

**Research Article**

# Managing the Congestion for Delivering and Receiving Truck Container at the Tanjung Priok Terminal by Analyzing the Congestion at Koja Container Terminal

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**Abstract.**

This study aimed to analyze the congestion that occurred around the Koja Container Terminal to develop strategies that will aid in managing the congestion presently occurring at the Tanjung Priok Container Terminal. Dwelling time, ship delay, gate server down, equipment damage, and lack of support for the truck arrival system were some causes of congestion in the Tanjung Priok area. There was an improvement in the truck arrival system (TAS) and Chassis Exchange Terminal (CET). Analyzing the inefficiency in managing the arrival of trucks for container pickup is the strategy needed for controlling congestion. This research was conducted by observing the field movements at the Koja Container Terminal and interviewing the people who experienced congestion in the terminal. This methodology was proposed to aid in efficiently operating the Tanjung Priok Port and alleviate truck congestion. Because it provides systematic, structured, and problem-solving benefits, this study is expected to be a source of consideration for stakeholders when making decisions. The result of this study will help improve the management of congestion at Terminal Koja.

**Keywords:** Managing Congestion, Delivering and Receiving, Truck Container, Terminal Container, Port

## 1. Introduction

Tanjung Priok Port, Indonesia's main port for export and import services, continues to face congestion as container trucks in and out the regional ports. The impact can be felt as far west as North Jakarta [1]. Most Asian terminals currently provide 24-hour service, therefore there is no room to expand gate opening hours. The development of a timeframe that relies on ships as a way to control trucks is one that is possible [2].

There are several terminals at Tanjung Priok, including those managed by JICT, TPK Koja, NPCT-1, MAL, T305 TSJ, T3 OJA, and others. TPK Koja is the case study in this research. Every day, vessel arrive at TPK Koja, which consists of two mother vessel and

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**Published** 26 May 2023

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the ICASI Conference Committee.

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some feeder vessel for transshipment. The current issue is that the volume of exports and imports continuing to grow, generating congestion in the port region.

Dwelling time, ship delay, gate server down, equipment damage, and no truck arrival system are some of the causes of congestion in the Tanjung Priok area. The length of time it takes to load and unload containers (Stevedoring) has become one of the factors that creates the most congestion (Dwelling Time) [3]. Since President Joko Widodo intended to speed up the flow of commodities at Tanjung Priok Port, the term "Dwelling Time" has gained popularity in Indonesia. The average container stay in Terminal used to be seven days, it is now only 2.5 days. Congestion are caused by the new policy. Because empty trucks will pick up imported containers at the same time, stacking fees can be avoided.

Ship Delay caused by the previous situation, notably the Covid-19 epidemic, is another source of congestion. According to the observations in Fig 1, Covid-19 has little effect on TPK Koja. TPK Koja has increased, whereas several terminals in Tanjung Priok have decreased. While China was under lockdown, ports like JICT were delayed to accept ships from China. Because the Philippines and Thailand have not yet been subjected to a lockdown, TPK Koja has received ships from the Philippines and various surrounding countries. This situation arose because TPK Koja aided the economy and port activities.



Figure 1: Terminal Market Share.

Another cause is Gate Server Down; this is more likely to occur once or twice a year, or never happened server downtime. The Auto Gate's speed is then determined by speed data collected at the Gate of Gate in and Gate out, which ranges from 20 to 30 seconds depending on whether the truck is full or empty. As a result, the amount of traffic caused by Auto Gate is minimal.

The Truck Arrival System is the most essential factor in reducing traffic congestion in Indonesia. In general, by increasing gate capacity and the improving of TAM, the queue would be reduced. Truck Arrival Management should be given a lot of thought since there is not any accessible for gate development because of land and resource[4].

Terminal operators implement a web-based information system to display gate operation hours and hourly entry quotas, while truck drivers use it to make incoming appointments in the TAS system. TAS is mostly utilized for imported containers that are part of terminal operations that are grounded [5]. Because TPK Koja admits all trucks that arrive without a reservation, it creates congestion. Since the land and the capacity of the land area are not available, the congestion that occurs cannot be overcome.

