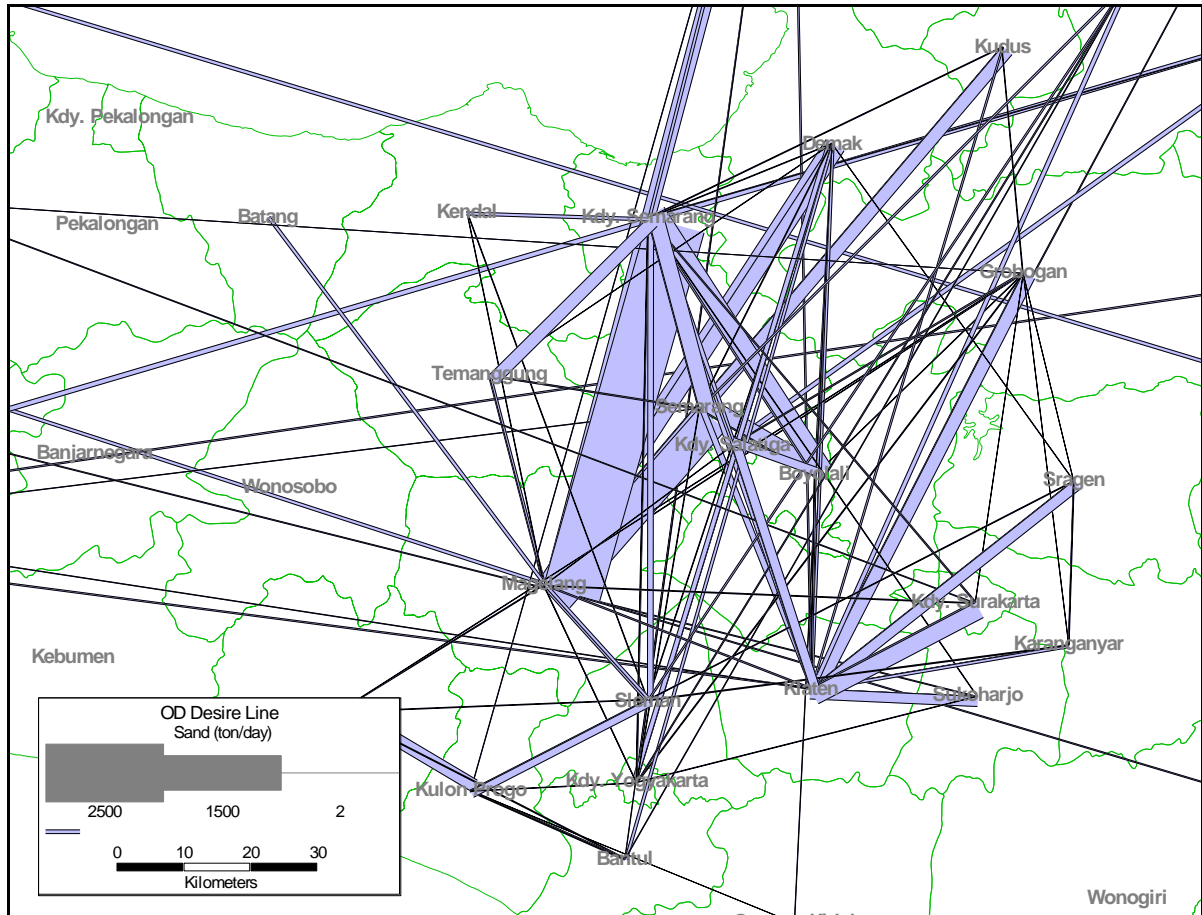
Note: Only trips departing, arriving and passing through Semarang – Solo – Yogyakarta corridor was surveyed.  
 Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.9 Desire Lines of Cement in Semarang – Solo – Yogyakarta Corridor**

**Quartz Sand (Silica)**

Since sand, important raw material for cement, is mined in the Central Java region, its transport flow is within the region. The following figure depicts the flow of sand in Semarang – Solo – Yogyakarta corridor. In contrast with steel and cement, vertical flow is massive such as Magelang – Kota Semarang, Magelang – Kabupaten Semarang, Boyolali – Kota Semarang, Klaten – Kota Surakarta. Transported sand from Magelang to Kabupaten Semarang exceeds more than 2,000 tons / day.



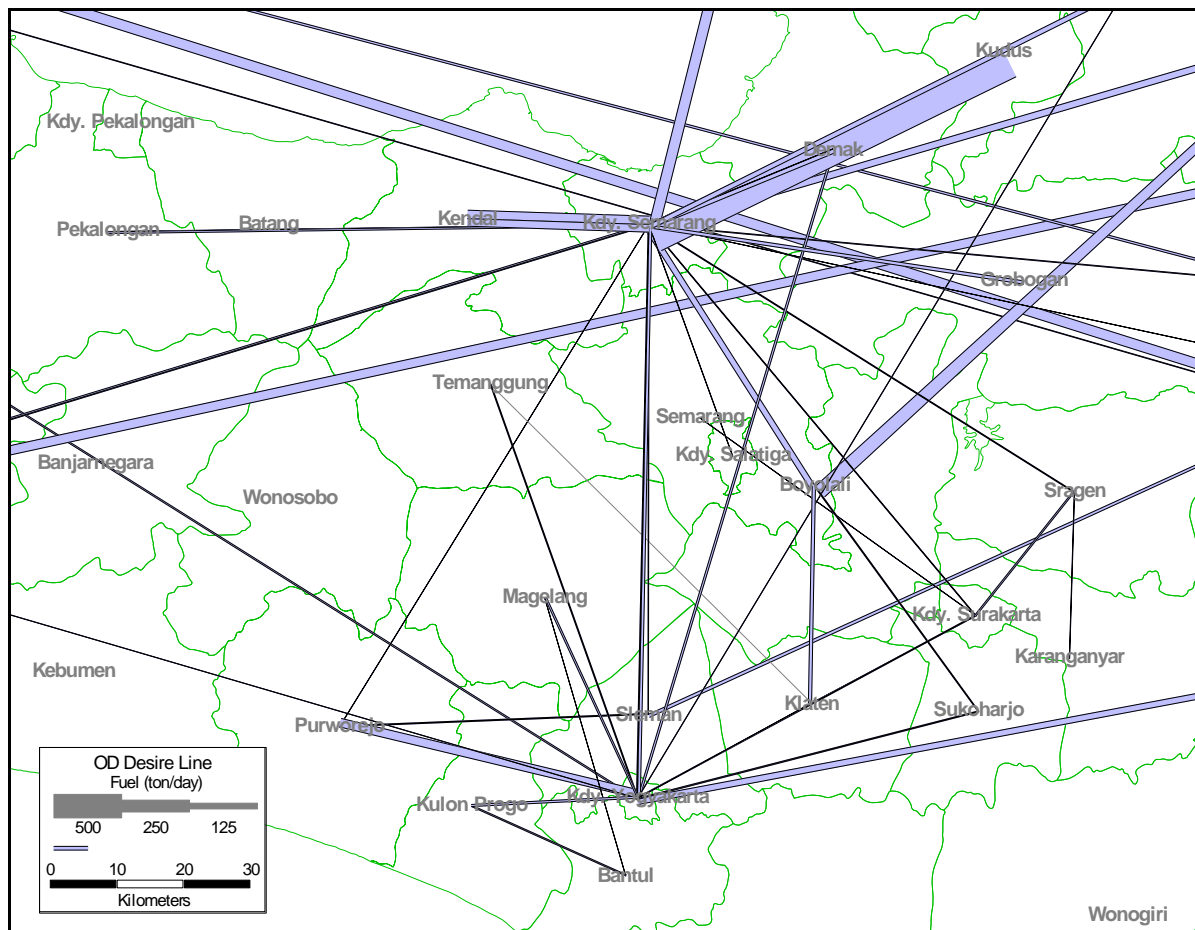


Source: CJRR, Road Traffic Survey, 2008

**Figure 1.2.10** Desire Lines of Sand in Semarang – Solo – Yogyakarta Corridor

## Fuel

While major traffic flow of fuel originates in Yogyakarta, Semarang and Boyolali where fuel depot / terminal of PT. Pertamina is located to adjacent Kabupaten, interregional flow was also observed during road traffic survey including Tangelang – Surabaya and Cilacap – Tuban.



Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.11** Desire Lines of Fuel in Semarang – Solo – Yogyakarta Corridor

### (3) Bus Passenger OD Interview Survey

#### 1) Survey Objective

To understand the traffic flow between cities and create an OD table of bus passenger for use as basic data for forecasting traffic demand.

#### 2) Survey Contents

##### a. Survey Location

Survey was conducted at 15 intercity bus terminals within the Case Study region of Yogyakarta - Solo - Semarang and it's surroundings. (See Figure 1.2.12 and Table 1.2.8)

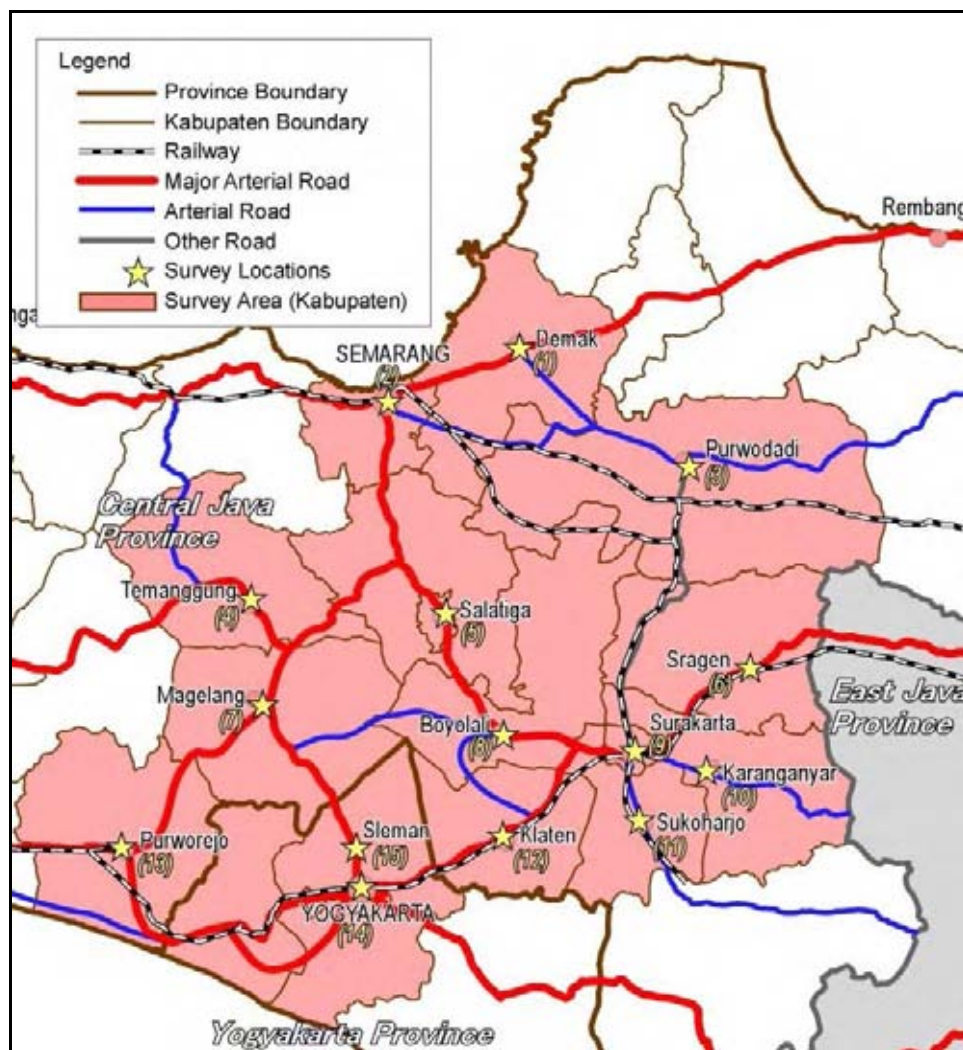


Figure 1.2.12 Bus Passenger OD Interview Survey Locations

**Table 1.2.8 List of Bus Passenger OD Interview Survey Locations**

No.	Bus Terminal Name	Kabupaten / Kota	City	Survey Hour
1	Bintoro	Kab. Demak	Demak	14 hours
2	Terboyo	Kota Semarang	Semarang	24 hours
3	Purwodadi	Kab. Grobogan	Purwodadi	11 hours
4	Madureso	Kab. Temanggung	Temanggung	12 hours
5	Tingkir	Kota Salatiga	Salatiga	14 hours
6	Pilangsari	Kab. Sragen	Sragen	9 hours
7	Tidar	Kota Magelang	Magelang	12 hours
8	Boyolali	Kab. Boyolali	Boyolali	14 hours
9	Tirtonadi	Kota Surakarta	Surakarta	24 hours
10	Jongke	Kab. Karanganyar	Karanganyar	12 hours
11	Sukoharjo	Kab. Sukoharjo	Sukoharjo	10 hours
12	Jonggrangan	Kab. Klaten	Klaten	12 hours
13	Purworejo	Kab. Purworejo	Purworejo	14 hours
14	Giwangan	Kota Yogyakarta	Yogyakarta	24 hours
15	Jombor	Kab. Sleman	Yogyakarta	11 hours

**b. Survey Method**

Interviewer asked intercity bus passengers boarding at the bus terminals about trip purpose, OD, etc while the passengers are waiting to their buses. In addition, the approximate number of boarding, arriving, and passing passengers of every departing and arriving bus was surveyed by counting and interviewing to conductor at entrance of bus terminal.

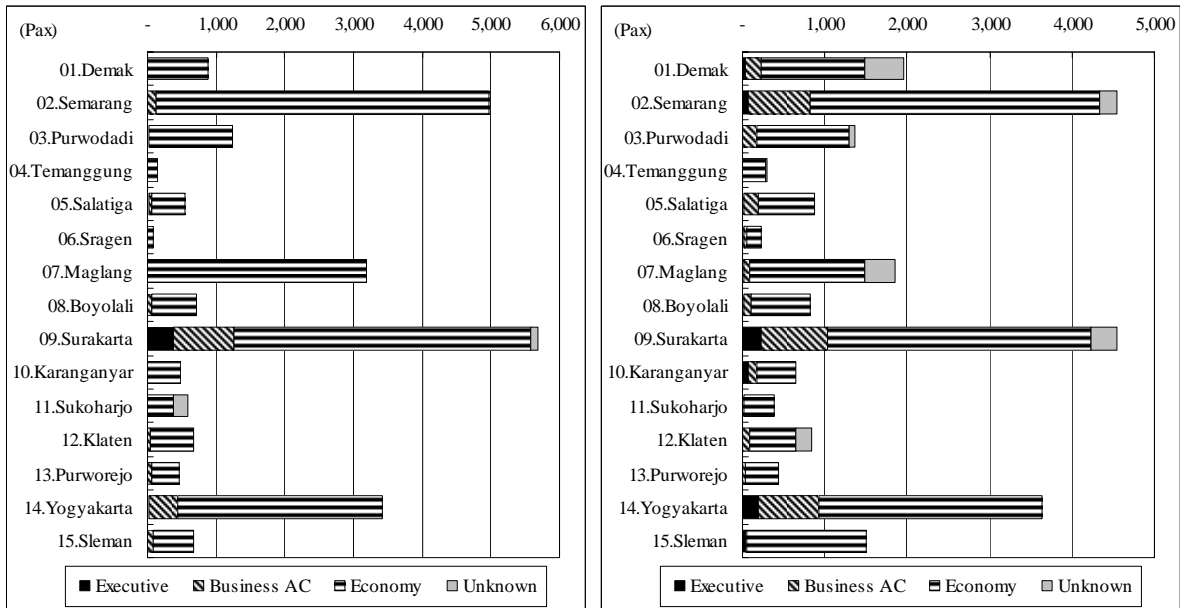
**c. Survey Period**

In keeping with the working hours in regional cities, it was basically from 6:00 to 20:00, a total of 14 hours on Tuesday, Wednesday or Thursday. However, survey period was extended to 24 hours for large bus terminals which is operated 24 hours. On the other hand, some bus terminals were closed before 20:00. The surveys were continued until closing time for these bus terminals. (See Table 1.2.8). The survey was conducted from June to July, 2008.

**3) Survey Results of Passenger Count Survey**

**a. Alighting and Boarding Bus Passenger Volume by Class by Terminal**

Alighting and boarding passenger volume by terminal is shown as follows. Semarang, Surakarta and Yogyakarta terminal exceeds more than 3,000 passengers per day for both alighting and boarding. Executive and Business AC class passengers ratio of Surakarta and Yogyakarta terminals are comparatively higher than that of Semarang.



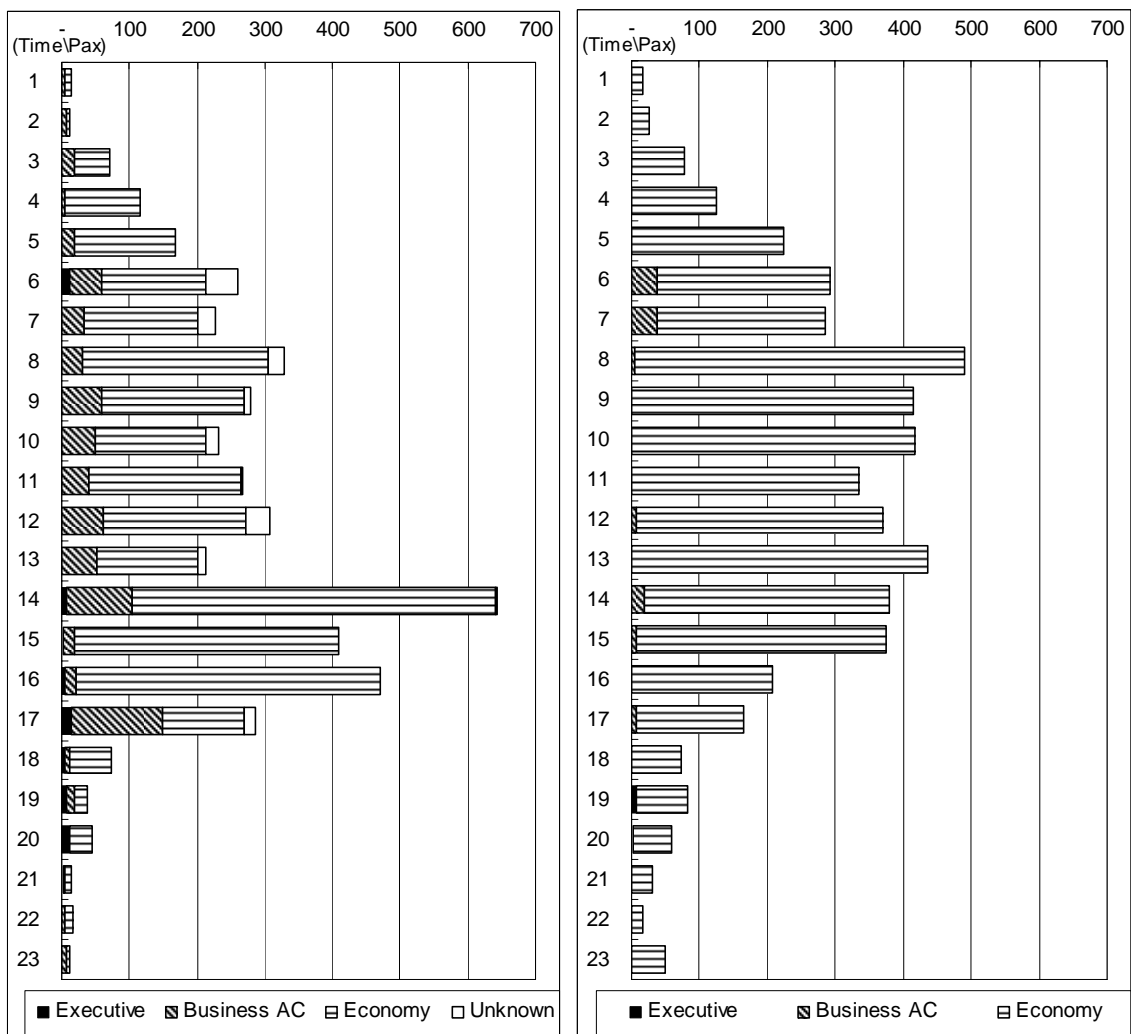
Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.13 Bus Passenger Volume by Class by Terminal**

