

Chapter 3 Overview of Each Transport Sector in Central Java Region

Information and data on the current conditions of each transport sector such as road, bus passenger transport, railway, air transport, and sea port and dry port in and around the Central Java region were collected and reviewed.

3.1 Road Sector

As shown in Table 3.1.1, total length of the roads in Indonesia as of 2005 is over 390,000 km, around 80% of which belong to the regions called Kabupaten/Kota. Mode shares of the road are around 90% in passenger transport and 50% in freight transport. Major cities in Java, Sumatra, Sulawesi, and Bali islands have been interconnected by trunk roads. Moreover, construction of additional toll roads invested by the private sector is in progress, and the total toll roads length has exceeded 600 km. On the other hand, problems such as chronic traffic congestion in urban areas and significant amount of road damages in the regional-level roads have occurred. Enhancements of road maintenance and management capacity of local governments are issues in the decentralized governmental system. The five-year National Development Plan emphasizes improvement of transportation services on the urban trunk roads, maintenance and management of the rural roads, utilization of private funds through public-private partnership (PPP), and so on for smoother transportation and enhancement of the road network.

Table 3.1.1 Total Road Length by Class in Indonesia

Road Class	Length (km)
National Roads	34,629
Provincial Roads	40,125
Regional (Kabupaten/Kota) Roads	316,255
Total	391,009

(Source: Provincial and Regency Public Works Offices, as of 2005)

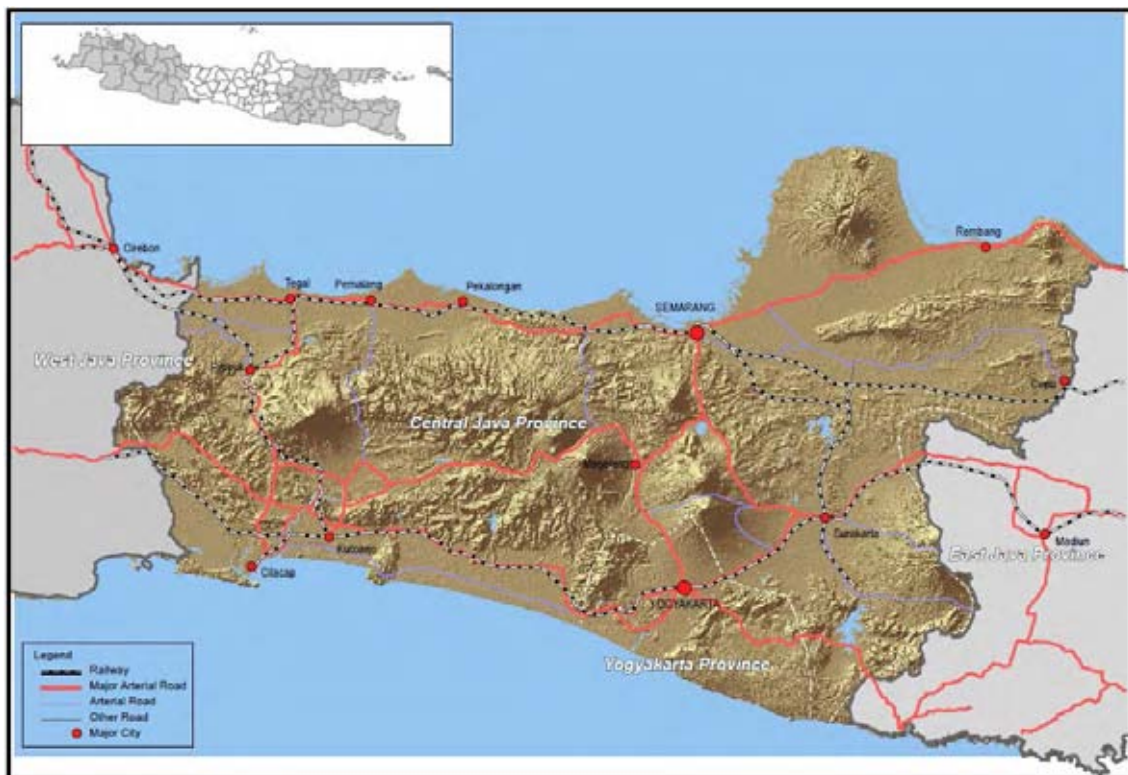


Figure 3.1.1 Major Road and Railway Networks in the Central Java Region

As shown in Figure 3.1.1, the main arterial roads of the Central Java region’s road network are the national highways extending from Jakarta to Surabaya via Cirebon, Tegal, Semarang, Yogyakarta, and Solo as well as the one from Semarang heading to Solo. Other roads are provincial or Kabupaten/Kota roads. These roads are four-lane roads in urban areas and mostly two-lane roads in rural areas. The only toll roads that are currently in service in the Central Java region are Semarang ring roads which consist of three sections totaling 19.3 km.

3.1.1 Ordinary Road

The total road length is 26,307 km in Central Java Province and 4,596 km in Yogyakarta Special Province (DIY) as shown in Table 3.1.2. Ratio of national highways is roughly 4% to 5% and the rest are either provincial or Kabupaten/Kota roads. Ratio of paved roads is around 70% in both provinces, and the road conditions are generally good. Road densities are 0.8 km/km² in Central Java Province and 1.6 km/km² in DIY, meaning that the roads are more densely developed in DIY. Road densities in major cities are 7.4 km/km² in Semarang City, 15.4 km/km² in Surakarta (Solo) City, and 7.4 km/km² in Yogyakarta City. The road density in Solo is relatively higher.

Table 3.1.2 Length of Roads by Type

[Unit: km]				
	Central Java Province		Special District of Yogyakarta	
	Length (km)	% Share	Length (km)	% Share
Jurisdiction				
1. National Road	1,297	4.9%	169	3.7%
2. Provincial Road	2,590	9.8%	690	15.0%
3. Kabupaten/Kota Road	22,420	85.2%	3,737	81.3%
Total	26,307	100.0%	4,596	100.0%
Surface Type				
1. Asphalt	21,350	81.0%	4,596	100.0%
2. Gravel	2,407	9.1%	0	0.0%
3. Earth	885	3.4%	0	0.0%
4. Unspecified/No Cover ^{*1}	1,716	6.5%	0	0.0%
Total	26,358	100.0%	4,596	100.0%
Road Condition				
1. Good	12,691	48.1%	2,241	48.8%
2. Sufficient/Moderate	6,685	25.4%	1,440	31.3%
3. Damaged	4,534	17.2%	915	19.9%
4. Heavily Damaged/No Cover ^{*2}	2,452	9.3%	0	0.0%
Total	26,362	100.0%	4,596	100.0%

*1: Unspecified (in Central Java Province)/No Cover (in DIY)

*2: Heavily Damaged (in Central Java Province)/No Cover (in DIY)

Source:

DIY: Infrastructure and Settlement Agency of D.I Yogyakarta (DIY in figures, 2006/2007), and
 Central Java Province : - Public Work Service of Jawa Tengah Province (Jawa Tengah in figures, 2007)
 - BPS-Statistic of Regency/City (Jawa Tengah in figures, 2007)

Focusing on the national roads, current conditions of the roads on the north (Brebes – Tegal – Pemalang – Pekalongan – Semarang – Demak – Kudus – Pati – Rembang), central (Purwokerto – Banyumas – Banjarnegara – Temanggung – Salatiga – Magelang – Surakarta (Solo) – Sragen), and

south (Cilacap – Kroya – Kebumen – Purworejo – Yogyakarta – Klaten – Boyolali – Wonogiri) Java corridors in the Central Java region are summarized in Table 3.1.3, Table 3.1.4, and Table 3.1.5, respectively. As a whole, national road conditions in the Study area are generally on a moderate level, although most of the sections are two-lane roads in the central and south corridors.

Table 3.1.3 Current Condition of Major National Roads in Central Java Region (North)

Link Number	Link name	Section Length (km)	Width (m)	Pavement Type	IRI (m/km)	AADT (veh/day)	Condition
001	PEJAGAN-LOSARI	9.42	14	AC	5.40	18,398	Moderate
002	BREBES - PEJAGAN	14.62	14	AC	4.1	20,854	Moderate
003	TEGAL - BREBES	8.79	8.2	AC	5.3	19,496	Moderate
004.2	PEMALANG - TEGAL (PKL BARAT)	23.22	13.1	AC	4.1	15,255	Moderate
005	PEKALONGAN - PEMALANG	25.07	9.6	AC	4.2	11,724	Moderate
007.1	BATANG - WELERI (PKL TIMUR)	40.67	14	AC	4	16,119	Moderate
007.2	WELERI - BATANG (SMG BARAT)	2.69	8.8	AC	3.8	16,766	Moderate
007.3	JLN. TEMBUS PLELEN BARU	1.69	7	AC	5.7	9,149	Moderate
008	KENDAL - WELERI	14.15	13.7	AC	3.6	19,994	Moderate
009	SEMARANG - KENDAL	11.48	8	AC	4.6	9,862	Moderate
081	SEMARANG - DEMAK	18.34	10.7	AC	4.1	9,096	Moderate
084	DEMAK - TRENGGULI	5.08	11.4	AC	3.5	8,306	Moderate
086.1	TRENGGULI - BTS. SMT	13.41	9.2	AC	4.6	17,483	Moderate
086.2	BTS. PTB - JATI	2.69	8.9	AC	4.1	17,483	Moderate
091.1	KUDUS - BTS. PATI BARAT	10.32	8.2	AC	4.6	16,306	Moderate
091.2	BTS. PATI UTARA - PATI	5.23	9.9	AC	3.6	15,685	Moderate
093	PATI - REMBANG	28.95	7.1	AC	3.5	9,969	Moderate
094	REMBANG - BULU (BATAS JATIM)	46.85	6.5	AC	4.6	11,241	Moderate

Source: Ministry of Public Works (2007)

Table 3.1.4 Current Condition of Major National Roads in Central Java Region (Centre)

Link Number	Link name	Section Length (km)	Width (m)	Pavement Type	IRI (m/km)	AADT (veh/day)	Condition
011.1	BAWEN - PRINGSURAT	17.19	7.7	AC	4.3	13,318	Moderate
011.2	PRINGSURAT - BAWEN (KDT)	9.47	7.2	AC, etc.	3.5	13,633	Moderate
012	BAWEN - SALATIGA	9.62	8.7	AC	3.6	20,971	Moderate
013	SECANG - PRINGSURAT	4.78	8.2	AC	3.8	12,709	Moderate
015.1	SALATIGA - BOYOLALI (SMG BARAT)	6.98	8.2	AC	3.6	16,651	Moderate
020	KARTASURA - BOYOLALI	14.05	10.7	AC	5.2	16,625	Moderate
021	SURAKARTA - KARTASURA	5.55	8.7	AC	3.3	24,706	Moderate
022	SURAKARTA - PALUR	1.4	12.4	AC	4.4	18,519	Moderate
023	PALUR - SRAGEN	20.28	10	AC	3.9	14,278	Moderate
024	SRAGEN - MANTINGAN	12.41	9.4	AC	3.7	11,812	Moderate
033.1	BATAS JAWA BARAT - KARANG PUCUNG	51.38	6.3	AC	4.2	4,103	Moderate
033.2	KARANG PUCUNG - WANGON	21.68	6.5	AC	4.5	4,101	Moderate
035	MANGANTI - WANGON	11.26	7	AC	4.4	6,983	Moderate
041	RAWALO - MANGANTI	2.49	7	AC	4.2	6,738	Moderate
043	PATIKRAJA - RAWALO	9.22	6.1	AC	4.1	6,213	Moderate

Source: Ministry of Public Works (2007)

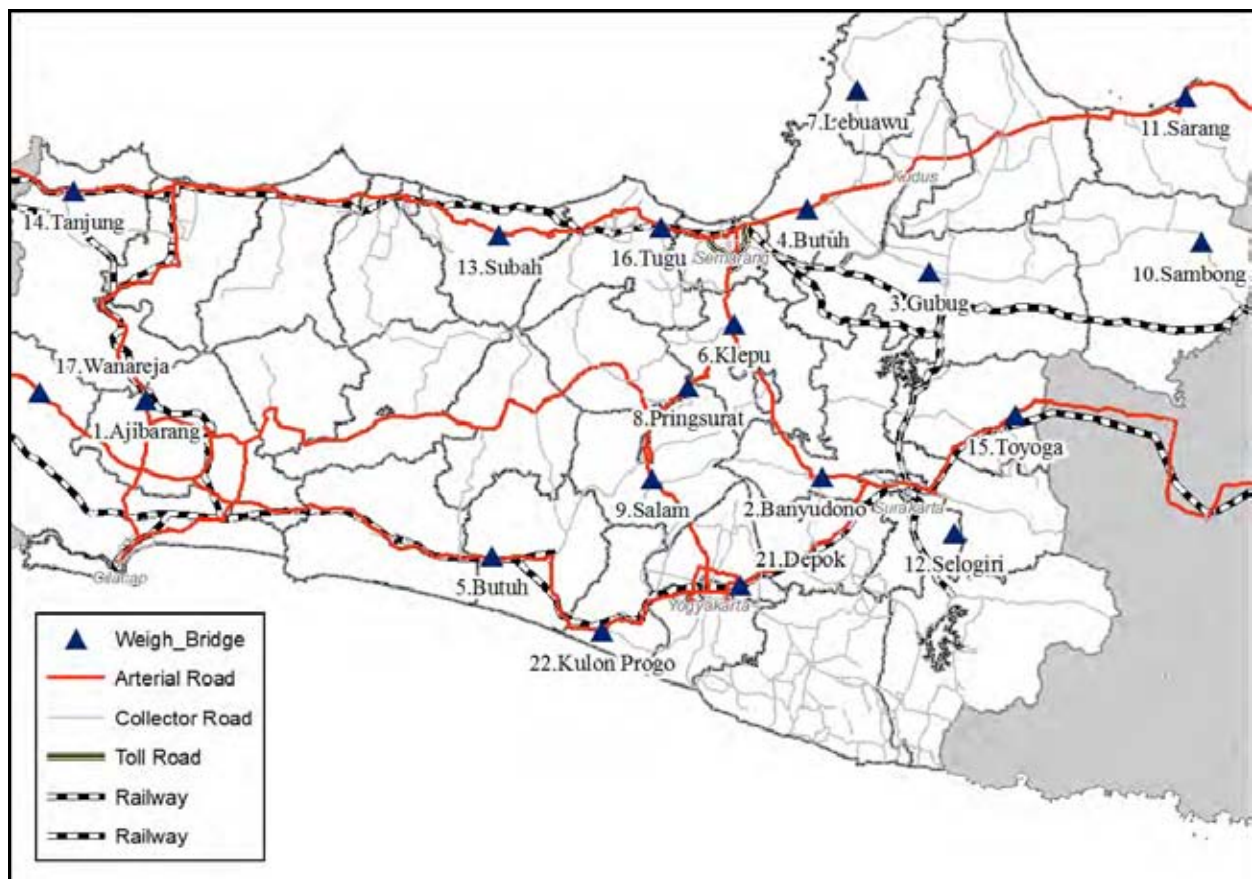
Table 3.1.5 Current Condition of Major National Roads in Central Java Region (South)

Link Number	Link name	Section Length (km)	Width (m)	Pavement Type	IRI (m/km)	AADT (veh/day)	Condition
036.2	BTS. BANYUMAS - CUMILIR	2.39	6.2	AC	4.4	11,632	Moderate
037	GUMILIR - CILACAP	5	7.6	AC	2.5	8,549	Good
038	SLARANG - GUMILIR	4.42	7	AC	4.4	8,522	Moderate
039.3	KESUGIHAN - SLARANG (BMB)	2.89	6.2	AC	4.1	4,845	Moderate
042.2	SAMPANG - BUNTU	8.82	6.9	AC	3.6	6,114	Moderate
050.1	KEBUMEN - BTS. BANYUMAS TENGAH	24.02	8.1	AC	3.7	10,784	Moderate
050.2	BTS. KEDU SELATAN - BUNTU	19.69	7	Lasbutag, AC	3.8	10,138	Moderate
057	PREMBUN - KEBUMEN	12.41	7.1	AC	4.3	11,827	Moderate
060	KUTOARJO - PREMBUN	12.76	7.1	AC	3.9	11,414	Moderate
063	PURWOREJO - KUTOARJO	7.28	8.2	Gravel, Telford, Penmac, AC, etc.	4.4	11,280	Moderate
080	PURWOREJO - KARANGNONGKO	16.99	7.4	AC	4.2	6,405	Moderate
109.2	GIRIWOYO - GLONGGONG	6.58	6.6	AC	4.6	2,126	Moderate
127	GIRIWOYO - DUWET	27.26	5.4	AC	5.8	1,087	Moderate
133	SAMPANG - MAOS - KESUGIHAN	14.15	6.9	AC	3.9	3,802	Moderate

Source: Ministry of Public Works (2007)

(1) Road Damage

Since effect of over loaded trucks has been a concern in Indonesia, weigh bridge stations (or *Jembatan Timbang*), which weigh freight carrying vehicles along roads, are located on major arterial roads in Indonesia. All freight vehicles with loads have to enter the station when they pass from an adjacent arterial road except container trucks, tankers and empty trucks. Overloaded trucks are fined by its weight capacity ratios. There are 17 weigh bridge stations in Central Java province and 2 weigh bridges in DIY province (See the following figure). These stations are operated by provincial government.

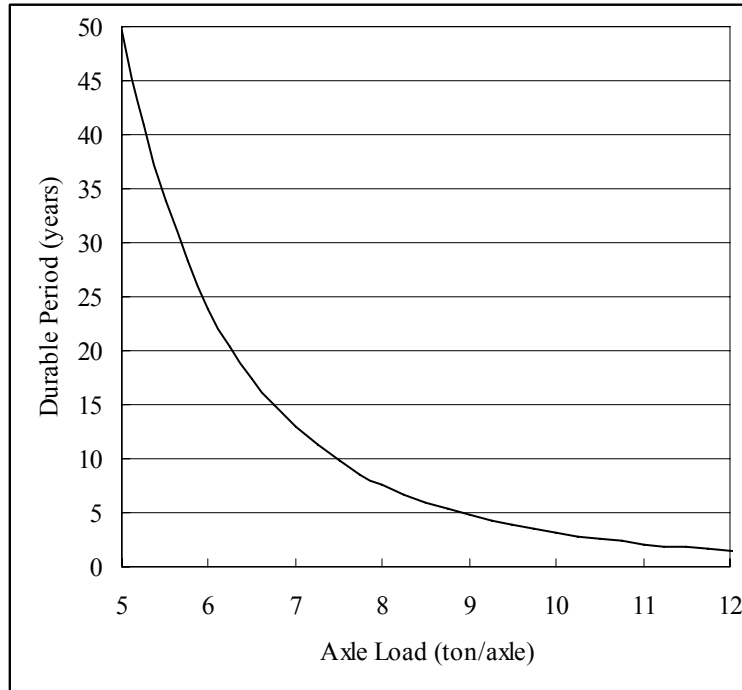


Note :Load capacity ratio is calculated by dividing cargo weight (excluding vehicle weight) by cargo weight capacity.

Source : CJRR Study Team, Weigh Bridge Survey, 2008

Figure 3.1.2 Weigh Bridge Stations in Central Java Region

Relation between axle load and durable period of flexible pavement is depicted in the following figure based on a simple simulation. With increase of axle load to pavement, durable period decreases drastically. While duration period is approximately 50 years with axle load of 5 ton / axle, it decreases to 3 years with load of 10 ton / axle. This illustrates that reduction of axle load significantly affects the cost of flexible pavement.



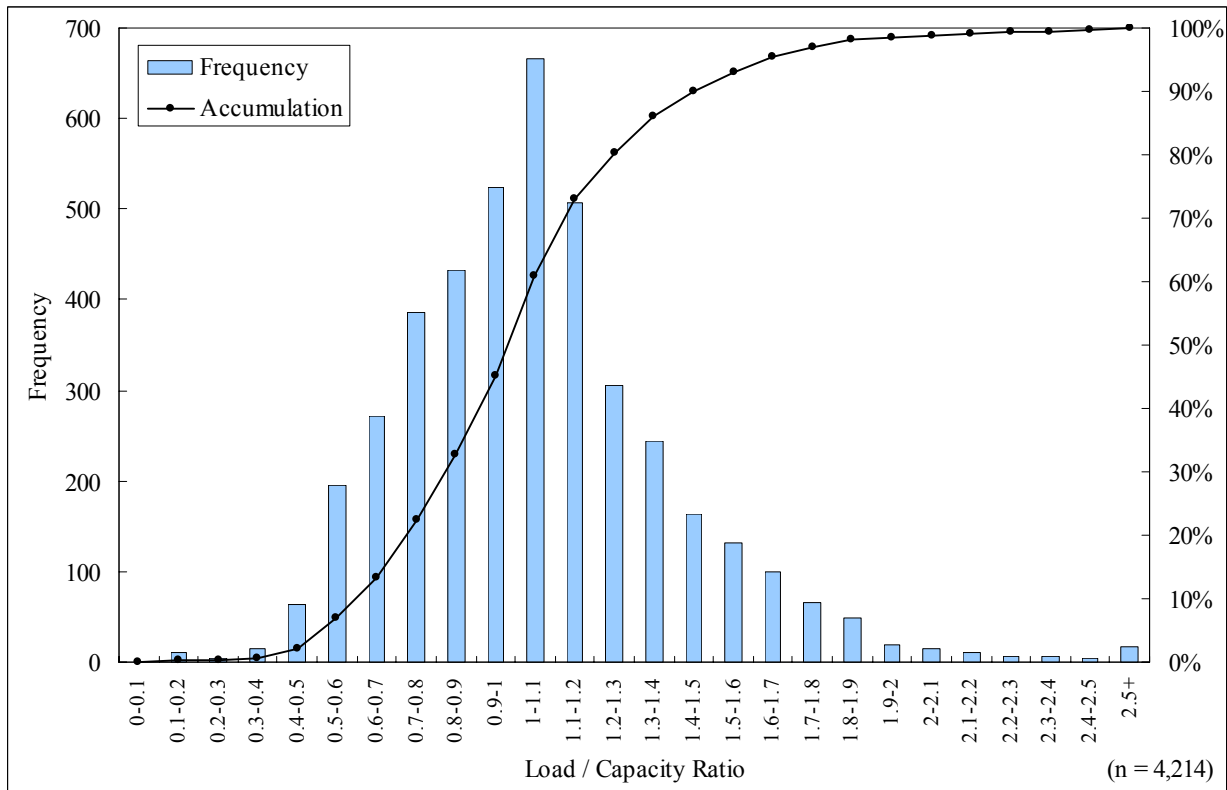
Basic assumptions of calculation:

Normal condition of national roads in Central Java Region is assumed: CBR: 5.0, Traffic: 500 axle / lane, Surface layer: 5cm asphalt, Base course: 12.5 cm asphalt, Upper sub-base: 20 cm Crushed stone, Lower sub-base: 25 cm sand, Design method: Japanese standard of pavement design.