## 2. Method

The study took place at Koja Container Terminal in North Jakarta. The location of TPK Koja was purposefully chosen as a case study of congestion that occurs around the Terminal in North Jakarta. The objective of this research is to give solution for the company utilizing qualitative methodologies. Qualitative approaches were employed because it was based on data collecting techniques such as observation and interviews. Observations and interviews were the primary sources of information in this research. Individual and focus group interviews, participant observation, ethnography, and a variety of other methodologies are common qualitative methods [6].

The aim of the interview is for researchers to get data from sources who are familiar with and related to the Koja Container Terminal organization. Researchers have a direct data in qualitative interviews, allowing them to express their perspective in their own words and avoiding the risk of the researcher imposing their own standpoint or limiting the scope of the discussion [7]. In addition, observations were made at Koja Container Terminal to acquire information in real-life circumstances or to watch field movements. In July 2021, one week was necessary to perform observations and interviews. Preparation using Zoom, data collecting through interviews, observation by heading immediately to the field, and compiling and processing report completion data are only a few of the processes.

The data collection technique developed was qualitative data aided by documents as a type of secondary data in addition to improve the strength of the analysis results. Narrative analysis and discourse analysis were utilized as data analysis tools. Narrative

analysis is used because it is frequently employed to make operational system interpretations. Discourse analysis is then utilized because it concentrates on the social context in which respondents and researchers communicate.

### 3. Discussion and Result

This study includes strategies for solving the problem, which is to establish the strategy to fix traffic congestion when it occurs in Tanjung Priok.

The X line shows total container accomplishments, whereas the Y line indicates year accomplishments. The total number of containers received and sent each year is represented by TRT (Truck Round Time). The graph below shows TRT at TPK Koja in 2021 from January to May. TPK Koja received 104,058 TEUS, with 45,008 TEUS being shipped.



Figure 2: External Truck Round Time (Minute).

The TRT stated earlier ensures the provision of extraordinarily tall receiving and shipping containers. The number of inbound containers climb dramatically from the previous year to mid-May 2021. As a result, container retrieval is affected.

TPK Koja's Dwelling Time is depicted in Figure 3 below. The amount of time spent for loading and unloading containers at the terminal is referred to as Dwelling Time. The X line depicts the amount of days necessary for stevedoring activities. On the Y line, the annual achievement for dwelling time is represented.

The higher the dwell period, the further away the subjects are from their intended location. A shorter Dwelling Time implies that the desired objective has been accomplished. The government's current aim is a two-day average. From 2021 to May, export

operations had issues above 4 days, because the vessel arriving was late. But import operations were unaffected and achieve the target because the needed time was just 2.7 days.

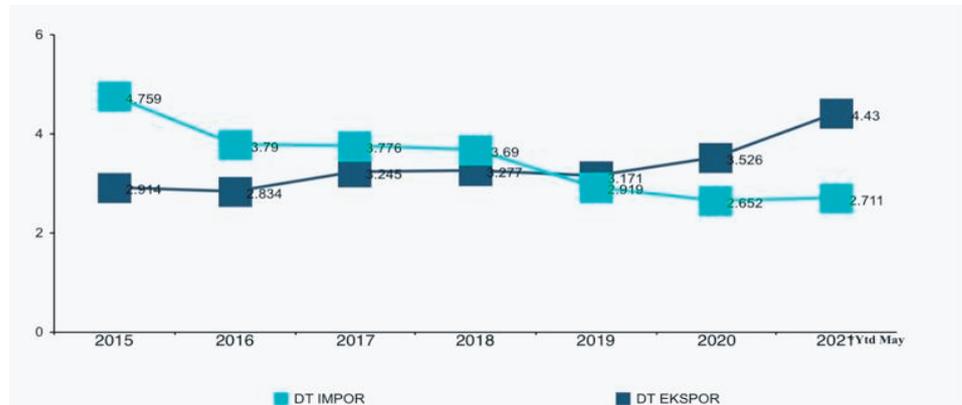


Figure 3: Dwelling Time (Day).

In June 2021, the data obtained is the total container for exports and imports. There are 20,310 containers for export, while Import consists of 28,015 containers.

