BACHELOR THESIS - ME184841

AN ANALYSIS OF CONTAINER DWELL TIME AT CONTAINER TERMINAL BY USING SIMULATION MODELLING

Proposed by:
Radifan Hassan
04211540000006

Supervisors:
1. Raja Oloan Saut Gurning, ST., M.Sc., Ph.D.
2. Dr. Dhimas Widhi Handani, ST., M.Sc.

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ENDORSEMENT PAGE

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BACHELOR THESIS

Submitted to Comply One of The Requirements to Obtain a Bachelor Engineering Degree
On
Reliability, Availability, Management, and Safety (RAMS)
Bachelor Program Department of Marine Engineering
Faculty of Marine Technology
Institut Teknologi Sepuluh Nopember

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This bachelor thesis has written and developed independently without my plagiarism act, and confirm consciously that all data, concepts, design, references, and material in this report own by Reliability, Availability, Management, and Safety (RAMS) in Department of Marine Engineering ITS which are the product of research study and reserve the right to use for further research study and its development.

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Bachelor Thesis Title	: An Analysis of Container Dwell Time at Container Terminal by Using Simulation Modelling
Department	: Marine Engineering

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Surabaya, 2019

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ABSTRACT

One of the parameters affecting the efficiency of the container terminal is dwell time (DT). The more least the DT the more efficient a container terminal would be. As the government regulations of the Ministry of Transportation that stated in Number PM 25 in 2017 in Article 2 Paragraph 1 explains that the maximum dwell time must not exceed than 3 days. The purpose of this study is to identify the major factor of prolonged DT in a container terminal. The authors used discrete event simulation to model the system inside the container terminal operation by using Arena Simulation software. The Root Cause Analysis (RCA) is being used for the data analysis and finding the root cause. At first, the container handling inside the container terminal data is collected, then the effect container of handling the equipment on dwelling time was testified by creating model, simulated then analyzed. The result of the simulation is that there is a small impact from container handling equipment towards DT. Another result is from the container stacking tiers that shown if container stacking height being increased, yard capacity increases, yard occupancy ratio decreases and DT decreases. From the Problem Tree framework that created based on the operational data and interviews. It shows that the most DT is contributed by the prolonged time of container stay at container yard.

Keywords: *Dwell Time, Container, Root Cause Analysis, Import, Arena*

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ABSTRAK

Salah satu parameter yang mempengaruhi efisiensi terminal petikemas adalah *dwell time (*DT). Semakin sedikit DT, semakin efisien terminal petikemas. Sebagaimana peraturan pemerintah dari Kementerian Perhubungan yang dinyatakan dalam Nomor PM 25 Tahun 2017 dalam Pasal 2 Paragraf 1 menjelaskan bahwa waktu tinggal container maksimum adalah tidak boleh lebih dari 3 hari. Tujuan dari penelitian ini adalah untuk mengidentifikasi faktor utama dari DT berkepanjangan dalam terminal kontainer. Penulis menggunakan simulasi diskrit untuk memodelkan sistem di dalam operasi terminal kontainer dengan menggunakan perangkat lunak Arena Simulation. *Root Cause Analysis* (RCA) digunakan untuk analisis data dan menemukan akar penyebabnya. Data penanganan kontainer didalam terminal kontainer dikumpulkan, kemudian efek penanganan kontainer pada DT diuji dengan membuat model, disimulasikan kemudian dianalisis. Hasil dari simulasi adalah bahwa ada dampak kecil dari peralatan penanganan kontainer terhadap DT. Hasil lain adalah dari tinggi tumpukan container di *container yard* yang menunjukkan jika tinggi tumpukan kontainer meningkat, kapasitas *container yard* meningkat, *yard occupancy ratio* menurun dan DT menurun. Dari kerangka *Problem Tree* yang dibuat berdasarkan data operasional dan wawancara menunjukkan bahwa DT paling banyak dikontribusikan oleh waktu tinggal kontainer yang lama di *container yard*.

Keywords: *Dwell Time, Container, Root Cause Analysis, Import, Arena*

PREFACE

In the name of Allah SWT, the almighty God, with His blessings to me that I, Radifan Hassan, has completed this bachelor's thesis entitled "**AN ANALYSIS OF CONTAINER DWELL TIME AT CONTAINER TERMINAL BY USING SIMULATION MODELLING**". This bachelor thesis is presented not only to fulfill one of the requirements in accomplishing Bachelor Program Department of Marine Engineering, Faculty of Marine Technology, Institut Teknologi Sepuluh Nopember, but also a contribution to make Indonesia a better place.

