

## Transition in Freight Movement in Jakarta Metropolitan Area Over the Years

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**Abstract:** The Jakarta metropolitan area of Indonesia with more than 31 million populations is the capital region of one of the emerging countries. Along with economic development, the number of freight movement has been rapidly increasing. Two Truck OD Interview Surveys that were conducted in 2002 and 2018 revealed significant freight movement transition in terms of movement pattern, commodity, type of trucks, and so on. Existence of infrastructure development and changes in related regulations are also identified.

*Keywords:* Jakarta Metropolitan, Economic Development, Transition, Freight Movement.

### 1. INTRODUCTION

Jakarta as the largest city in the Indonesia, in 2017 has approximately 10 million population according the population projection of 2010 population census. The gross regional domestic product (GRDP) of the Jakarta reached Rp. 1636 trillion (Indonesia rupiahs) (approx. 117 billion US dollars) in 2017, which is approximately 17 percent of the total Indonesian gross domestic product (GDP); and in 2017 export volume and value through Jakarta by loading port is 14 million ton and 51 billion US\$ which is approximately 3 percent of the total export volume and 31 percent of the total export value in Indonesia. The import volume and value through the main port of Jakarta, namely Tanjung Priok, in 2017 was 36 million tonnage and 81 billion US\$ which is approximately 23% of the total import volume and 52% of the total import value nationwide. Tanjung Priok is the main element of freight movement and is projected to handle 21.24 Mio TEUs in 2030 (BAPPENAS, 2013).

Tanjung Priok serves industrial estates around Jakarta metropolitan area and beyond. Due to lack of rail-based facility for freight movement activity, truck is the main and, if not, the only mode to connect from/to the port. The road network, however, suffers from mixed traffic (freight and person) and is led to congestion. Intervention of policy has been applied for and changed several times in order to get the most-benefitted ones despite the effectiveness has never been measured.

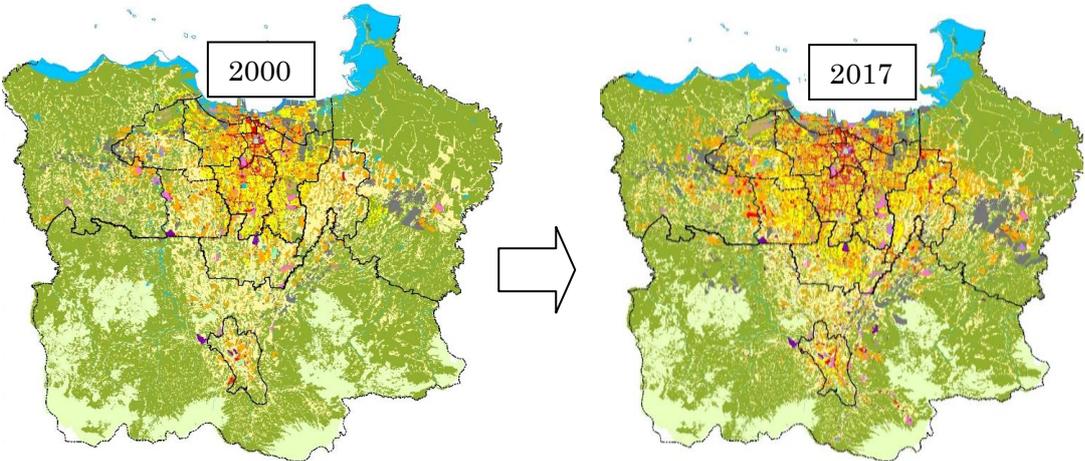
The most recent Truck Origin-Destination Surveys with study area of Jakarta metropolitan area was conducted in 2018 under the technical cooperation project of JICA (Japan International Cooperation Agency), namely Jabodetabek Urban Transportation Policy Integration (JUTPI) Phase 2. The second most recent one was conducted in 2002 under the masterplan study of JICA, namely Study on Integrated Transportation Masterplan (SITRAMP).

This paper presents the comparison result/transition of freight movement in Jakarta metropolitan area over almost two decades away.