EQUIPMENT  
 NUMBER OF OCC : 2.5  
 ASSIGNED OCC : 301+306+307

MOVEMENT	20					40					45					TOTAL	
	FL	MT	REF	OH	DG	FL	MT	REF	OH	DG	FL	MT	REF	OH	DG		
DISCHARGE	45	---	11	---	2	475	---	40	---	---	---	---	---	---	---	573	
TRANSHIPMENT - DISCHARGE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
LOADING	232	170	---	---	---	306	---	---	---	---	28	---	---	---	---	736	
TRANSHIPMENT - LOAD	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
TOTAL	277	170	11	---	2	781	---	40	---	---	28	---	---	---	---	1309	
																TEUS	2.165

**PRE - BERTHING VESSEL PLAN**

**ACTIVITIES PLAN**

VESSEL/ VOYAGE : KOTA WANGI  
 CO.VSL/VOY : PIL/KTWNGI/0080N  
 BERTH SIDE : KANAN (STARBOARD SIDE) **KADE KOJA**  
 BERTH NO : K1  
 LOA/ BITT NO : 185/020.0 - 205.0  
 SOA : PIL  
 ETA : 03/07/21 09.00  
 CLOSING TIME : 02/07/21 23.00  
 BERTHING WINDOW : 03/07/21 15.30  
 WORKING HOUR : 03/07/21 16.00 Until 04/07/21 23.00 **EX KAPAL : KMTC CHENNAI**  
 ETD : 05/07/21 02.00

**LABOR GANG**

DAYS	DATE	SHIFT - 1	SHIFT - 2	SHIFT - 3
1st DAY	03-Jul-21	0	3	3
2nd DAY	04-Jul-21	3	3	0
3rd DAY	05-Jul-21	0	0	0

Figure 4: Receiving/Delivery Cargo.

In both outgoing and receiving cargo, CRP may present. The majority of research has been on outbound containers, for which the retrieval sequence (ship-loading sequence)

is known before the retrieval operation begins [8]. With an increase in the total number of export and import containers, critical issues may arise, and it is possible that export movement would be slowed or threatened. Exporters will be impacted if the movement proves to be problematic. In this sense, the coordination and government roles are still underdeveloped.

The data that has been obtained by the Berthing Vessel Plan on the Kota Wangi Vessel, it can be seen below:

Export				
Tanggal	Shift			Total Export
	I	II	III	
01/06/21	116	84	36	236
02/06/21	98	120	205	423
03/06/21	129	183	141	453
04/06/21	86	236	351	637
05/06/21	161	186	98	445
06/06/21	72	28	56	156
07/06/21	163	358	260	781
08/06/21	252	374	501	1127
09/06/21	349	452	525	1326
10/06/21	426	462	391	1279
11/06/21	327	507	569	1403
12/06/21	543	273	119	935
13/06/21	83	43	47	173
14/06/21	137	318	213	668
15/06/21	179	149	134	462
16/06/21	222	218	266	706
17/06/21	255	234	378	867
18/06/21	246	227	337	810
19/06/21	298	254	170	722
20/06/21	151	73	25	249
21/06/21	27	29	54	110
22/06/21	84	239	256	579
23/06/21	233	258	468	959
24/06/21	347	281	510	1138
25/06/21	382	344	508	1234
26/06/21	300	245	156	701
27/06/21	104	49	40	193
28/06/21	116	319	244	679
29/06/21	118	224	147	489
30/06/21	89	114	131	334
			Total	20.310

Import				
Tanggal	Shift			Total Import
	I	II	III	
01/06/21	226	362	120	708
02/06/21	357	489	731	1577
03/06/21	448	377	423	1248
04/06/21	302	408	472	1182
05/06/21	280	254	81	615
06/06/21	196	341	83	620
07/06/21	415	499	680	1594
08/06/21	555	532	550	1637
09/06/21	463	438	432	1333
10/06/21	285	226	292	803
11/06/21	367	418	407	1192
12/06/21	474	338	106	918
13/06/21	235	273	98	606
14/06/21	281	388	664	1333
15/06/21	578	422	379	1379
16/06/21	557	509	481	1547
17/06/21	473	396	465	1334
18/06/21	284	396	389	1069
19/06/21	287	203	66	556
20/06/21	129	66	28	223
21/06/21	52	81	196	329
22/06/21	99	165	88	352
23/06/21	58	101	157	316
24/06/21	311	417	593	1321
25/06/21	440	347	230	1071
26/06/21	134	108	19	261
27/06/21	36	134	29	199
28/06/21	93	128	267	488
29/06/21	285	459	396	1140
30/06/21	322	458	338	1118
			Total	28.015

Figure 5: Working Hours Vessel Kota Wangi.