Figure 3.1.3 Relationship of Axle Load and Durable Period of Flexible Pavement

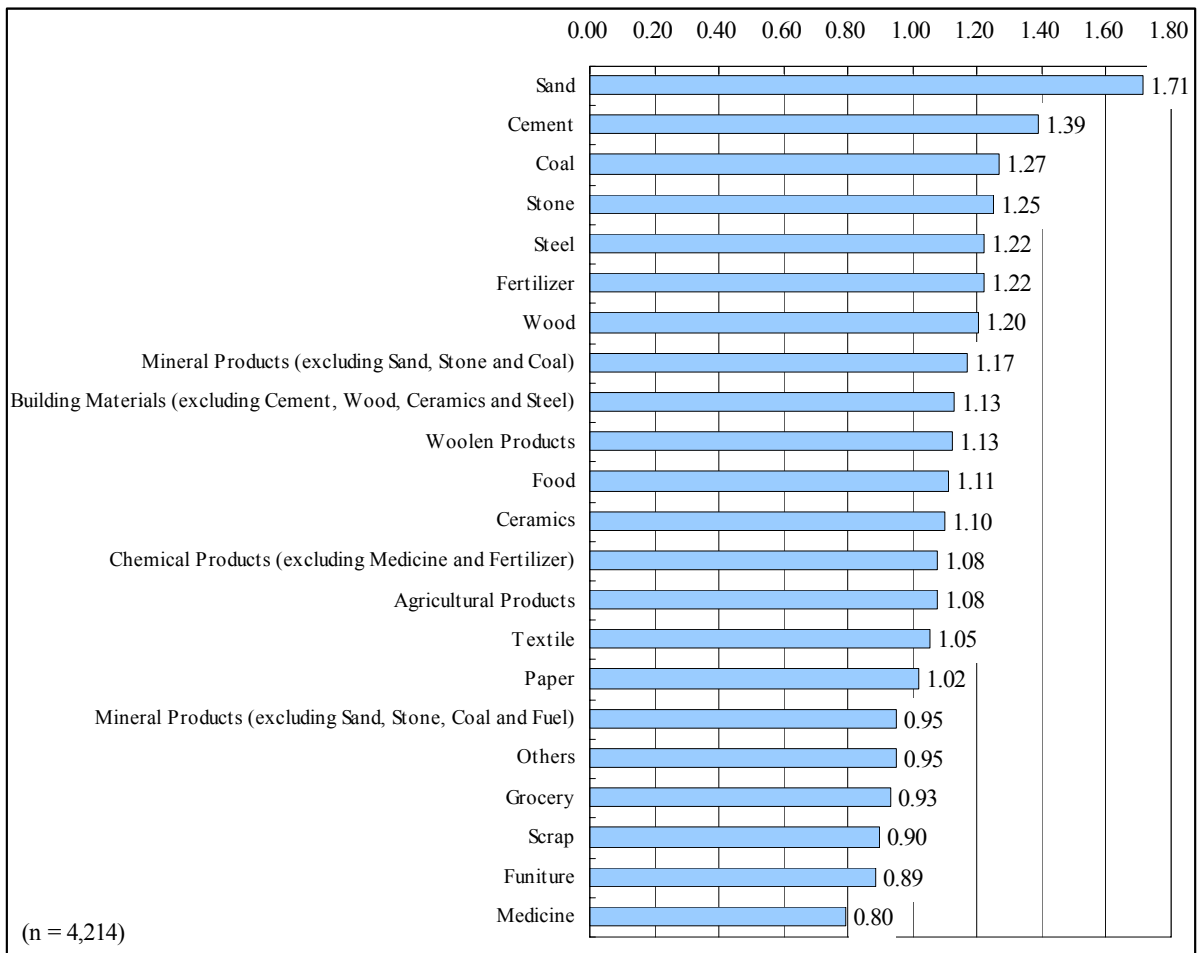
In spite of government policy to reduce over loaded trucks by fine, the majority of trucks load over their capacity. The following figure depicts distribution of load / capacity ratio of trucks in Central Java region based on Weigh Bridge Survey conducted at 9 weigh bridge stations in Central Java Region. Load / capacity ratio and average axle load are also depicted by commodity type in Figure 3.1.5 and Figure 3.1.6.

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.



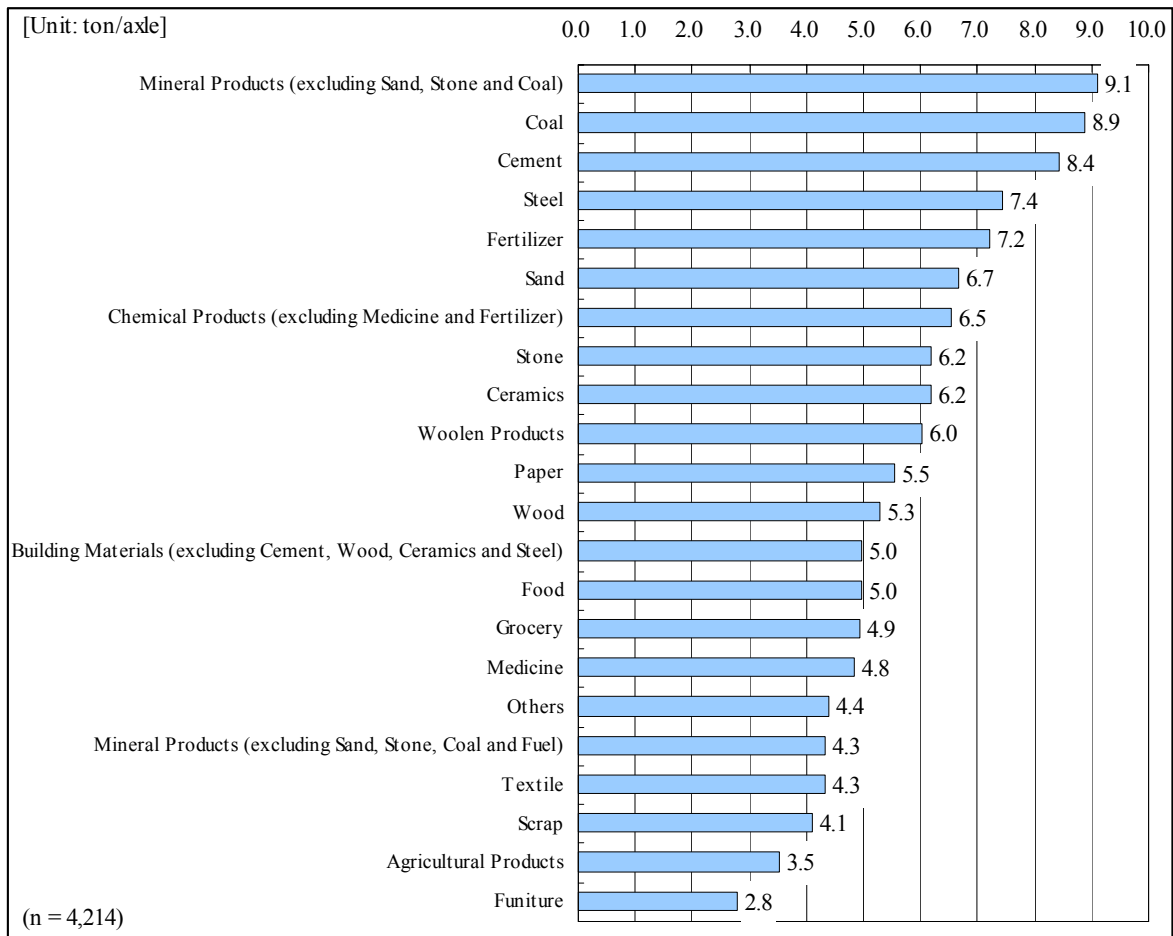
Note: Load capacity ratio is calculated by dividing cargo weight (excluding vehicle weight) by cargo weight capacity.
 Source: CJRR Study Team, Weigh Bridge Survey, 2008

Figure 3.1.4 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 3.1.5 Load / Capacity Ratio by Commodity Type at Weigh Bridges

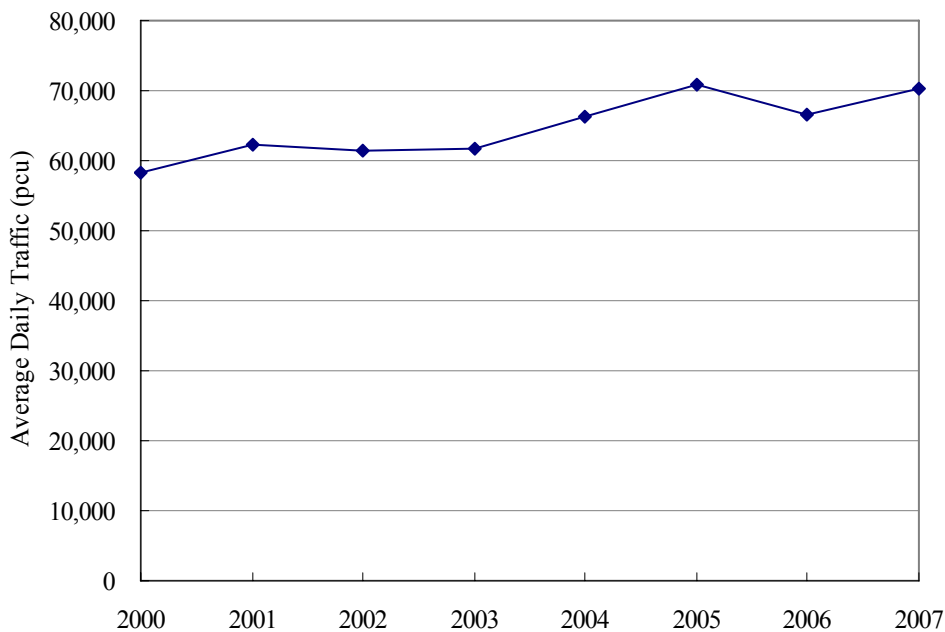


Note: Average axle weight is calculated by dividing gross weight including vehicle and cargo .by number of axles.
 Vehicles with more than five axles are assumed to be 5.5 axles.
 Source: CJRR Study Team, Weigh Bridge Survey, 2008

Figure 3.1.6 Average Axle Weight by Commodity Type at Weigh Bridges (ton / axle)

3.1.2 Toll Road

In the Central Java region, there are toll roads currently operated only in Semarang. There are three sections (Section A: Krapyak – Jatingaleh, Section B: Jatingaleh – Banyumanik, and Section C: Terboyo – Jatingaleh), and the total length is 24.75 km. These toll roads serve as ring roads bypassing Semarang City, and, in the future, they will form part of the toll road connecting Semarang and Solo. Trend of the daily number of vehicles which use the Semarang toll roads is shown in Figure 3.1.7. Although the total length of the toll roads is still short, traffic volume has been increasing with an average growth rate of about 3%.



Note: Figures show total number of vehicles passing Sections A, B, and C.
Source: Jasa Marga

Figure 3.1.7 Trend of Daily Number of Vehicles Using Semarang Toll Roads

3.1.3 Road Traffic

In Indonesia, there was little development of the railway after Independence. As a result, road traffic has become the dominant land transport in line with motorization, and the number of automobiles has been rapidly increasing except during the economic crisis. Recent trend of the number of registered vehicles in both provinces is summarized in Table 3.1.6. On average, the annual growth rate of vehicles is as much as over 10% in both provinces. The number of

motorcycles and its growth are especially remarkable, and the share of motorcycles to all vehicles is 88% and 87% in Central Java Province and DIY, respectively. This rapid motorization has brought the major cities many urban problems such as traffic congestion and environmental pollution. Traffic congestion on the roads around and between the major cities such as the road connecting Semarang and Solo is becoming worse year by year. In Semarang city, traffic congestion is heavy during the morning and evening peak hours, and bus rapid transit (BRT) services are planned and soon to be implemented.

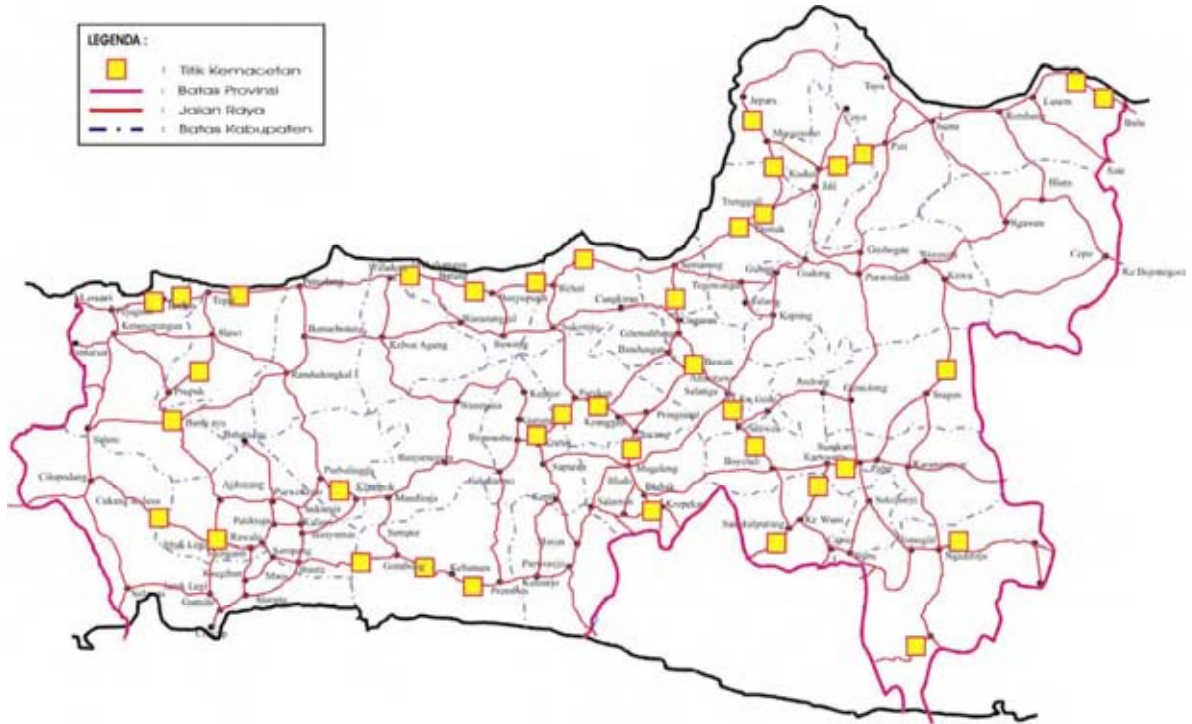
Table 3.1.6 Trend of Number of Registered Vehicles

Year	Central Java Province					Yogyakarta Special Province (DIY)				
	Passenger Vehicle	Non-Passenger Vehicle	Bus	Motor-cycle	Total	Passenger Vehicle	Non-Passenger Vehicle	Bus	Motor-cycle	Total
2001					2,963,244	67,309	27,745	6,591	539,448	641,093
					-	-	-	-	-	-
2002					3,353,107	70,203	30,816	7,400	597,143	705,562
					<i>13.2%</i>	<i>4.3%</i>	<i>11.1%</i>	<i>12.3%</i>	<i>10.7%</i>	<i>10.1%</i>
2003	271,821	247,721	38,719	3,005,869	3,564,130	74,728	32,520	8,039	666,941	782,228
	-	-	-	-	<i>6.3%</i>	<i>6.4%</i>	<i>5.5%</i>	<i>8.6%</i>	<i>11.7%</i>	<i>10.9%</i>
2004	302,533	258,131	38,158	3,889,864	4,488,686	78,817	34,031	9,968	755,101	877,917
	<i>11.3%</i>	<i>4.2%</i>	<i>-1.4%</i>	<i>29.4%</i>	<i>25.9%</i>	<i>5.5%</i>	<i>4.6%</i>	<i>24.0%</i>	<i>13.2%</i>	<i>12.2%</i>
2005	340,255	281,192	41,530	4,392,651	5,055,628	82,705	35,670	14,685	843,077	976,137
	<i>12.5%</i>	<i>8.9%</i>	<i>8.8%</i>	<i>12.9%</i>	<i>12.6%</i>	<i>4.9%</i>	<i>4.8%</i>	<i>47.3%</i>	<i>11.7%</i>	<i>11.2%</i>
2006	372,515	295,986	44,372	5,113,565	5,826,438	84,786	36,812	17,673	916,204	1,055,475
	<i>9.5%</i>	<i>5.3%</i>	<i>6.8%</i>	<i>16.4%</i>	<i>15.2%</i>	<i>2.5%</i>	<i>3.2%</i>	<i>20.3%</i>	<i>8.7%</i>	<i>8.1%</i>

Note: *Italic* figures show annual growth.

Source: BPS

Major traffic congestion points in the trunk road network of Central Java Province are presented in Figure 3.1.8. Besides traffic concentration, congestion tends to occur at points due to the reduced traffic capacity often caused by narrow road width, deteriorated road surface, commercial activities (e.g. market, parking) beside the road, and so on. Figure 3.1.9 shows roads that are currently near or over the capacity in Central Java Province. Based on these two figures, traffic congestion seems to be most serious on Semarang – Yogyakarta, Semarang – Solo, Semarang – Rembang, and Solo – Yogyakarta corridors.



Source: Kompas (2004)

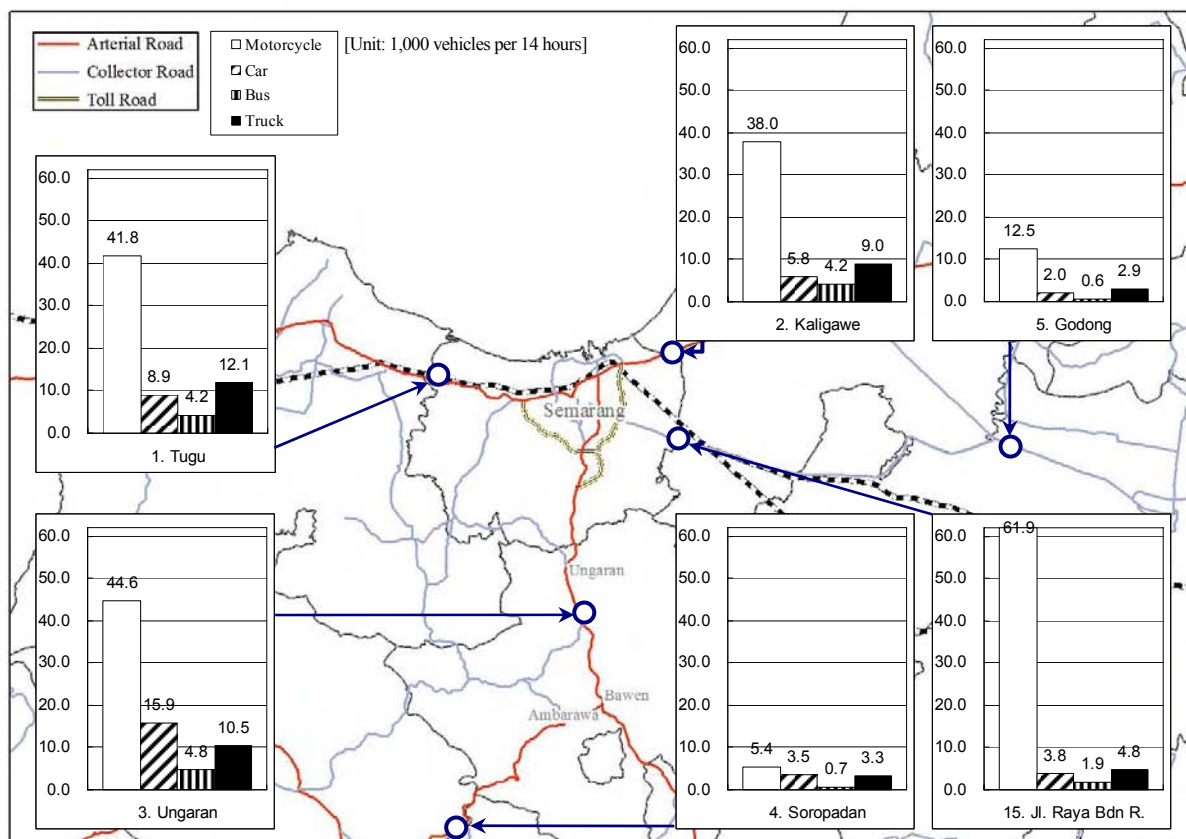
Figure 3.1.8 Major Traffic Congestion Points in Central Java Province



Source: Studi Penyusunan Tataran Transportasi Wilayah (TATRAWIL), Central Java Province (2004)

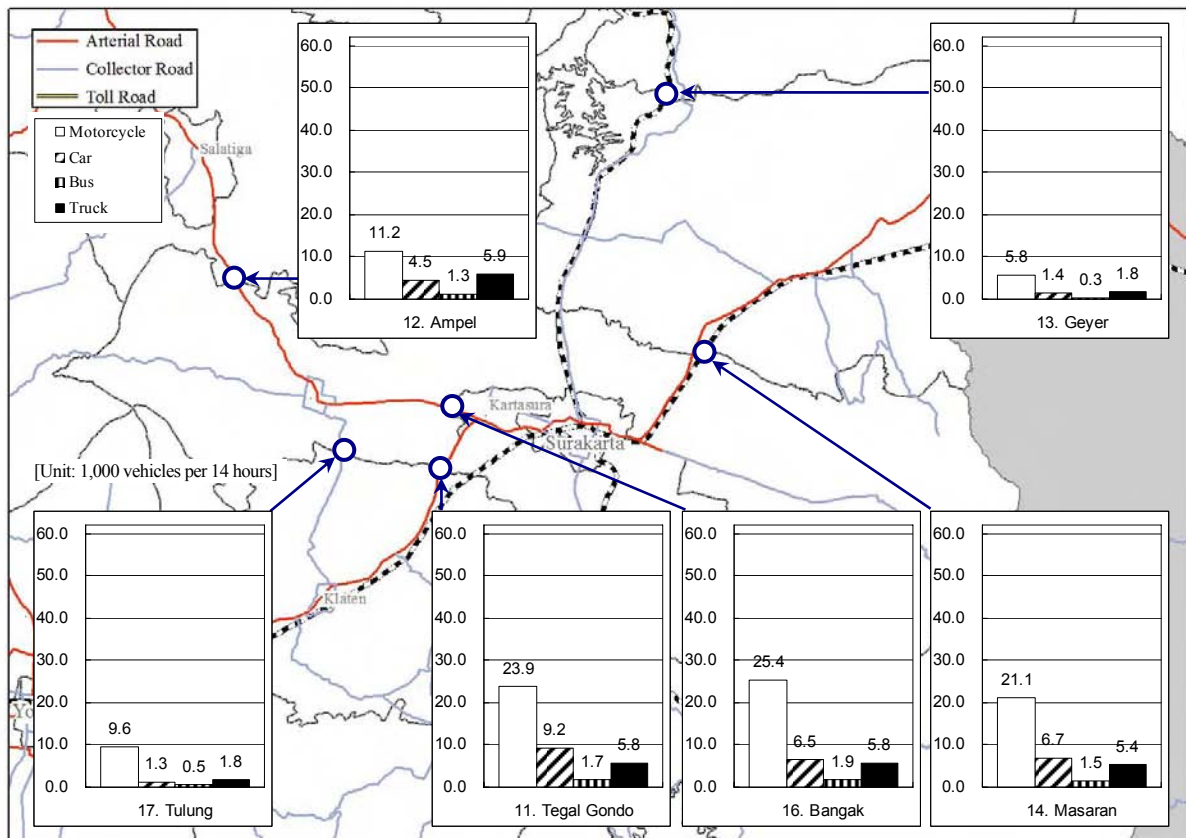
Figure 3.1.9 Roads with Volume Capacity Ratio over 0.85 in Central Java Province

For the purpose of obtaining usage status of roads in the Central Java region, Classified Hourly Traffic Count Survey was conducted at 18 locations on the boundary of Kabupaten. Traffic volumes of major road around Semarang, Surakarta and Yogyakarta city are shown in Figure 3.1.10, Figure 3.1.11 and Figure 3.1.12 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.