**2. REGULATION CHANGES OVER THE YEARS**

Over the years that separate the two surveys away, the government (local, provincial, and national levels) has been applying quite various regulations that are related to the truck or freight movement. One of the most impeccable one would be the truck traffic ban on certain time of day and/or on some road sections.

Goods movement is important for economic growth of region. Figure below depicts the change of land use map that indicates more dense activity centers from 2000 to 2017 along the trunk corridors in which passed by the goods transport. Demand and supply for the commodity as daily needs and export-import purposes are also increasing despite the movement itself is outrun by priority of people movement. Thus, freight movement punctuality is always challenged and costly. So, by comparing the freight movement in 2000 and 2017, it is hoped that clear direction for further implementation is achieved.



Legend:

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Furthermore, discussion of regulation changes over the years is elaborated.

Years of 2016-2018

In recent two years, the odd-even number plate regulation to enter toll road has been proven effective to reduce the load of truck on the trunk road. The regulation was initiated by the Jabodetabek Transportation Authority to smoothen the traffic in general in the city center (see Figure 1). The regulation was also complemented by the regulation of container ban to enter the toll road from 5AM to 10PM. The limited time for container service created the truck traffic concentration to night time period.



Source: [www.bptj.dephup.go.id](http://www.bptj.dephup.go.id)2017

Figure 1. Roads impacted by the odd-even policy in city center (red and light blue lines)

#### Years of 2010-2014

During this period the completion of perfectly round-shape of the ring road occurred/was being implemented. Trucks were banned by several points. They are; to enter the road section in city center that has the level of service (LOS) of 0.8 or worse, to enter the road section in the city center that has average speed of 30 kilometer per hour or less, to enter the road section that has no alternative routes in case unlikely situation happens. During these years, there was also container ban period to enter the toll road during 5AM to 8PM.

Also during this period, local agencies made adjustment to the regulation of the existing freight movement upon onsite decision-making process. For example; some industrial estates opened their main gates only at certain period of timeline in a day, transportation agencies also applied truck route detour during certain period of time to avoid over congested road section. Such decision was made locally, therefore, coordination to higher level (regional or central government) was not necessary.

#### Years of 2003-2016

The demand management of general traffic in the city center was regulated by “3-in-1” regulation. This regulation mainly regulated the ridership of private car to be ridden by minimum of three passengers along specific road section (see Figure 2). Although the regulation was applied only to private car during peak period of morning and evening, the truck vehicle was prohibited to enter implicated road sections from 6AM to 8PM during weekdays.



Source: [www.jakarta.go.id](http://www.jakarta.go.id)

Figure 2. Roads impacted by the 3-in-1 policy

### 3. SURVEYS

#### 3.1 2002 Truck OD Interview Survey

Truck OD Interview Survey in 2002 covered the industrial estates, the airport, the Tanjung Priok port and truck depots around the Jakarta metropolitan area with the sample rate of 10% and survey duration of 16 hours (6AM to 10PM). The survey method is to count the truck and interview the truck drivers at the gate of industrial estate and port area. The questionnaire for interview is as follows:

*Form questionnaire:*

This survey component covers the freight vehicle information including type of vehicle, number of rider, weight and capacity of the vehicle, volume, type of commodity, and origin-destination of the freight.

#### 3.2 2018 Truck OD Interview Survey

Truck OD Interview Survey in 2018 also covered the industrial estates, the airport, the Tanjung Priok port and truck depots around the Jakarta metropolitan area with the sample rate of 10% and survey duration of 16 hours (6AM to 10PM). Although the survey method, survey period, and the form questionnaire were the same, the survey locations have changed and expanded. Key element of expansion applies to Tanjung Priok port that has been expanding to more number of terminals including the reclamation area. Some of the surveyed industrial estate locations also expand and are relocated. Figure 3 shows the difference of survey locations for the two surveys.

*Form questionnaire:*

This survey component covers the freight vehicle information including type of vehicle, number of rider, weight and capacity of the vehicle, volume, type of commodity, and

origin-destination of the freight.