**(Right: Departure, Left: Arrival)**

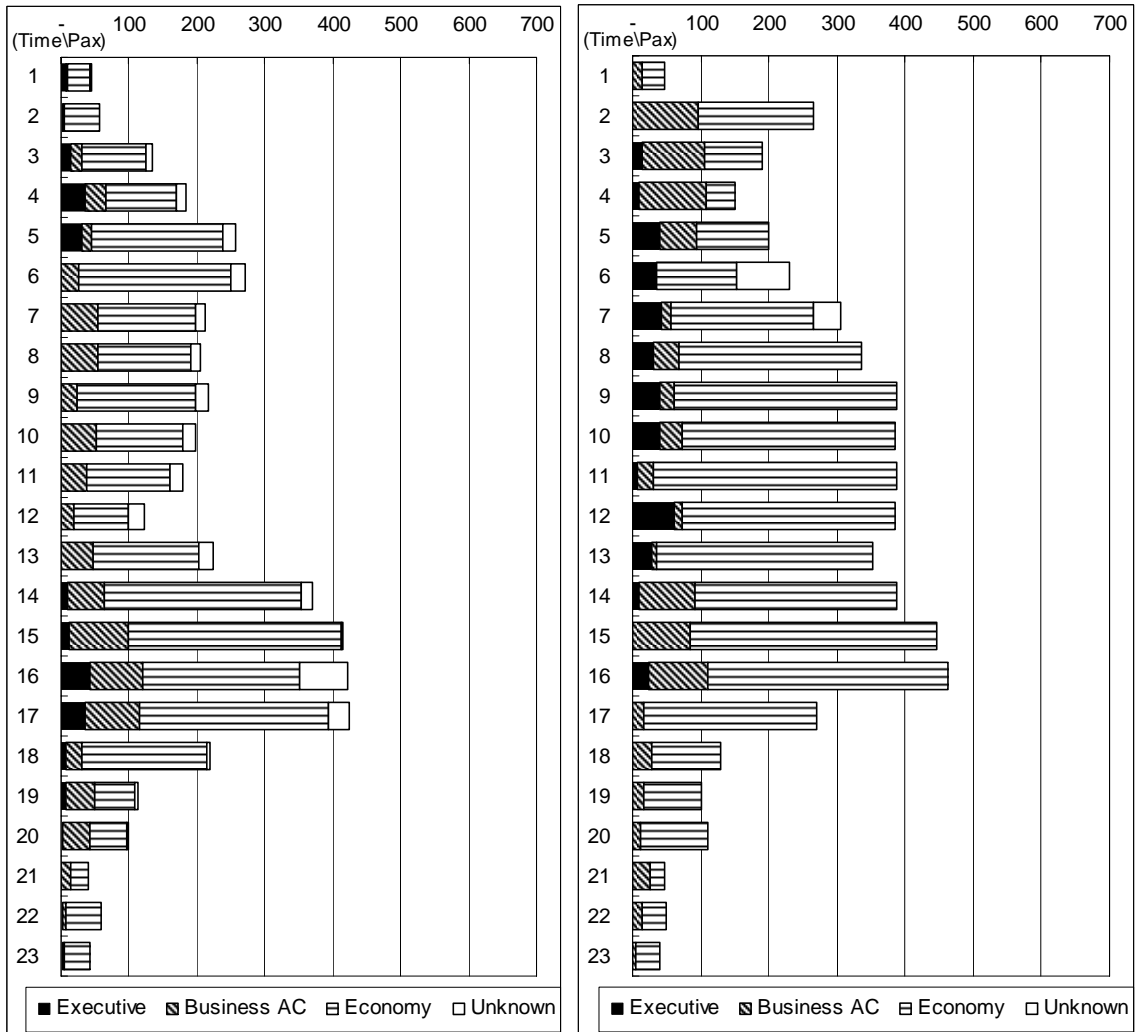
**b. Hourly Bus Passenger Volume by Class by Terminal**

Departure passenger volume is large from 2 PM to 4 PM while arrival passenger volume shows moderate peak from 8 AM to 3 PM at Semarang bus terminal. Hourly passenger volume Surakarta bus terminal shows similar pattern. On the other hand, Yogyakarta bus terminal shows moderate peak from 8 AM to 16 PM for both departing and arriving passengers.



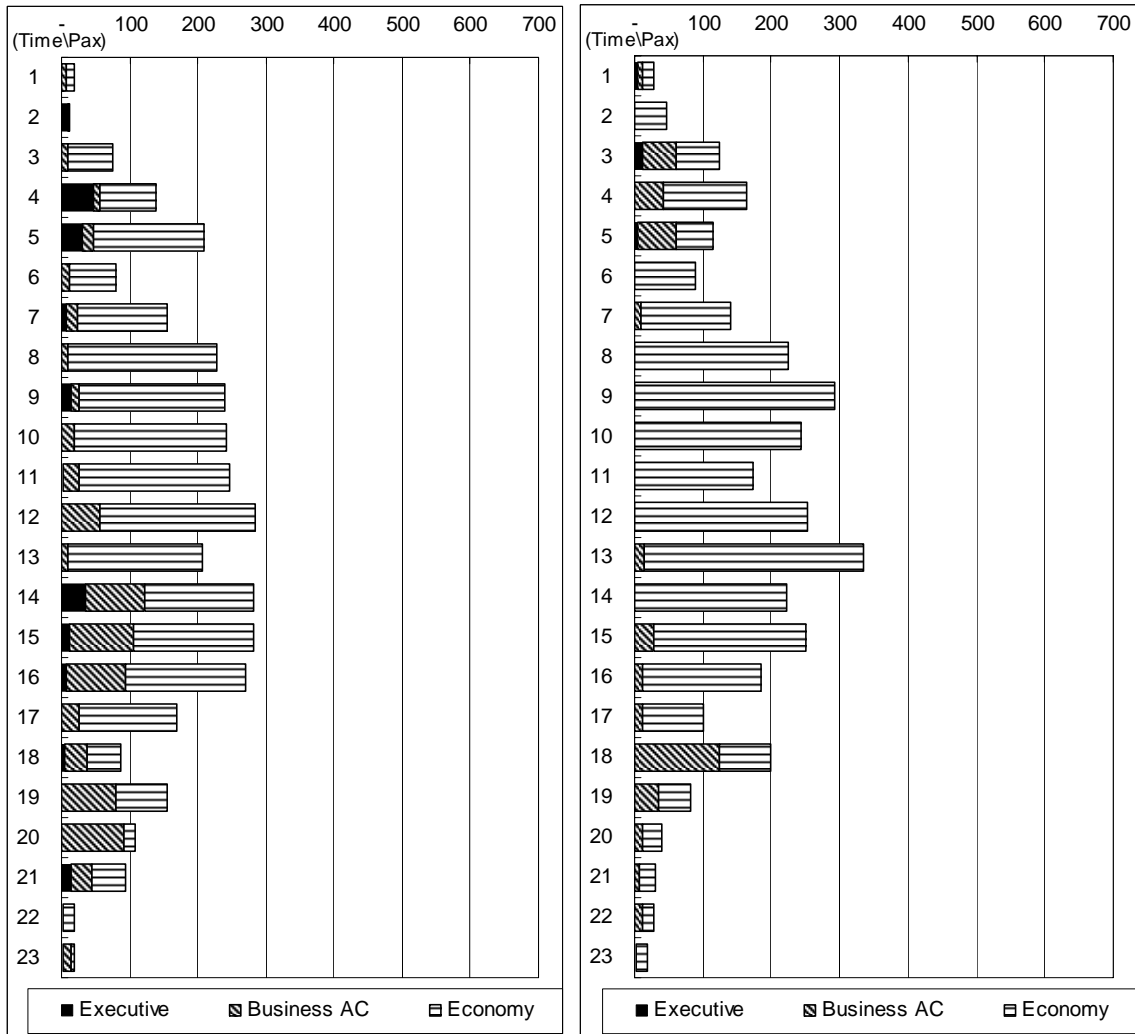
Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.14 Hourly Bus Passenger Volume by Class at Terboyo (Semarang) Bus Terminal**  
 (Right: Departure, Left: Arrival)



Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.15 Hourly Bus Passenger Volume by Class at Tirtonadi (Solo) Bus Terminal**  
**(Right: Departure, Left: Arrival)**



Source: CJRR Study Team, Road Traffic Survey, 2008

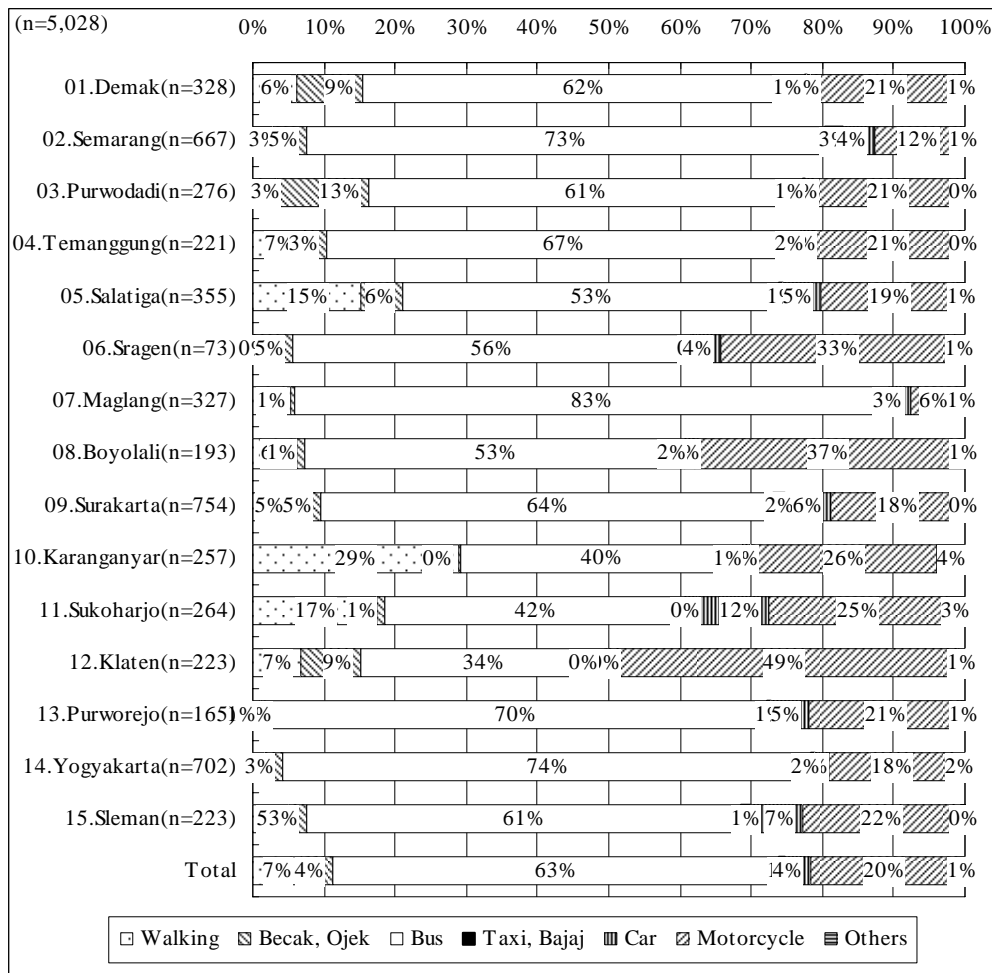
**Figure 1.2.16 Hourly Bus Passenger Volume by Class at Giwangan (Yogyakarta) Bus Terminal**  
**Right: Departure, Left: Arrival**



#### 4) Descriptive Survey Results of Interview Survey

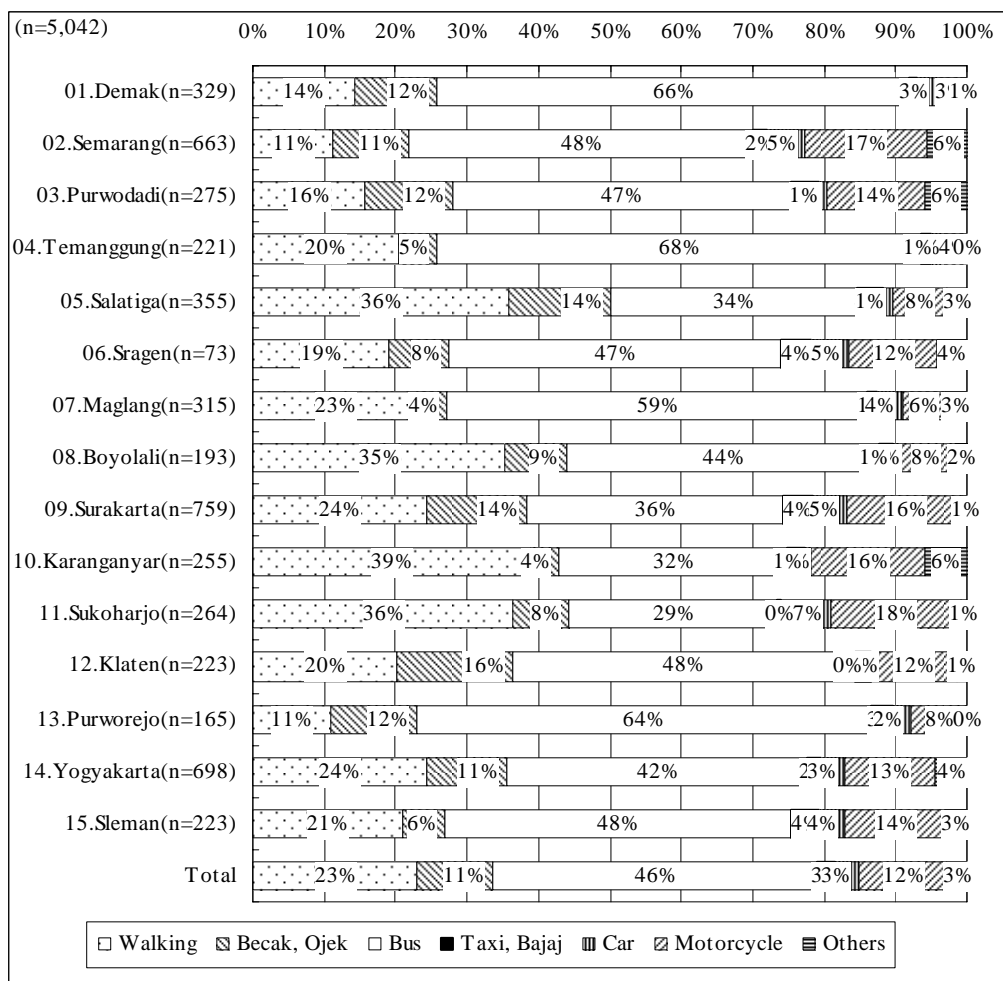
##### a. Access and Egress Transportation Mode by Bus Terminal

Access and egress transportation mode by bus terminals are shown below. Bus was the largest share and motorcycle is the second largest share is motorcycle for most bus terminals.



Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 1.2.17 Access Mode to Bus Terminals

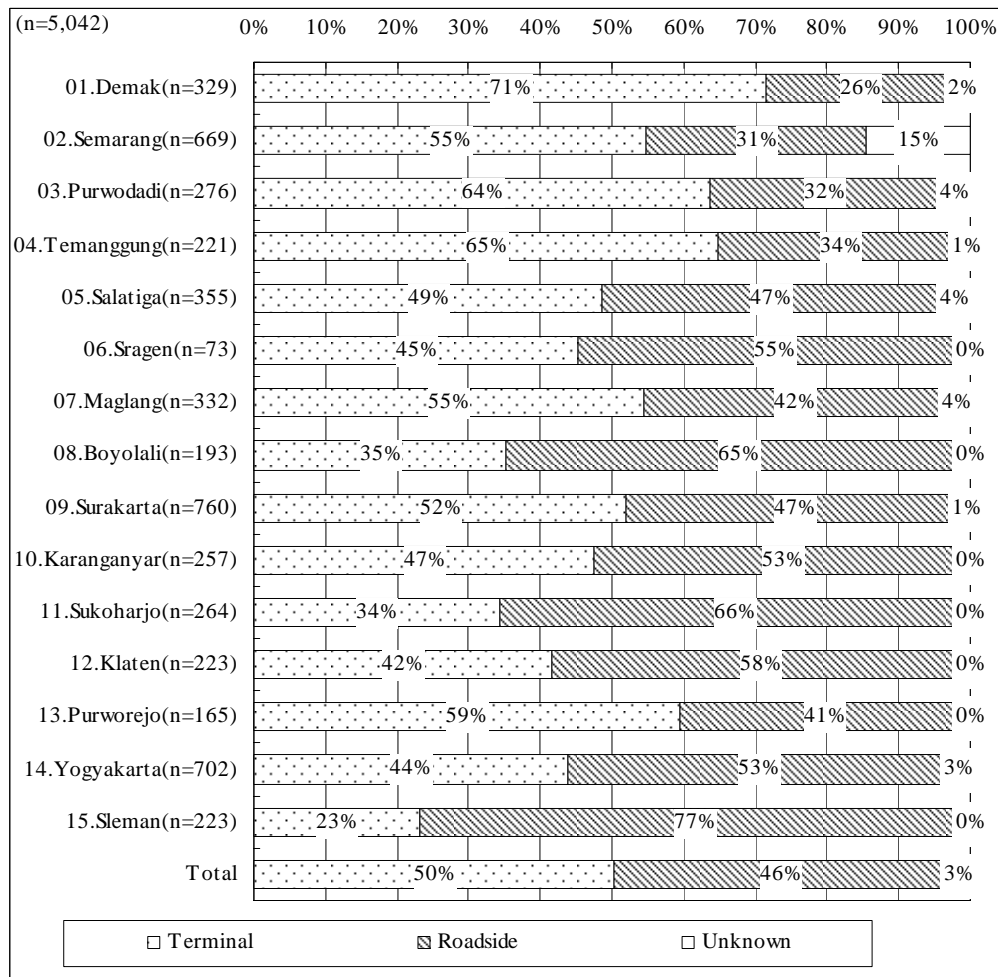


Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 1.2.18 Egress Mode from Bus Terminals

**b. Bus Alighting Location**

It is observed that some bus passenger boarding/alighting at roadside while all intercity bus passengers are obliged to board/alight at bus terminals. Types of alighting locations by bus terminals were shown below. Approximately half of bus passengers board from bus terminals do not alight at bus terminals.

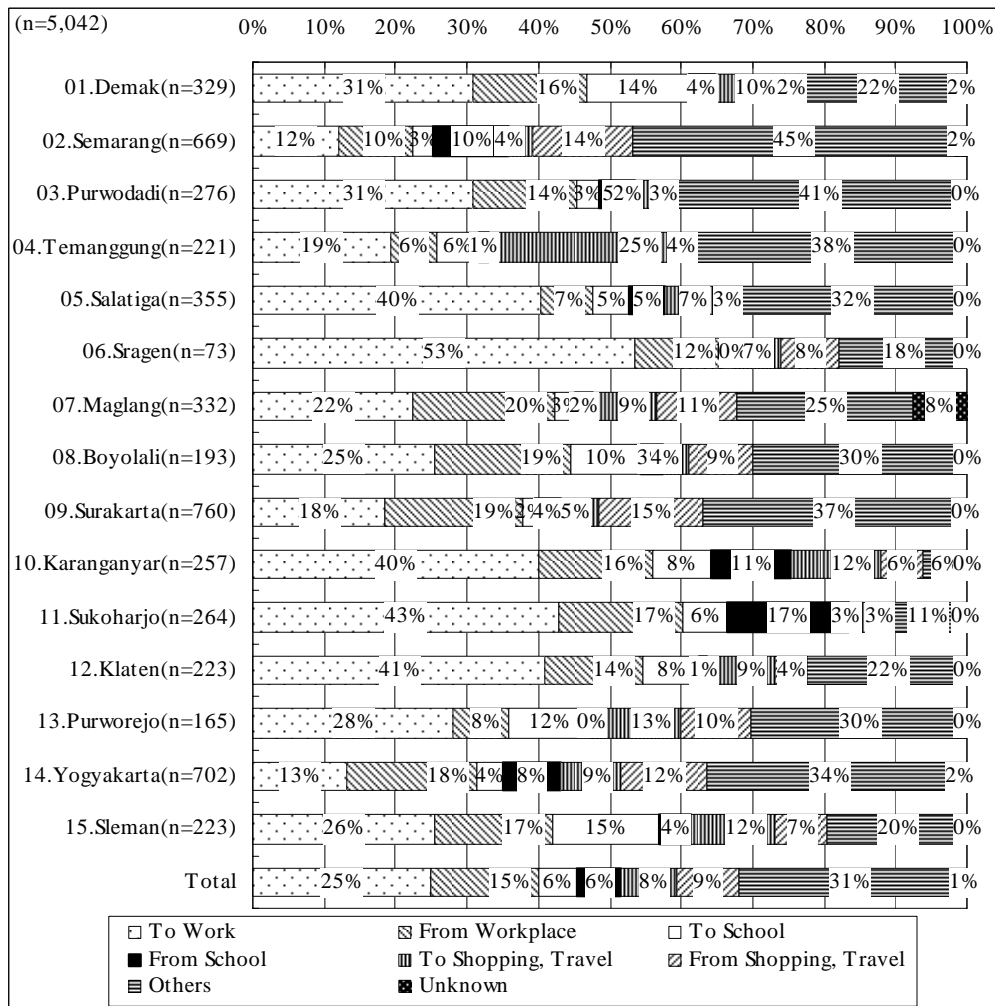


Source: CJRR Study Team, Bus Passenger OD Interview Survey

**Figure 1.2.19 Egress Mode from Bus Terminals**

**c. Trip Purpose by Bus Terminal**

Trip purpose by bus terminals are shown below. Trip purpose by bus terminals are shown below. The share of “To work” is larger than other purposes.