The author would like to give a bunch of appreciation for those who had assisted, motivated, and turned the light on the street in the process of completion of this thesis.

1. The author's eternal love parents, Ayah H. Dr. Nilmandjaja, Msc. and Mama Hj. Drs. Nur Chasanah, Msc., you have given outnumbered and varies support and loves during this research.
2. Dr. Eng, M. Badrus Zaman, ST., M.T. as Chairman of Marine Engineering Department, Marine Technology Faculty of Institut Teknologi Sepuluh Nopember.
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4. Dr. Dhimas Widhi Handani, ST., M.Sc. as the second Supervisor and who always guides, motivates and gives advice to the author in the RAMS Laboratory.
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6. Bapak Bambang Hasbullah, the Operation Director of PT TPS, Mba Hera, as my mentor at PT TPS, and all PT TPS employees who have helped in providing knowledge and precious information in regards of the author's research.
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9. The author mentor of life, Pak Haryanto Budiman, Indonesia CEO of J.P. Morgan, Ilmi Mayuni Bumi, Nadhira Fidhelia, and Gwyn Walesa.

10. The author beloved friends, Ardy Makarim, Kitto Ario Basara, Tatyana A. Ibrahim, Cindy Yumm, Marsya Sungkar, Dea Pradnya, Luh Rika, Made Mahavira, Nadhila Fajriani, Aisyah Sekaranggi and Salsabila Raihana Radian whose company and its impactful support will not be forgotten by the author throughout his life path.
11. The author dormmates, Aji Wirasakti Setyawan and Fadel Yulian who accompanied the author through thick and thin.
12. All fellows from YLI Community, Astra1st, Schlumberger VT, ITS MUN Club, SPE ITS SC, XLFL B5, and AIESEC Surabaya, without you I couldn't make this far.

The author hoped that this research result will not be only beneficial for future research but also has a positive impact on the country. Any further discussion, criticism and suggestion are wide-open. To whoever will reopen this thesis, the author also aspired that when you open this, the author has to pursue his purpose of life and creating a bigger impact on human society. At the time this writing was written, I, the author, Radifan Hassan, is signing out as a student of Marine Engineering to go to the next chapter of this exciting life. Thank you.

Surabaya, 2019

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CHAPTER I
INTRODUCTION

1.1 Background

Port in Indonesia plays a significant role in economic development as it affects the national and international logistical distribution. Nowadays, Port is not only as of the gateway of cargoes but also turned to be the logistic hub (Pettit & Beresford, 2009). Economic development has a connection to the global trade, which facilitated by the increasing process of containerization of freight (Takola, 2018). The fact that container terminal has a crucial function, in which as an interface point of sea and hinterlands, indicates that its quality of productions and services cannot be neglected (Syafaaruddin, 2015). According to the World Bank, container throughput in Indonesia has increased from 2010 until 2017 with the annual growth rate of 5.3%. As seen in Figure 1.1. that described container port traffic in Indonesia in 2010 was 9,692,442 TEUs and it has been increased into 13,859,500 TEUs in 2017.

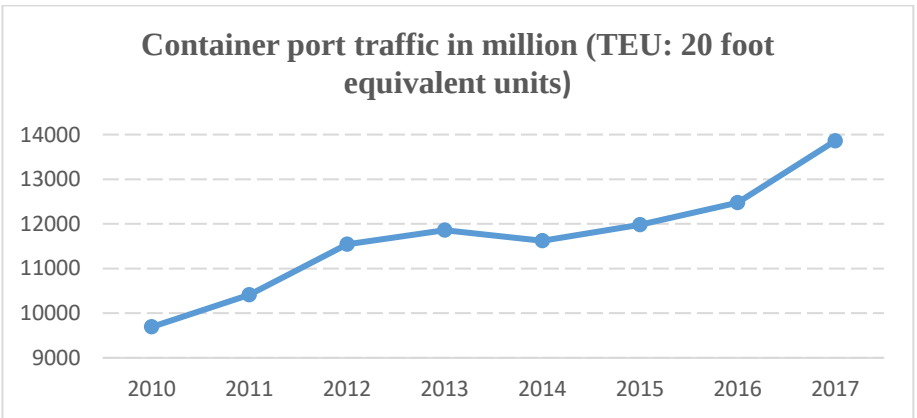

Figure 1.1. Indonesia container port traffic 2008-2017
Source: World Bank

One of the parameters that is used to calculate the efficiency of the container terminal, as the main reference in the port is import container dwelling time. Dwelling time is the amount of time that an import container sits at a marine terminal (terminal dwell time) or rail terminal (rail dwell time) before commencing its inland journey (Nicoll, 2007). So that container dwelling time means the time required from the start lifted the containers from the vessel until the container out of the port. The prolonged dwell time at a port may result in negative effects. According to Arvis & Rabaland (2010) dwell time will directly affect operational costs in the ports as it increases inventory levels and uncertainty in the dispatching process. On the other hand, dwell times have been