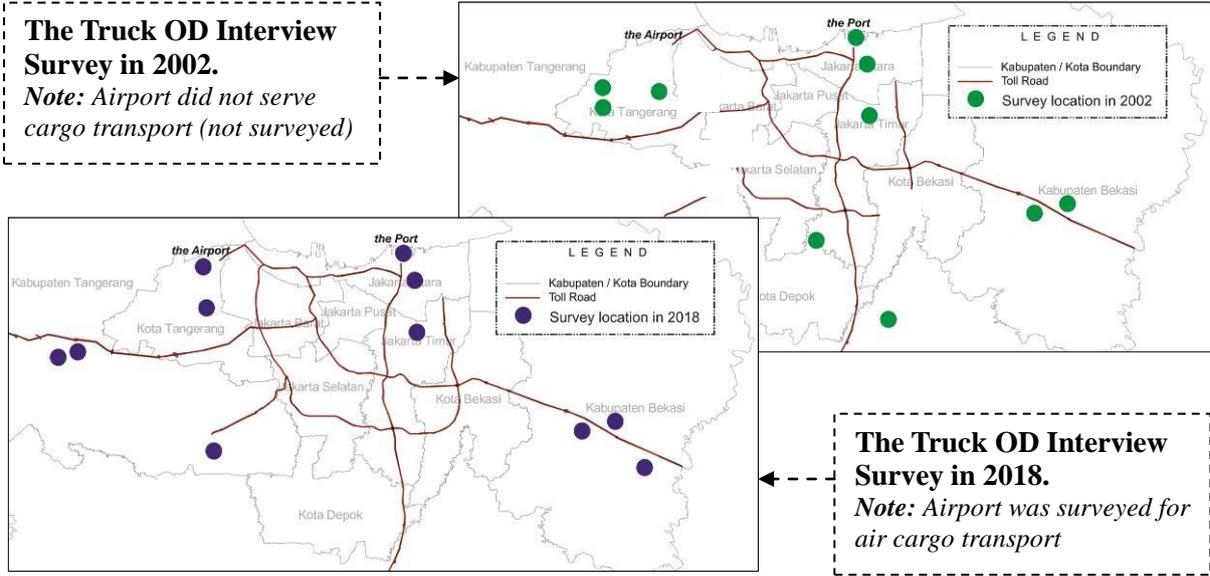


Figure 3. The Truck OD Interview survey locations in 2002 and 2018

4. COMPARISON SURVEY RESULTS

4.1 Truck Flow Volume by Group Area

An imaginary line is built to distinguish the location of industrial estate area by North, East, West, and South. The characteristic of Tanjung Priok port as hub, however, does not allow its inclusion to any group. This case does not apply to the airport because it did not serve cargo service until after 2002 (see Figure 3.). Consideration of grouping has been made considering the two surveys do not consist of entirely the same locations.

The division of industrial estate location refers Tanjung Priok port as the main hub as it does not belong to any North, East, West, or South. The one called North group is the industrial areas around the port.

Table 1. Truck volume by area group in 2002 and 2018

(in Vehicle unit)

Group	Pick Up		2-Axle Truck		3-Axle Truck		Trailer/Container		Connected Truck	
	2002	2018	2002	2018	2002	2018	2002	2018	2002	2018
North	1,532	382	2,427	1,335	393	1,450	2,474	9,868	4	-
South	379	4,545	1,771	8,919	1,208	1,463	185	598	210	10
East	2,285	7,662	4,249	15,572	1,006	4,052	305	2,393	95	26
West	2,092	2,674	2,628	5,323	234	378	162	301	18	4
Port	1,749	933	2,759	1,661	2,501	1,312	8,768	20,787	251	15
Total	8,037	16,196	13,834	32,810	5,342	8,655	11,894	33,947	578	55

Table 2. Increase/decrease of truck volume by area group in 2002 and 2018

Group	Pick Up	2-Axle Truck	3-Axle Truck	Trailer/Container	Connected Truck
North	-75%	-45%	269%	299%	-100%
South	1099%	404%	21%	223%	-95%
East	235%	266%	303%	685%	-73%
West	28%	103%	62%	86%	-78%
Port	-47%	-40%	-48%	137%	-94%
<b>Total</b>	<b>102%</b>	<b>137%</b>	<b>62%</b>	<b>185%</b>	<b>-90%</b>