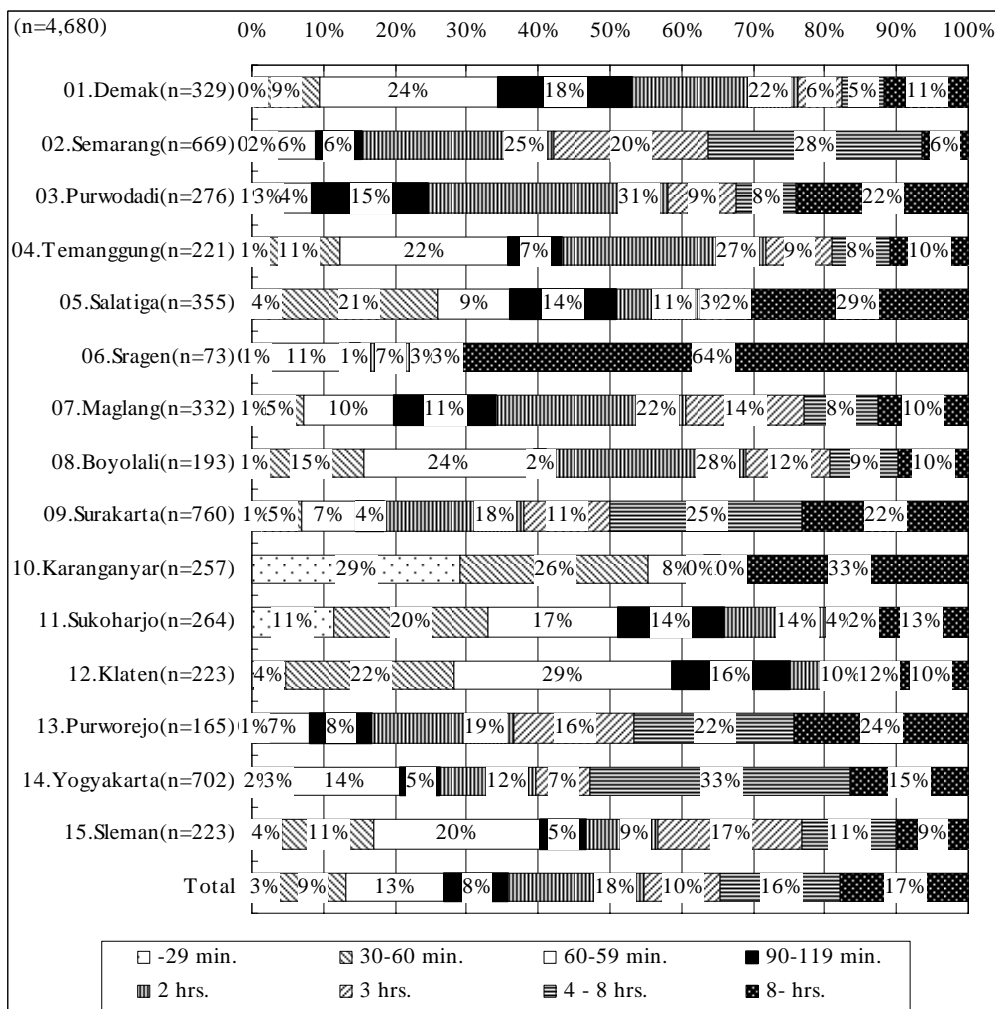


Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.20 Trip Purpose by Bus Terminals**

**d. Travel Time**

Travel time by bus terminals are shown below. Since bus terminals serve for intercity and inter-regency transport, approximately 80 % of passengers travel more than 1 hour.

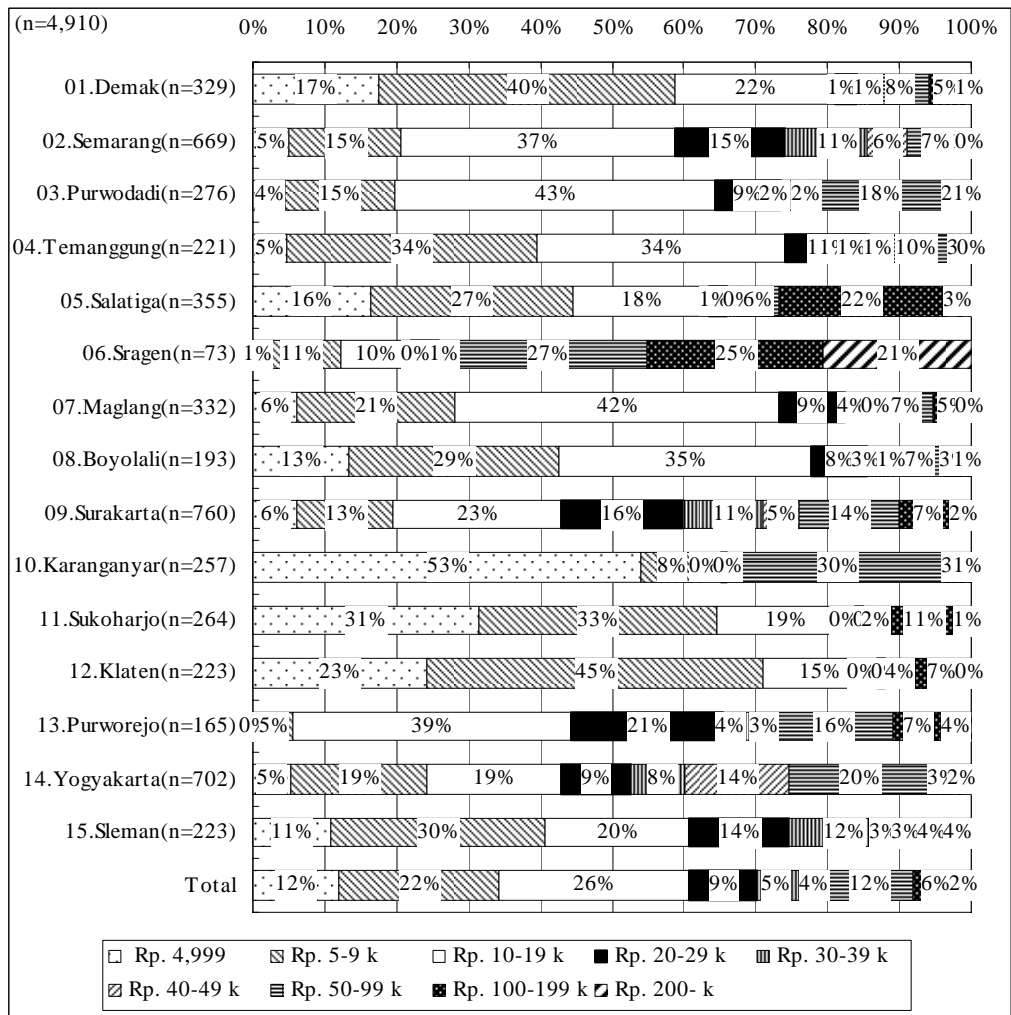


Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.21 Travel Time by Bus Terminals**

**e. Transportation Cost**

Travel cost by bus terminals are shown below. Since bus terminals serve for intercity and inter-regency transport, approximately 64 % of passengers' travel cost exceeds Rp. 100,000.

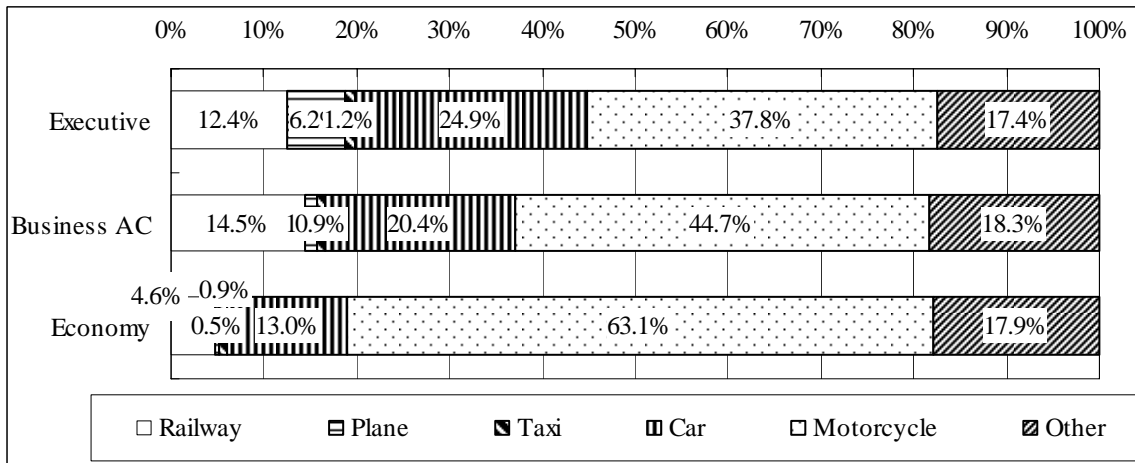


Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.22 Travel Cost by Bus Terminals**

**f. Alternative Transport Mode**

Alternative transportation mode of bus by class is shown below. For executive class, the share of Plane and is comparatively larger than economy and business class.

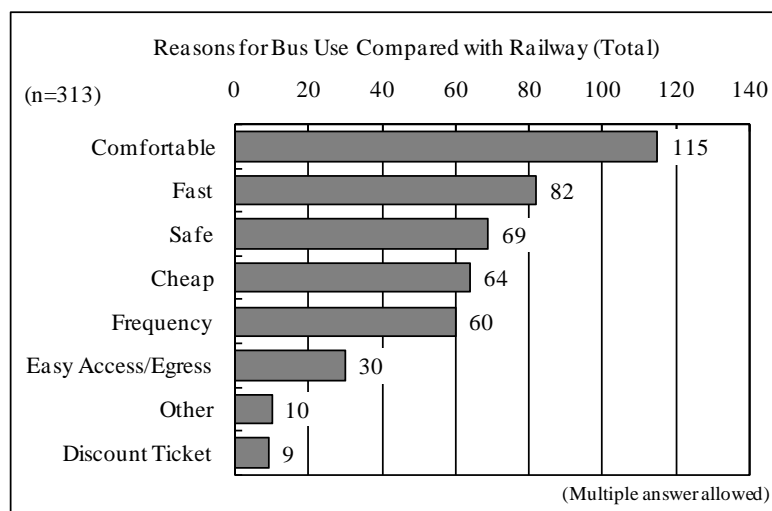


Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.23 Alternative Transportation Mode by Class**

**g. Reason for Bus Use**

313 respondents answered their alternative transport mode is railway. Figure 1.2.24 shows their reasons for bus use. Regardless of class, most respondents answered that comfort is the reason for bus use instead of railway. Other major reasons were speed, safety, price and frequency, in that order. These passengers could potentially be railway users with improvement of these factors.



Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.24 Reasons for Bus Use**

## 5) Origin Destination Table Calibration and Analyses

### a. Sampling Ratios

Sampling ratios by bus terminal by direction is shown below. 9,142 valid interview samples were surveyed and average sampling ratio was 19.1%.

**Table 1.2.9 Sampling Ratios by Bus Terminals**

City	Terminal	Direction	Number of Departure Passengers	No. of Valid Samples	Sampling Ratios
01.Demak	Bintoro	West	895	197	22.0%
01.Demak	Bintoro	East	977	85	8.7%
01.Demak	Bintoro	Unknown	82	8	
01.Demak	Bintoro	Total	1,954	290	14.8%
02.Semarang	Terboyo	West	426	77	18.1%
02.Semarang	Terboyo	South	1,385	177	12.8%
02.Semarang	Terboyo	East	2,708	290	10.7%
02.Semarang	Terboyo	Unknown	18	97	
02.Semarang	Terboyo	Total	4,537	641	14.1%
03.Purwodadi	Purwodadi	West	821	62	7.6%
03.Purwodadi	Purwodadi	East	282	125	44.3%
03.Purwodadi	Purwodadi	South	246	48	19.5%
03.Purwodadi	Purwodadi	Unknown	18	12	
03.Purwodadi	Purwodadi	Total	1,367	247	18.1%
04.Temanggung	Madureso	North	91	47	51.6%
04.Temanggung	Madureso	Southeast	203	163	80.3%
04.Temanggung	Madureso	Unknown	-	1	
04.Temanggung	Madureso	Total	294	211	71.8%
05.Salatiga	Tingkir	North	868	304	35.0%
05.Salatiga	Tingkir	Unknown	1		
05.Salatiga	Tingkir	Total	869	304	35.0%
06.Sragen	Pilangsari	West	216	63	29.2%
06.Sragen	Pilangsari	East	11	4	36.4%
06.Sragen	Pilangsari	Unknown	-	3	
06.Sragen	Pilangsari	Total	227	70	30.8%
07.Maglang	Tidar	South	881	148	16.8%
07.Maglang	Tidar	North	975	116	11.9%
07.Maglang	Tidar	Unknown	4	16	
07.Maglang	Tidar	Total	1,860	280	15.1%
08.Boyolali	Boyolali	Southeast	410	85	20.7%
08.Boyolali	Boyolali	North	420	93	22.1%
08.Boyolali	Boyolali	Unknown	-	13	
08.Boyolali	Boyolali	Total	830	191	23.0%
09.Surakarta	Tirtonadi	North	181	48	26.5%
09.Surakarta	Tirtonadi	West	1,441	247	17.1%
09.Surakarta	Tirtonadi	South	391	59	15.1%
09.Surakarta	Tirtonadi	East	1,004	222	22.1%
09.Surakarta	Tirtonadi	Southwest	1,106	90	8.1%
09.Surakarta	Tirtonadi	Unknown	424	54	
09.Surakarta	Tirtonadi	Total	4,547	720	15.8%
10.Karanganyar	Jongke	West	640	168	26.3%
10.Karanganyar	Jongke	Unknown	-		
10.Karanganyar	Jongke	Total	640	168	26.3%
11.Sukoharjo	Sukoharjo	South	258	142	55.0%
11.Sukoharjo	Sukoharjo	North	114	58	50.9%
11.Sukoharjo	Sukoharjo	Unknown	6	18	
11.Sukoharjo	Sukoharjo	Total	378	218	57.7%
12.Klaten	Jonggrangan	West	454	89	19.6%



12.Klaten	Jongrangan	East	370	117	31.6%
12.Klaten	Jongrangan	Unknown	7	1	
12.Klaten	Jongrangan	Total	831	207	24.9%
13.Purworejo	Purworejo	West	192	59	30.7%
13.Purworejo	Purworejo	East	239	92	38.5%
13.Purworejo	Purworejo	Unknown	-	7	
13.Purworejo	Purworejo	Total	431	158	36.7%
14.Yogyakarta	Giwangan	West	654	171	26.1%
14.Yogyakarta	Giwangan	South	469	104	22.2%
14.Yogyakarta	Giwangan	East	1,472	176	12.0%
14.Yogyakarta	Giwangan	North	1,038	182	17.5%
14.Yogyakarta	Giwangan	Unknown	7	25	
14.Yogyakarta	Giwangan	Total	3,640	658	18.1%
15.Sleman	Jombor	South	287	102	35.5%
15.Sleman	Jombor	North	1,222	91	7.4%
15.Sleman	Jombor	Unknown	1	14	
15.Sleman	Jombor	Total	1,510	207	13.7%
Total			47,830	9,140	19.1%

Source: CJRR Study Team, Road Traffic Survey, 2008

### b. Methodology

Origin and destination table of bus users in the Central Java region was calibrated by bus passenger count survey and bus OD interview survey results. Expansion factor by train by survey station were calculated by dividing boarding passengers of the bus by the number of OD survey respondents. Since the passengers who will alight at non-surveyed terminals can represent boarding passengers at non-surveyed terminals, these samples with opposite OD were added for OD table. The number of passenger of survey locations which surveyed less than 24 hours, expansion factors for 24 hours are multiplied.

**Table 1.2.10 Expansion Factors for 24 Hours**

Survey Hours	Expansion Factors
9	1.892
10	1.625
11	1.415
12	1.289
13	1.241
14	1.205
24	1.000

Source: CJRR Study Team, Estimates based on Road Traffic Survey, 2008

### c. Origin Destination Table by Large Zone

The estimated daily OD table of bus passengers is shown below.

**Table 1.2.11 Bus Passenger OD Table in the Central Java Region by Analysis Zone**

[Unit: passengers per day]

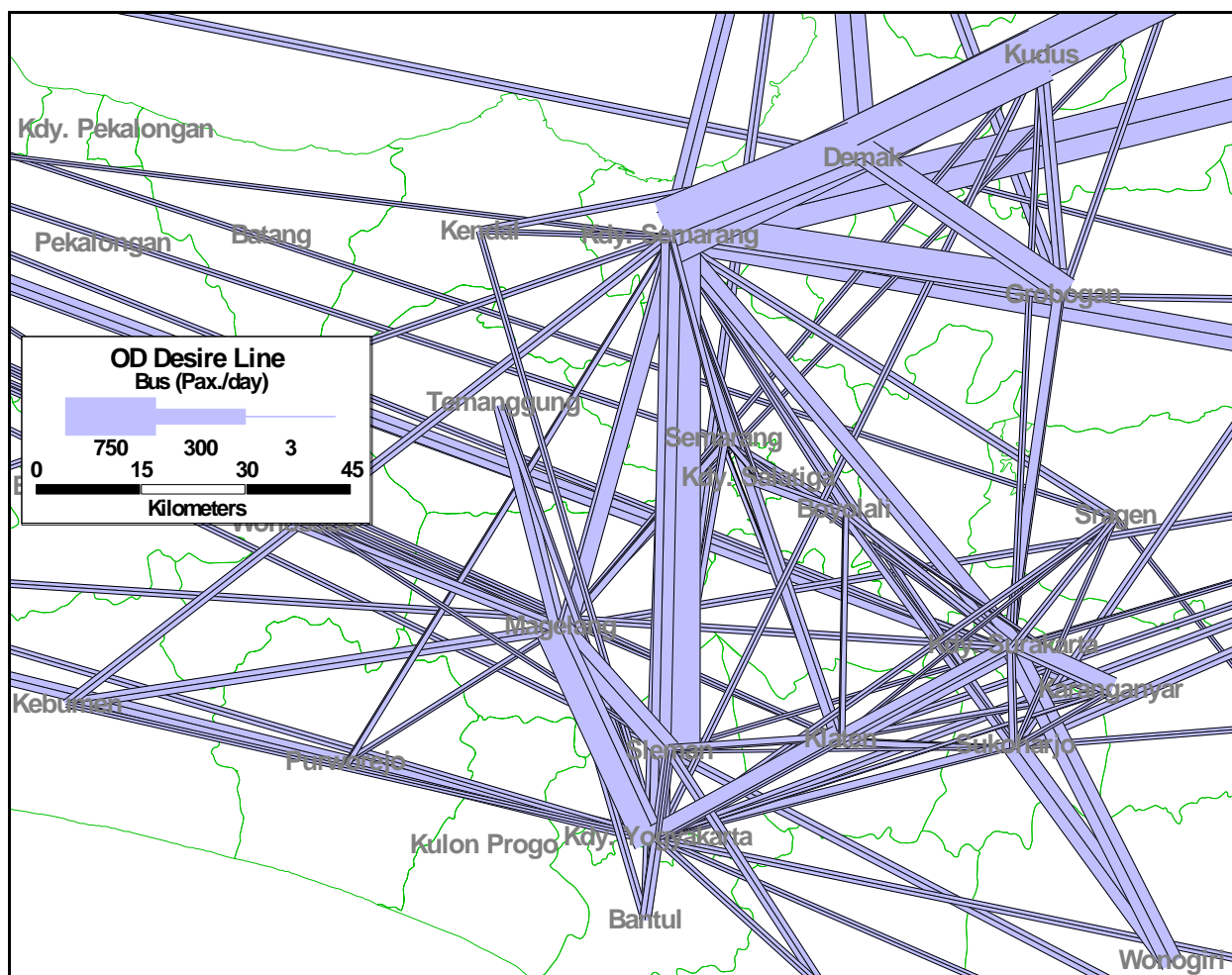
	Bo	De	Es	Kl	Ku	Ma	Pu	Sa	Sm	Sr	Su	Ws	Yo	Total
Bo	21	7	103	23	6	24	7	168	166	17	228	148	48	966
De	8	341	740	8		35	146	62	771	15	28	382	41	2,575
Es	63	70	303	149	40	148	52	128	274	30	138	571	389	2,357
Kl	98	38	123	83	16	19	12	26	91	13	397	262	420	1,598
Ku			54				8		37	4	10		27	141
Ma	19	19	218	15	15	237	25	160	311	17	48	724	802	2,609
Pu	20	404	411	14			139	30	544	22	224	339	60	2,207
Sa	224	14	254	115		49	26	218	163	7	97	415	92	1,676
Sm	58	219	1,958	171	6	69	92	58	74	30	204	451	269	3,658
Sr	30		44	37		6	3	41	68	17	57	378	80	761
Su	191	35	1,317	183		47	46	157	404	100	1,139	992	437	5,047
Ws	28	38	644	81	6	272	33	124	232	11	216	510	475	2,670
Yo	77	7	981	123	50	458	70	198	924	12	300	1,226	455	4,879
Total	837	1,192	7,150	1,001	139	1,363	660	1,370	4,058	295	3,086	6,397	3,597	31,145

Analysis Zone: Bo = Kab. Boyolali, De = Kab. Demak, Es = Eastern Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Kl = Kab. Klaten, Ku = Kab. Kulon Progo, Ma = Kab. Magelang and Kota Magelang, Pu = Kab. Grobogan, Sa = Kab. Salatiga and Kota Salatiga, Sm = Kota Semarang, Sr = Sragen, Su = Kota Solo (Sulakarta) and Kab. Kranganyar, Ws = Western Area of the Semarang-Solo-Yogyakarta Corridor (external zone), Yo = Kab. Sleman, Kab. Bantul and Kota Yogyakarta

Source: CJRR Study Team, Road Traffic Survey, 2008

### d. Desire Line of Bus Passengers

Figure 1.2.25 depicts the desire line of bus passenger in the Central Java region. While the number of passenger between Semarang and northeast kabupaten such as Demak and Kudus are comparatively larger than other hinterland of Semarang city such as Kendal and Kabupaten Semarang. It is presumed that survey results were affected by location of bus terminal. Since Terboyo (Semarang) bus terminal is located in the north east of Semarang City, passengers from center of Semarang city to northwest direction cities use Terboyo bus terminal. On the other hand, passengers from center of Semarang city to other direction, they usually board at roadside in CBD of Semarang city.