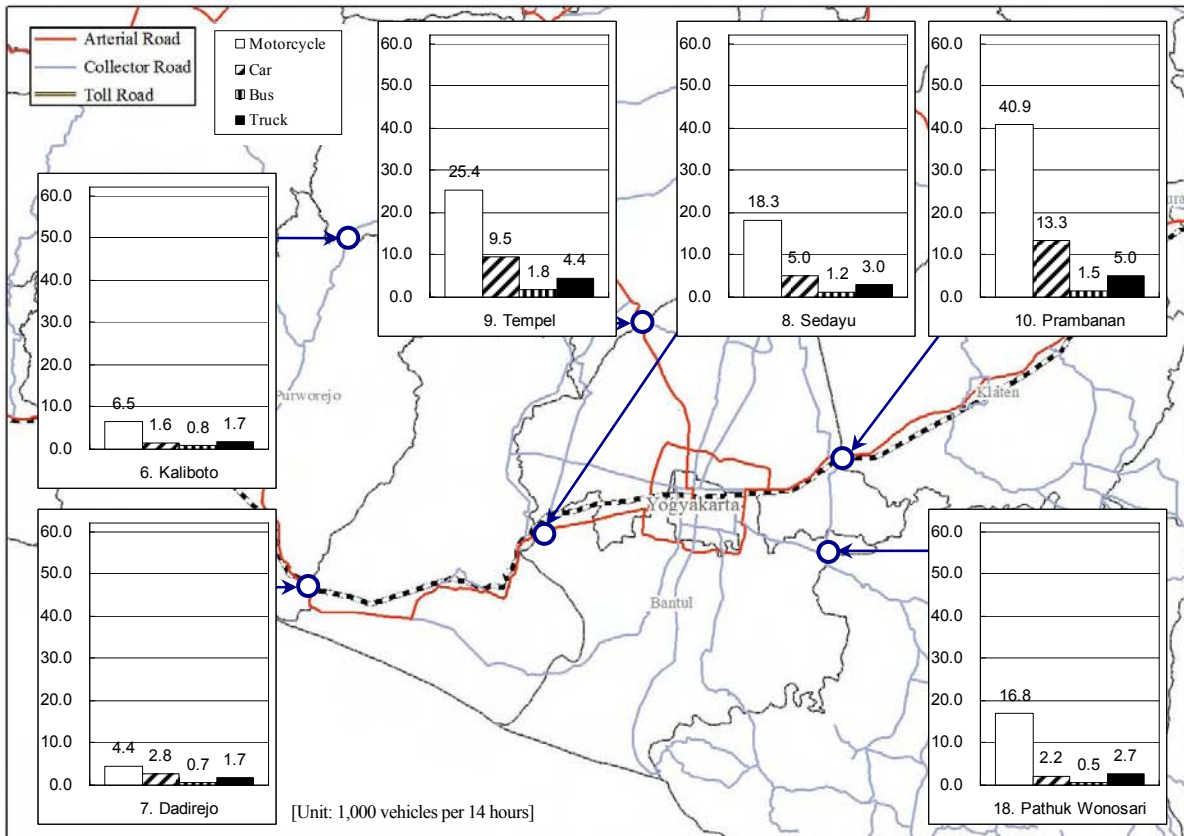
Source: CJRR Study Team, Road Traffic Survey

Figure 3.1.10 Traffic Volume of Major Roads around Semarang City



Source: CJRR Study Team, Road Traffic Survey

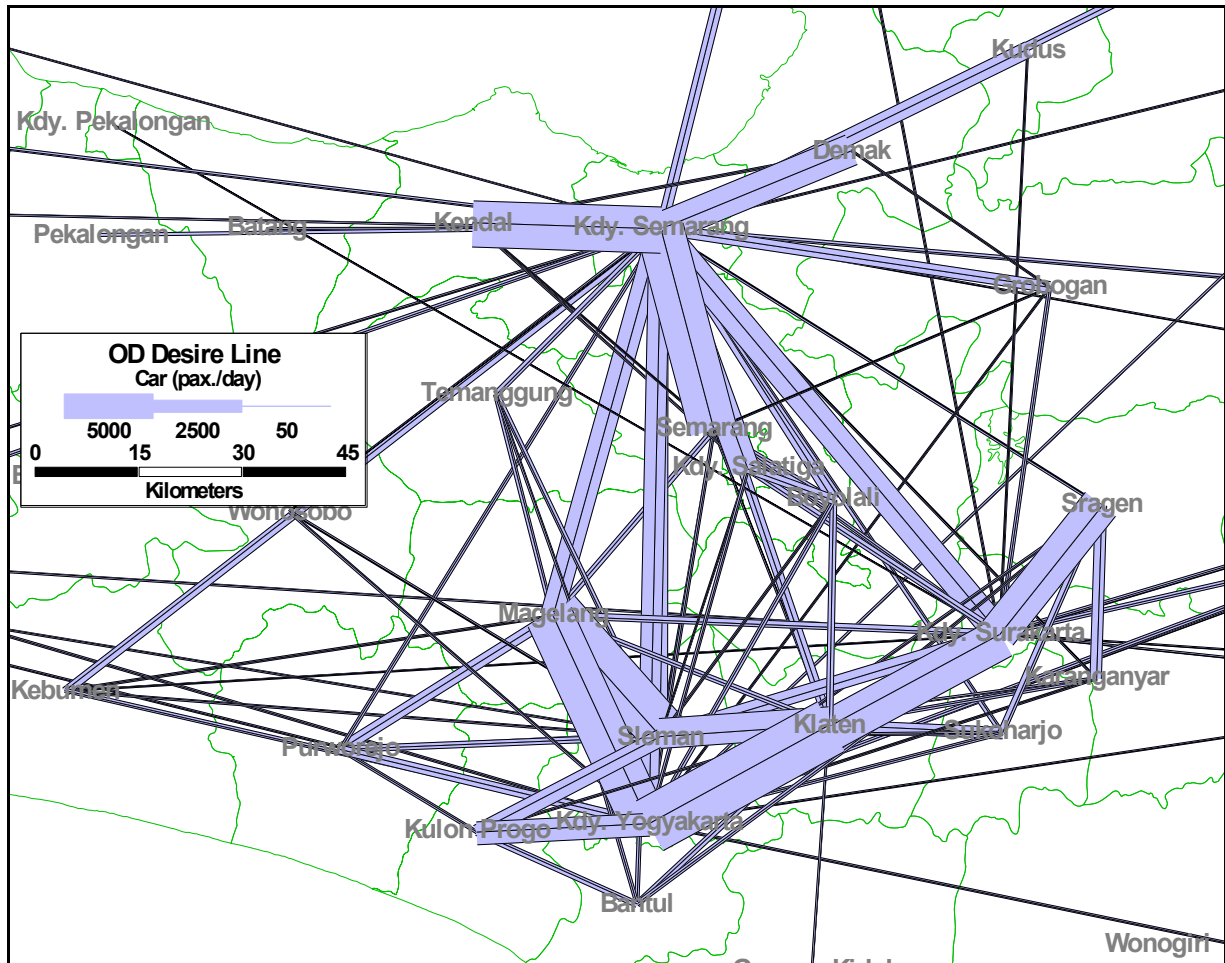
Figure 3.1.11 Traffic Volume of Major Roads around Surakarta City



Source: CJRR Study Team, Road Traffic Survey

Figure 3.1.12 Traffic Volume of Major Roads around Yogyakarta City

Based on the road traffic survey conducted by the study team in 2008, desire lines of car passengers in Semarang – Solo – Yogyakarta corridor are depicted in Figure 3.1.7. There are 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 where zonal distance is approximately 50 – 100 km, such as Kota Semarang – Kota Surakarta, Kota Semarang – Kota Yogyakarta, Kota Semarang – Magelang are major traffic flows along the corridor.

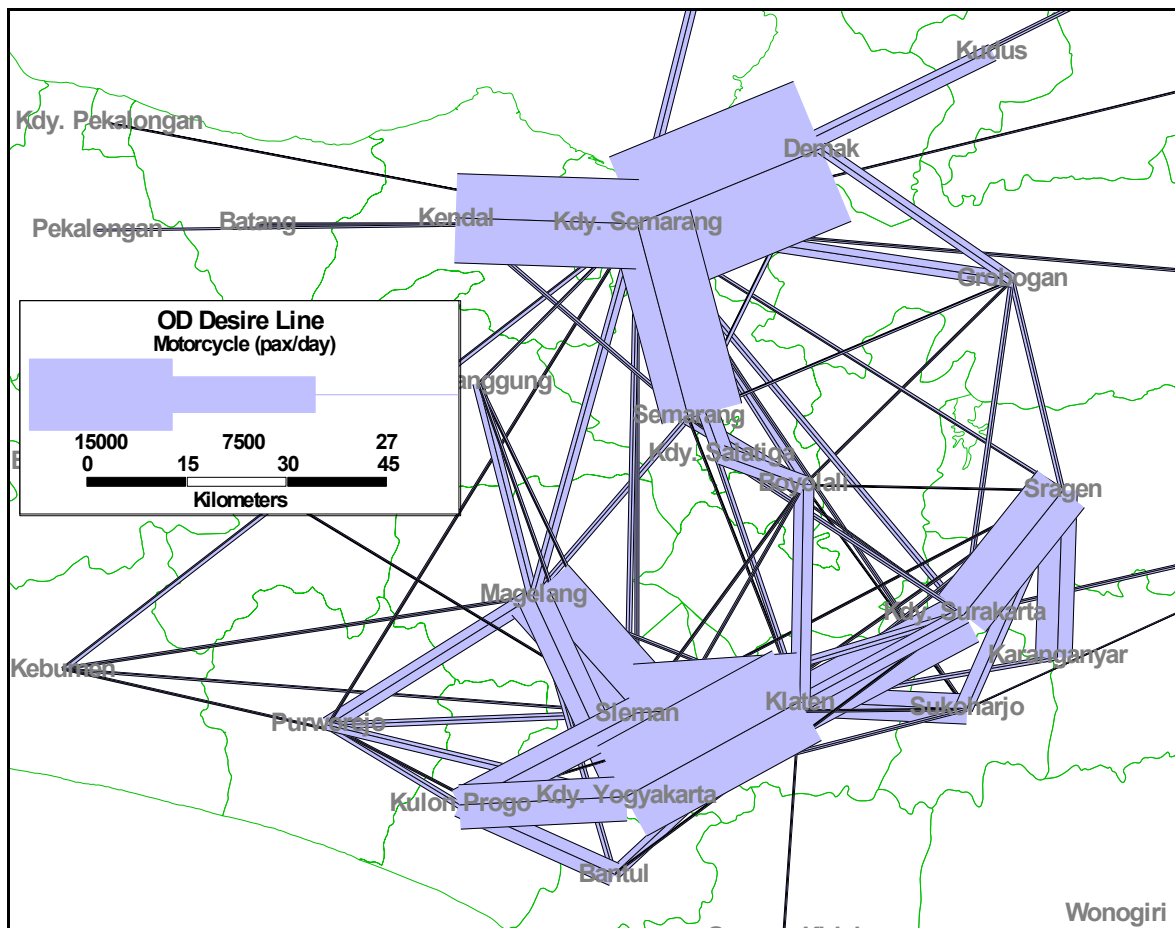


Note: Desire lines which have less than 200 passenger /day for one direction are excluded.
Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 3.1.13 Desire Lines of Car Passengers in Semarang – Solo – Yogyakarta Corridor

Based on the road traffic survey conducted by the study team in 2008, desire lines of motorcycle passengers in Semarang – Solo – Yogyakarta corridor are depicted in Figure 3.1.14. 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 Semarang, Kota Yogyakarta – Klaten, Sleman – Magelang, Kota Surakarta – Sragen are approximately twice or triple that of car passengers.

It is not negligible that some passengers choose motorcycle 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 includes more than 1,000 passengers per day while the number of passengers are smaller than number of 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 3.1.14 Desire Lines of Motorcycle Passengers in Semarang – Solo – Yogyakarta Corridor

3.1.4 Intercity Bus Transportation

Each city has intercity bus terminal(s) from which relatively frequent bus services connecting the city with Jakarta or major cities in the region are operated. In the Central Java region, there are around 200 daily bus services connecting Tegal, Semarang, and Solo. Usually several bus companies are operating bus services on the same route, and it is often the case that bus conductors are scrambling for passengers at bus terminals.

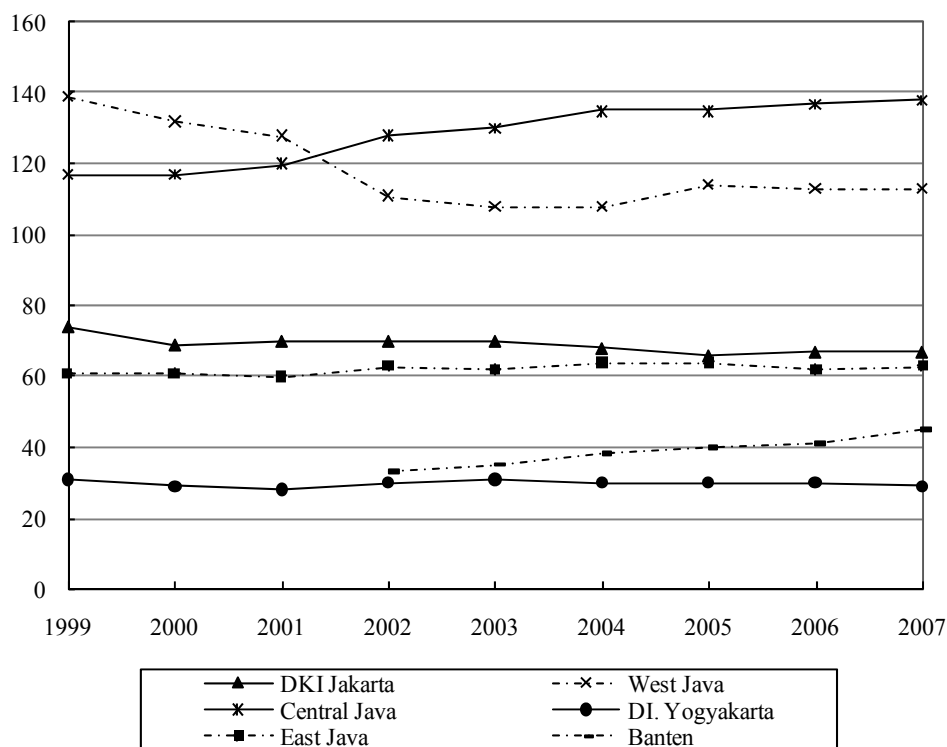
While use of motorcycles is very popular for individual, short-distance travel, buses are major mode of travel for a longer distance because the fare is generally reasonable due to the high competition among bus companies. Furthermore, for intercity, inter-provincial bus service, upper and lower limits of the economy class fare have been regulated by the government. Travel details of bus services between major cities in the Central Java region such as travel times and load factors are summarized in Table 3.1.7. Bus lines connecting these major cities in the Central Java region are generally quite highly loaded.

Table 3.1.7 Travel Details of Bus Services between Major Cities

No	Section (From – To)	Distance (km)	Travel Time (min.)	Average Speed (km/h)	Load Factor		
					Minimum	Maximum	Average
1	Semarang-Yogyakarta	118	180-240	30	0.2	0.63	0.51
2	Yogyakarta-Semarang				0.24	1.17	0.81
3	Semarang-Solo	102	150-180	40	0.17	0.63	0.43
4	Solo-Semarang				0.59	1.24	1
5	Semarang-Rembang	111	180-240	40	0.11	0.94	0.63
6	Rembang-Semarang				0.19	1.13	0.76
7	Purwokerto-Yogyakarta	185	240-300	40	0.22	1	0.72
8	Yogyakarta-Purwokerto				0.48	1.41	0.88
9	Semarang-Purwokerto	211	300-360	35	0.11	0.94	0.63
10	Purwokerto-Semarang				0.17	1.13	0.79
11	Semarang-Tegal	165	240-270	40	0.44	1.41	0.98
12	Tegal-Semarang				0.23	0.89	0.54

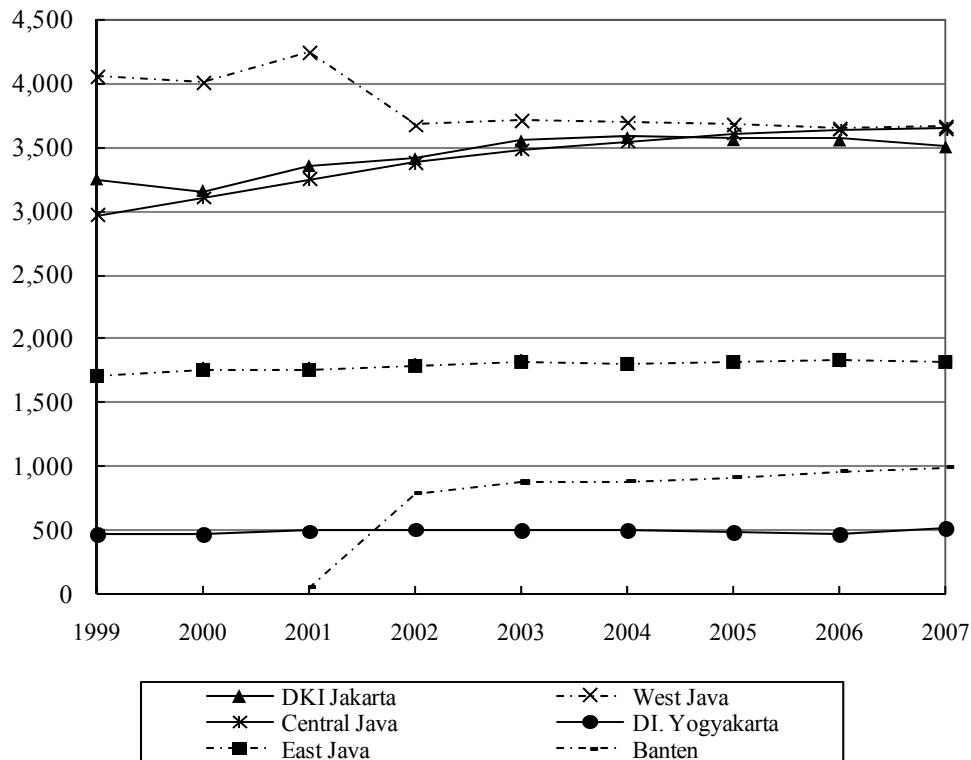
Source: DLLAJ of Central Java Province (2002)

For operation of intercity, inter-provincial bus services and intercity, intra-provincial bus services, routes must be approved by the Ministry of Transport (Departemen Perhubungan) and the provincial traffic and road transport agency (DLAJ: Dinas Lalu Lintas dan Angkutan Jalan), respectively. The trend in the number of inter-provincial bus companies registered in each province of Java Island is illustrated in Figure 3.1.15 while the trend of the number of inter-provincial buses registered in each province is illustrated in Figure 3.1.16. The number of buses as well as bus companies registered in Central Java Province has been steadily increasing due to its geographically important location, taking the largest share of all the provinces in Java Island.



Source: Subdit Angkutan Jalan, Ministry of Transport (2007)

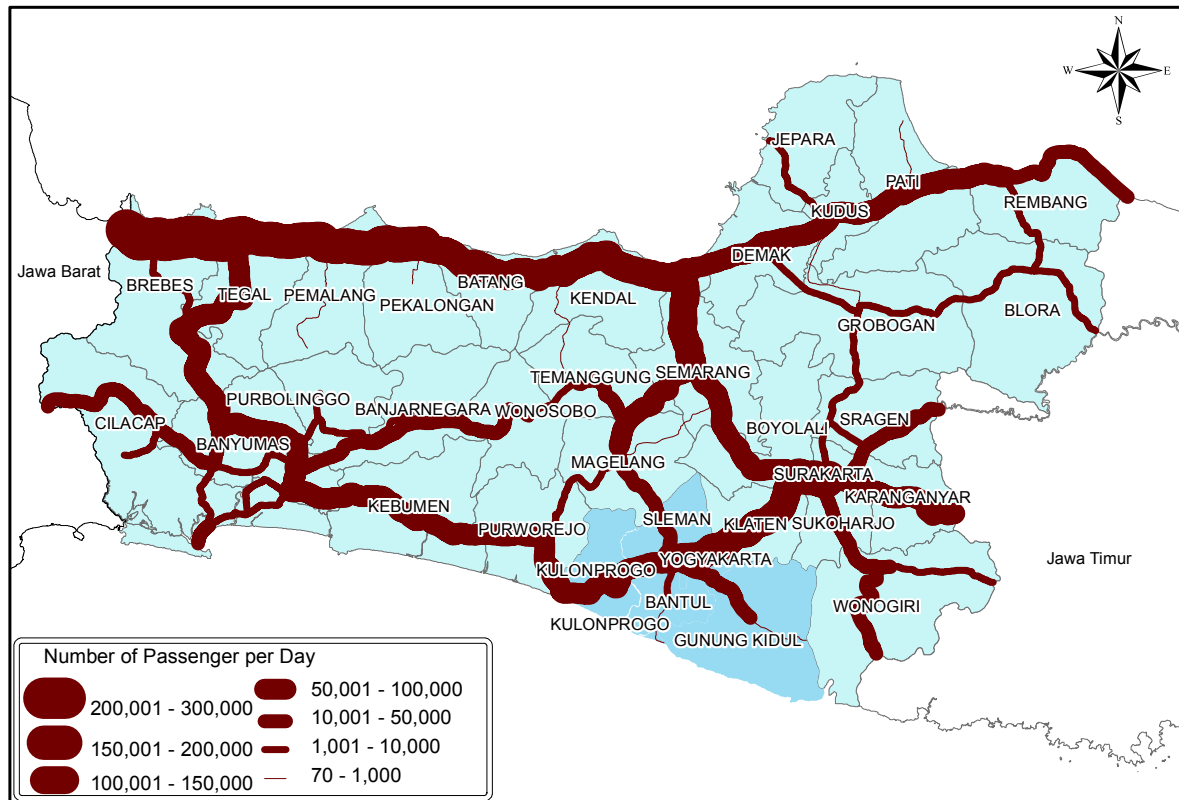
Figure 3.1.15 Number of Inter-Provincial Bus Companies Registered in Each Province



Source: Subdit Angkutan Jalan, Ministry of Transport (2007)

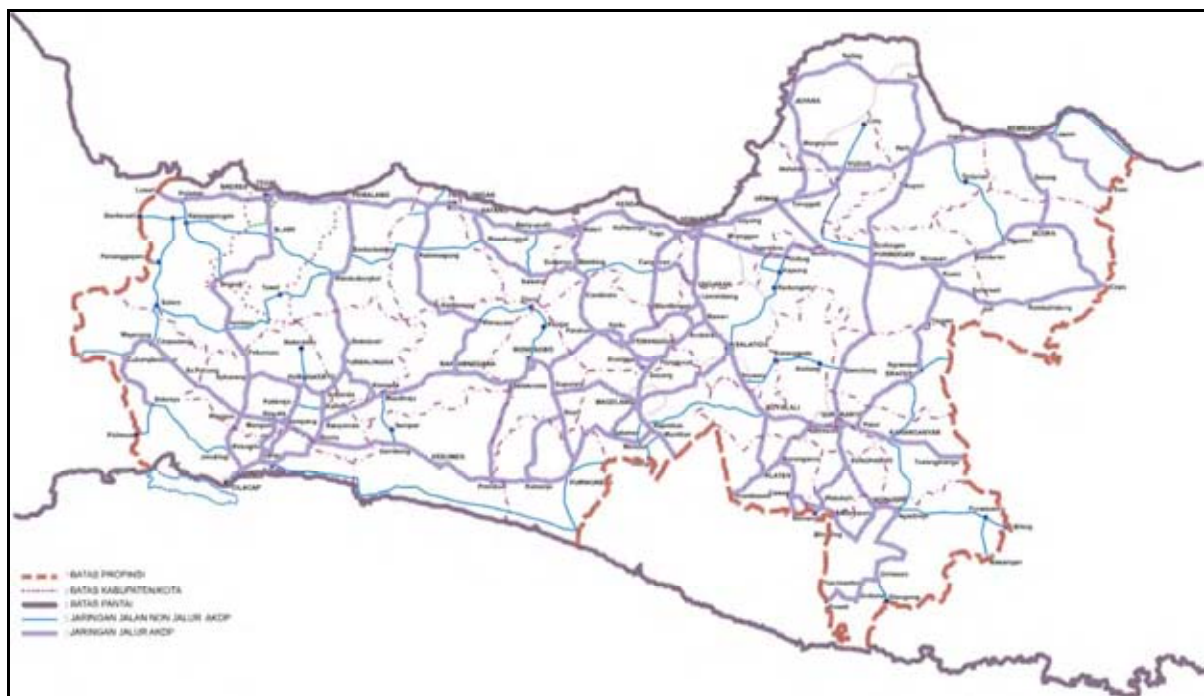
Figure 3.1.16 Number of Inter-Provincial Buses Registered in Each Province

Passenger volume of inter-city inter-province bus by a road section in the Central Java region is shown in Figure 3.1.17. The number of passenger is large in northern coast line corridor, roughly 200,000 passengers and southern corridor, roughly 100,000 passengers. Vertical route such as Semarang – Surakarta section, roughly 150,000 passengers, and Tegal – Banyumas section, roughly 150,000 passengers, and Semarang – Yogyakarta section, roughly 100,000, passengers, have larger passengers. Roads to be used by intercity intra-provincial bus services in Central Java Province are also presented in Figure 3.1.18.