Tables 1 and 2 show the change of truck volume surveyed by the two Truck OD Interview surveys. As total, all types of truck show increase in number except for connected truck. Decrease of connected truck may be related to the fact that Jakarta metropolitan area that becomes more and more urbanized so that the connected truck does not seem to fit road safety issue. Furthermore, it is worth noting that increase number of trailer/container type at the port conjugate to the other types decrease. In addition to this, all groups show the tendency of larger truck utilization over the two surveys. This may tell us that the freight movement from/to hub point gets larger by year to the extension of utilization of larger size of truck is a must. The smaller truck type may no longer take the main role of transporting goods from/to hub points but domestic or locally.

The decreasing tendency occurs for pick-up truck at North group is caused by handling process that over the years has been shifting to more effective and efficient method. Thus, larger size of the truck is suggested. As distribution to other locations pick-up type is quite commonly used.

Figure 4 shows the hourly traffic fluctuation throughout the day from/to Tanjung Priok port. In term of vehicle number, the traffic is lower in 2002 than of in 2018 (compare to Figure 4's vertical axis). However, the same pattern of off peak period of the Tanjung Priok is still the same; at noon and at 6PM. This may be related to the regulation that is applied to the port in which mostly administrative matters and schedule of ship loading/unloading schedule. The peak, however, slightly changed to be more flat rather than steep like in 2002. Morning peak that was used to be at 10AM is now changed to "evenly" distribution of 9 to 11AM. Afternoon peak that was concentrated at 4PM is now changed to "evenly" distribution of 2 to 4PM. Please see and compare the total truck traffic in Figures 4 and 5.

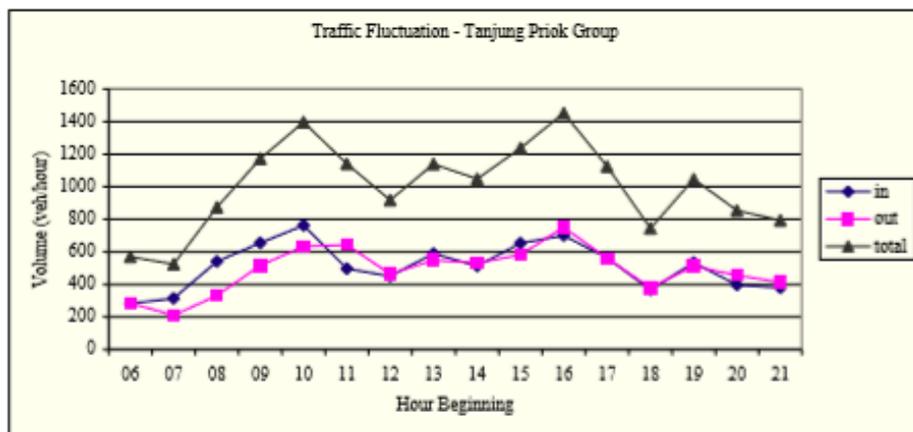


Figure 4. Hourly Truck Fluctuation in 2002 (from/to Tanjung Priok Port)

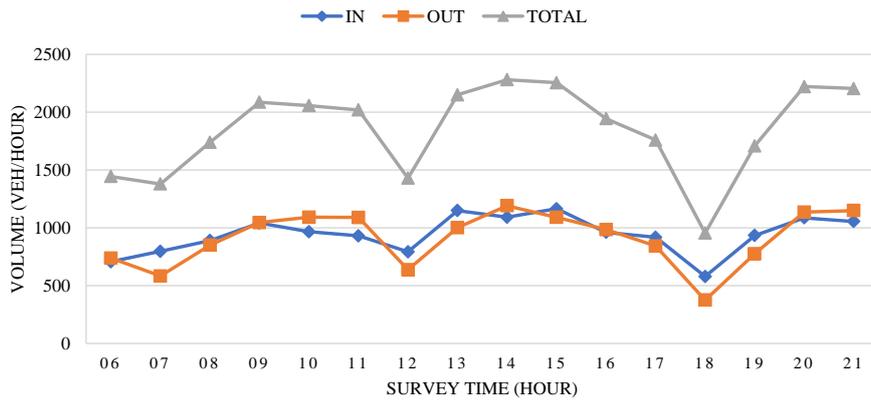


Figure 5. Hourly Truck Fluctuation in 2018 (from/to Tanjung Priok Port)

Such condition must have been the impact of regulation application throughout the years. The regulation will be discussed further. However, truck ban regulation has forced the truck movement to shift to different pattern than what was usual.