Note: Desire lines which have less than ??? passenger /day for one direction are excluded.  
Source: CJRR Study Team, Road Traffic Survey, 2008

**Figure 1.2.25 Desire Line of Bus Passengers in Semarang – Solo – Yogyakarta Corridor**

### 1.3 Travel Speed Survey

#### 1) Survey Objective

In order to compare the travel time for automobiles and buses with that of trains, the variation in automobile travel time is analyzed to obtain its competitiveness in relation to trains. Furthermore, congestion bottlenecks and its causes were also investigated.

#### 2) Survey Contents

##### a. Survey Routes

Survey the 7 main trunk road routes in the Yogyakarta - Solo - Semarang sector that are believed to be in competition with the railways. (See Figure 1.3.1) Each route was divided into sections by city, intersection of arterial road, border of kabupaten/kota, large river and other geographical features.

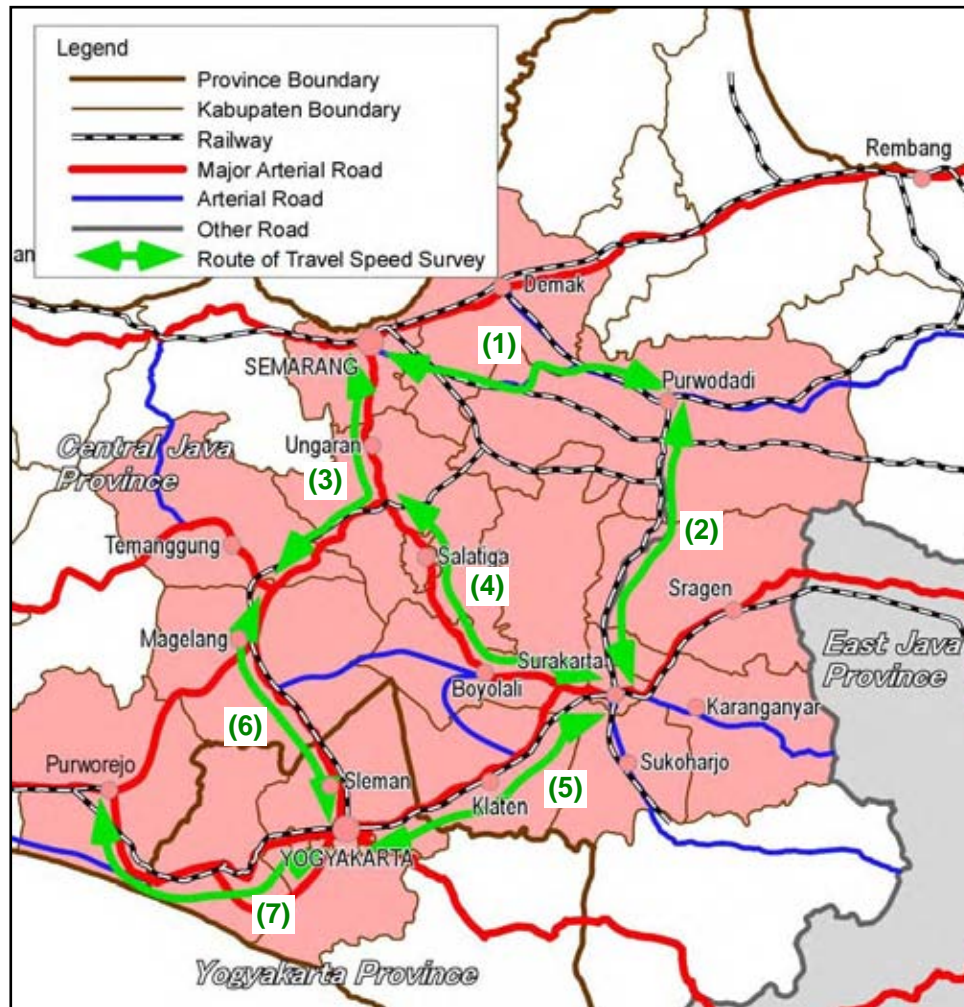


Figure 1.3.1 Route covered by Travel Speed Survey

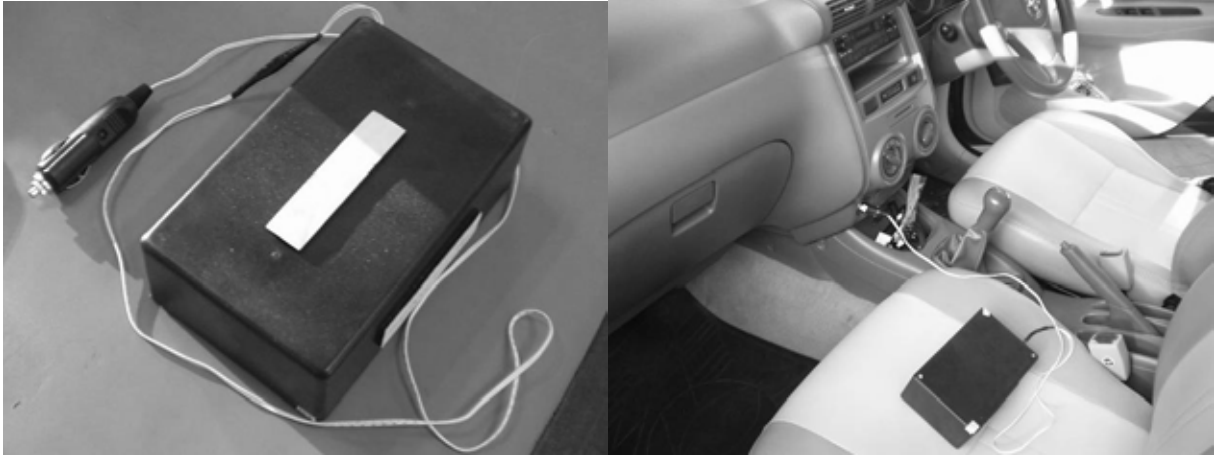
**b. Survey Method**

A survey vehicle equipped with a GPS (Global Positioning System) device, which could transmit positional data at every 30 seconds via GPRS (General Packet Radio Service) were utilized and travel speed were calculated. A set of devices were installed on the survey vehicle (See Source: CJRR Study Team, Travel Speed Survey, 2008

Figure 1.3.2).

**c. Survey Period and Duration**

Travel speed data of two directions 3 times a day (morning, lunch, evening) at each route were surveyed. The survey was conducted on weekday of Tuesday, Wednesday and Thursday, 3rd - 5th and 18th in June.



Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.2 GPS device for Travel Speed Survey**

### **3) Survey Results**

Travel Speed Survey results are shown below. Each route is divided by several sections and colored by travel speed categories.

a. Semarang - Purwodadi

Morning

Semarang - Purwodadi



Travel Speed of Semarang - Purwodadi Route - Morning 4 June 2008

Purwodadi - Semarang



Travel Speed of Purwodadi - Semarang Route - Morning 5 June 2008

Noon



Travel Speed of Semarang - Purwodadi Route - Noon 4 June 2008



Travel Speed of Purwodadi - Semarang Route - Noon 4 June 2008

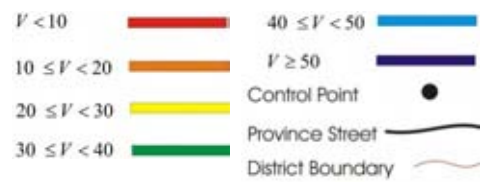
Evening



Travel Speed of Semarang - Purwodadi Route - Evening 4 June 2008



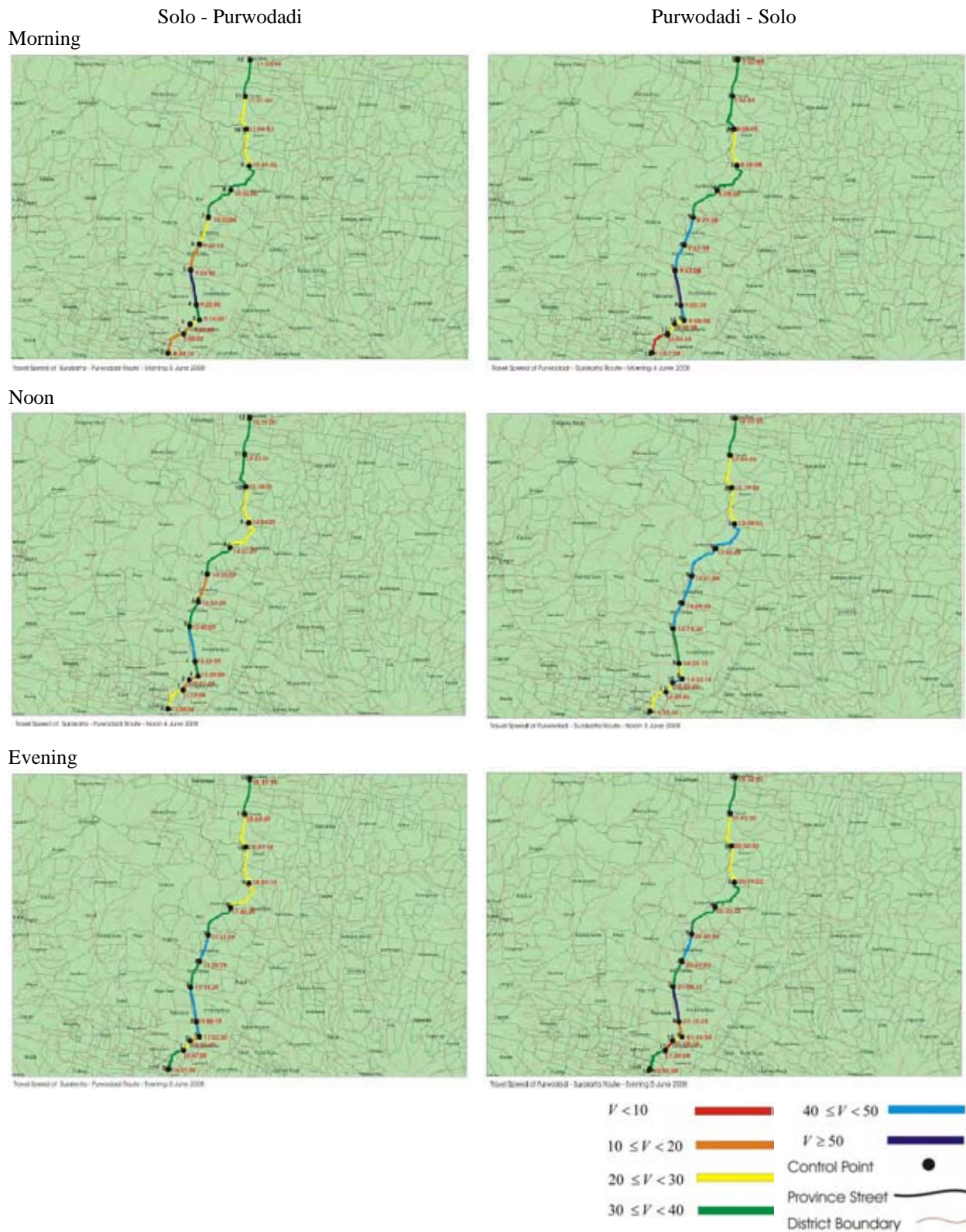
Travel Speed of Purwodadi - Semarang Route - Evening 5 June 2008



Source: CJRR Study Team, Travel Speed Survey, 2008

Figure 1.3.3 Travel Speed of Semarang – Purwodadi Route

**b. Solo – Purwodadi**



Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.4 Travel Speed of Semarang – Purwodadi Route**

**c. Semarang - Magelang**

Morning

Semarang - Magelang



Travel Speed of Semarang - Magelang Route - Morning 4 June 2008

Magelang - Semarang



Travel Speed of Magelang - Semarang Route - Morning 5 June 2008

Noon



Travel Speed of Semarang - Magelang Route - Noon 3 June 2008



Travel Speed of Magelang - Semarang Route - Noon 4 June 2008

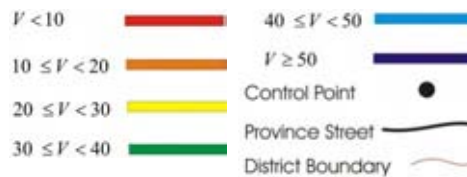
Evening



Travel Speed of Semarang - Magelang Route - Evening 6 June 2008



Travel Speed of Magelang - Semarang Route - Evening 5 June 2008

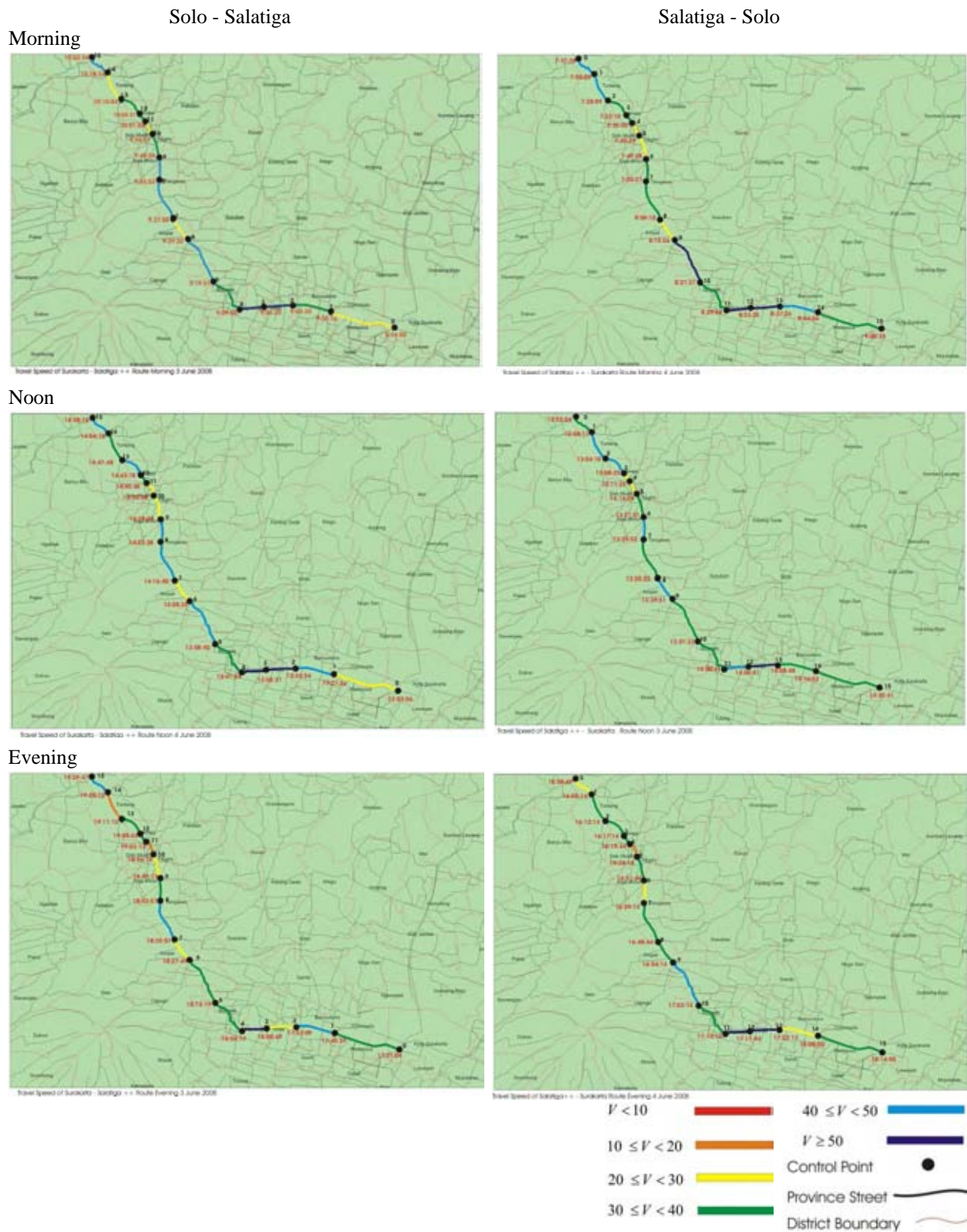


Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.5 Travel Speed of Semarang – Magelang Route**



**d. Solo - Salatiga**



Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.6 Travel Speed of Solo – Salatiga Route**

e. Yogyakarta – Solo

Morning

Yogyakarta - Solo



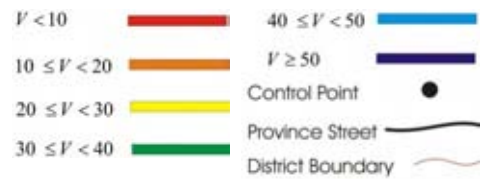
Solo - Yogyakarta



Noon



Evening



Source: CJRR Study Team, Travel Speed Survey, 2008

Figure 1.3.7 Travel Speed of Yogyakarta – Solo Route

**f. Yogyakarta - Magelang**

Morning

Yogyakarta - Magelang



Travel Speed of Yogyakarta - Magelang Route Morning 4 June 2008

Magelang - Yogyakarta



Travel Speed of Magelang - Yogyakarta Route Morning 5 June 2008

Noon



Travel Speed of Yogyakarta - Magelang Route Noon 3 June 2008



Travel Speed of Magelang - Yogyakarta Route Noon 4 June 2008

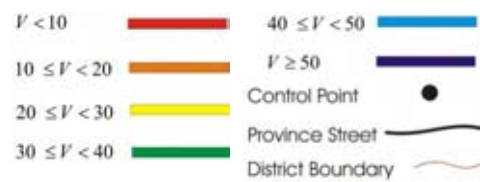
Evening



Travel Speed of Yogyakarta - Magelang Route Evening 4 June 2008



Travel Speed of Magelang - Yogyakarta Route Evening 5 June 2008



Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.8 Travel Speed of Yogyakarta – Magelang Route**

**g. Yogyakarta Purworejo**

Yogyakarta - Purworejo

Morning



Travel Speed of Yogyakarta - Purworejo Route - Morning 4 June 2008

Purworejo - Yogyakarta



Travel Speed of Purworejo - Yogyakarta Route - Morning 5 June 2008

Noon



Travel Speed of Yogyakarta - Purworejo Route - Noon 3 June 2008



Travel Speed of Purworejo - Yogyakarta Route - Noon 4 June 2008

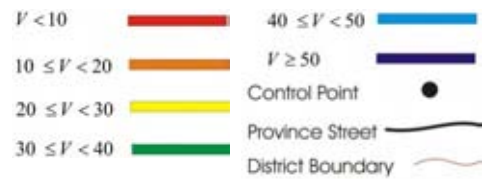
Evening



Travel Speed of Yogyakarta - Purworejo Route - Evening 4 June 2008



Travel Speed of Purworejo - Yogyakarta Route - Evening 3 June 2008



Source: CJRR Study Team, Travel Speed Survey, 2008

**Figure 1.3.9 Travel Speed of Yogyakarta – Purworejo Route**

## 1.4 Stated Preference Survey

### 1) Survey Objective

This survey was aimed at investigating the characteristics of travel taken by the community within the scope of commuter train service plan. The travel characteristics include travel origin and destination, transportation mode being used, departure time, travel time, and travel frequency. In addition, the survey was aimed at investigating the responses of the community regarding the plan of commuter train passing through their living area and looking at their desire to use the transportation service. From the survey, it is expected that the enthusiasm of the community to use commuter train can be investigated and the ability of the community to use the commuter train can be assessed.