Source: Ministry of Transportation, consolidated by CJRR Study Team

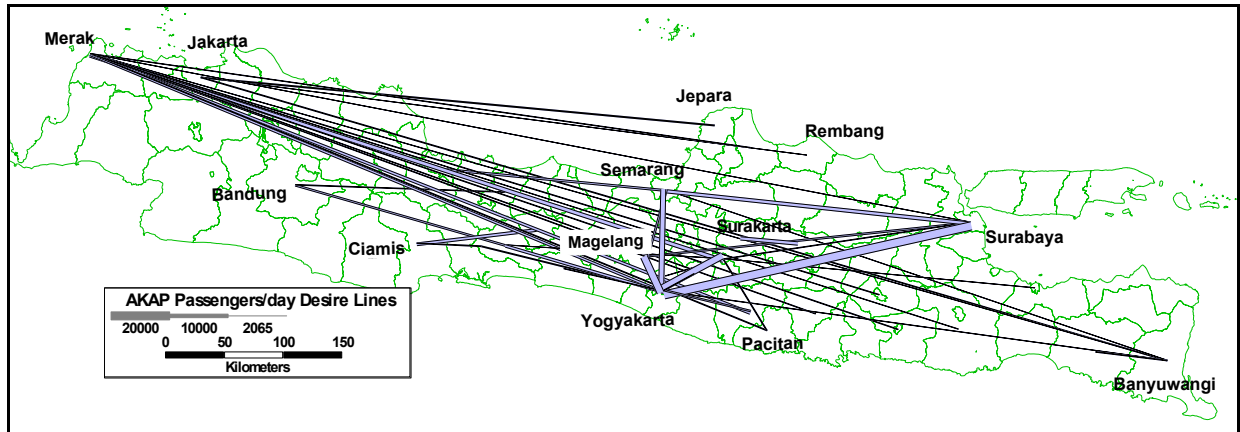
Figure 3.1.17 Intercity, Inter-Provincial Bus Passenger Volume in Central Java Province



Source: DLLAJ of Central Java Province (2003)

Figure 3.1.18 Intercity, Intra-Provincial Bus Route Network in Central Java Province

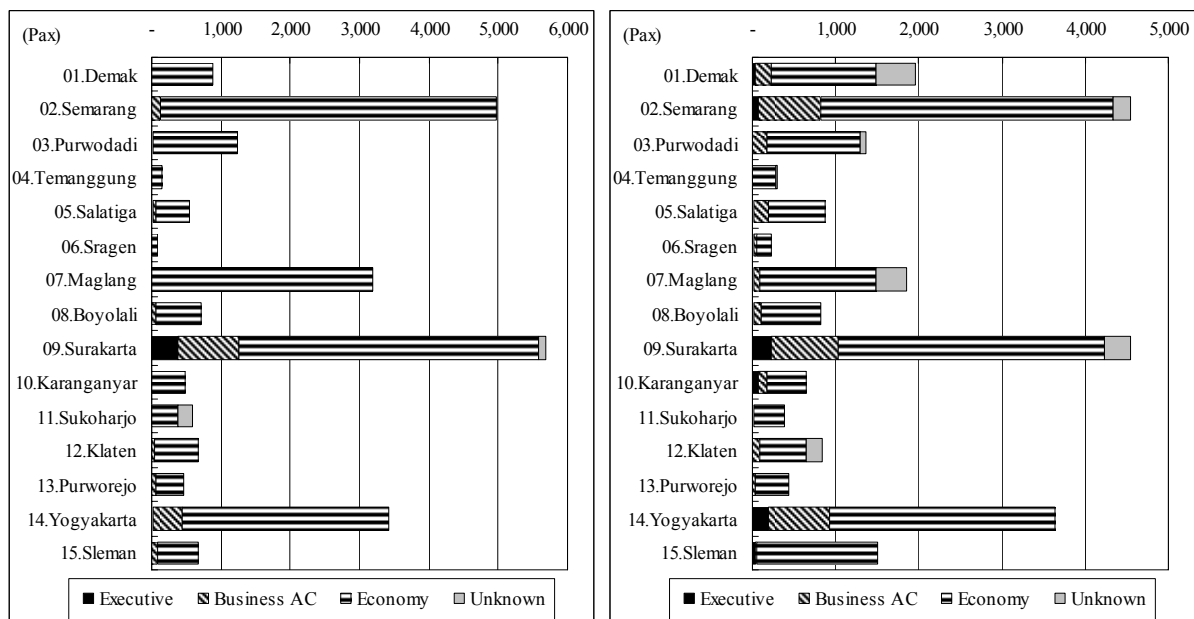
Based on the bus route service registration data from Ministry of Transportation, desire line of intercity, inter-provincial bus service passengers in the Central Java region is depicted in Figure 3.1.19. There is a number of bus routes connecting Jakarta and cities in the Central Java region. Since DIY is surrounded by Central Java province, the number of intercity, inter-provincial bus passengers from DIY is comparatively larger than that of other cities in the Central Java region.



Source: Ministry of Transportation, consolidated by CJRR Study Team

Figure 3.1.19 Desire Line of Intercity, Inter-Provincial Bus Passengers in Central Java Region

Bus Passenger Count Survey was conducted at 15 intercity bus terminals around Yogyakarta - Solo - Semarang corridor and its surroundings. The survey was conducted for 24 hours at Semarang, Surakarta and Yogyakarta bus terminals and conducted for 14 hours or until closing time of a bus terminal at other bus terminals. Alighting and boarding passenger volume by terminal is shown below. Semarang, Surakarta and Yogyakarta terminal exceeds more than 3,000 passengers per day for both alighting and boarding. Executive and Business AC (air-conditioned) class passenger ratio of Surakarta and Yogyakarta terminals are comparatively higher than that of Semarang.

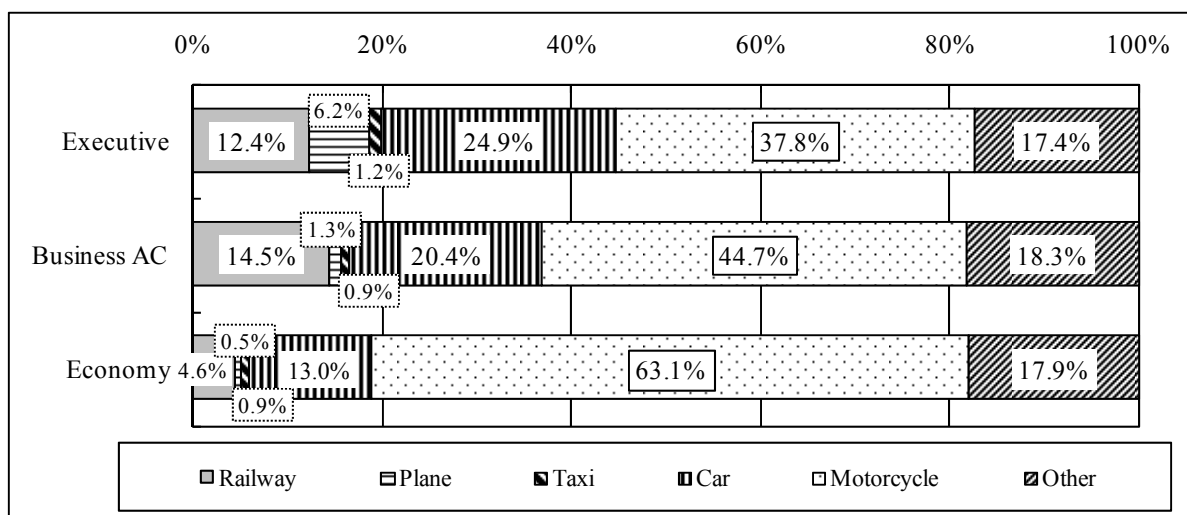


Source: CJRR Study Team, Road Traffic Survey

Figure 3.1.20 Bus Passenger Volume by Class by Terminal

(Right: Departure, Left: Arrival)

Alternative transportation mode for bus terminal users was also surveyed in Road Traffic Survey (Figure 3.1.21). Although the share of motorcycles is the largest for all classes, shares of car, railway and plane are relatively higher for executive and business class. More than 60% of economy class passenger answered they would travel by motorcycle if bus is not available.

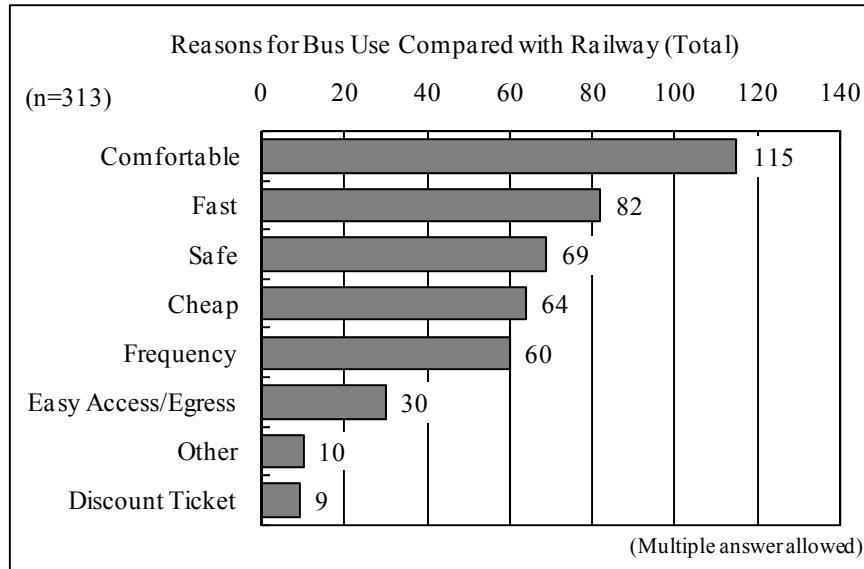


Source: CJRR Study Team, Road Traffic Survey

Figure 3.1.21 Alternative Transportation Mode for Bus

313 respondents answered their alternative transport mode is railway. Figure 3.1.22 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.

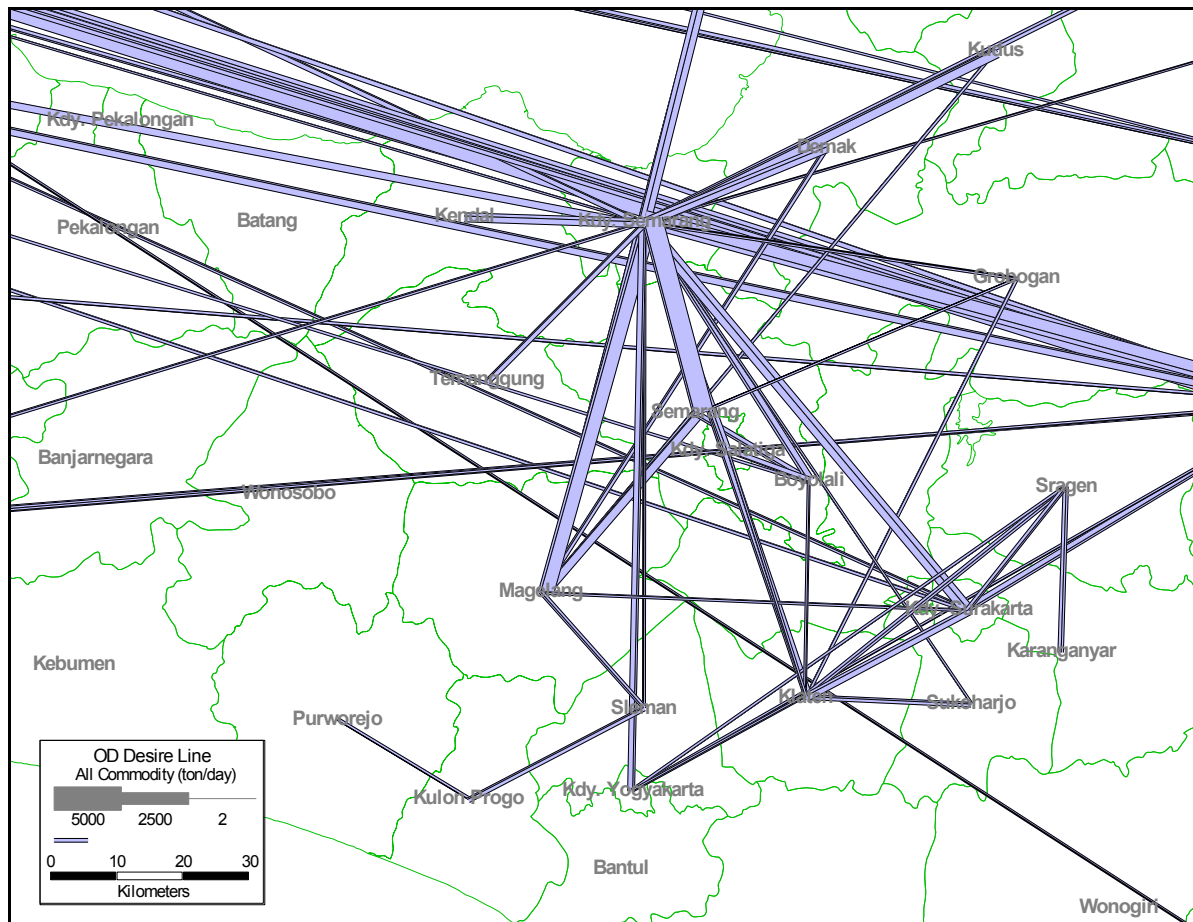


Source: CJRR Study Team, Road Traffic Survey

Figure 3.1.22 Reasons for Bus Use

3.1.5 Freight Transportation by Road

Road is the main mode of cargo transportation in Java island and also in Central Java Region. 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.

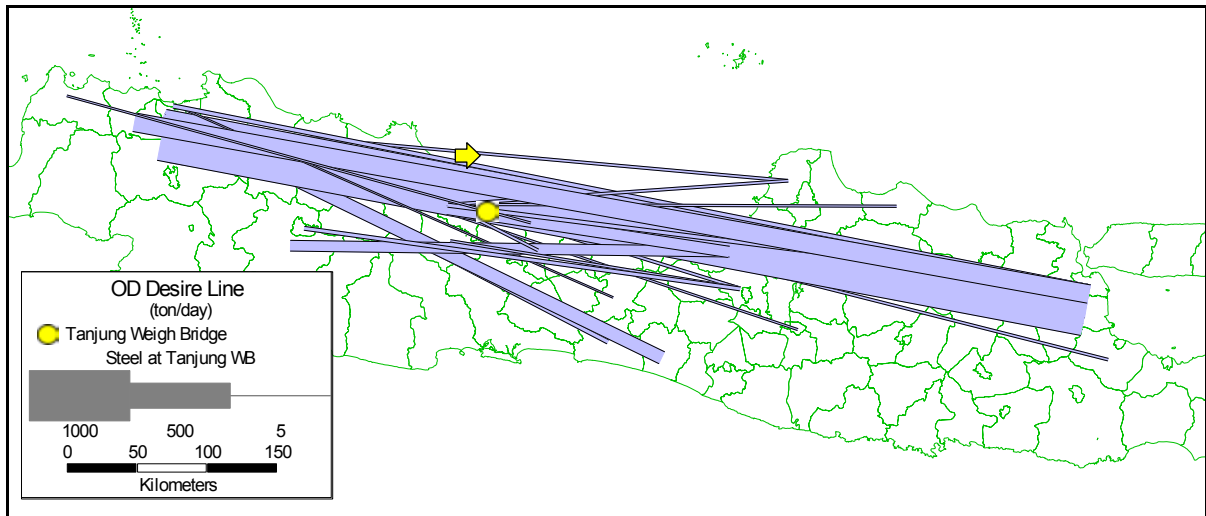


Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 3.1.23 Desire Lines of Freight Transport in Semarang – Solo – Yogyakarta Corridor

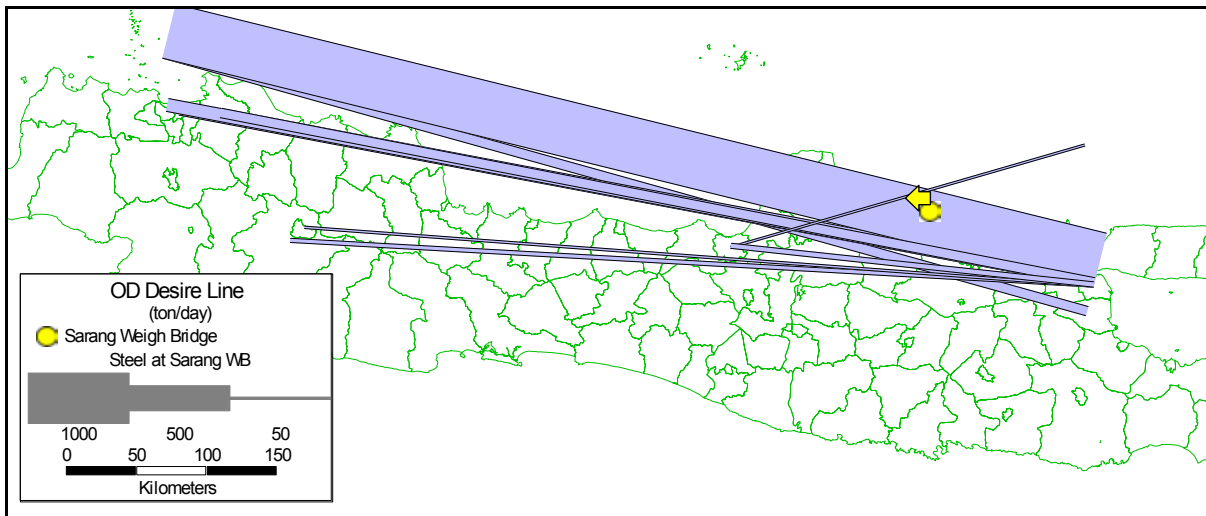
(1) Steel

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 3.1.24 Desire Lines of Steel at Tanjung Weigh Bridge



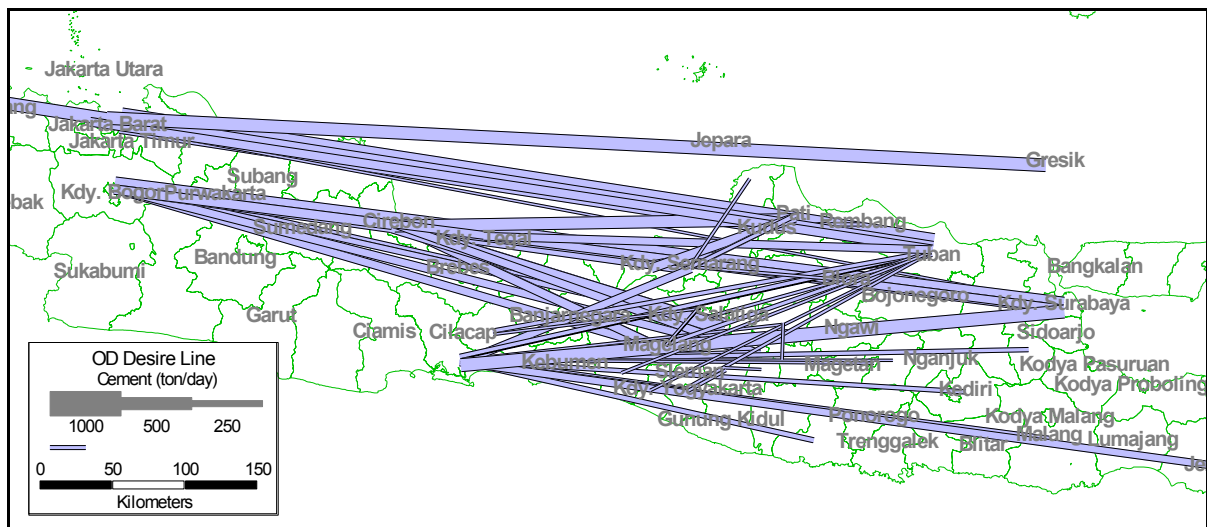
Note: Only west bound traffic was surveyed.
Source: CJRR Study Team, Weigh Bridge Survey, 2008

Figure 3.1.25 Desire Lines of Steel at Sarang Weigh Bridge

(2) 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.