#### 4.2 Truck Share on Trunk Roads (2002 and 2018)

The change of mode share of the truck vehicle on the trunk road by years of 2002 and 2018 is shown in Figure 6. In line with Tables 1 and 2, the share may indicate that the utilization of larger-type of truck has been applied. This may be related to the production company strategy to optimize the profit while to also consider the intervention of ever changing regulations.

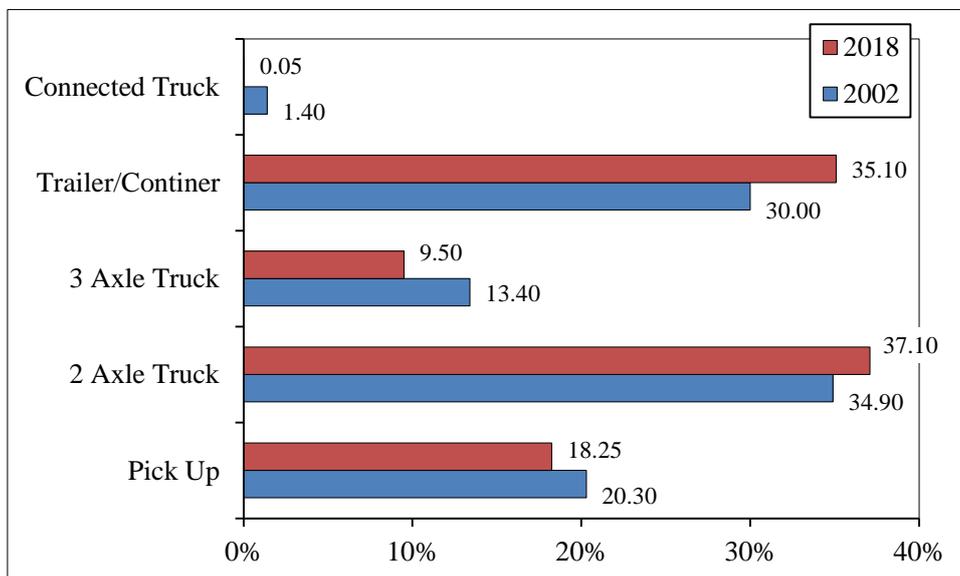


Figure 6. Truck share by type in 2002 and 2018

In Figure 3, the network is shown different in 2002 and 2018. Mainly toll road development has been implemented to connect the “missing link” to form the perfectly round-shape ring road. Since there have been truck ban to enter the city, toll road may be the only option to be taken. Lack of connection of toll road network in westward of Jakarta metropolitan area in 2002 limits the movement of freight mainly from the south and southwest of the study area. This may be the cause of industrial estates relocation over the years from south towards east/southeast and west/southwest. In 2002, the mostly loaded toll road by truck was the inner ring road with no other option was available.