### 2) Survey Method

In the survey, surveyor interviewed communities living in the scope of the commuter train area. Surveyor came to the residents' houses, door to door, located in plan area of commuter train. In order to get reliable data, surveyor prioritized residents living near the station.

Firstly, the surveyor asked personal and family data of the respondent. During this interview, the surveyor recorded the travel characteristics of the respondent. Subsequently, surveyor explained the plan of commuter train, including the concept and service plan. After the information the surveyor gave was seemed sufficient, the surveyor asked for respondent's response to the presence of commuter train.

### 3) Survey Location and Samples

The survey was conducted in Central Java region, which had high potential of travel demand for commuter train. In Central Java, furthermore, there are three cities of business centers and play as the center of economical activity and study. The cities are Semarang, Surakarta and Yogyakarta. The scope of this commuter train investigated in this survey included the three regions and their buffer areas, including Wates, Yogyakarta, Klaten, Solo, Sragen, Semarang, Purwodadi, Demak, and Kendal. Furthermore, the survey area was divided into several zones, i.e. Wates – Yogyakarta segment, Yogyakarta – Klaten segment, Adi Sucipto Yogyakarta Airport, Klaten – Solo segment, Solo-Sragen segment, Semarang – Brumbung segment, Semarang – Kendal segment and Semarang – Demak segment. The sample of the survey included citizens living around the corridors potential to use train. The detail of survey location and number of sample is presented in the following table.

**Table 1.4.1 Survey Location and Number of Sample**

No	Survey Location	Number of Sample
1.	Wates – Yogyakarta Segment	300
2.	Yogyakarta – Klaten Segment	300
3.	Adi Sucipto Yogyakarta Airport	200
4.	Klaten – Solo Segment	300
5.	Solo – Sragen Segment	301
6.	Semarang – Brumbung Segment	300
7.	Semarang – Kendal Segment	302
8.	Semarang – Demak Segment	293
	Total	2,296

#### 4) Survey Time Period

This survey was conducted in 25 August 2008 – 2 September 2008.

#### 5) Summary of Questions

The following is the list of survey questions.

**Table 1.4.2 List of Survey Questions**

ID Group	Group of Question	Detail Information	
A	Information of Household	1	Vehicle ownership
		2	Income (Rupiahs)
		3	Number of Family Member
		4	Number of Adult Family Member
		5	Number of Adult & Working Family Member
		6	Time needed to go to train station by walk
B	Information of Personal Data	1	Gender
		2	Social Status
		3	Driving License
		4	Car Availability
		5	Motorcycle Availability
C	Travel Detail	1	Trip Purpose
		2	Departure time
		3	Total Travel Time
		4	Transportation Mode
		5	Travel Type
		6	Weekly Travel Intensity
		7	Monthly Travel Intensity
		8	Public Transport Cost
		9	Taxi Cost
		10	Car Operation Cost (Monthly)
		11	Motorcycle Operation Cost (Monthly)
D	Willingness & Ability to pay	1	Tariff of Rp 2,500
		2	Tariff of Rp 5,000
		3	Tariff of Rp 7,500
		4	Tariff of Rp 10,000
		5	Reason of Not Using Train Service

Source: CJRR Study Team, Stated Preference Survey, 2008

#### 6) Result of Survey

In the implementation of the survey, there are several problems encountered. The largest problem is on the process of data input. The followings are problems found in the preparation

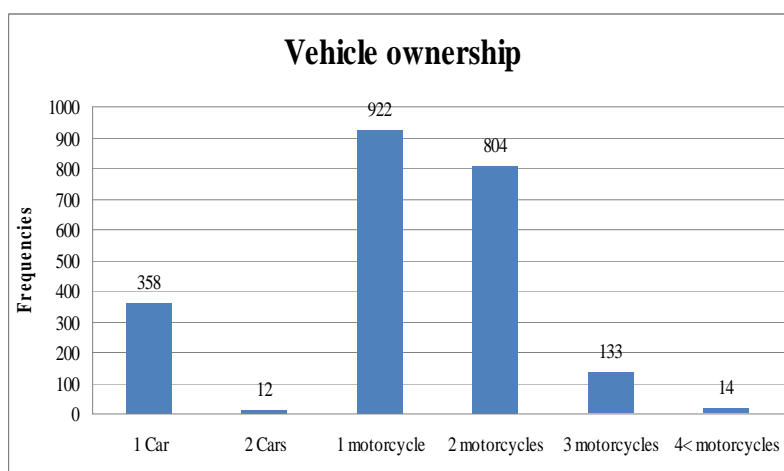
and implementation of the survey.

- The first problem is related to bureaucracy. It takes too long time to issue the license to enter the passenger waiting room in Adisutjipto airport (until one week), while it takes only three days to complete the survey.
- The second problem is the difficulty to meet respondents, particularly for those living in elite settlement area, because most of them have no time to be interviewed. Consequently, the survey was conducted at night in order to increase the possibility to meet the appropriate respondents.
- The greatest problem is found during the data inputting process, in which most respondents have no sufficient information regarding names of village or sub-district of their travel destination. Information which can be acquired includes names of street or landmark of the areas. Therefore, the data input person needs to trace the location in accordance to additional information from the complete regional map. It surely takes much time.

## A. Household Information

### A.1) Vehicle ownership

In accordance to the data on motor vehicle ownership, majority of respondents owned motorcycle, consisted of 804, 922 and 147 respondents owning 2 motorcycles, 1 motorcycle and more than 2 motorcycles, respectively. Furthermore, respondents who owned car amount for 370 respondents, consisted of 358 respondents owning one car and 12 respondents owning two cars for each respondent. The detail of number of respondents by vehicle ownership is presented in figure 1.

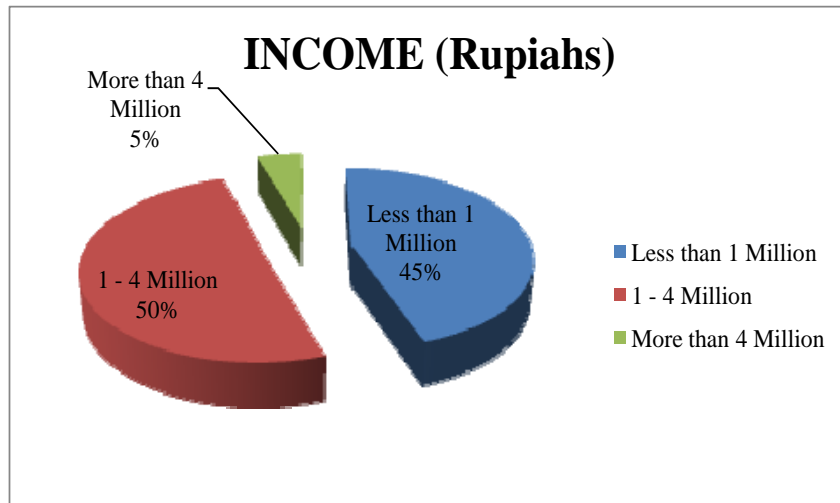


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.1** Number of Respondents by Vehicle Ownership

### A.2)Income

The result of the survey data shows that 50% respondents have income rate between 1 and 4 million rupiah per month. Respondents who have income rate less than 1 million per month amount for 46% of all respondents. Furthermore, respondents who have income rate more than 4 million per month amount for 4%. The detail of number of respondents by income is presented in figure 2.



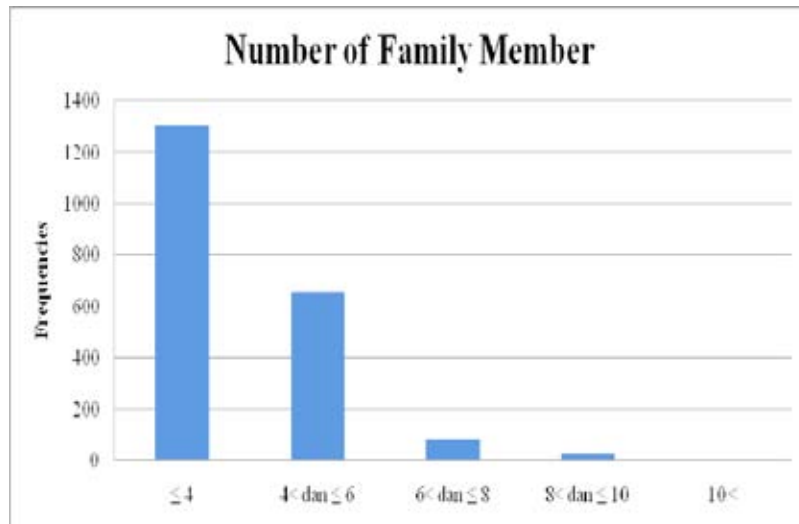
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.2 Number of Respondents by Income**

### A.3)Number of Family Member

The result of the survey showed that 1304 respondents have family member of less than 4 persons while 661 respondents have family member between 4 and 6 persons. Furthermore, respondents who have family member between 6 and 8 persons and more than 8 persons amount for 88 and 29 respondents, respectively. The detail of number of respondents by number of family member is presented in figure 3.



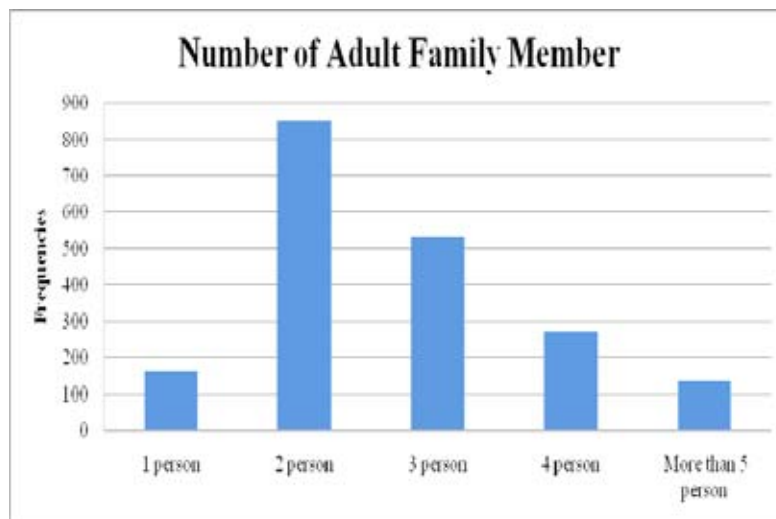


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.3 Number of Respondents by Number of Family Member**

A.4) Number of Adult Family member

Number of adult family number within most of respondents' family is two persons (852 respondents). Furthermore, respondents who have adult family member of 3 persons and more than 3 persons are 533 and 410 respondents, respectively. The detail of number of respondents by the number of adult family member is presented in figure 4.



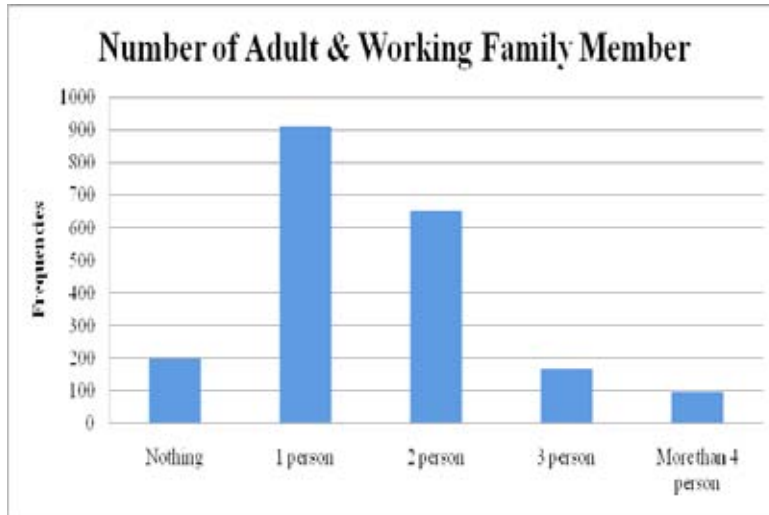
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.4 Number of Respondents by The Number of Adult Family Member**

A.5) Number of adult and working family member

Most respondents stated that they had one adult, working family member, usually the family head. This surely has significant impact on the frequency of travel of the family. Respondents who had one adult, working family member amount for 913 respondents while those who had 2,

3 or more and no adult, working family member amount for 654, 259 and 196 respondents. The more the number of working family number is, the greater the number of travel demand. The detail of number of respondents by the number of adult, working family member is presented in figure 5.

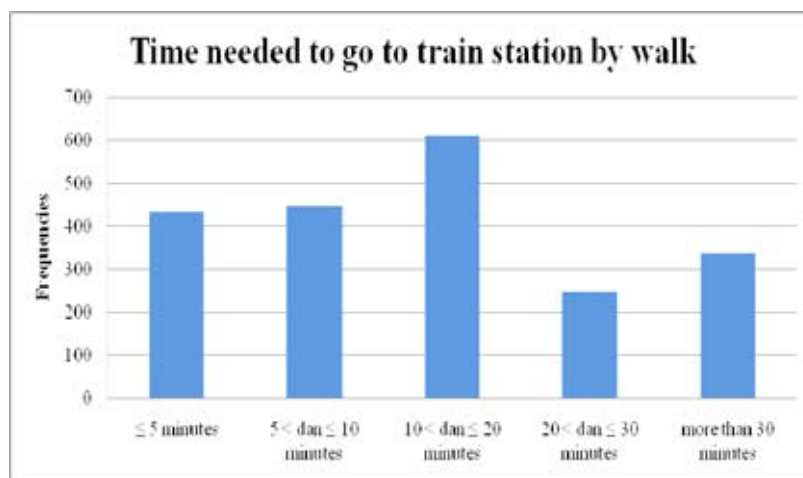


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.5 Number of Respondents by The Number of Adult, Working Family Member**

A.6) Time needed to go to train station by walk

Most of respondents, 612 respondents, stated that they needed 10 to 20 minutes to arrive at the station by foot. Furthermore, respondents who needed less than 5 minutes, 5 to 10 minutes and more than 20 minutes to arrive at the station by foot amounted for 433, 488 and 585 respondents. The detail of number of respondents by time need to go to train station by walk is presented in figure 6.



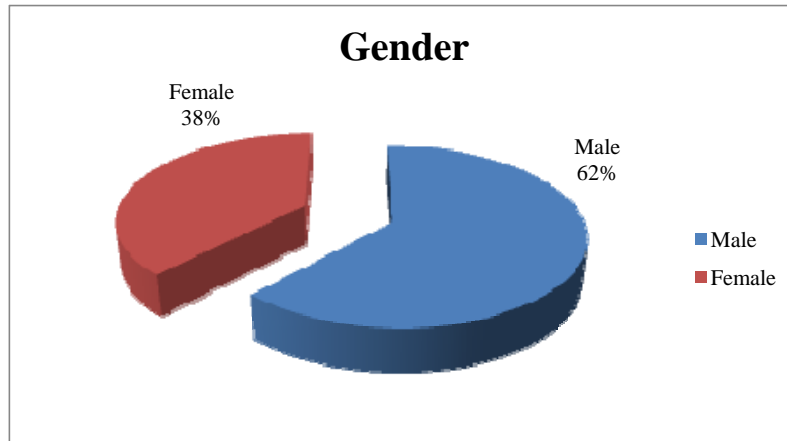
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.6 Number of Respondents by Time Need to Go to Train Station by Walk**

## B. Personal Information

### B.1) Gender

The sample of this survey consisted of 1286 males (62%) and 791 females (38%).

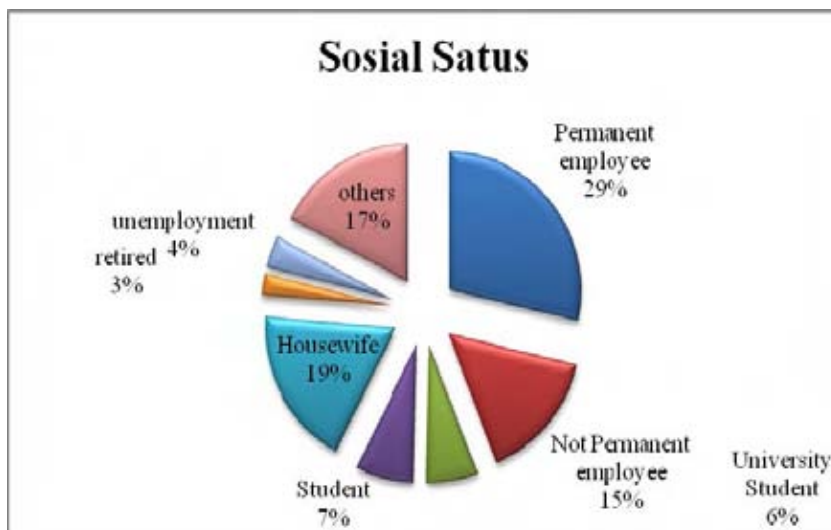


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.7 Percentage Of Respondents By Gender**

### B.2) Social status

Regarding the social status, respondents of the survey were permanent employee, non permanent employee, housewife, students, unemployment, retired and others. The percentage of respondents by social status is presented in the following figure.

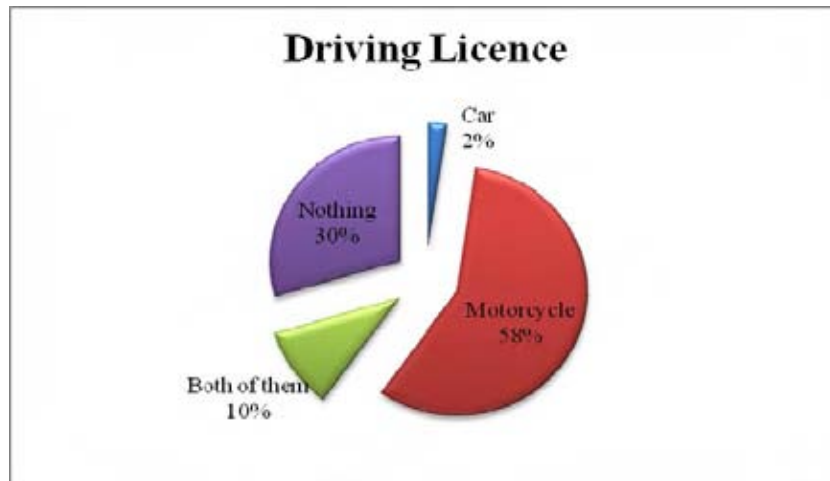


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.8 Percentage Of Respondents By Social Status**

### B.3) Driving Licenses

As for driver's license, about 2% of respondents only hold car license, about 58% of respondents only hold motorcycle license, 10% of respondents hold both licenses, and 30% of respondents do not have a driver's license. The detail of number of respondents by possession of driving license is presented in figure 9.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.9 Number Of Respondents By Possession Of Driving License**

### B.4) Car Availability

In terms of car availability, 77% respondents said that they had no car available. Only did 13% respondents say that they had car available and 10% respondents say that they sometimes had car available.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.10 Percentage Of Respondents Which Have Car Availability**

### B.5) Motorcycle Availability

For motorcycle availability, 57% respondents said that they had motorcycle available. Furthermore, 27% respondents said that they sometimes had motorcycle available and 15% respondents said that they had no motorcycle available.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.11 Percentage Of Respondents Which Have Motorcycle Availability**

## C. Detail of Respondents' Trip

### C.1) Trip Purpose

Most respondents stated that they traveled for work (761 respondents or 37%). Other trip purposes included study, shopping, personal affair, pick up/leads and recreation. The detailed number of respondents by trip purposes is presented in figure 12.



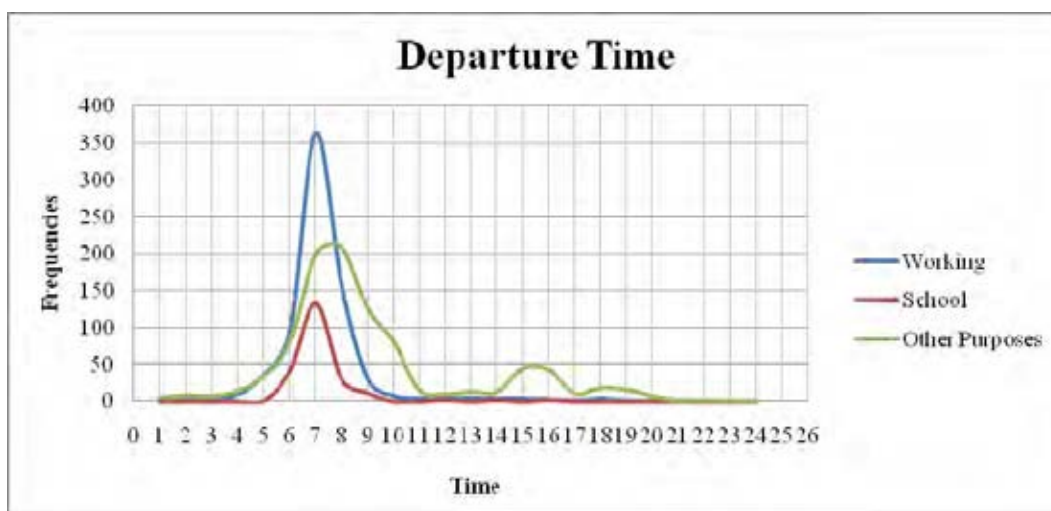
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.12 Percentage Of Respondents By Trip Purpose**

### C.2) Departure time

Most respondents who traveled for work and school usually leave between 6.00 and 7.00 am. Furthermore, the numbers of respondents who traveled for work and school on the time span were 364 and 133 respondents, respectively.