The data above shows Working Hours for Unloading Containers on July 3, 2021 which took 1 day 7 hours for 2,165Teus. Then this explains that on July 4, 2021. If there are >2000 Containers in the Container Yard (CY), a truck will come to pick up the container. The container is taken by the truck without knowing the time because the operational system of TPK Koja is 24 x 7 hours. Typically, terminals do not enforce time-of-arrival restrictions, allowing trucks to arrive whenever desired [2].

### 1. The Improvement Level of Managing Congestion

Several nations in America and Europe have adopted the Truck Arrival System (TAS), which is beneficial to terminal operators in controlling port authorities for terminal operations [9]. The Truck Arrival system can help reducing container handling during the collection process for imported containers. With a small improvement in terminal

information regarding truck arrivals, information on a large reduction in rehandling was received [10].

The Truck Arrival System functions in such a way that it can expedite container transaction requests for appropriate labor and equipment. TAS can also work to reduce the cost of drayage. When specifying Window Berthing for Trucks, drayage costs can be reduced [9]. Because there is an appointment quota for truck arrivals, TAS can help reducing lines at the gate. In this study, TAS is limited to a quota per terminal time window.

TAS will offers a number of advantages, including the ability for port operators to match truck arrivals with containers. As a result, the time spent to prepare the container will be more efficient. Another advantage of employing TAS is that terminal operators may be distributed evenly for truck arrivals throughout the day, reducing lines at the terminal and at the gate.

However, in using TAS, the thing that must be considered is the re-handling of the arrangement of imported containers in the Container Yard in order to facilitate productive work movements. Implementing TAS has its own level of difficulty because it has to gather several stakeholders such as the Government, parties involved in the Terminal, APTRINDO, Shipping Line, etc [10]. In the study of container shuffling or re-handling, it received considerable attention from terminal operators, but remains a difficult problem to solve.

The Chassis Exchange Terminal (CET) is the next level, a new solution proposed for Western Europe that aims to have a container truck consisting of a tractor and a trailer exchange its trailer (also referred to as the chassis) for containers rather than unloading and loading containers at deep sea terminal locations [11]. However, CET is difficult to implement in the existing port in Tanjung Priok due to the lack of adequate land. It is still a few ports that use this solution and there is not much scientific literature yet about this system.

### 1. Strategy Analysis of Managing Congestion

The productive crane action is the one that moves the intended container. Rehandling, or movement that eliminates undesirable containers in the process of retrieving the intended containers, is an example of inefficient crane movement. Assume that the recovered containers are distributed at random, and that re-handled containers are always moved to the next stack. One of the main reasons affecting terminal efficiency is

field operation efficiency. Container rehandling's large share of unproductive procedures affects field efficiency, increases external truck delays, and lowers vessel operational efficiency [10].

Another method is to require containers to be carried by receiving and delivering trucks. Implementing the regulation that empty vehicles cannot access the terminal is the technique needed to decrease congestion caused by increased receiving and delivery of containers. Trucks arriving at the terminal must do both export and import operations. Trucks can not just import and export since they have to wait in long lines. They must engage in both import and export activities if they want to import, in order to maintain a balance between exports and imports.

## 4. Conclusion

In general, traffic congestion in Indonesia cannot be eliminated, but it can be controlled and decreased to the greatest extent possible. Using an ever-increasing improvement level can make it easier for stakeholders to alleviate congestion in Indonesia, particularly in ports. TAS and CET are employed to reduce congestion at the Improvement Level. Terminal operators can use TAS to match truck arrivals to containers. As a result, the time spent preparing the container becomes more efficient. The terminal has a number of features that help to streamline equipment movement and reduce congestion. Like the previously mentioned analysis technique, Productive Crane Movement, Rehandling, or movement that removes unwanted containers in the process of getting the desired containers, are the examples of inefficient crane movement. Another option is to enforce the rule that no empty trucks are permitted to enter the terminal.

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