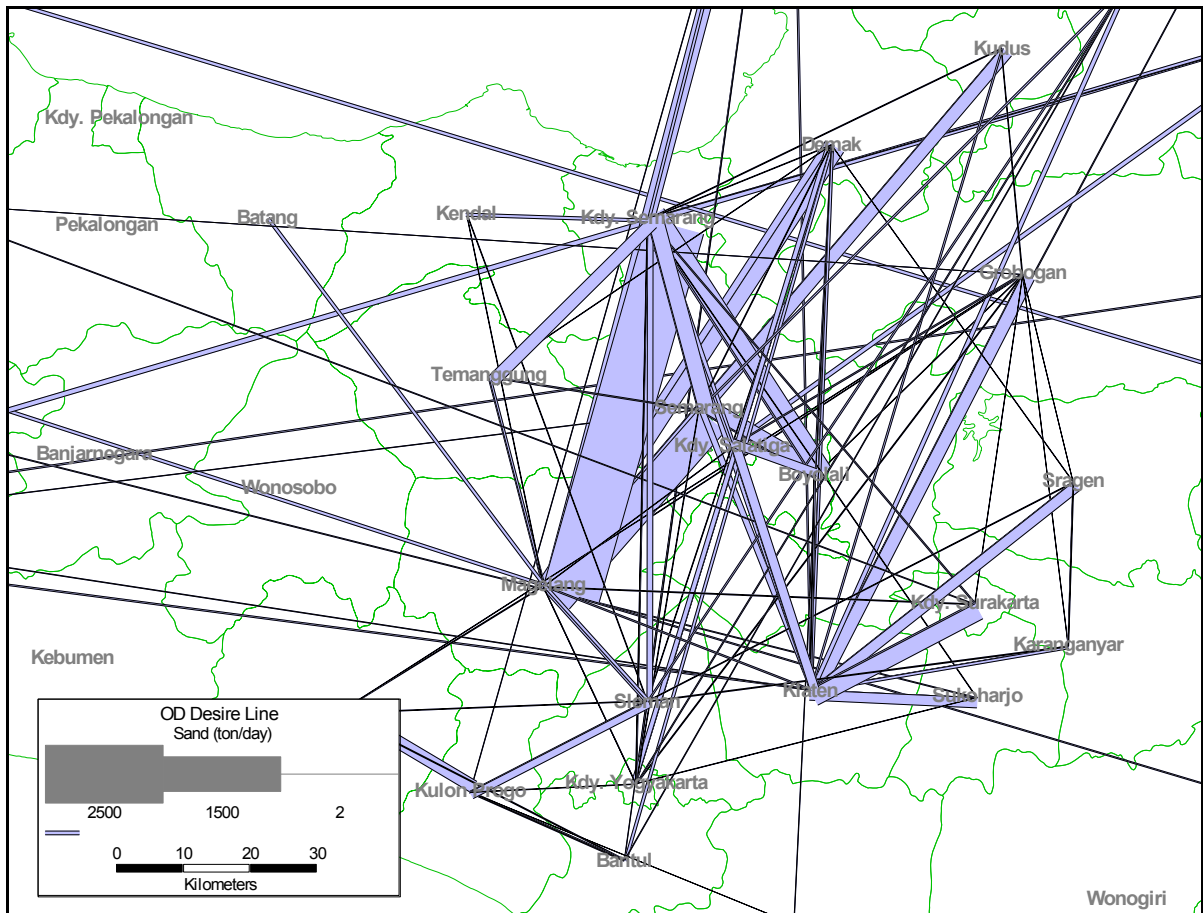


Note: Only trips departing, arriving and passing through Semarang – Solo – Yogyakarta corridor was surveyed.
 Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 3.1.26 Desire Lines of Cement in Semarang – Solo – Yogyakarta Corridor

(3) Quartz Sand (Silica)

Since sand, important raw material for cement, is mined in 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.

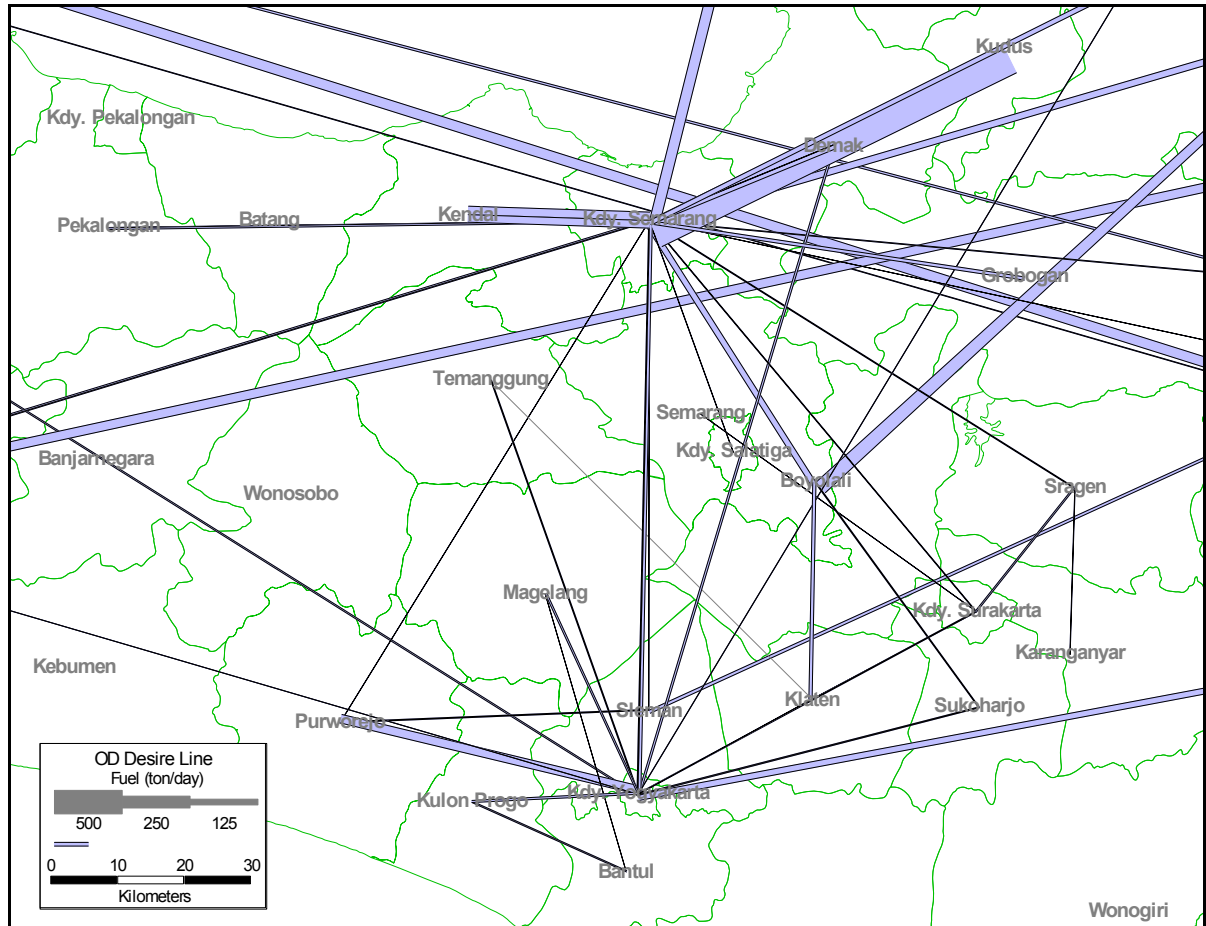


Source: CJRR, Road Traffic Survey, 2008

Figure 3.1.27 Desire Lines of Sand in Semarang – Solo – Yogyakarta Corridor

(4) 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.

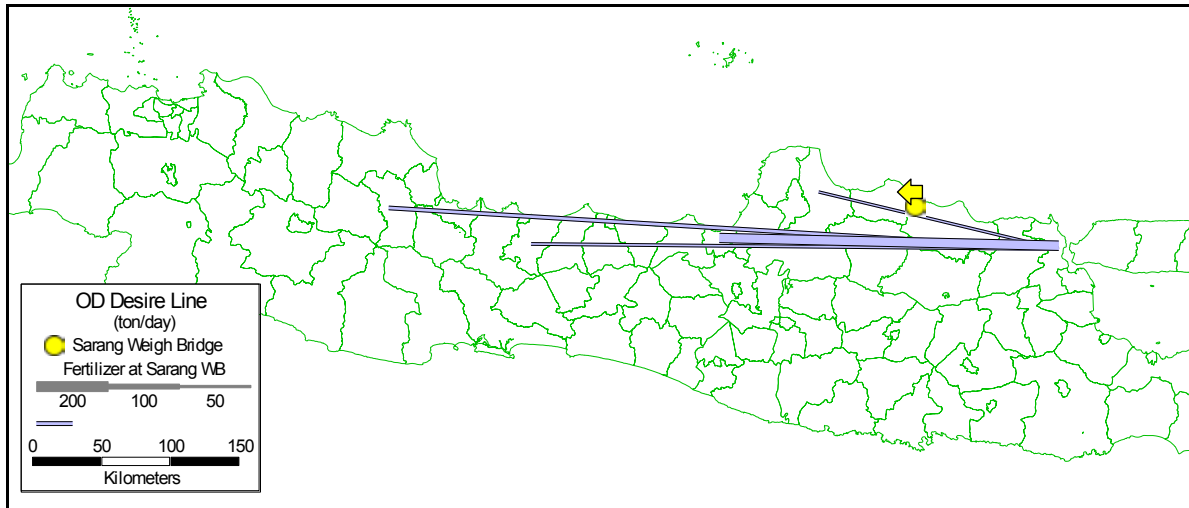


Source: CJRR Study Team, Road Traffic Survey, 2008

Figure 3.1.28 Desire Lines of Fuel in Semarang – Solo – Yogyakarta Corridor

(5) Fertilizer

Although transported weight of fertilizer across 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 Sarang 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 3.1.29 Desire Lines of Fertilizer at Sarang Weigh Bridge

3.2 Railway Sector

Total length of the railway lines in Indonesia that are in service is presented in Table 3.2.1. As of 2006, total 4,675 km of railway is currently in service. Among others, 3,370 km (or 72%) of the railway in service is in Java Island. Including the railway lines that are not in service, total railway length in Indonesia is 8,067 km, of which 6,076 km (or 75%) are in Java Island.

Table 3.2.1 Railway Lines in Indonesia

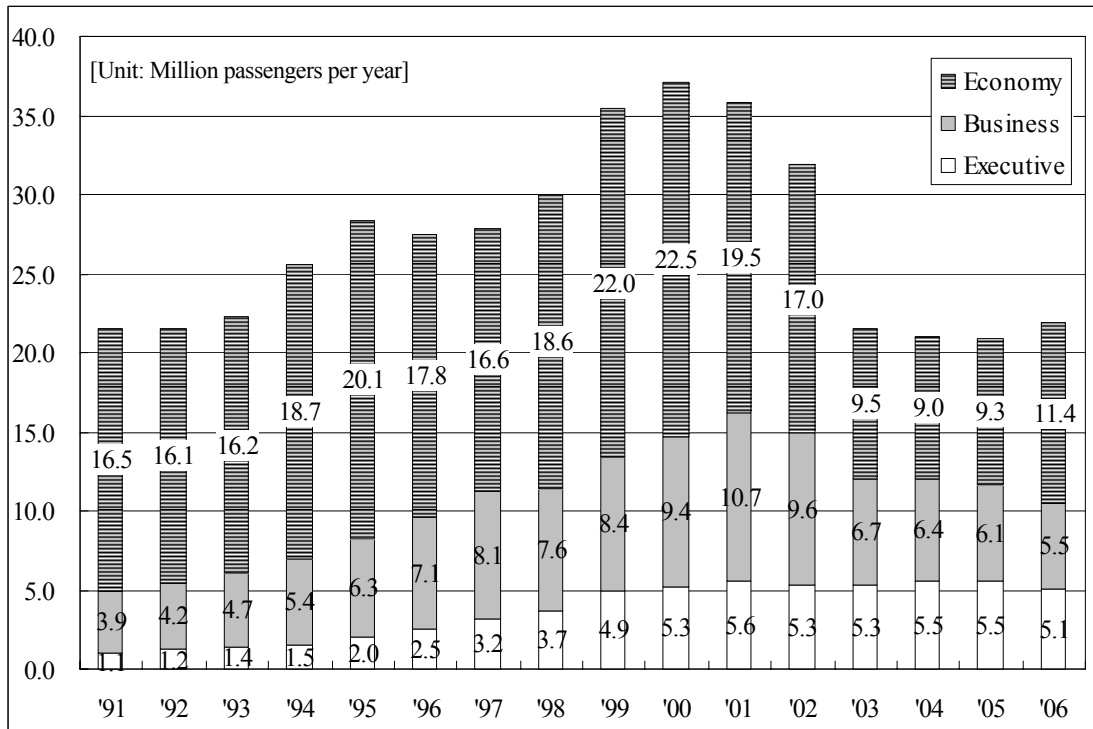
Line	Java Island	Sumatra Island	Total
Sections in Service			
- Trunk Line	3,180	1,118	4,298
- Other Line	190	187	377
Subtotal	3,370	1,305	4,675
Sections Not in Service	2,706	686	3,392
Total	6,076	1,991	8,067

Source: PT. Kereta Api (Persero)

As indicated by the map of the Study area (Figure 3.1.1), Central Java region's railway network is comprised of the Java north trunk line running east to west (Cirebon – Tegal - Semarang - Surabaya) and the Java south trunk line (Bandung – Kroya – Yogyakarta - Solo - Surabaya); the north-south lines linking these two trunk lines between Semarang - Solo and Cirebon - Purwokerto - Kroya; as well as the branch line between Kroya - Cilacap.

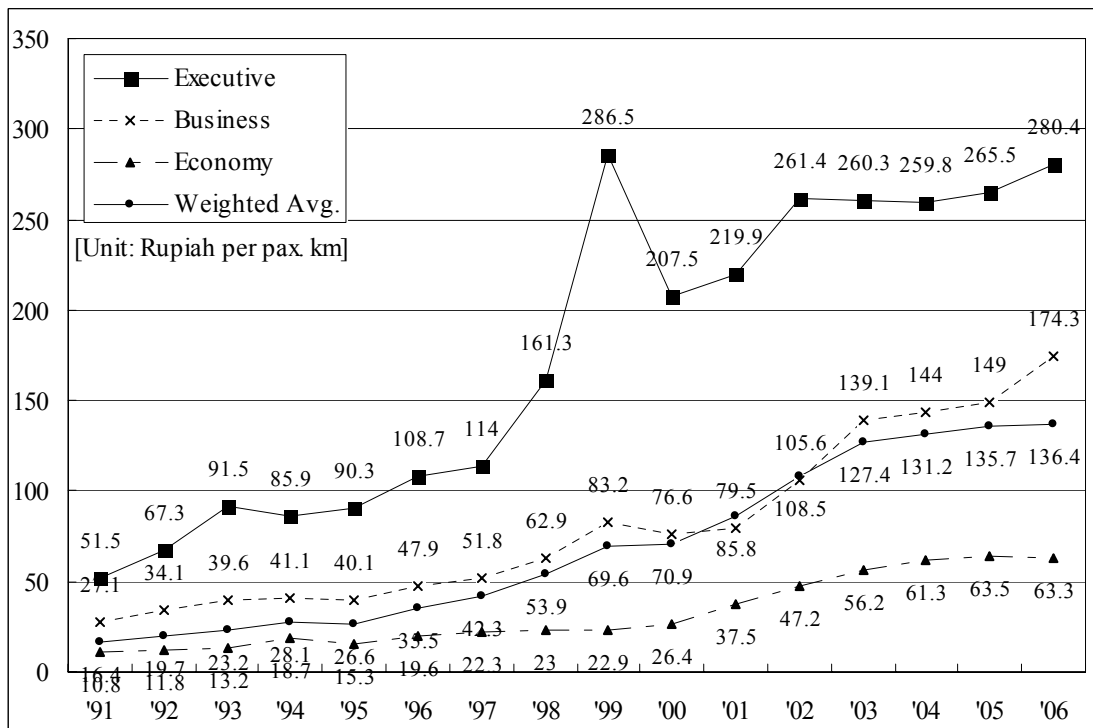
3.2.1 Passenger Transport

Annual trend of railway passenger volume and railway fare in Java island is shown in Figure 3.2.1 and Figure 3.2.2 respectively. The number of economy and business class passengers decreases with fare increase from 2000. Total passengers slightly increased from 2005.



Source: PT. Kereta Api (Persero)

Figure 3.2.1 Annual Trend of Railway Passenger Volume in Java Island



Source: PT. Kereta Api (Persero)

Figure 3.2.2 Annual Trend of Railway Fare in Java Island

Passenger transport in the Central Java region is mainly through the operation of long-distance trains, and it has been the core business for PT. KA. Loading profile on the long-distance trains in Java Island is depicted in Figure 3.2.3. For the route between Jakarta - Surabaya, more trains are operated via the Java south line than via the north line. However, special express and cargo trains that link Jakarta - Surabaya with the shortest time of 9 hours via the north line.

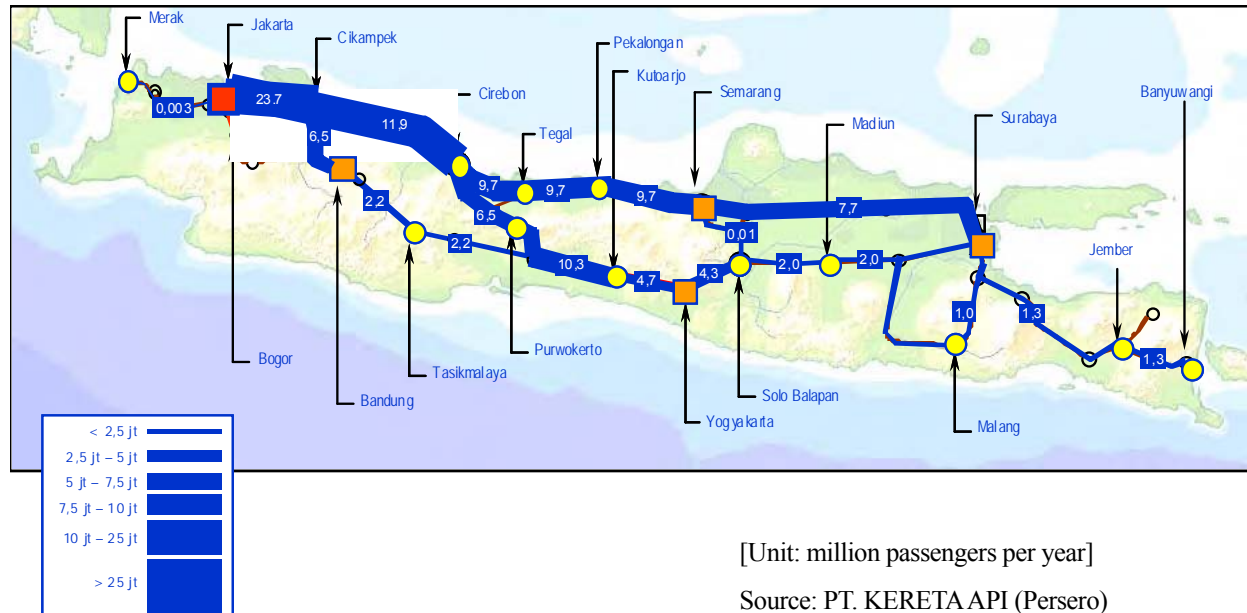
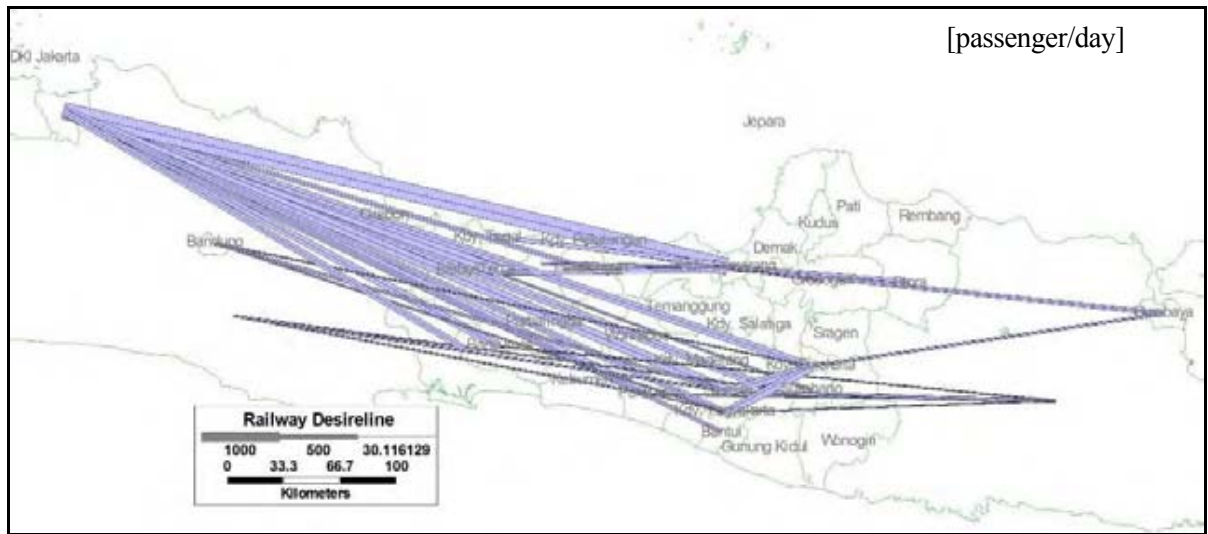


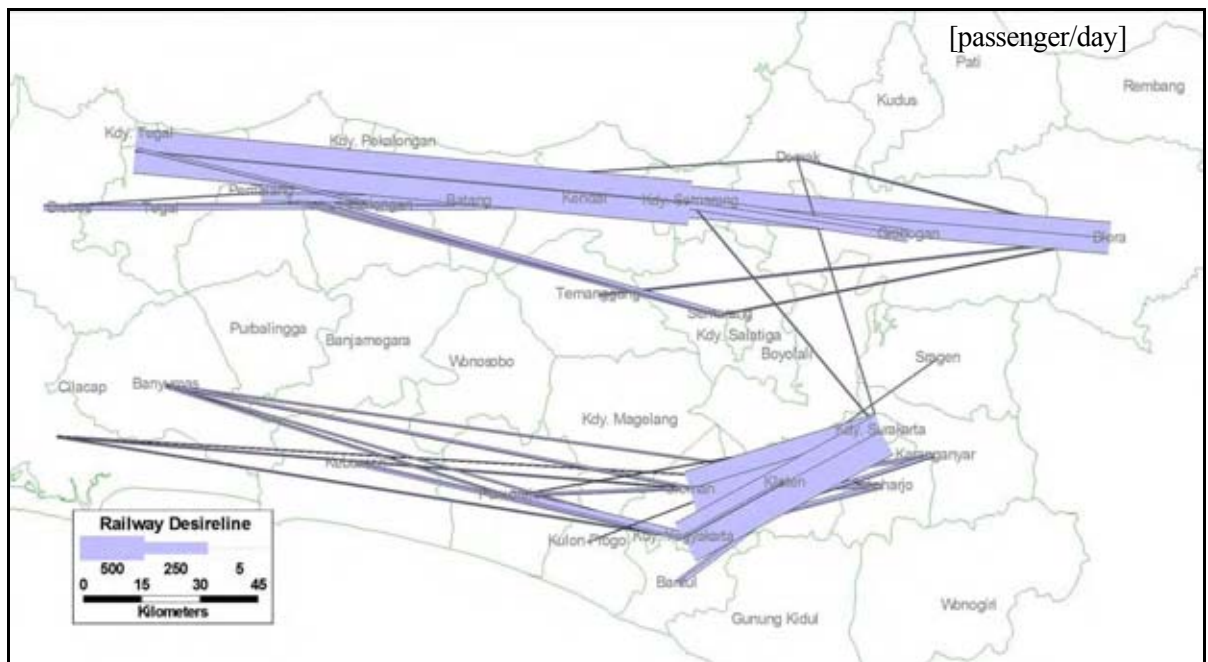
Figure 3.2.3 Loading Profile on Long-Distance Trains in Java Island (2005)

Railway passenger boarding and alighting in Central Java region is shown in Figure 3.2.4. Passenger volume from / to Jakarta is larger than other OD pairs such as intra Central Java region and passenger from / Surabaya, Bandung. Passenger volume of intra Central Java region is also shown in Figure 3.2.5. Although railway passenger volume of OD pairs connecting large cities in 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 Passenger OD Interview Survey