Respondents who traveled for purpose other than work and school tended to have various departure time characteristics. Respondents traveling between 7.00 and 8.00 am amounted for 209 respondents and those traveling between 6.00 and 7.00 am amounted for 199 respondents. Other favorable departure time was between 2.00 and 3.00 pm (45 respondents). The detail of number of respondents by departure time is presented in figure 13.

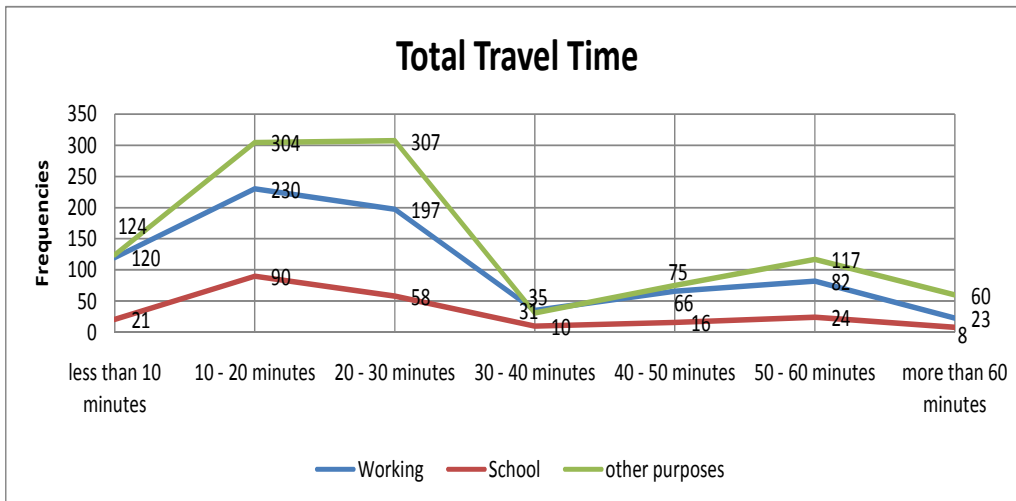


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.13 Number Of Respondents By Departure Time**

### C.3) Total Travel Time

For respondents traveling for work, most of them (230 respondents) usually need 10 to 20 minutes to arrive at their workplace. For those traveling for school (90 respondents), it usually takes 10 to 20 minutes to arrive at school or university. For other trip purposes, it usually takes 10 to 30 minutes from the origin to the destination which can be further categorized into two time spans, i.e. 10 to 20 minutes (304 respondents) and 20 to 30 minutes (307 respondents). The detail of number of respondents by total travel time is presented in figure 14.

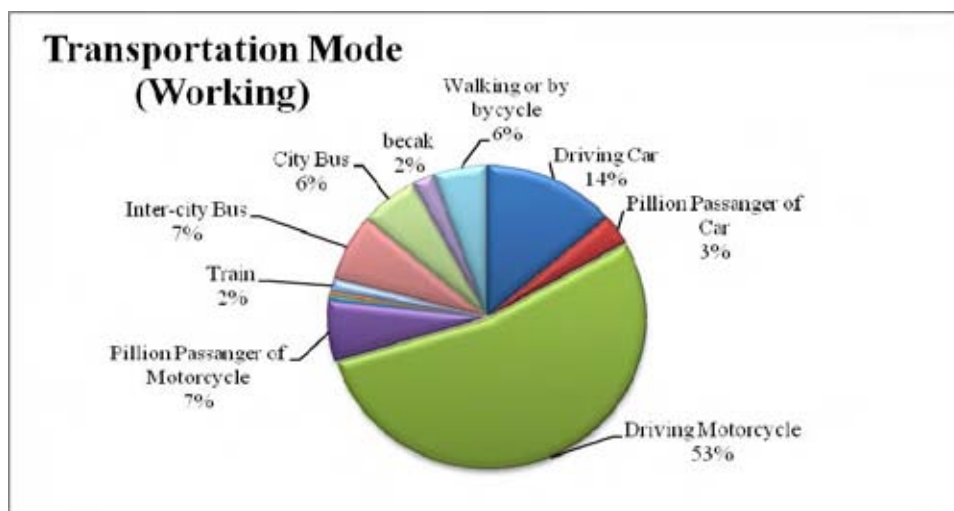


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.14 Number Of Respondents By Total Travel Time**

#### C.4) Transportation Mode

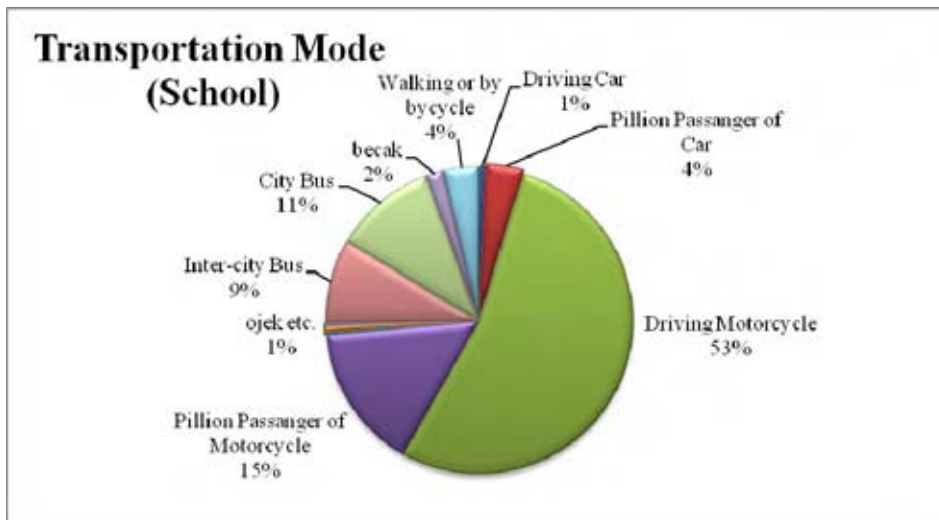
In conducting travel, respondents traveling for work used several transportation modes. Most of them used motorcycle (53%) and other respondents got a ride on motorcycle (7%). Other respondents used private car (14%), got ride on car (3%), inter-city bus (7%), city bus (6%) and trains (2%). The detail of number of respondents (traveling for work) by transportation mode is presented in figure 15.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.15 Number Of Respondents (Traveling For Work) By Transportation Mode**

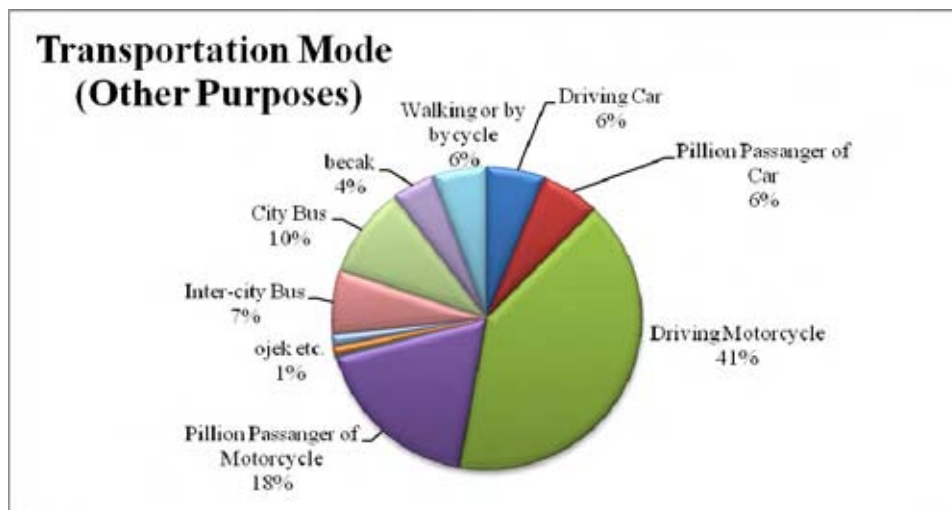
For respondents traveling for school, most respondents (53%) rode motorcycle and 15% respondents got ride. For public transportation mode, inter-city bus and city bus are the most common transportation mode. The detail of number of respondent traveling for school by transportation mode is presented in figure 16.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.16 Number Of Respondent Traveling For School By Transportation Mode**

For respondents traveling for purpose other than work and school, most of them used motorcycle, amounting for 41%, and 18% respondents got a ride. For public transportation mode, respondents using inter-city bus and city bus amounted for 7% and 10%, respectively. The detail of number of respondents traveling for purpose other than work and school by transportation mode is presented in figure 17.



Source: CJRR Study Team, Stated Preference Survey, 2008

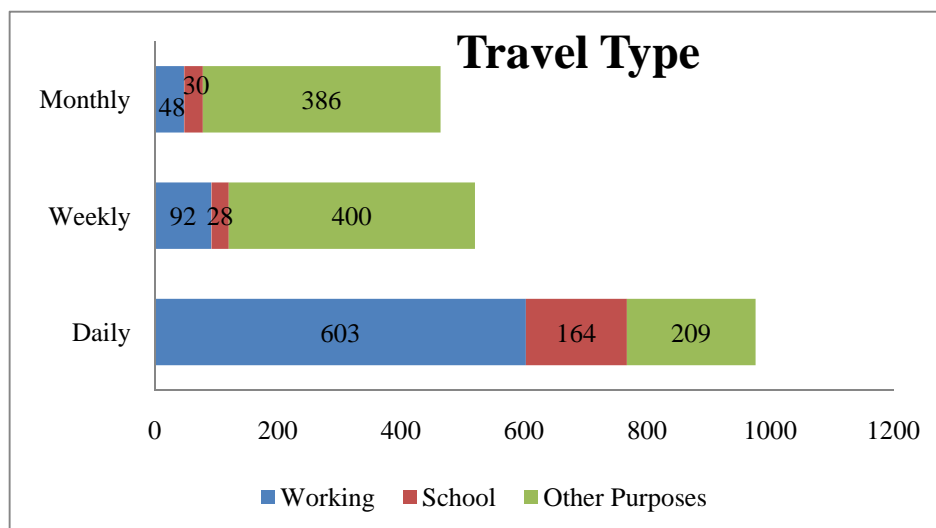
**Figure 1.4.17 Number Of Respondents Traveling For Purpose Other Than Work And School By Transportation Mode**

### C.5) Travel Type

Most respondents stated that they conducted daily travel. Respondents conducting daily travel for work purpose amounted for 603 respondents. In addition, respondents conducting travel for



school commonly preferred daily travel, amounting for 164 respondents. Meanwhile, respondents traveling for purposes other than work and school commonly preferred weekly travel, amounting for 400 respondents. The detail of number of respondents by travel type is presented in the following figure.



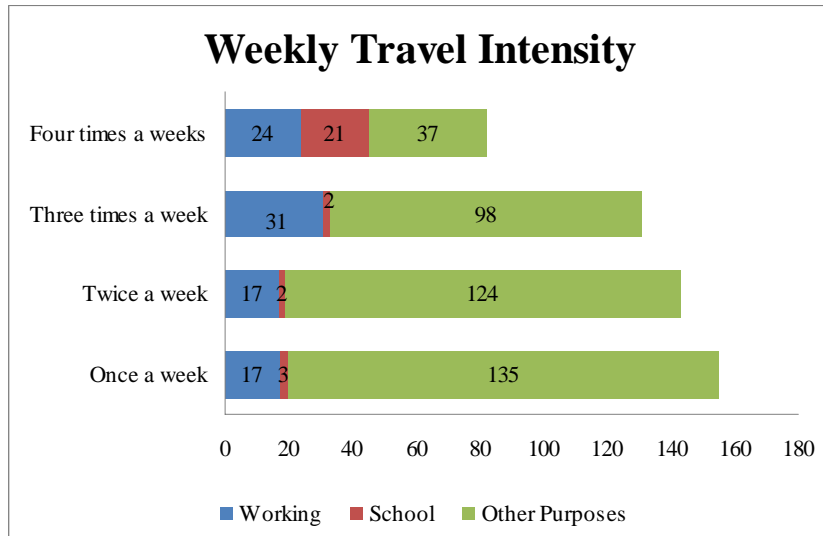
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.18 Number Of Respondents By Travel Type**

#### C.6) Weekly Travel Intensity

Respondents who frequently conduct weekly travel are those traveling for purposes other than work and school. As an comparison, for respondents traveling once a week, those traveling for school and work amount for 3 and 17 respondents, respectively, while those traveling for purpose other than school and work amount for 124 respondents. Another comparison, for respondents traveling twice a week, those traveling for school and work amount for 2 and 17 respondents, respectively, while those traveling for purpose other than school and work amount for 124 respondents.

For three-time-a-week travel intensity, there are 31, 2 and 98 respondents stating that they travel for work, school and other purpose, respectively. Furthermore, for four-time-a-week travel intensity, there are 24, 21 and 37 respondent stating that they travel for work, school and other purposes, respectively. The detail of number of respondents by weekly travel intensity is presented in figure 19.

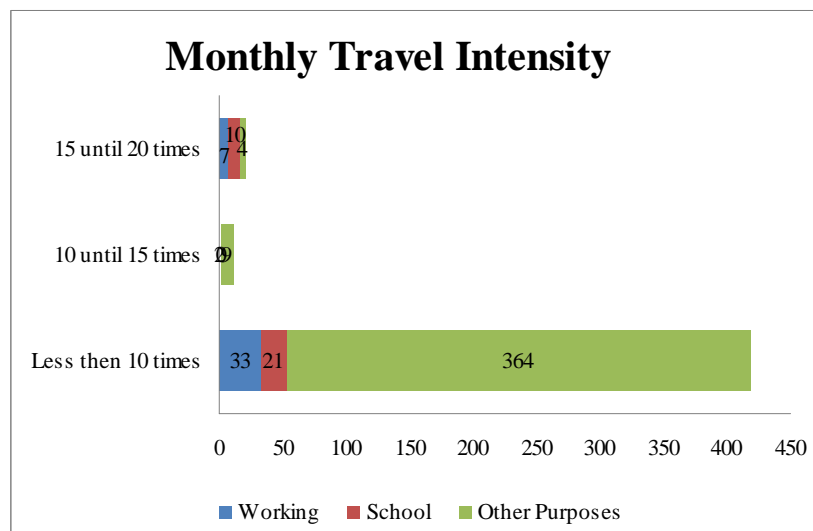


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.19** Number Of Respondents By Weekly Travel Intensity

### C.7) Monthly Travel Intensity

In terms of monthly travel intensity, most respondents conducting this type of travel are those traveling for purposes other than work and school. Most respondents traveling less than 10 times a month, consisted of 33 respondents traveling for work, 21 respondents traveling for school and 364 respondents traveling for purposes other than work and school. The detail of number of respondents by monthly travel intensity is presented in the following figure.

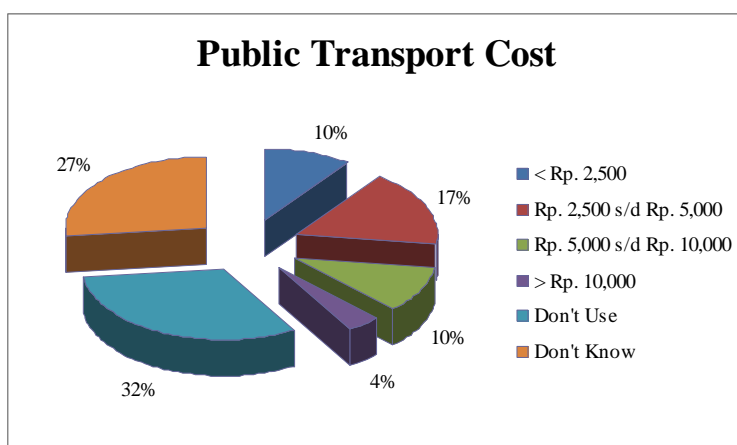


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.20** Number Of Respondents By Monthly Travel Intensity

### C.8) Public Transport Cost

In terms of public transportation cost, seventeen percents or 342 respondents said that they spent Rp 2,500 to Rp 5,000 for the public transportation cost while 10% respondents said that they spent less than Rp 2,500 for the public transportation cost. Fifteen percents of respondents spent more than Rp 5,000 for the public transportation cost while 31% respondents did not use public transportation and 27% respondents did not know the amount the spent for public transportation cost. The detail of number of respondents by amount spent for public transportation cost is presented in figure 21.

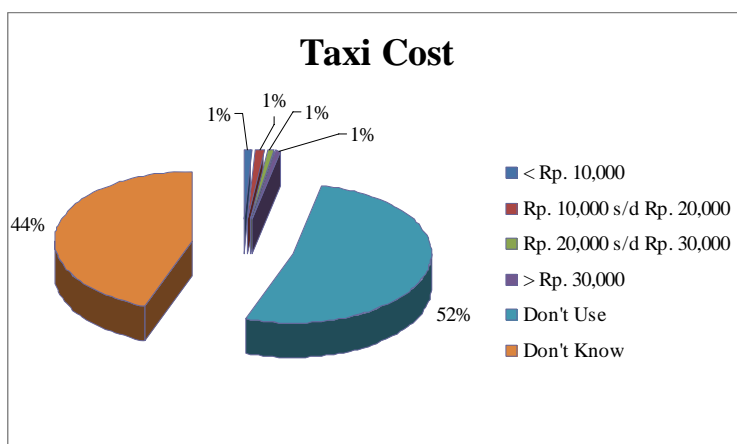


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.21 Number Of Respondents By Amount Spent For Public Transportation Cost**

### C.9) Taxi Cost

Most respondents rarely used taxi. Only did 4% respondents spend cost for traveling using taxi. The detail of number of respondents by the amount spent for taxi cost is presented in the following figure.

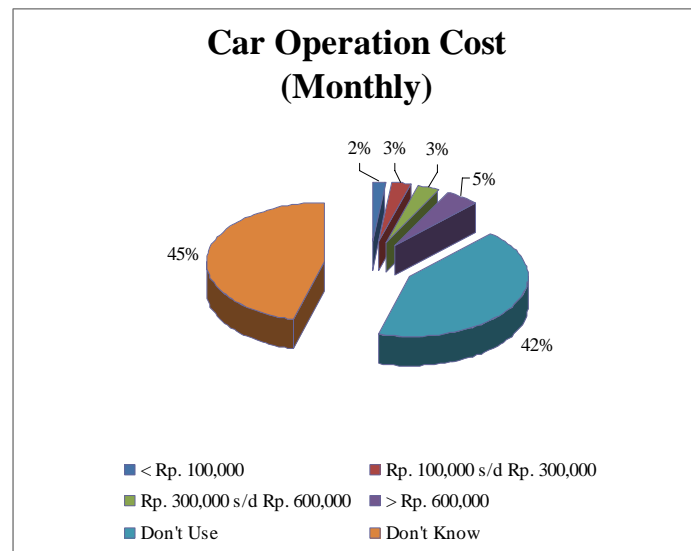


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.22 Number Of Respondents By The Amount Spent For Taxi Cost**

### C.10) Car Operation Cost (monthly)

In terms of car operation cost, most respondents did know the amount since they did not use private car. However, 2%, 3%, 3% and 4% respondents said that they spent less than Rp 100,000; Rp 100,000 – Rp 300,000; Rp 300,000 – Rp 600,000 and more than Rp 600,000 for the private car operation cost. The detail of number of respondents by the amount of monthly car operation cost is presented in figure 23.

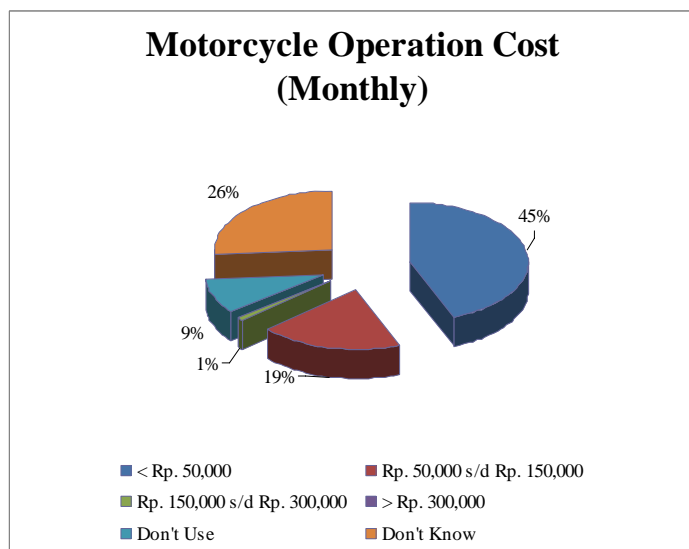


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.23** Number Of Respondents By The Amount Of Monthly Car Operation Cost

### C.11) Motorcycle Operation Cost ( monthly )

Most respondents (894 or 44%) said that they spent Rp 50,000 per month for motorcycle operation cost. Furthermore, 396 (20%) respondents said that they spent Rp 50,000 – Rp 150,000 per month for the motorcycle operation cost while 24 (1%) respondents said that they spent Rp 150,000 – Rp 300,000 per month for the cost. The rest of respondents did know the amount of motorcycle operation cost and did not use motorcycle. The detail of number of respondents by the amount of monthly motorcycle operation cost is presented in figure 24.