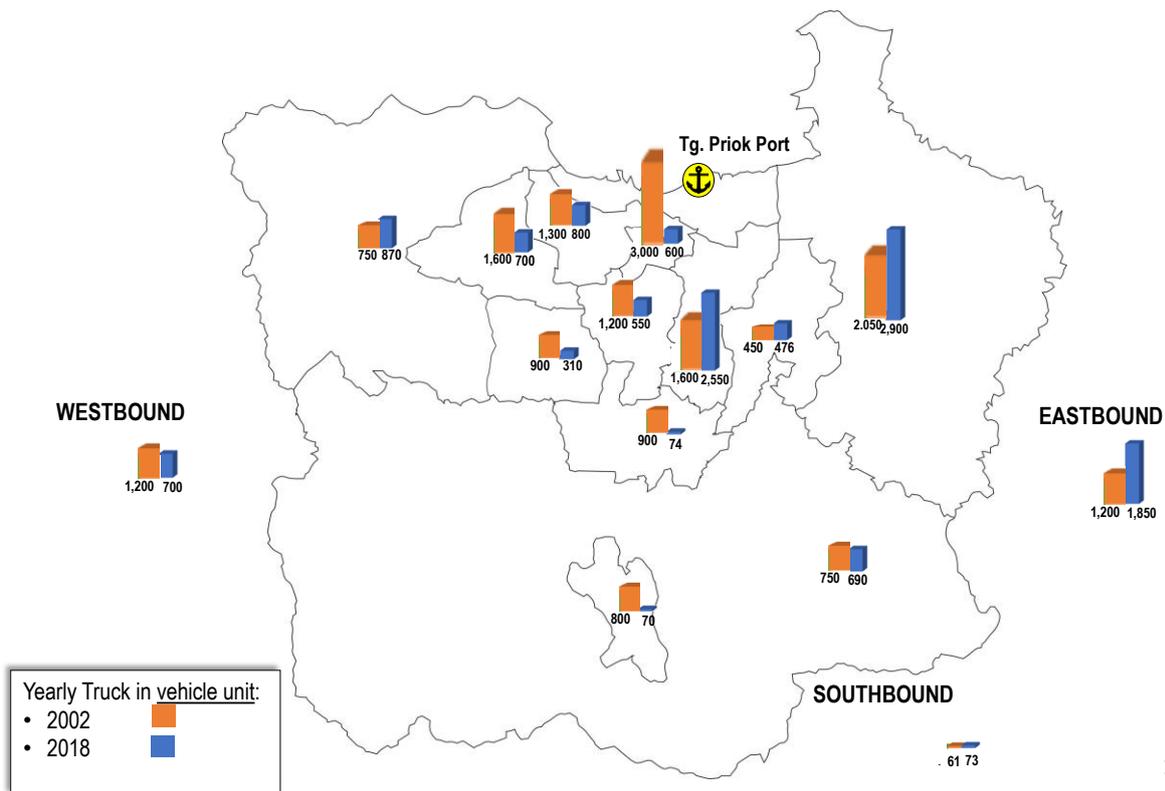


Figure 7. Truck volume comparison in 2002 and 2018 from/to Tanjung Priok Port

Figure 7 shows the truck volume comparison between 2002 and 2018 that goes to and come from the port of Tanjung Priok. It can be seen that the truck traffic and the location of industrial estate were still within the core city of Jakarta metropolitan area in 2002 although this is not the case of the year of 2018. Throughout the years, industrial estate has been relocated to the outskirts area as the metropolitan area gets urbanized. Such tendency can be seen that the volume of truck generated and attracted to the city center area was big in 2002 and now decreases unless for the east part of city center in which industrial area still remains at the same location.

## 5. CONCLUSION

The changes over the year of 2002 and 2018 have created changes in freight transport pattern in Jakarta metropolitan area. The full round-shape of the ring road has enabled the freight movement coming from/ going to all directions in Jakarta metropolitan area, thus, the growth of industrial estate as reflection of the growth of economic development in the study area has also increased. In line with this, the type of truck vehicle being utilized to transport the freight also experiences changes.

Smaller-type of truck was utilized in 2002 and larger-type of truck was utilized in 2018. Lack of connection of the toll road directed the truck movement to enter city center. The government has been changing the freight transport regulation to fit yearly condition. Once the toll road was connected, the firm regulation of truck ban was applied to prevent large truck from entering city center. Various regulations have been applied to the metropolitan area in the level of national, regional, and local.

Furthermore, the analysis of type of commodity to be transported shall be interesting to research. The movement and relocation of industrial estate – and the increase of the

economic development of Jakarta metropolitan area – must have made the changes of type of commodity being transported. Such research may also indicate one of the characteristics of a metropolitan area.

## **ACKNOWLEDGMENT**

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