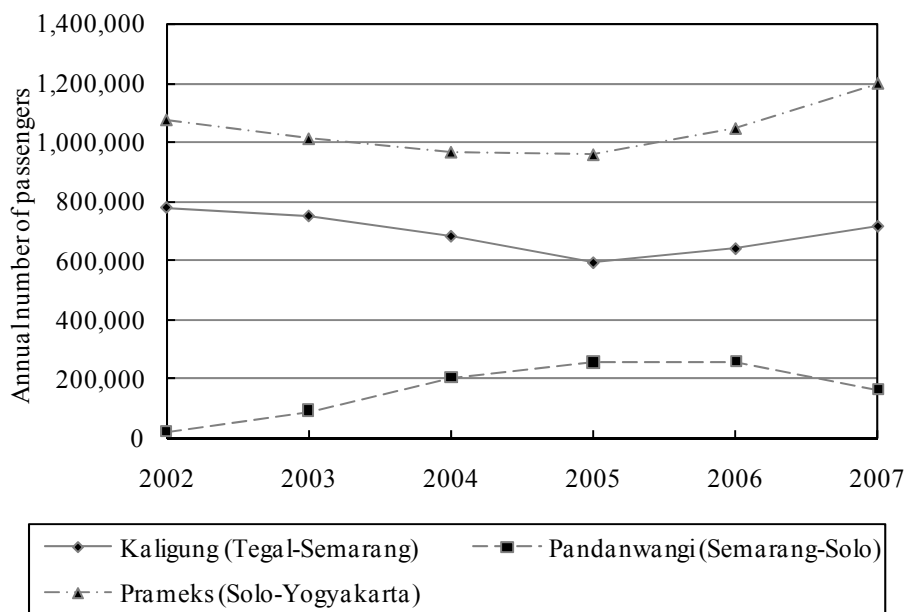
Figure 3.2.4 Desire Line of Railway Passengers Boarding and Alighting in Central Java Region



Source: CJRR Study Team, Railway Passenger OD Interview Survey

Figure 3.2.5 Desire Line of Railway Passengers intra Central Java Region

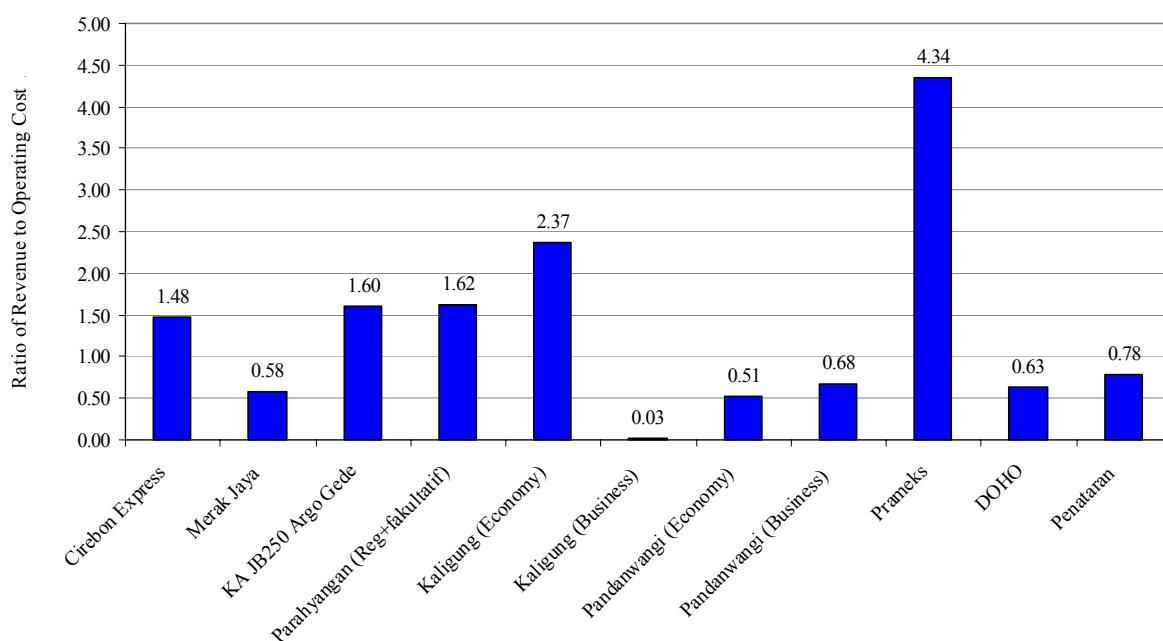
Furthermore, in Central Java local (business or economy) trains also operate between Semarang – Solo (Pandanwangi), Solo – Yogyakarta (Prameks), and Tegal – Semarang (Kaligung). In addition, new local train service has recently been initiated for the section of Yogyakarta – Kutoarjo (Prameks) along with the completion of the double tracking project. In September, 2008, a new local train service started its operation for the section of Semarang – Solo – Sragen (Banyubiru) as well. Trend of ridership of the above-mentioned local trains is presented in Figure 3.2.6. Prameks and Kaligung are serving significant number of passengers although the recent ridership trend is leveling off.



Source: "Progran dan Realisasi" Report DAOP IV and VI

Figure 3.2.6 Number of Passengers Using Major Local Trains in Central Java

Fare box ratios (i.e., ratio of revenue to operating cost) of the major short-distance train services in Java Island are compared in Figure 3.2.7. In the Central Java region, Prameks and Kaligung are showing a gain; in particular, the profitability of Prameks, which has the highest frequency of service (seven times a day with approximately 1.5-hour headway), is the most remarkable of all the short-distance train services. As a result, significant shares of local train passengers are observed in Semarang (DAOP IV) and in Yogyakarta/Solo (DAOP VI) as shown in Table 3.2.2.



Source: PT. Kereta Api (Persero)

Figure 3.2.7 Fare Box Ratios of Major Short-Distance Trains (< 250 km) in Java Island

Table 3.2.2 Number of Passengers in Each DAOP by Train Type in 2007

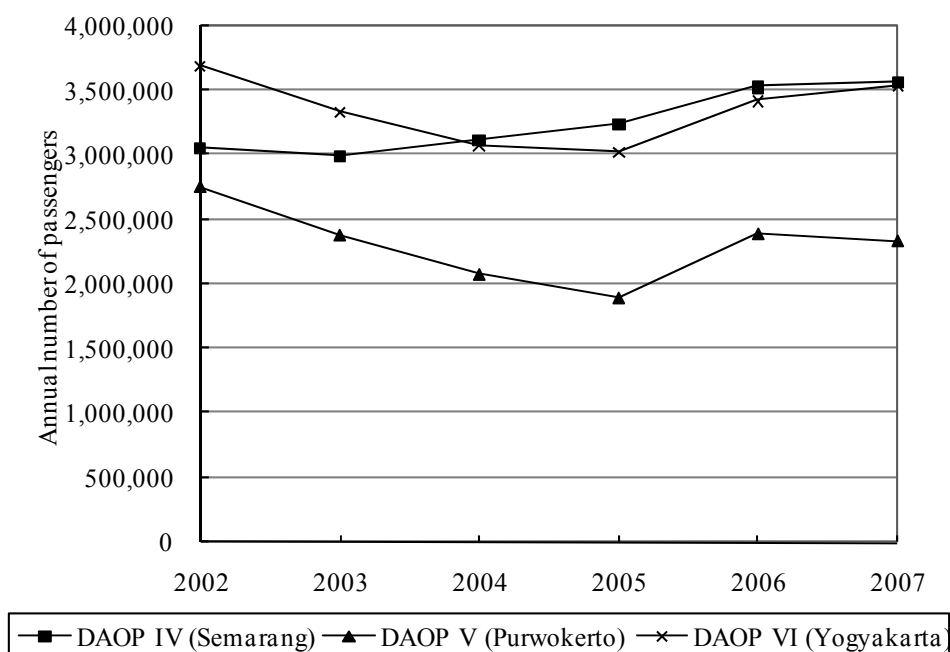
Type of Train Service	DAOP IV Semarang		DAOP V Purwokerto		DAOP VI Yogyakarta		Central Java Region (DAOP IV, V, VI)	
	Passengers	%	Passengers	%	Passengers	%	Passengers	%
Executive	485,843	13.6%	133,090	5.7%	570,562	16.1%	1,189,495	12.6%
Business	349,331	9.8%	423,455	18.1%	571,562	16.1%	1,344,348	14.2%
Economy	749,475	21.0%	1,770,445	75.7%	1,134,975	32.0%	3,654,895	38.7%
Local Business	675,433	18.9%	10,563	0.5%	1,258,947	35.5%	1,944,943	20.6%
Local Economy	1,275,987	35.8%	-	0.0%	9,562	0.3%	1,285,549	13.6%
Local Other	30,886	0.9%	-	0.0%	-	0.0%	30,886	0.3%
Total (Non-Local)	1,584,649	44.4%	2,326,990	99.5%	2,277,099	64.2%	6,188,738	65.5%
Total (Local)	1,982,306	55.6%	10,563	0.5%	1,268,509	35.8%	3,261,378	34.5%
Grand Total	3,566,955	100.0%	2,337,553	100.0%	3,545,608	100.0%	9,450,116	100.0%

Note: Number of passengers is based on the ticket sales data in each DAOP.

Some of the passenger trips may actually have been made in other DAOP.

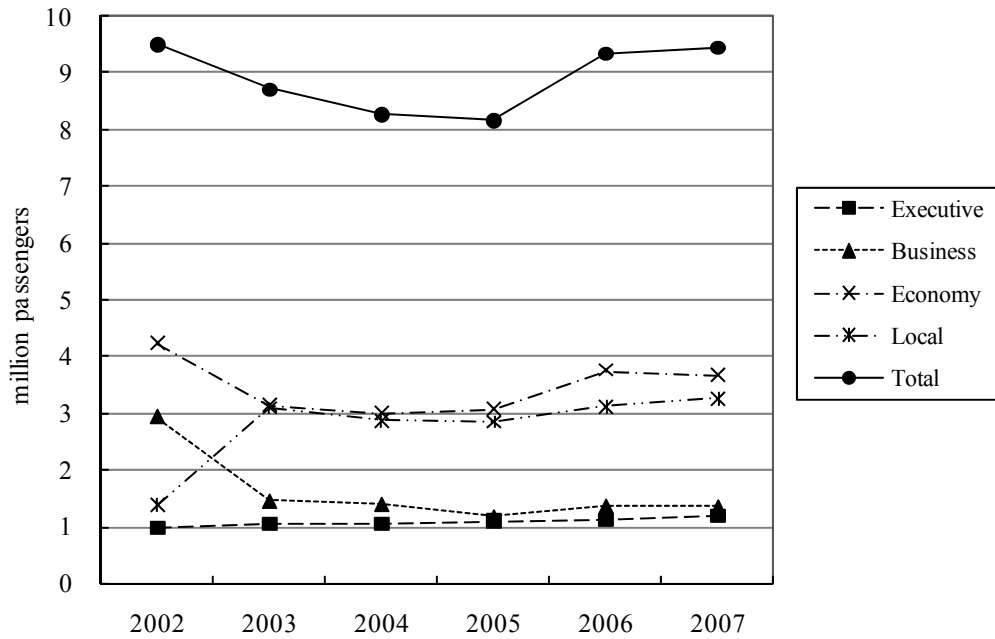
Source: PT. KERETA API (Persero)

Trend of annual total volume of passengers based on the ticket sales data is presented for each DAOP in Figure 3.2.8. While a slight decrease in ridership was observed in some years, especially in DAOPs V and VI, the latest trend is generally upwards. Trend of annual total of railway passengers by train service type in the latest three years is presented in Figure 3.2.9. In terms of ridership, the increase in the number of passengers of local train services as well as economy non-local train services is mainly contributing to the total passenger growth in the Central Java region. In terms of revenues collected, non-local trains, especially, executive and business train services have become great revenue sources for passenger transport service, as shown in the annual revenue by passenger train service type in each DAOP in Figure 3.2.10.



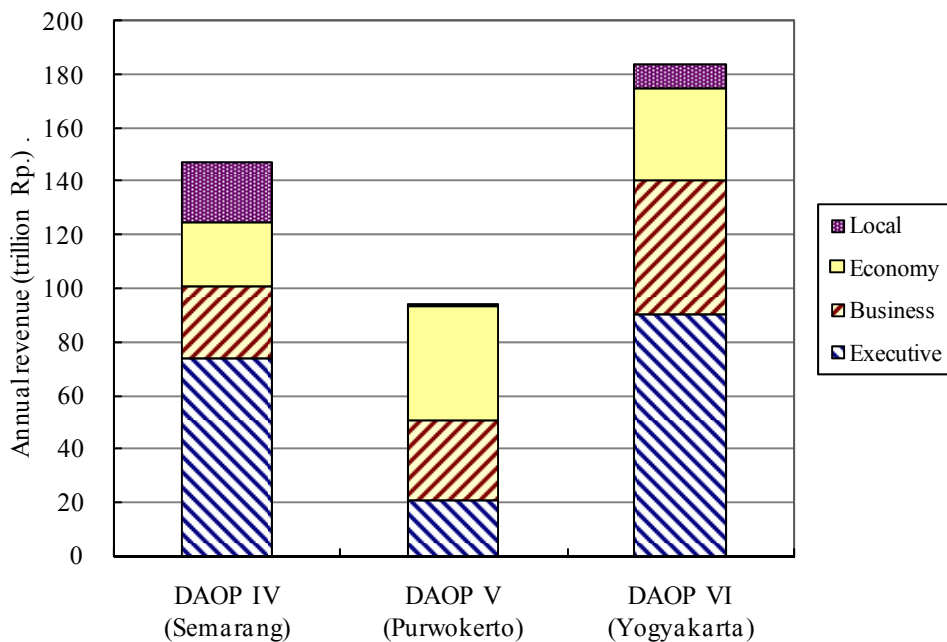
Source: PT. Kereta Api (Persero)

Figure 3.2.8 Trend of Annual Total of Railway Passengers in Each DAOP



Note: Economy, business, and executive trains in the legend are all non-local.
Source: PT. Kereta Api (Persero)

Figure 3.2.9 Trend of Annual Total of Railway Passengers by Train Service Type



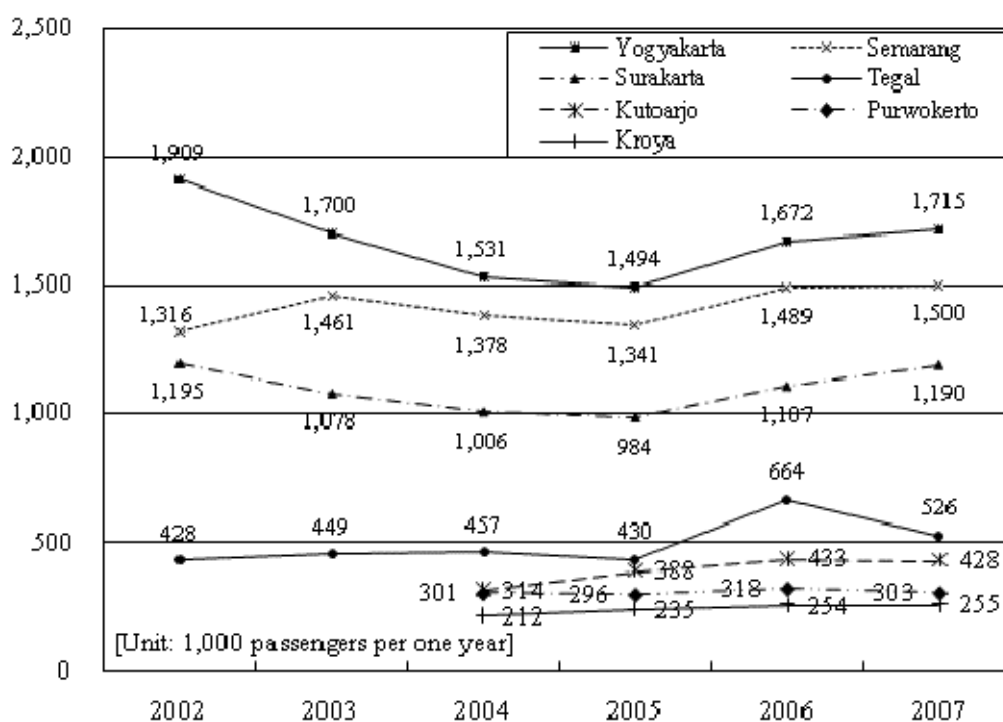
Note: Economy, business, and executive trains in the legend are all non-local.
Source: PT. Kereta Api (Persero)

Figure 3.2.10 Annual Revenue by Passenger Train Service Type in Each DAOP in 2007

In order to make train operation easier in large cities, stations for medium and long-distance trains and those for local trains have been set up separately, but close to each other.

- Semarang: Semarang Tawang Station (medium/long-distance trains), Semarang Poncol Station (local trains)
- Yogyakarta: Yogyakarta (Tugu) Station (medium/long-distance trains), Lempuyangan Station (local trains)
- Solo: Solo Balapan Station (medium/long-distance trains), Solo Jebres Station (local trains)

Annual trend of boarding passengers at major cities in the Central Java region is shown in Figure 3.2.11. Yogyakarta city has the largest volume in the Region and Semarang, Surakarta Tegal, Kutoarjo, Purwokerto and Kroya, in that order. Although boarding passenger volume was generally decreasing or flat until 2005, passenger volumes increased at all major cities. Especially in Tegal, boarding passengers increased more than 50%.



Note: Yogyakarta is sum of Yogyakarta and Lempuyangan stations;
Semarang is sum of Semarang Tawang and Semarang Poncol stations;
Surakarta is sum of Solo Balapan, Solo Jebres and Purwosari stations.
Source: PT. Kereta Api (Persero)

Figure 3.2.11 Annual Trend of Boarding Passengers at Major Cities in Central Java Region

Trend in annual total of boarding passengers at each station in DAOPs IV, V, and VI is presented in Table 3.2.3, Table 3.2.4, and Table 3.2.5, respectively.

Table 3.2.3 Annual Total of Boarding Passengers at Stations in DAOP IV

	Station	2002	2003	2004	2005	2006
Semarang - Tegal	1 Tegal	428,341	449,196	457,016	430,350	663,637
	2 Larangan	0	0	0	0	0
	3 Suradadi	0	0	0	0	0
	4 Pemalang	70,131	72,666	79,435	70,545	63,508
	5 Petarukan	46	50	54	61	510
	6 Comal	3,567	3,211	4,163	2,111	3,942
	7 Sragi	2,567	2,722	2,881	75	827
	8 Pekalongan	76,232	75,141	120,168	104,288	109,272
	9 Batang	7,456	8,767	9,300	6,359	4,215
	10 Ujungnegoro	0	0	0	1	2
	11 Kuripan	229	230	233	190	268
	12 Pelabuhan	76	85	98	81	90
	13 Krengseng	265	276	285	5	203
	14 Weleri	38,976	40,321	45,963	38,642	52,506
	15 Kalibodri	115	135	157	48	8,913
	16 Kaliwungu	1,148	1,232	1,384	69	407
	17 Mangkang	5	7	1	1	2
	18 Jerakah	15	20	22	25	0
	19 Semarang Poncol	657,859	710,605	751,284	706,308	825,391
	20 Semarang Tawang	657,859	750,605	626,855	634,350	663,637
Bojonegoro-Semarang	21 Semarang Gudang	0	0	0	0	0
	22 Alastua	17,432	18,132	18,293	20,358	24,331
	23 Brumbung	19,401	19,765	20,253	19,913	24,146
	24 Tegowanu	4,545	4,678	4,949	5,045	11,765
	25 Gubug	18,565	18,675	18,761	17,870	22,178
	26 Karangjati	29,765	30,455	32,761	25,560	26,767
	27 Sedadi	33,367	33,567	35,342	30,494	32,438
	28 Ngrombo	26,299	26,454	27,121	23,929	34,599
	29 Gambringan	8,765	8,966	9,268	10,624	34,599
	30 Tanggung	0	0	0	0	1,447
	31 Jambon	44,322	45,123	46,339	43,543	58,839
	32 Panunggalan	29,756	31,576	32,066	33,060	39,385
	33 Kradenan	69,755	70,434	72,992	72,207	86,600
	34 Sulur	13,197	13,456	15,291	14,612	14,442
	35 Doplang	29,343	30,333	31,776	29,993	37,358
	36 Randublatung	59,777	60,123	62,871	56,796	78,574
	37 Wadu	23,454	24,567	25,635	24,982	44,871
	38 Kapuan	7,645	8,111	9,011	7,857	8,565
	39 Cepu	146,321	150,976	152,007	134,139	165,906
	40 <i>Tobo</i>	23,544	24,351	25,206	32,905	13,294
	41 <i>Kalitidu</i>	24,322	25,134	27,233	32,205	9,626
	42 <i>Bojonegoro</i>	232,455	255,321	260,152	317,300	395,458
43 Ambarawa	12,354	15,232	16,635	20,479	25,462	
to Gundih	44 Kedungjati	2,878	3,005	3,344	2,444	17,731
	45 Padas	0	0	0	0	0
	46 Telawah	5,342	5,921	6,225	15,218	42,793
	47 Karangsono	3,122	3,222	4,432	7,616	34,286
48 Gundih	3,121	3,232	3,450	7,266	15,745	

Note: Stations in *italic letters* are located in East Java Province.

Source: PT. Kereta Api (Persero)

Table 3.2.4 Annual Total of Boarding Passengers at Stations in DAOP V

	Station	2002	2003	2004	2005	2006
to Tegal	1 Banjaran			0	0	0
	2 Slawi			0	0	0
	3 Balapulang			0	0	0
	4 Margasari			0	0	0
	5 Prupuk			1,317	1,262	2,882
Kroya-Cirebon	6 Linggapura			316	92	353
	7 Bumiayu			14,680	16,199	19,754
	8 Kretek			30	14	114
	9 Patuguran			60	76	139
	10 Legok			80	99	377
	11 Karang Sari			59	0	0
	12 Karanggandul			0	0	687
	13 Purwokerto			301,242	295,969	318,498
	14 Notog			134	190	687
	15 Kebasen			0	0	148
	16 Randegan			153	85	247
	17 Kroya			211,587	235,366	253,683
Bandung-Kroya	18 Sikampung			3,826	3,093	4,354
	19 Maos			66,410	61,644	81,498
	20 Kasugihan			0	0	0
	21 Lebeng			13,769	13,456	15,269
	22 Jeruklegi			5,486	5,861	11,056
	23 Kawunganten			55,023	52,006	55,904
	24 Gandrungmangun			77,905	79,521	91,251
	25 Sidareja			103,119	95,662	114,008
	26 Cipari			38,470	36,613	42,612
	27 Meluwung			6,679	6,861	8,274
	28 Langen			19,734	20,574	25,991
Kutoarjo-Kroya (to Yogyakarta)	29 Kemranjen			99	151	505
	30 Sumpiuh			17,832	20,078	25,039
	31 Tambak			54	179	277
	32 Idjo			65	1	319
	33 Gombong			256,287	252,129	285,794
	34 Karanganyar			122,375	115,621	138,208
	35 Sruweg			971	23	0
	36 Soka			0	0	670
	37 Kebumen			213,863	233,912	261,623
	38 Wonosari			233	57	4
	39 Kutowinangun			16,119	16,783	20,799
	40 Prembun			24,793	27,580	41,012
	41 Butuh			0	0	0
	42 Kutoarjo			313,729	388,207	433,333
	43 Cilacap			105,944	62,572	63,200
	44 Karangtalun			0	0	0
	45 Gumilir			18,386	16,334	20,021
	46 Karangandri			0	45	106
47 Purworejo			48,516	42,156	36,151	
48 Purbalingga			0	0	3,423	

Source: PT. Kereta Api (Persero)

Table 3.2.5 Annual Total of Boarding Passengers at Stations in DAOP VI

	Station	2002	2003	2004	2005	2006
Yogyakarta-Kutoarjo	1 Montelan	19	3	56	30	8
	2 Jenar	18,836	16,960	16,443	17,273	22,694
	3 Wojo	72	145	140	4	321
	4 Kedundang	438	229	180	179	329
	5 Wates	71,563	61,158	59,411	60,299	70,690
	6 Sentolo	16,714	13,654	18,815	14,771	17,352
	7 Rewulu	0	194	207	206	473
	8 Patukan	208	296	338	157	244
	9 Yogyakarta (Tugu)	1,200,033	1,055,778	927,728	912,572	982,518
	10 Lempuyangan	709,006	643,817	603,461	581,895	689,821
Solo-Yogyakarta	11 Maguwo	358	633	350	301	261
	12 Kalasan	1,025	2,759	1,952	581	554
	13 Brambanan	31,573	29,724	28,725	28,102	25,467
	14 Srowot	13,520	12,902	13,142	14,047	17,285
	15 Klaten	226,516	213,575	204,924	205,172	233,328
	16 Ceper	39,875	38,736	36,338	38,090	45,624
	17 Delanggu	29,558	27,581	26,087	23,878	27,227
	18 Gawok	1,453	990	848	1,723	1,194
	19 Purwosari	346,597	328,413	304,937	297,855	350,681
	20 Solokota	3,188	3,483	2,607	1,728	2,976
	21 Sukoharjo	11,233	9,812	8,325	9,140	12,318
	22 Pasarnguter	3,167	2,727	2,514	2,653	4,363
	23 Wonogiri	14,493	10,913	8,223	8,569	13,193
	24 Solo Balapan	650,178	579,607	546,262	538,473	578,121
	25 Solo Jebres	198,265	170,219	154,387	147,513	178,287
Gundih-Solo	26 Kalioso	0	0	0	0	0
	27 Salem	4,241	17,233	18,737	19,601	22,859
	28 Sumberlawang	0	0	0	0	0
	29 Goprak	0	0	0	0	0
Walikukun-Solo	30 Palur	8	6,852	14,112	16,091	18,777
	31 Kemiri	433	331	295	280	281
	32 Masaran	266	430	443	461	641
	33 Sragen	76,154	65,113	56,534	62,627	79,085
	34 Kebonromo	1,026	916	873	919	1,109
	35 Kedungbanteng	22,163	20,266	18,753	19,773	25,774

Source: PT. Kereta Api (Persero)

Daily passenger flow between major stations were surveyed in Railway Traffic Survey (Table 3.2.6). 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.