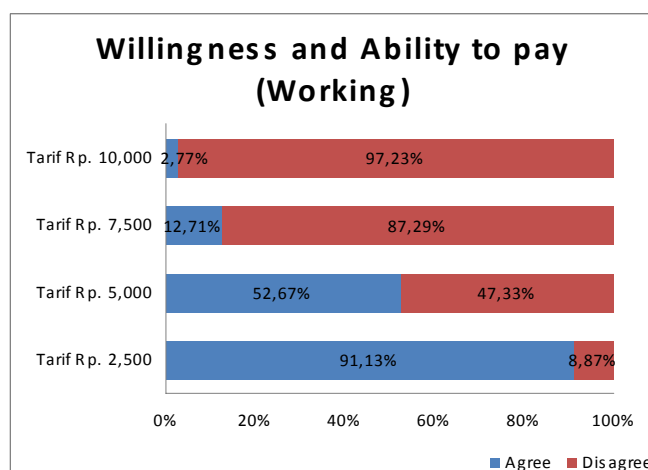
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.24 Number Of Respondents By The Amount Of Monthly Motorcycle Operation Cost**

**D. Willingness and ability to pay**

**D.1) Working Purpose**

Respondents with working purpose have the capability and ability in paying more than respondents with other purposes. 91.13% respondents with working purposes agree if the established tariff is Rp 2,500.00. Respondents with working purposes who agree if the tariff is Rp 5,000.00 are 52.67% and the rest 47.33% did not agree. For the tariff of Rp 7,500.00 and Rp 10,000.00 the respondents who agree are 12.72% and 2.77%, respectively. The detail of number of respondents traveling for work by willingness and ability to pay is presented in figure 25 below.

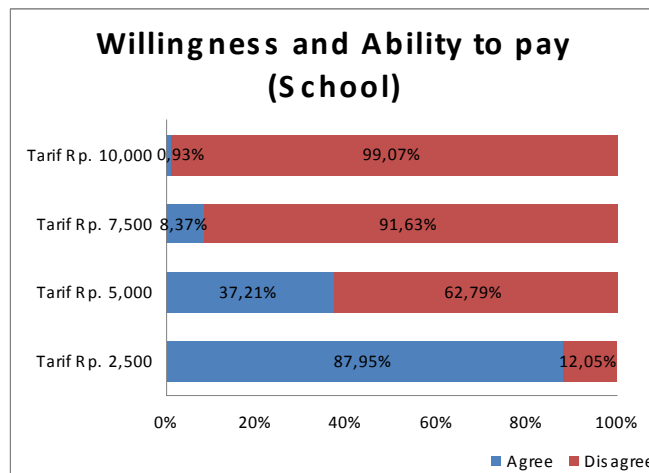


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.25 Number Of Respondents Traveling For Work By Willingness And Ability To Pay**

### D.2) School Purpose

Respondents traveling for school purpose have the capability and ability in paying in the least price than respondents with other purposes. 87.95% respondents with school purpose agree if the tariff is Rp 2,500.00. For the tariff of Rp 5,000.00 respondents with school purpose who agree with the tariff are 37.21% respondents and the rest 62.79% respondents did not agree with the tariff. For tariff of Rp 7,500.00 and Rp 10,000.00 respondents who agree are 8.37% respondents and 0.93% respondents, respectively. The detail of number of respondents traveling for school purpose by willingness and ability to pay is presented in figure 26 below.

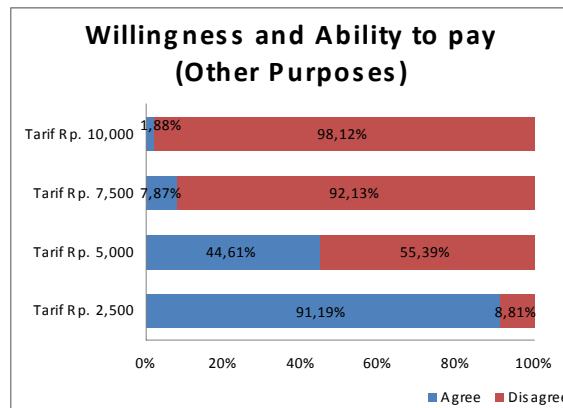


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.26 Number Of Respondents Traveling For School Purpose By Willingness And Ability To Pay**

### D.3) Other Purposes

Respondents with purposes other than school and work have the average capability and ability in paying compared to respondents with school and working purposes. 91.19% respondents with purposes other than school and working agree with the tariff of Rp 2,500.00. It can be said that almost most of them agree with the tariff of 2,500.00. For the tariff of Rp,5 000.00, 44.61% respondents with working purpose agree with the tariff and the rest 55.39% respondents did not agree. For the tariff of Rp 7,500.00 and Rp 10,000.00, respondents who agree with the tariff are 7.87% and 1.88% respondents, respectively. The detail of number of respondent traveling for purpose other than school and work is presented in figure 27.

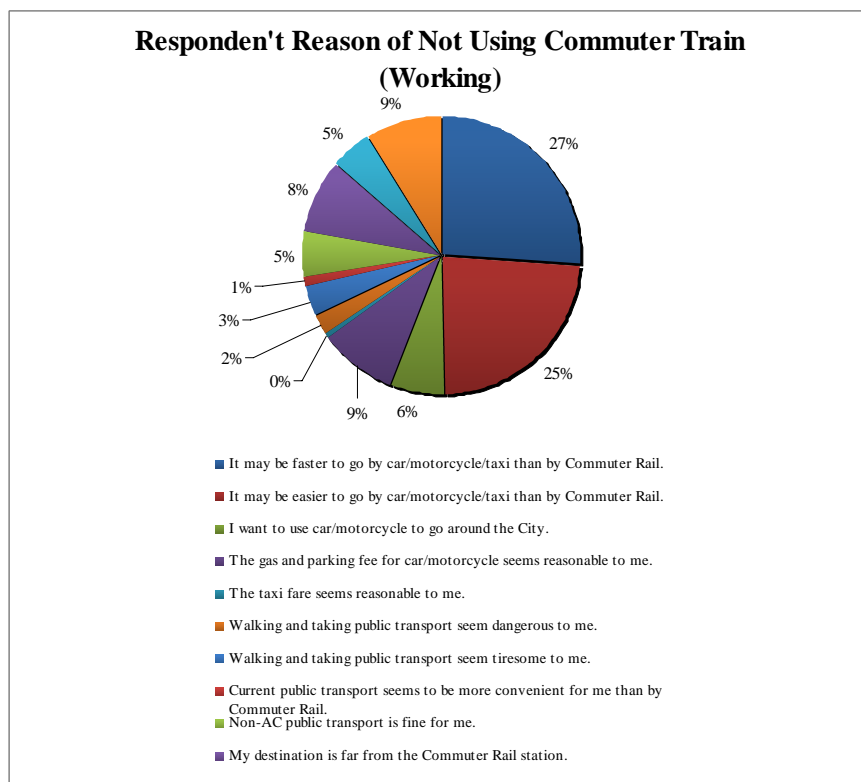


Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.27 Number Of Respondent Traveling For Purpose Other Than School And Work**

D.4) Respondent's reason of not using commuter train

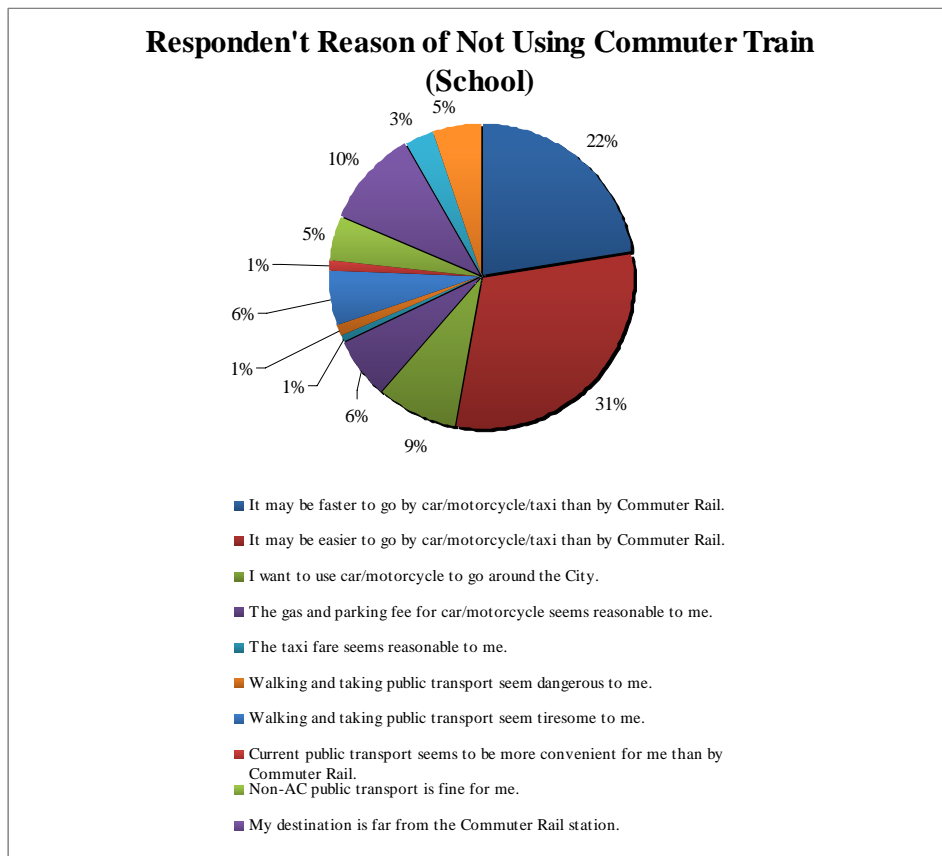
Most of respondents with working purposes did not use train with the reason that using private vehicle are faster and easier. Respondents who said using private vehicle is faster are 265 respondents and respondents who considered that using private vehicle is easier are 24% respondents. The detail of number of respondents traveling for work by their reason of not using commuter train is presented in figure 28.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.28 Number Of Respondents Traveling For Work By Their Reason Of Not Using Commuter Train**

Furthermore, for respondents with school purpose have almost the similar reason to respondents with working purpose for not using commuter train. Most of the respondents with school purposes did not use commuter train with the reason that using private vehicles is faster and easier. There are 23% respondents who said that using private vehicles is faster. Respondents who said that using private vehicles is easier are 30% respondents. Other reasons, which quite many, are the fuel and parking costs are still very reachable for them. The detail of number of respondents traveling for school by their reason of not using commuter train is presented in figure 29.



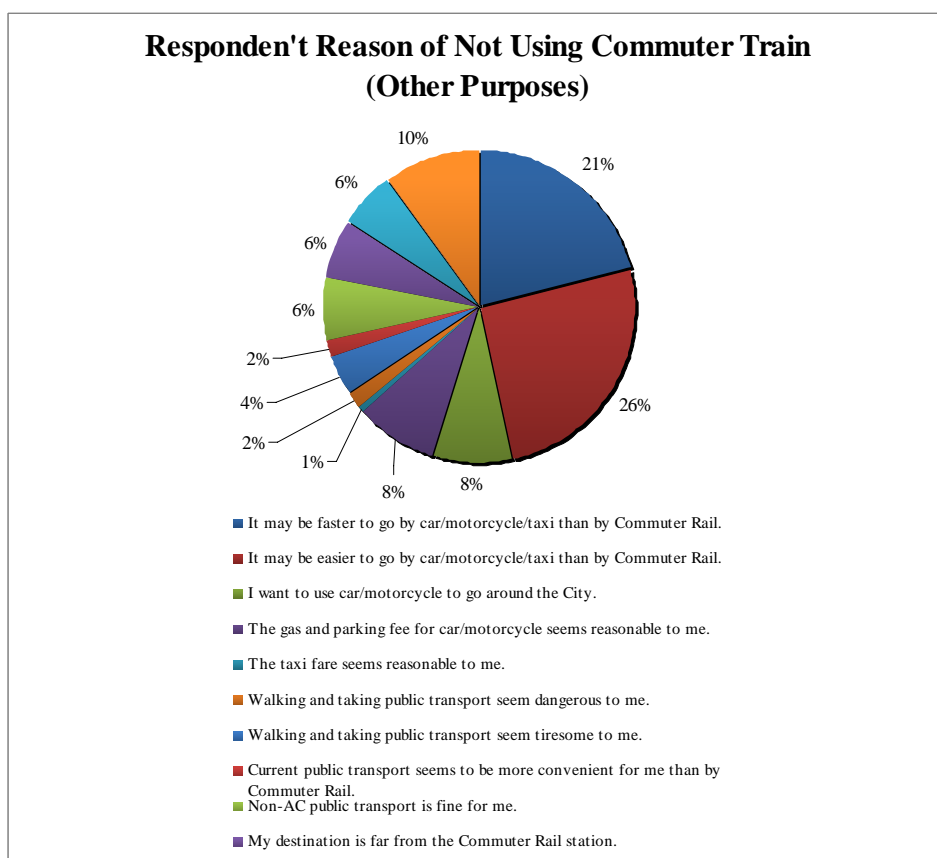
Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.29 Number Of Respondents Traveling For School By Their Reason Of Not Using Commuter Train**

Most of respondents with purposes other than school and working did not use train because it is faster and easier using private vehicles for them. Respondents who said that using private vehicle is faster are 21% respondents. And respondents who considered that using private vehicle is easier are 26% respondents. Other reason that quite many is that they thought using public transportation is quite dangerous. There are 10% respondents with this reason from all respondents with trip purposes other than school and working. The detail of number of respondents traveling for purpose other than school and work by their reason of not using



commuter train is presented in figure 30.



Source: CJRR Study Team, Stated Preference Survey, 2008

**Figure 1.4.30 Number of Respondents Traveling for Purpose Other than School and Work by Their Reason of Not Using Commuter Train**

## 7) CONCLUSION

In general, the survey has been conducted well in accordance to the TOR. Important input for the implementation of similar activities in the future is the necessity to previously determine the zone system, both internal and external study location, to be used in the survey before it is executed so that identification and data inputting process will be much easier.

The Center for Transportation and Logistics Studies (PUSTRAL) UGM would like to thanks to Oriental Consultants Co., Ltd., for the trust to conduct the activity. Hopefully, the cooperation will be much better in the future.

## 1.5 Weigh Bridge Interview Survey

### 1) Survey Objective

Weigh Bridge Station is located at major boundary of kabupaten/kota in the Central Java region. Since all truck except tanker and empty loaded truck have to pass Weigh Bridge, precise freight

transport data can be obtained by conducting interview survey at weigh bridge stations. Freight transport weight, origin, destination, and commodity type were surveyed for both intra provincial and inter provincial transport.

## **2) Survey Contents**

### **a. Survey Method**

Interviewer made vehicles entering Weigh Bridge Stations stop with the cooperation of a traffic officer to ask the drivers about trip purpose, OD, commodity type. Interviewer also record total weight by reading weigh bridge indicator and vehicle weight and capacity by reading vehicle registration information labeled on each vehicle. A manual hourly traffic count also was conducted at each survey location by vehicle type.



Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.1 Weight Bridge Interview Survey Situation**

### **b. Survey Period**

The survey shall be conducted on 15, 17 of July for 24 hours.

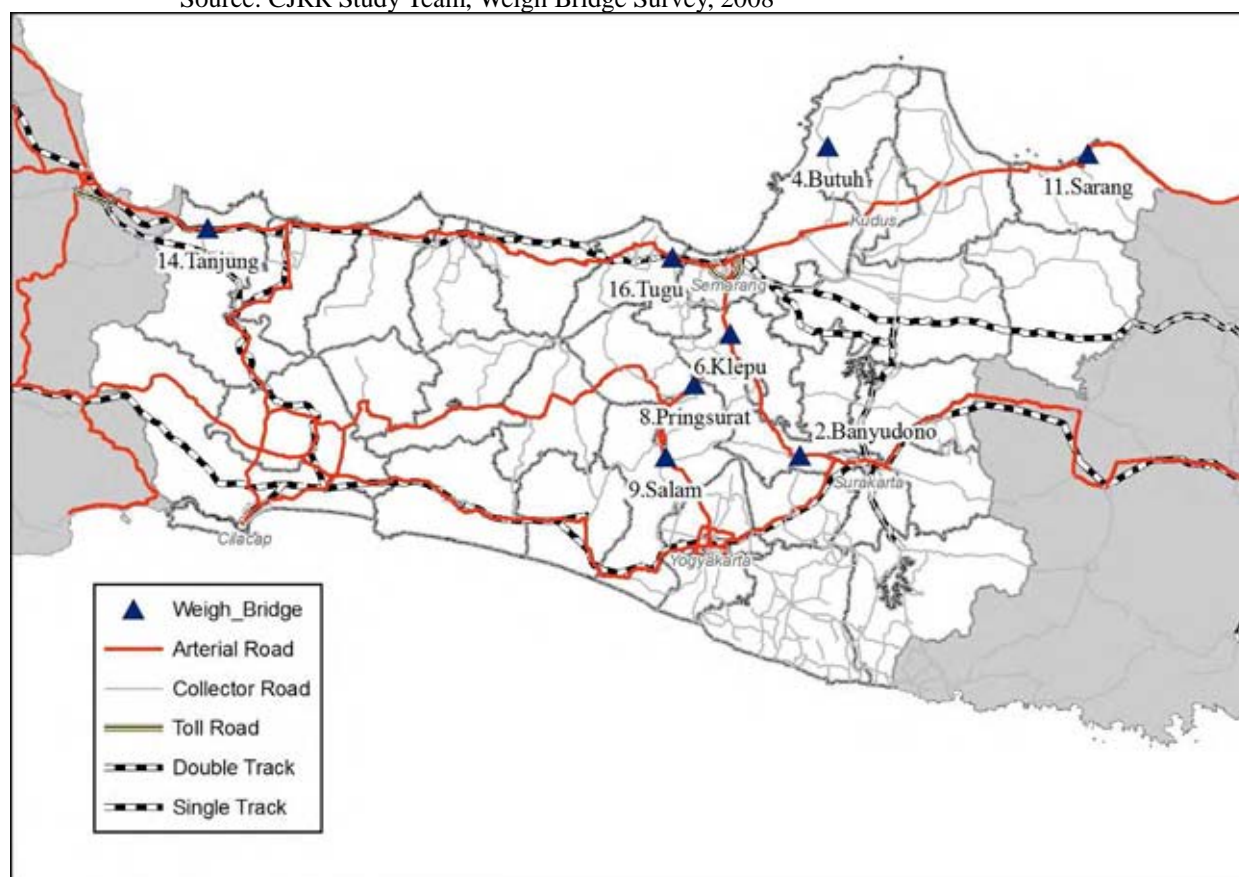
### **c. Survey Location**

Interview survey and traffic count shall be conducted at the following 8 Weigh Bridge Stations (Jembatan timbang) out of 17 Weigh Bridge Stations in Central Java Province considering traffic flow in survey area. Since Roadside OD Interview Survey was conducted at Weigh Bridge Station in Yogyakarta Special Province (DIY), Weigh Bridge Station Survey was not conducted at DIY.