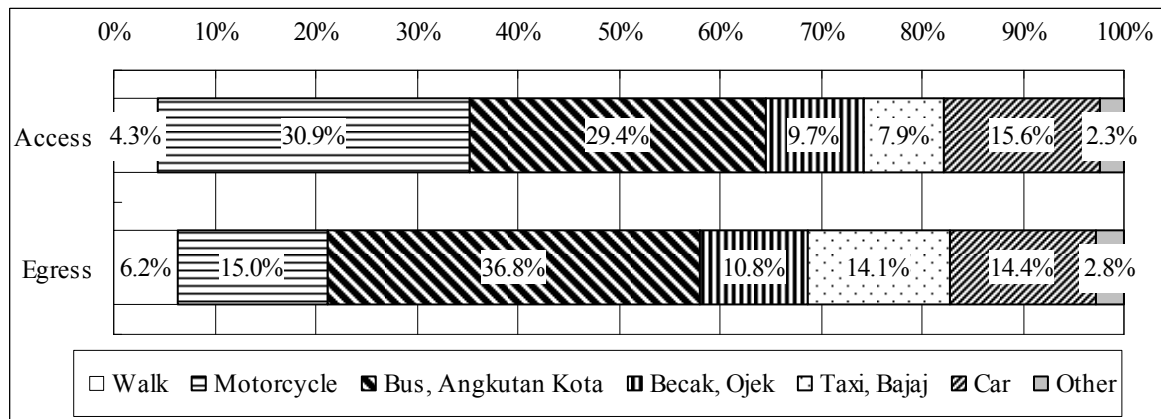
Table 3.2.6 Daily Passenger Flow between Major Stations

From/To	Central Java Region										External Zone			Total
	Cepu	Klaten	Kroya	Kutoarjo	Pekalongan	Purwokerto	Semarang	Solo	Tegal	Yogyakarta	Jakarta	Bandung	Surabaya	
Cepu	-	-	-	-	15	-	332	-	-	-	-	-	-	346
Klaten	-	-	5	1	-	4	-	66	-	81	420	45	39	662
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	6	63	-	239	14	52	488
Purwokerto	-	-	15	34	-	-	-	10	-	22	455	-	53	590
Semarang	332	-	-	-	116	-	-	119	530	24	1,746	39	292	3,199
Solo	-	43	26	11	11	69	67	3	9	1,514	769	251	226	2,998
Tegal	-	-	-	-	-	-	708	6	-	6	607	7	42	1,374
Yogyakarta	-	22	19	184	-	97	-	1,324	-	-	1,260	390	303	3,599
Jakarta	-	424	313	848	239	455	1,747	809	607	1,260	-	-	13	6,714
Bandung	-	45	99	186	14	-	39	251	7	390	-	-	-	1,031
Surabaya	-	39	41	96	52	53	295	226	42	303	13	-	-	1,158
Total	346	581	531	1,372	446	787	3,290	2,916	1,257	3,917	6,670	1,031	1,156	24,300

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

Source: CJRR Study Team

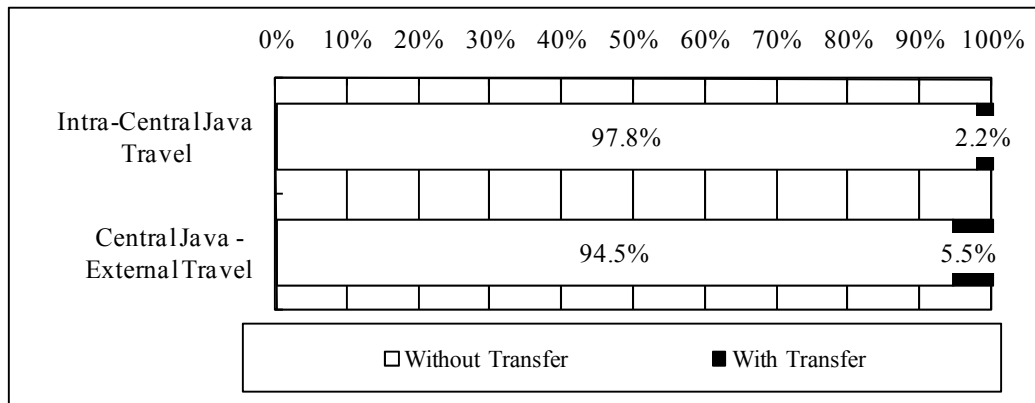
Access and egress transportation mode to a railway station in Railway Traffic Survey is shown in Figure 3.2.12. Since the survey was conducted for boarding passengers, the shares for access transportation mode of motorcycle and bus including small intra-city bus (or *Angkutan Kota*) are the largest, approximately 30% each. The share for egress transportation of bus and small intra-city bus is approximately 37%. The share for egress transportation of taxi and small taxi (or *bajaj*), walking, bus, cycle rickshaw (or *becak*) and motorcycle taxi (*ojek*) is larger than their shares of access transportation mode.



Source: CJRR Study Team, Road Traffic Survey

Figure 3.2.12 Access and Egress Transportation Mode to a Railway Station

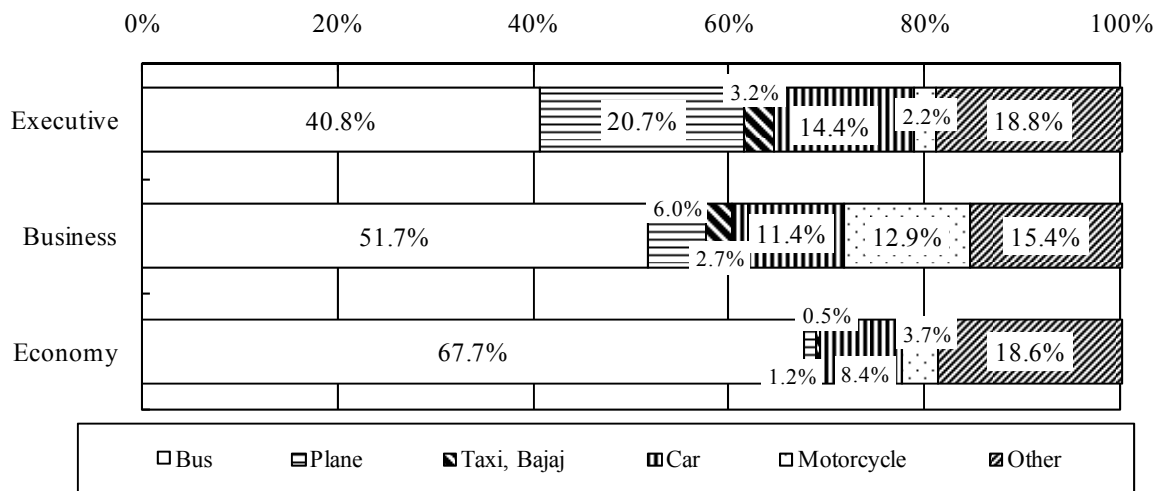
Train transfer behaviors were surveyed in Railway Traffic Survey (Figure 3.2.13). More than 90% of passengers do not transfer when they use railway in the Central Java region. In fact, approximately 98% of passengers do not transfer when they travel within the Central Java region.



Source: CJRR Study Team, Road Traffic Survey

Figure 3.2.13 Transfer Behavior of Railway Passengers

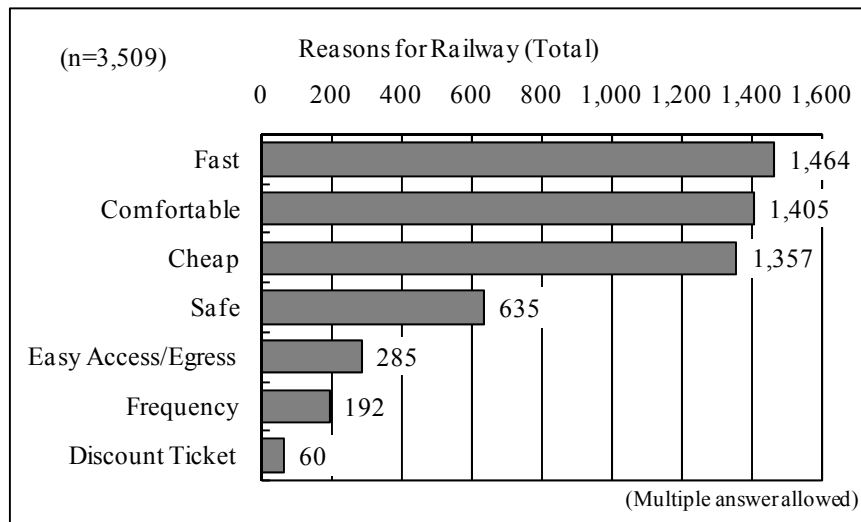
Alternative transportation mode for railway user was also surveyed in Railway Traffic Survey (Figure 3.2.14). Although share of bus is the largest for all classes, shares of car, railway and plane are relatively higher for executive and business class. More than 65% of economy class passenger answered they would use bus if railway is not available.



Source: CJRR Study Team, Road Traffic Survey

Figure 3.2.14 Alternative Transportation Mode for Railway

Reasons for railway use were asked to railway users (Figure 3.2.15). 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, Road Traffic Survey

Figure 3.2.15 Reasons for Railway Use

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 3.2.7. The average ratio of train free rider in 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 3.2.7 Free Riders by Train Type

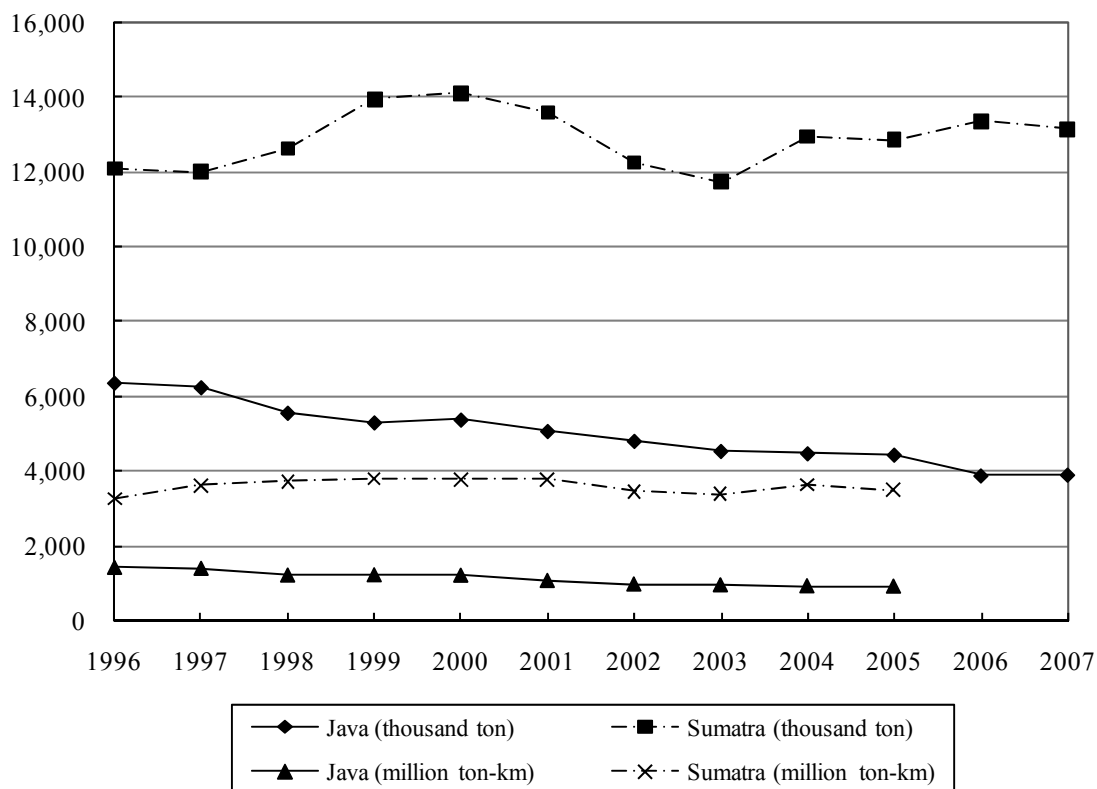
Train Type	# of Survey Trains	# of Pax	# of Free Rider	Free Rider Ratio
Long Distance	5	1,392	49	3.5%
Local Train	4	996	75	7.5%
North Corridor	6	1,737	51	2.9%
South Corridor	2	469	30	6.4%
Longitudinal	1	182	43	23.6%
Day Train	8	2,157	124	5.7%
Night Traing	1	231	0	0.0%
Executive Class	3	520	13	2.5%
Business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

Note: Free Rider Survey Data of DAOP IV and V

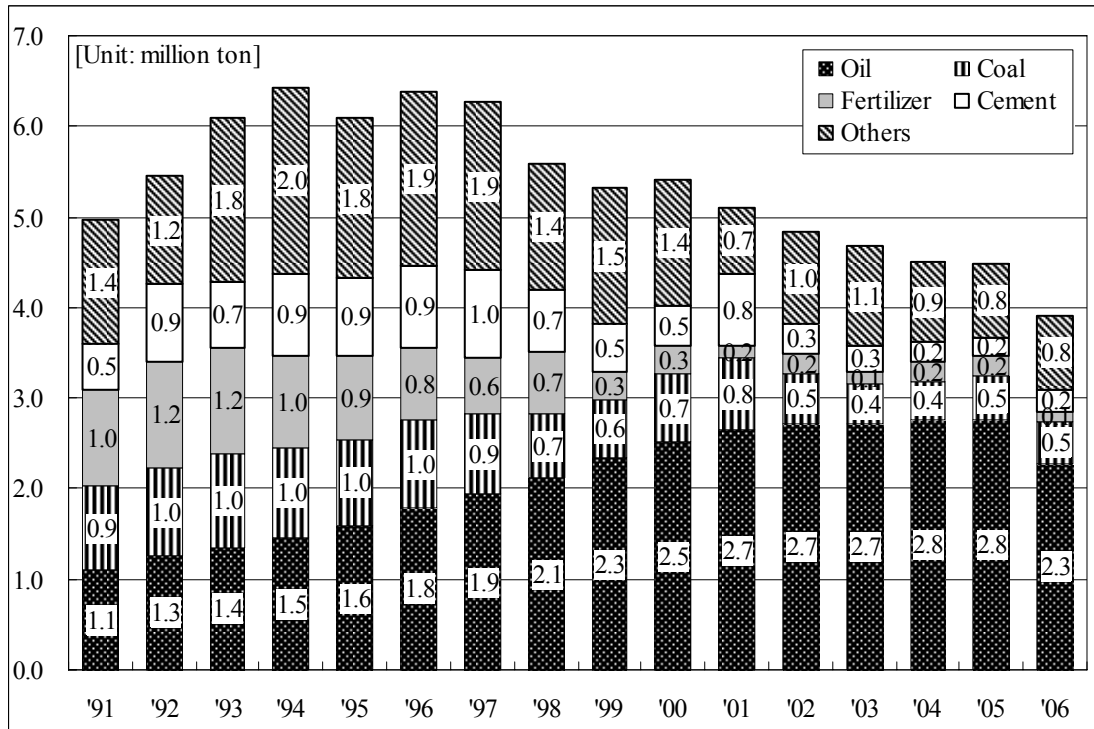
3.2.2 Cargo Transport

Trend of total volume of cargos transported by rail in Indonesia is depicted in Figure 3.2.16. Total volume as well as total ton-km of cargo transported by rail is much larger in Sumatra Island than in Java Island. Although two-thirds of the total cargo trains or 6,550 freight cars are allocated to Java Island, Sumatra Island takes about 70% of the whole cargo transport in Indonesia. This is because in Sumatra there are more commodities that are suitable for long-distance mass transport such as coal, cement, oil, and agricultural goods. As of 2005, average transport distance of cargos is 209 km in Java Island and 272 km in Sumatra Island. Major commodities transported by rail in Java are fuel oil, cement, containers, coal, and fertilizer; however, average transport distance in Java is much shorter than in Sumatra.



Source: Statistical Bureau (or *Badan Pusat Statistik, BPS*)

Figure 3.2.16 Annual Volume of Cargos Transported by Railway in Indonesia



Source: PT. Kereta Api (Persero)

Figure 3.2.17 Annual Trend of Railway Cargo Volume by Commodity Type in Java Island

Railway cargo transport volume as well as ton-km has been decreasing since 1996 in spite of growth of oil transport. As a result, railway cargo volume dropped approximately 40% over 10 years. Especially in 2006, cargo volume decreased more than 10% as oil transport volume decreased. However, cargo transport volume excluding oil is moderate from 2004 to 2005.

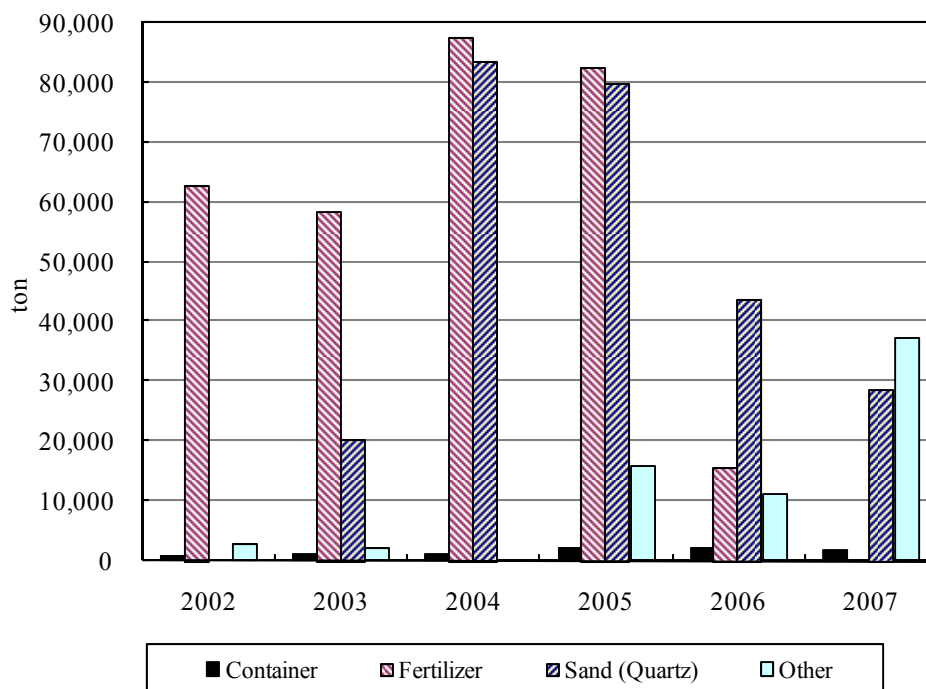
Reduced cargo carrying capacity due to a policy of prioritizing passengers and poorer service because of aging rolling stock including locomotives have resulted in low utilization ratio of train cars, and the ratio of cargo revenue is on the decline. The aged train cars, coupled with insufficient maintenance, have resulted in reduced operation speed, and cargo business is being taken away by trucks which are essentially more suitable for small-lot, door-to-door transportation service. As more toll roads are constructed and travel times between major cities in the Central Java region by road are shortened, the competitive position of the railway may be further weakened.

Cargo transport in the Central Java region covers Jakarta – Semarang – Surabaya line, Jakarta – Yogyakarta – Solo – Surabaya line, and Semarang – Solo line. Cargo trains operate with 10 cars between Yogyakarta - Solo, and with 4-6 cars between other sectors. For some lines such as Tegal – Pekalongan, the line capacity is over full.

One reason for the weakening of rail cargo business is the low transportation tariff that is often negotiable; consequently, necessary improvements cannot be made due to insufficient revenue and

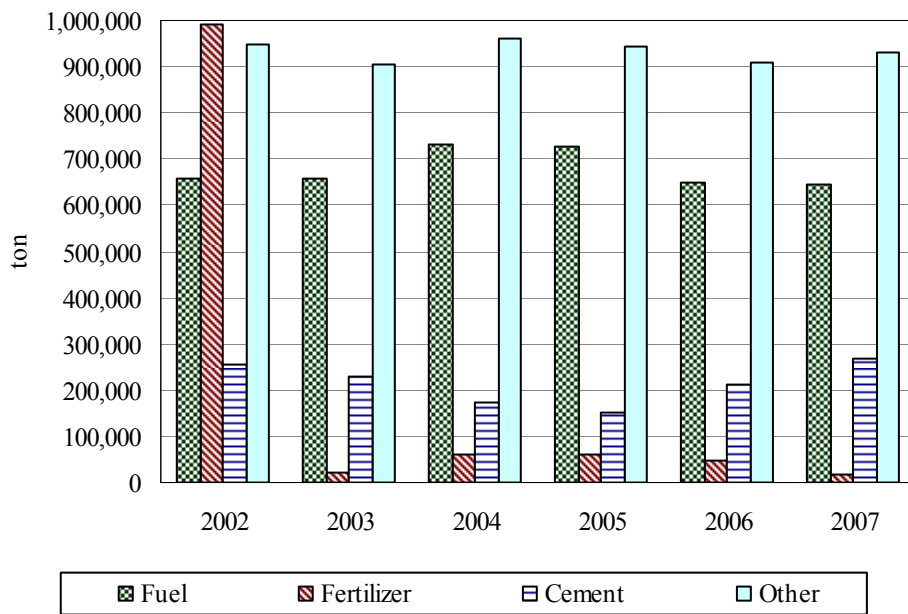
profits. Furthermore, since the railway sector currently has fundamental problems such as train delays and frequent accidents, it is important to provide more reliable services by improving infrastructure, communication and signaling systems, shortage of rolling stock, institutions, human resources, etc.