**Table 1.5.1 Weigh Bridge Stations in Central Java Province**

		Annual Weight 2007	Daily Average Weight	Estimated Peak-day Average	Selected Survey Stations
1	Ajibarang	174,337	478	574	
2	Banyudono	119,598	328	394	* to be surveyed
3	Gubung	204,925	561	673	
4	Katonsari	398,941	1,093	1,312	* to be surveyed
5	Butuh	304,982	836	1,003	
6	Klepu	443,839	1,216	1,459	* to be surveyed
7	Lebuawu	233,538	640	768	
8	Pringsurat	222,678	610	732	* to be surveyed
9	Salam	261,864	717	860	* to be surveyed
10	Sambong	136,333	374	449	
11	Sarang	370,255	1,014	1,217	* to be surveyed
12	Selogiri	111,097	304	365	
13	Subah	475,014	1,301	1,561	
14	Tanjung	442,586	1,213	1,456	* to be surveyed
15	Toyoga	234,400	642	770	
16	Tugu	571,896	1,567	1,880	* to be surveyed
17	Wanareja	143,472	393	472	

Source: CJRR Study Team, Weigh Bridge Survey, 2008



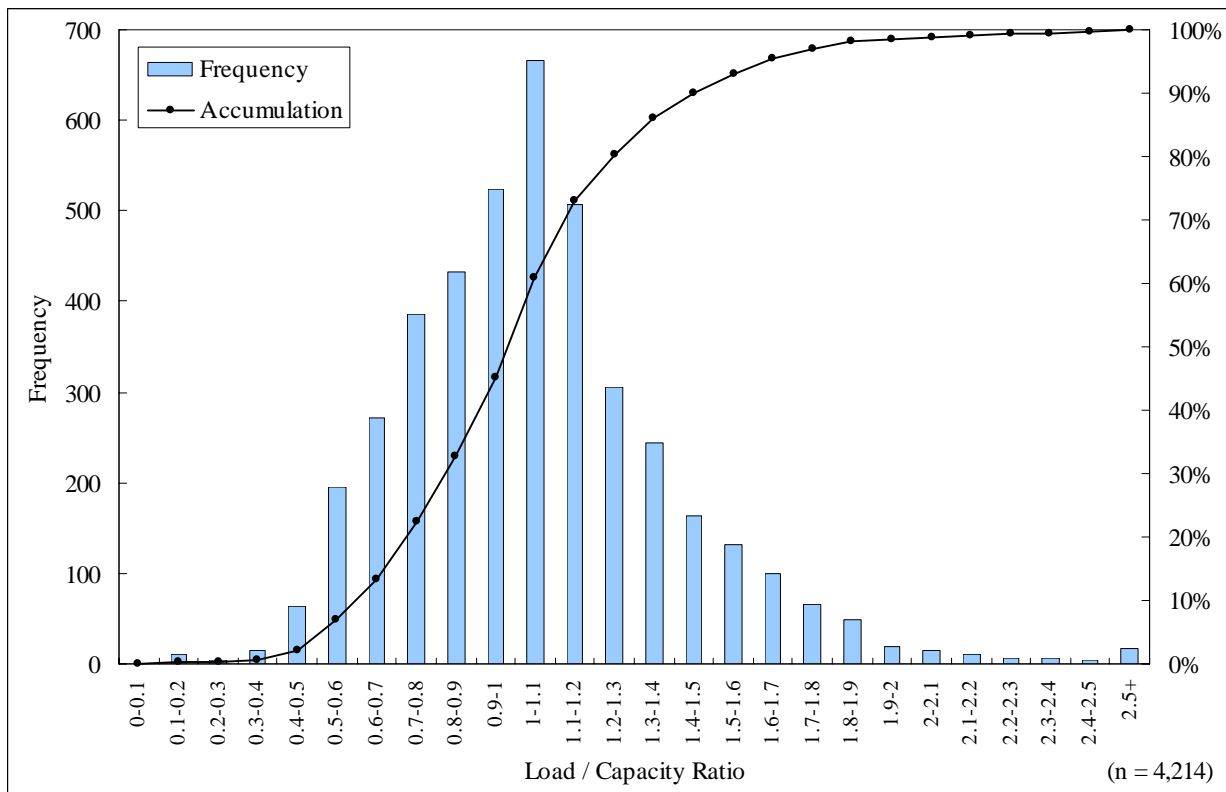
Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.2 Weigh Bridge Stations in Central Java Province**

### 3) Descriptive Survey Results

In spite of government policy to reduce over loaded trucks by fine, the majority of trucks load over their capacity. The following figure depicts distribution of load / capacity ratio of trucks in Central Java region based on Weigh Bridge Survey conducted at 9 weigh bridge stations in Central Java Region. Load / capacity ratio and average axle load are also depicted by commodity type in Figure 1.5.4 and Figure 1.5.5.

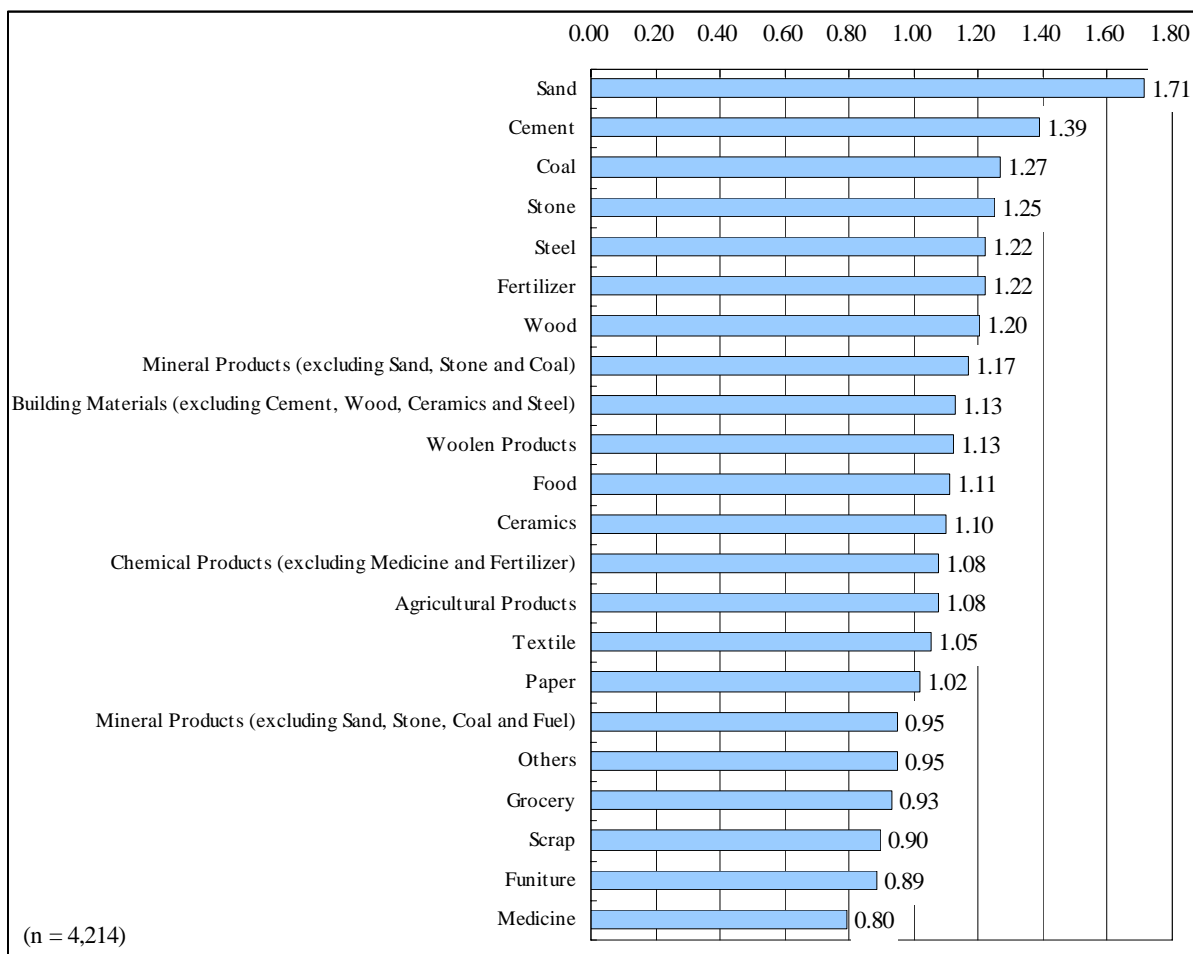
Roughly half of the trucks carry cargo more than their capacities, and even some trucks carry cargo with 2.5 times of its capacity. By commodity types, bulky cargo including sand, cement, coal, stone, fertilizer and steel is relatively high in both load / capacity ratio and average axle weight.



Note: Load capacity ratio is calculated by dividing cargo weight (excluding vehicle weight) by cargo weight capacity.

Source: CJRR Study Team, Weigh Bridge Survey, 2008

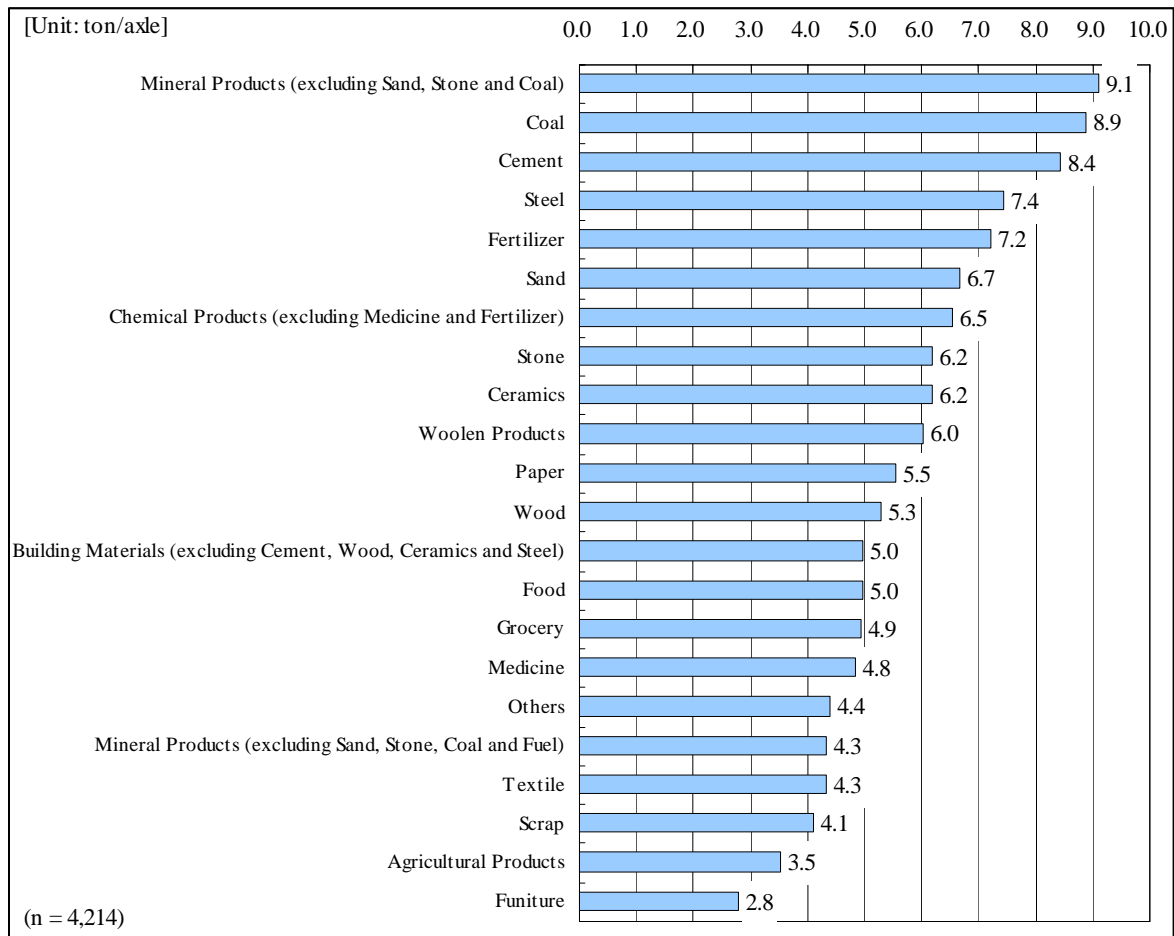
**Figure 1.5.3 Load / Capacity Ratio Distribution of Trucks at Weigh Bridges**



Note: Load capacity ratio is calculated by dividing cargo weight (excluding vehicle weight) by cargo weight capacity.

Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.4 Load / Capacity Ratio by Commodity Type at Weigh Bridges**



Note: Average axle weight is calculated by dividing gross weight including vehicle and cargo .by number of axles. Vehicles with more than five axles are assumed to be 5.5 axles.  
Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.5 Average Axle Weight by Commodity Type at Weigh Bridges (ton / axle)**

#### 4) Origin Destination Table Calibration and Analyses

##### a. Sampling Ratios

Sampling ratio for each weigh bridge station is shown as follows. Sampling ratios was set not to cause traffic congestion.

**Table 1.5.2 Sampling Ration of Weigh Bridge Stations**

Location	Direction (to)	2 Axles Truck			3 Axles Truck			Truck with More than 4 Axles		
		No. of Samples	TC	Sample Ratio	No. of Samples	TC	Sample Ratio	No. of Samples	TC	Sample Ratio
Banyudono	Semarang	290	857	33.8%	44	120	37%	5	278	1.8%
Katonsari	Surabaya	282	939	30.0%	78	235	33%	72	202	35.6%
Klepu	Semarang	367	1,768	20.8%	78	260	30%	-	10	0.0%
Pringsurat	Magelang	360	2,206	16.3%	44	261	17%	-	-	0.0%
Salam	Semarang	211	481	43.9%	40	45	89%	-	61	0.0%
Salam	Yogyakarta	338	661	51.1%	39	61	64%	2	20	10.0%
Sarang	Semarang	105	354	29.7%	101	319	32%	110	295	37.3%
Tanjung	Semarang	170	715	23.8%	173	681	25%	42	326	12.9%
Yogyakarta (Tugu)	Jakarta	327	1,458	22.4%	27	183	15%	11	146	7.5%
Kulonprogo	Wates	106	274	38.7%	37	80	46%	23	55	41.6%
Kulonprogo	Purworejo	127	388	32.8%	37	101	37%	11	39	27.9%
Depok	Klaten	198	473	41.8%	19	78	24%	12	47	25.3%
Depok	Yogyakarta	265	956	27.7%	44	172	26%	20	69	28.9%

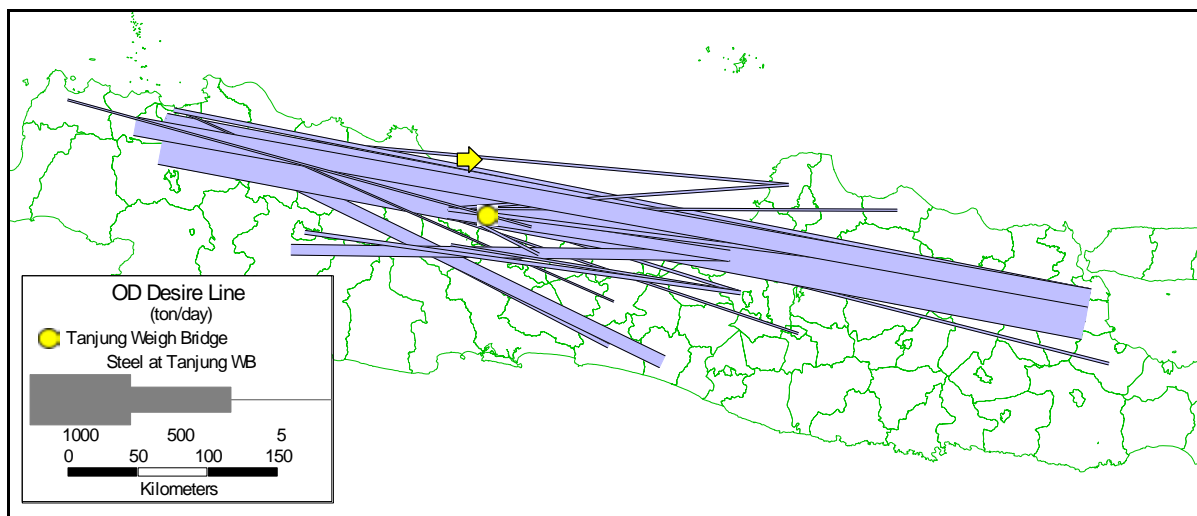
Source: CJRR Study Team, Weigh Bridge Survey, 2008

**b. Methodology**

OD matrix formulation procedure is as same as freight transport of roadside OD interview survey.

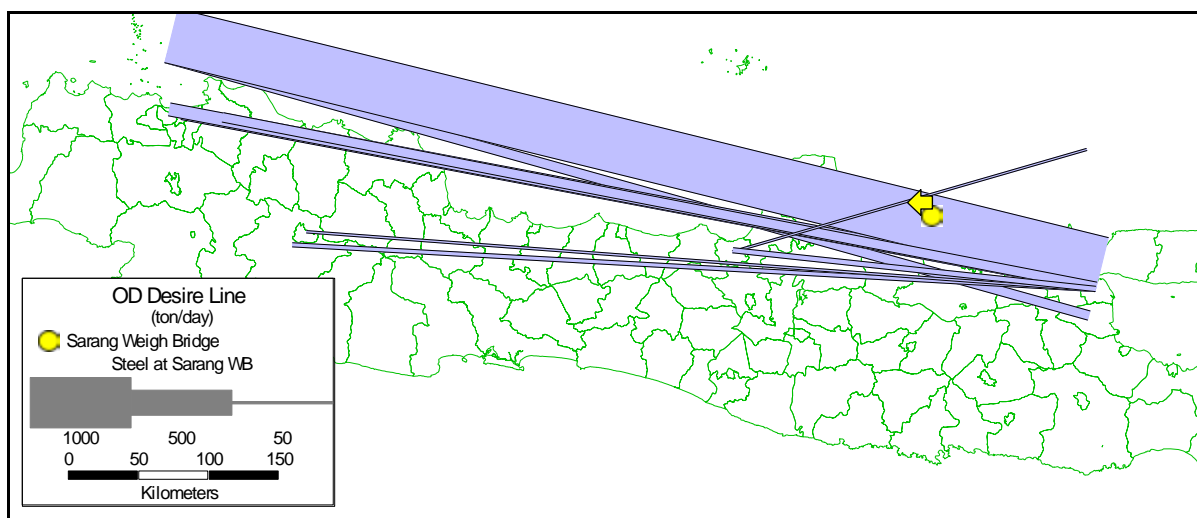
**c. Weight Desire Line by Major Commodity Type**

Steel is one of the major commodity types on the Northern Java Corridor. Traffic flow of steel was surveyed at two major weigh bridges, Tanjung and Sarang. Tanjung weigh bridge, located on the border of Central and West Java provinces, monitors almost all east bound freight vehicle on the Northern Java Freight, and Sarang weigh bridge, located on the border of Central and East Java provinces, monitors west bound freight on the corridor. Desire lines of both weigh bridges are shown in the figures below. It is noteworthy that approximately 1,000 tons of steel is transported more than 500 km for both east and west bound traffic on a daily basis such as Jakarta – Surabaya, while short distance flow is relatively smaller.



Note: Only east bound traffic was surveyed.  
Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.6** Desire Lines of Steel at Tanjung Weigh Bridge



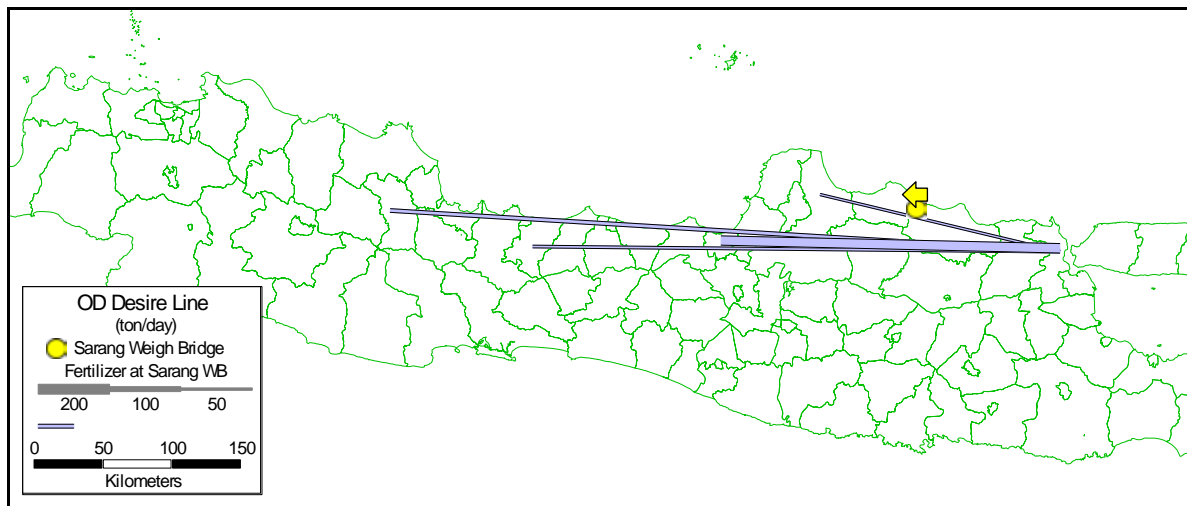
Note: Only west bound traffic was surveyed.  
Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.7** Desire Lines of Steel at Sarang Weigh Bridge



## Fertilizer

Although transported weight of fertilizer across the Central Java region is relatively smaller than cement, sand, steel and fuel, approximately 200 tons / day of fertilizer is transported from Gresik to Semarang according to the weigh bridge survey at Saragn weigh bridge. According to Road traffic survey by the study team, approximately 200 tons / day of fertilizer is also transported from Kabupaten Semarang to Kota Semarang and Grobogan.



Source: CJRR Study Team, Weigh Bridge Survey, 2008

**Figure 1.5.8** Desire Lines of Fertilizer at Sarang Weigh Bridge