Trend of the annual volume of cargos transported by railway in each DAOP is presented by commodity type in Figure 3.2.18 (DAOP IV), Figure 3.2.19 (DAOP V), and Figure 3.2.20 (DAOP VI). Major commodities transported by railway in DAOP IV (Semarang) are quartz sand and fertilizer. However, since the middle of 2006, fertilizer is no longer transported by railway from Tg. Emas (Semarang) Port. In DAOP V (Purwokerto), fuel and cement are the major commodities that are transported by railway. Significant amount of fuel is transported by railway from the refinery in Cilacap to Tegal. In DAOP VI (Yogyakarta), fuel is also a major commodity transported by railway as well as quartz sand. From Cilacap to Yogyakarta, aviation fuel is transported by railway. As for containers, although there are some transported by railway, the volume is relatively small.



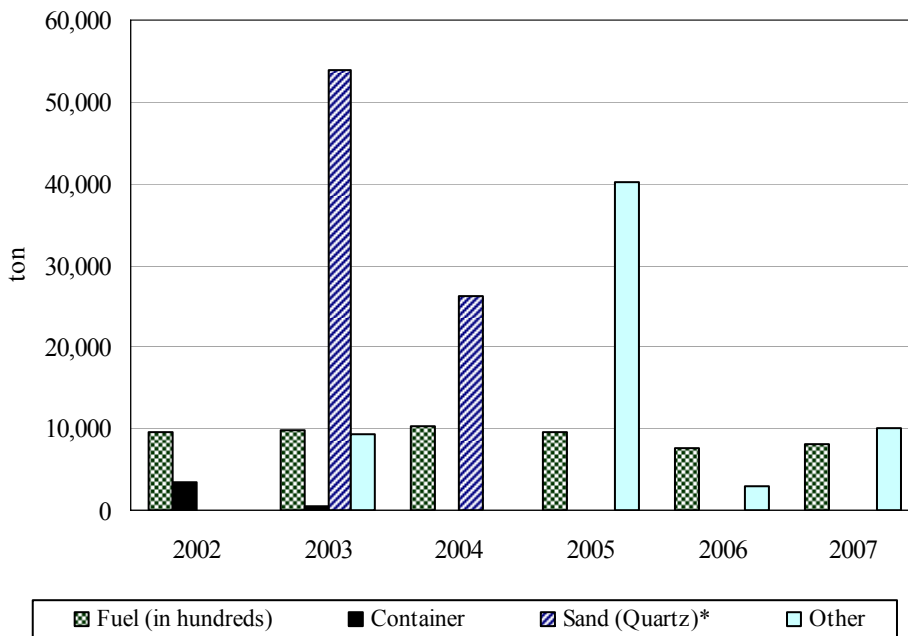
Source: PT. Kereta Api (Persero), DAOP IV

Figure 3.2.18 Annual Volume of Commodities Transported by Railway in DAOP IV



Source: PT. Kereta Api (Persero), DAOP V

Figure 3.2.19 Annual Volume of Commodities Transported by Railway in DAOP V

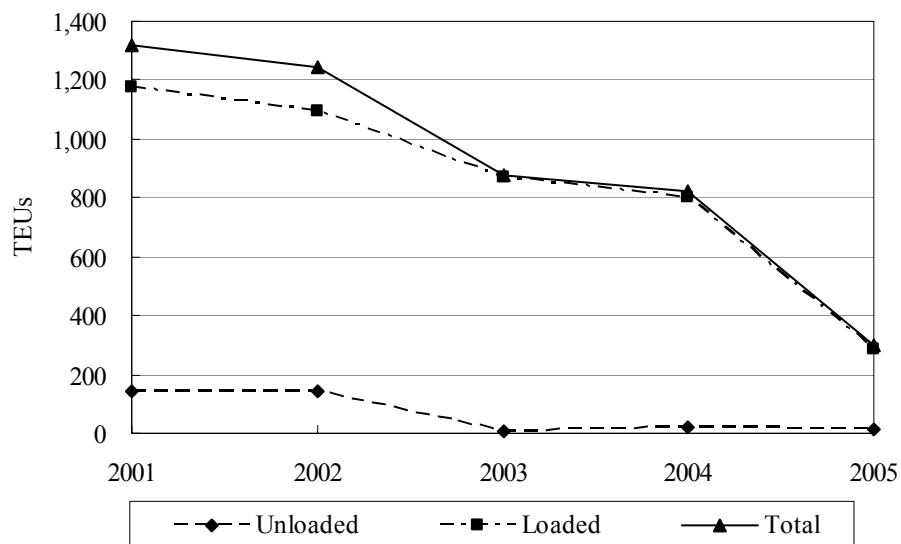


Note: Sand (quartz) has been included in “Other” since 2005.

Source: PT. Kereta Api (Persero), DAOP VI

Figure 3.2.20 Annual Volume of Commodities Transported by Railway in DAOP VI

Focusing on container movement by railway in Central Java Province, Figure 3.2.21 presents the trend of annual volume of loaded and unloaded containers transported by railway. The graph shows that the volume of containers transported by railway is diminishing year by year, and the volume of unloaded containers transported from inland by railway has become especially very small. As compared to the total container volume handled at Tg. Emas (Semarang) Port (in Table 3.4.3), the share of containers transported by railway is far less than 1%. It is also necessary to enhance the inter-modality by revitalizing railway facilities in Tg. Emas Port in Semarang as well as the dry ports at Solo Jebres (existing) and Kalijambe (planned).



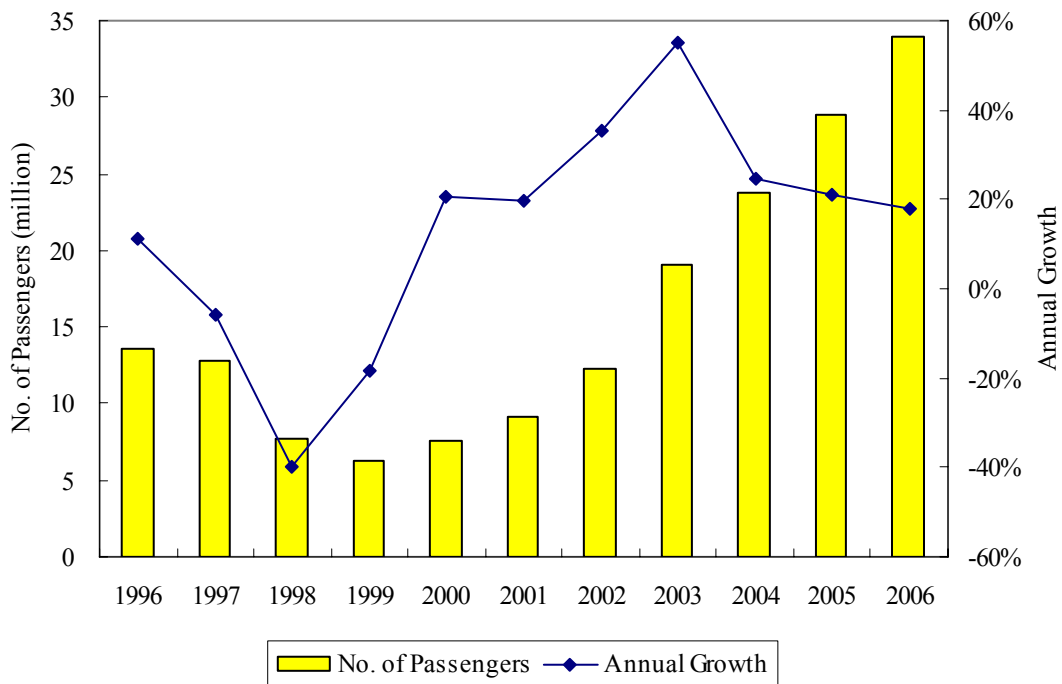
Source: Dinas Perhubungan dan Telekomunikasi, Central Java Province

Figure 3.2.21 Annual Volume of Containers Transported by Railway in Central Java

3.3 Air Transport Sector

3.3.1 Overview

Air travel is an important transportation mode in Indonesia due to the geographical spread of many islands over a wide area, and demand has grown rapidly especially in recent years together with the economic development. Recent trend in the annual number of domestic air passengers in Indonesia is depicted in Figure 3.3.1. Although growth leveled out temporarily with the Asian Currency Crisis of 1997, it has since recovered and with cheaper fares resulting from the deregulation of the airline industry and it has been recording annual growth of more than 20%. Passenger numbers to/from Europe and America have dropped since 2004 with a succession of airliner crashes and partial suspension of the flights; however, even so 2006 saw a growth of 18% compared to the previous year. Since air transportation is expected to grow on a global basis, the demand in Indonesia is also forecasted to expand in future.



Source: BPS

Figure 3.3.1 Annual Number of Domestic Air Passengers in Indonesia

3.3.2 Air Transport in the Central Java Region

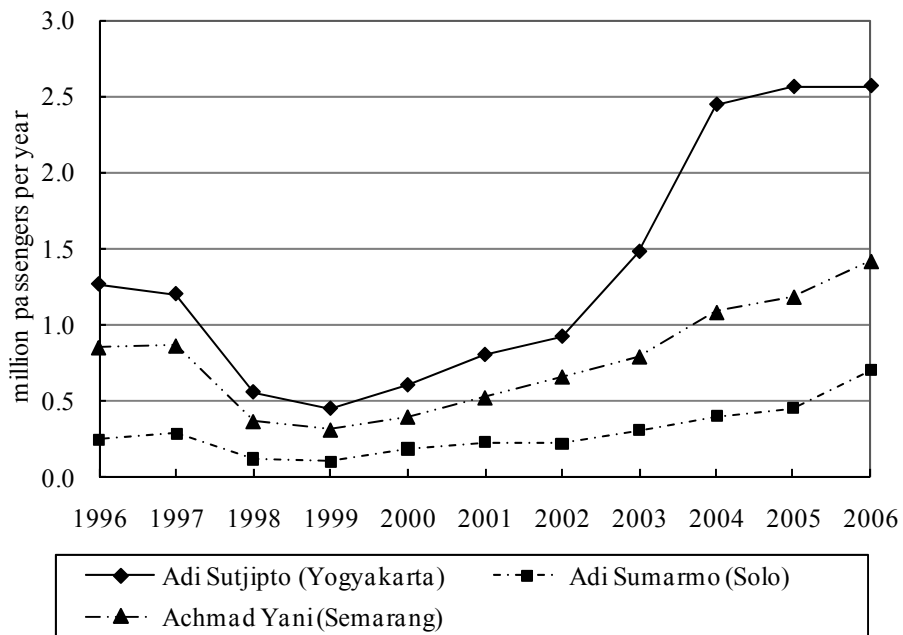
In the Central Java region, there are three major airports: namely, Semarang, Solo, and Yogyakarta. All the three airports also have some international flights connecting with neighboring countries such as Singapore and Malaysia. Additionally, there are three local airports: namely, Cilacap, Karimun Jawa, and Purbalingga. Specifications of the major airports in Java are summarized in Table 3.3.1.

Table 3.3.1 Specifications of Major Airports in Java

Airport	Passenger Terminal		Cargo Terminal	Runway Length (m)
	Total Floor Area (m ²)	Capacity (passengers/year)	Total Floor Area (m ²)	
Achmad Yani (Semarang)	Domestic: 4,401 International: 934	468	520,000 425,000	2,250
Adi Sumarmo (Solo)	Domestic: 1,428 International: 764	768	78,500 22,500	2,600
Adi Sutjipto (Yogyakarta)	8,500	384	1,000,000	2,200
Soekarno-Hatta (Jakarta)	276,308	-	18,000,000	3,660 3,600
Juanda (Surabaya)	Domestic: 27,200 International: 23,000	9,968	4,000,000 3,000,000	3,000

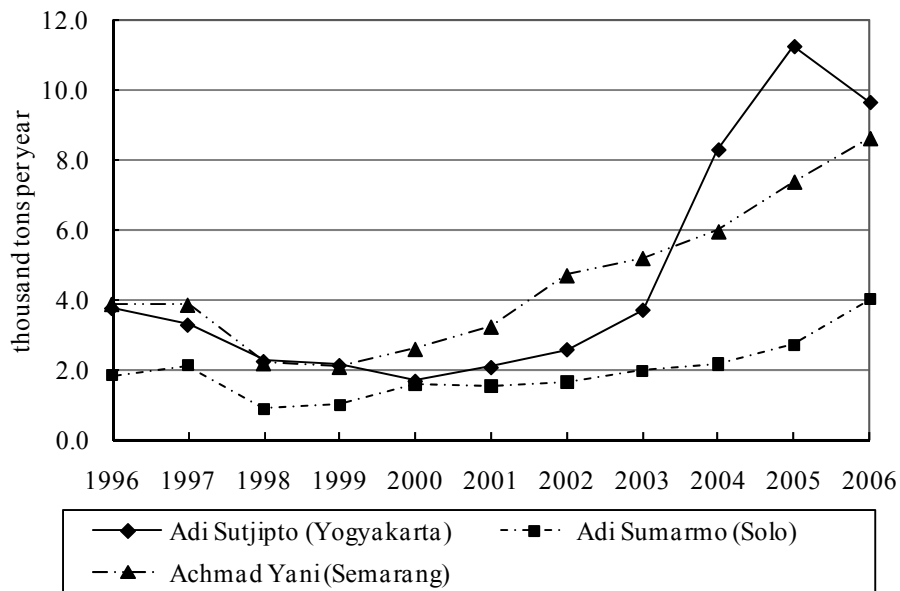
Source: PT. (Persero) Angkasa Pura I and PT. (Persero) Angkasa Pura II

The number of passengers at the three major airports in the Central Java region shows a similar trend as presented in Figure 3.3.2. Although there is some yearly fluctuation, the annual average growth between 2000 and 2006 is as high as 25%. Therefore, railway passenger demand for long distance train routes such as Jakarta – Semarang, Jakarta – Yogyakarta, and Jakarta – Solo is facing strong competition from lower airfares due to the deregulation of the airline sector. Annual volume of cargos handled at the three major airports has also been remarkably growing since 2000 as presented in Figure 3.3.3. In 2006, Adi Sutjipto (Yogyakarta) Airport saw a drop in the cargo volume in consequence of the Mid-Java Earthquake.



Source: Angkasa Pura I

Figure 3.3.2 Annual Number of Passengers at Each Airport in Central Java



Source: Angkasa Pura I

Figure 3.3.3 Annual Cargo Throughput at Each Airport in Central Java

3.4 Maritime Transport Sector

3.4.1 Overview

Maritime transport plays a vital role in an archipelago nation such as Indonesia; accordingly it should continue to be improved to support sustainable development of the Indonesian economy. Currently, Indonesia has 656 public ports and 1,233 special ports. In order to improve effectiveness and efficiency of public port management, the government decided that four Indonesian Port Corporations (IPCs) should manage 112 public ports on a commercial basis. The remaining 544 public ports are managed non-commercially by the government.

Total cargo throughput in Indonesia has been increasing at an annual rate of over 5% since 2002, as shown in Table 3.4.1.

Table 3.4.1 Total Cargo Throughput in Indonesia

[Unit: thousand tons]

Year	Domestic Cargo	International Cargo	Total	Annual Growth
2002	143,460	438,540	582,000	-
2003	170,530	442,920	613,450	5.40%
2004	187,557	465,067	652,624	6.39%
2005	206,338	492,970	699,306	7.15%
2006	220,780	515,153	735,933	5.24%

Source: Direktorat Jenderal Perhubungan Laut, December 2006

High priority is given to port development as well as to the development of national shipping in the national policy. The basic policy for port development is to expand port facilities and equipment to meet the future demand and hinterland potentials maintaining available capacity ahead of demand. To attain these targets, private sector participation is also introduced in the policy, with the objectives of increasing port capacity, relieving government from high investment burdens, introducing higher standards of efficiency through fair competition and expediting implementation.

As for container transportation, there are six major container terminals in Indonesia as shown in Table 3.4.2. The operators of these container terminals are classified into several categories

according to their relation with IPC: joint-venture (PT. JICT and PT. TPS); joint operation (TPK Koja); and direct concerned operation (subsidiary company and branch office of IPC).

Table 3.4.2 Container Terminals in Indonesia

Port	Name of Container Terminal	Operating Body	Relation with IPC
Belawan (Medan)	Belawan Container Terminal	Business Unit of Belawan Container Terminal	Subsidiary company of IPC-I
Tg. Priok (Jakarta)	Jakarta International Container Terminal	PT. JICT	Joint venture of IPC-II & Hutchison Port Holding (HPH)
	Koja Container Terminal	TPK Koja	Joint operation between IPC-II and HPH
	Multi Purpose Terminal	PT. Multi Terminal Indonesia (MTI)	Subsidiary company of IPC-II
Tg. Perak (Surabaya)	TPS: Surabaya Container Terminal	PT. TPS (Terminal Petikemas Surabaya)	Joint venture company of IPC-III & P&O
	Berlian Multi Purpose Terminal	PT. Berlian Jasa Terminal Indonesia (BJTI)	Subsidiary company of IPC-III
Tg. Emas (Semarang)	Semarang Container Terminal	Business Unit of TPKS (Terminal Petikemas Semarang)	Subsidiary company of IPC-III
Makassar	Makassar Container Terminal	Branch office of Makassar	Branch office of IPC-IV

Source: Annual Report of IPC-I-IV, Pamphlets of each container terminal

3.4.2 Ports in the Central Java Region

Among the ports located in the Central Java region, international trunk ports are in Semarang (Tg. Emas Port) and in Cilacap (Tg. Intan Port). Both ports have railway tracks beside/near the port. Among others, Tg. Emas Port in Semarang, which is under the management of PT. (Persero) Pelabuhan Indonesia (Pelindo) III headquartered in Surabaya, has been designated as a First Class port in the governmental decision of No.724/KPTS.BL.382/PIII-92, December 23, 1992. Located between the two prime ports, namely, Tg. Priok in Jakarta and Tg. Perak in Surabaya, Tg. Emas Port is the biggest port in Central Java Province and has a strategic role in the sea transport as the prime gateway to the economic activity in Central Java and DIY Provinces as well as some region in the west area of East Java Province.

Furthermore, there is a national trunk port in Juwana, and there are six regional ports: namely, Batang, Brebes, Jepara, Karimun Jawa, Rembang, and Tegal ports. Recent statistics of Tg. Emas Port and Tg. Intan Port are summarized in Table 3.4.3 and Table 3.4.4, respectively. According to Pelindo III, cargo tonnage handled at each port is disaggregated into packing types, which are categorized into the six groups: general cargo, bag cargo, liquid bulk cargo, container, and others

(pallet/unitized). Information on trade types such as loading/unloading, commodity types, and origin/destination place in Java Island is not available.

As one of the most strategic ports in Indonesia, Tg. Emas Port has been designated as an international port. As of 2006, total annual container throughput is about 370,000 TEUs, and the volume has been increasing year by year. Meanwhile, the total volume of non-container cargos which mainly consist of domestic inter-island cargos is about 3.7 million tons (as of 2006) excluding fuel, and recently the volume has also been growing. More than 90% of the inter-island cargos are unloaded cargos including oil fuel, timber, fertilizer, cooking oil, cement, and so on. As for passenger transport, total passenger volume has a slightly downward trend: from 500,000 passengers per year in 2000 to 400,000 passengers per year in 2006.

However, Tg. Emas Port was damaged by the submergence in 2003. No drastic measures have been taken yet since then, and the railway to the container yard is no longer used. It is hoped that the railway transportation will be revived for handling cargos, more specifically, containers.

Table 3.4.3 Port Activities: Tg. Emas (Semarang) Port

Item		Unit	1999	2000	2001	2002	2003	2004	2005	2006
1. Calling Vessels	(1) No. of Vessels	Vessel	4,562	4,600	4,898	5,446	3,872	4,997	4,571	3,809
	(2) Gross Weight	1000 GT	14,990	15,226	17,123	20,220	19,093	18,603	17,673	15,699
2. Passenger Volume	(1) On Board	1000 pax	252	262	270	266	229	168	149	204
	(2) Off Board	1000 pax	253	269	298	255	217	145	149	195
	Total	1000 pax	505	531	567	521	446	313	298	399
3. Fuel Volume		1000 Ton/Ltr	2,291	2,740	2,496	2,522	2,365	2,534	2,651	2,353
4. Container Volume	(1) Import	1000 TEUs	112	124	124	140	148	163	158	169
	(2) Export	1000 TEUs	136	148	148	175	175	191	196	201
	Total	1000 TEUs	248	272	273	315	323	354	354	370
5. Cargo Volume	(1) General Cargo	1000 Ton/m ³	4,412	2,409	1,153	1,250	1,221	1,285	1,534	1,184
	(2) Bag Cargo	1000 Ton/m ³	320	315	357	384	295	340	403	734
	(3) Dry Bulk	1000 Ton/m ³	580	361	1,007	1,148	1,086	1,083	1,076	1,164
	(4) Non-Fuel Liquid Bulk	1000 Ton/m ³	502	141	288	296	382	408	431	565
	(5) Pallet/Unitized	1000 Ton/m ³	181	201	202	334	350	236	0	5
	Total	1000 Ton/m ³	5,995	3,427	3,006	3,413	3,334	3,353	3,445	3,651

Source: Dinas Perhubungan dan Telekomunikasi, Central Java Province

In Tg. Intan Port, while there are no containers, considerable amount of fuel is handled. Fuel (i.e., gasoline, diesel, and kerosene) that is refined in the petroleum refinery in Cilacap is transported by railway mainly to Tegal area. Fuel for aircraft is also transported by railway from the petroleum refinery in the port to Rewulu station near Yogyakarta, in which a Pertamina depot is located, and supplied to Adi Sutjipto (Yogyakarta) Airport.

Total annual cargo throughput excluding fuel is about 2 million tons as of 2006, and the volume has been fluctuating a lot each year. Major commodities unloaded are limestone, fertilizer, and coal, while major commodities loaded are cement, and so on. A dry port exists in Cilacap which heads

to Tg. Intan Port, and another dry port is also planned in Purwokerto.

Table 3.4.4 Port Activities: Tg. Intan (Cilacap) Port

Item		Unit	2000	2001	2002	2003	2004	2005	2006
1. Calling Vessels	(1) No. of Vessels	Vessel	1,187	1,078	1,032	1,460	1,375	1,436	1,621
	(2) Gross Weight	1000 GT	20,140	20,668	20,805	21,455	20,475	19,242	19,582
2. Foreign Trade	(1) Import	1000 Ton/m3	258	344	244	298	351	517	313
	(2) Export	1000 Ton/m3	753	844	1,170	765	827	751	674
	(3) Fuel	1000 Ton/Ltr	21,875	21,369	20,733	10,563	10,866	18,859	21,513
3. Domestic Trade	(1) Unloaded	1000 Ton/m3	3,829	3,832	4,731	3,958	4,214	4,066	4,969
	(2) Loaded	1000 Ton/m3	227	250	175	48	87	143	89
	(3) Fuel	1000 Ton/ltr	-	-	-	11,236	13,352	-	11,657
4. Cargo Volume	(1) General Cargo	1000 Ton	0	-	1	0	-	-	2
	(2) Bag Cargo	1000 Ton	605	322	85	56	48	22	-
	(3) Dry Bulk	1000 Ton	702	990	1,612	1,102	922	1,200	2,075
	(4) Non-Fuel Liquid Bulk	1000 Ton	56	53	66	40	18	9	0
	Total	1000 Ton	1,363	1,365	1,763	1,199	988	1,232	2,077

Source: Direktorat Jenderal Perhubungan Laut