identified as an element for the competitiveness of the port and a factor in port choice related decisions (Magala & Sammons, 2008). Moreover, from the perspective of the shippers, decreasing port dwell times is one of the main goals in the port supply chain (Lee, Park, & Lee, 2003).

Table 1. Dwelling Time Terminal Petikemas Surabaya
Source: Pelindo III

RED LANE

Disc to Stack	Stack to Customs Clearance	Customs Clearance to Job Delivery	Job Delivery to Gate In	Gate In to Gate Out	Dwelling Time
0.02	3.47	1.18	0.81	0.04	5.53

■ Terminal Domain

GREEN LANE

Disc to Stack	Stack to Customs Clearance	Customs Clearance to Job Delivery	Job Delivery to Gate In	Gate In to Gate Out	Dwelling Time
0.02	1.88	0.83	1.08	0.04	3.84

■ Terminal Domain

QUARANTINE LANE

Disc to Stack	Stack to Customs Clearance	Customs Clearance to Job Delivery	Job Delivery to Gate In	Gate In to Gate Out	Dwelling Time
0.02	2.67	0.80	1.27	0.05	4.79

■ Terminal Domain

According to Pelindo III, per December 2018 the import dwelling time in Terminal Petikemas Surabaya has the number of 3.84 days on the Green Lane and 5.53 days on the Red Lane. If this number be compared with the other countries such as Singapore in which has dwelling time of 1.5 days, Hong Kong has dwelling time of 2 days, France has a dwelling time of 3 days, Los Angeles has a dwelling time of 4 days, Australia has dwelling time of 3 days, Port Klang, Malaysia has a dwelling time of 4 days, and Leam Chabang, Thailand has a dwelling time of 5 days (Artakusuma, 2012). Prolonged dwelling time will be affecting to the increment of Yard Occupancy Ratio (YOR), and it will result in no land for the container to be stacked from the berthing ship (Fajar, 2015). As dwelling time increased, then the logistical cost will increase as well.

As dwelling time has a significant effect on the efficiency of the port then the analysis in reducing dwelling time has to be conducted. Inadequate port capacity and navigational aids, bunching of vessels, limited cargo handling facilities, high downtime of equipment, low labor productivity and shortage of storage space, those factors contribute to the how long dwelling time will occur (Dowd & Leschine, 1990). Dwelling time also has a relation to the technical aspect in which the tools that are used in the terminal itself, including cranes and

trucks (Haerany & Adisasmita, 2017). This study will focus on the import container dwell time. The purpose of this study is to identify the major factor of prolonged dwell time in Terminal Petikemas Surabaya (TPS) in the unloading equipment or the technical aspect.

This research will use simulation as a method. The initial step of this research will determine the dimension of the ship as the sampling for the unloading scenario. Then the container unloading equipment will be chosen in the process of container discharging, cargodoring, and delivery stage. The selected equipment then will be modeled, and formation scenarios of this equipment will be created based on the available equipment at the terminal of Terminal Petikemas Surabaya. A simulation model is using Arena software based on existing condition then scenarios will be made in order to be compared, then being analyzed in order to find the least dwell time. Also, conclusion and recommendation will be offered in minimizing the dwell time in Surabaya Container Terminal.

1.2 Problem

The problem to be discussed in the research there are three, which are:

1. How to simulate a model of operation using a discrete simulation and compare between the real system and alternative model?
2. What are the factors that affect to the prolonged import dwelling time on its container handling equipment at the port?

1.3 Objectives

The Objectives of this thesis is as follows:

1. Simulate the model from a complex operation using a discrete simulation and compare between the real system and alternative model.
2. To know the factors affecting to the prolonged import dwelling time at the container terminal

1.4 Research Limitation

From the exposure of the problem statement above, the limitation of this research is:

1. The analysis in this research is limited for container terminal in Terminal Petikemas Surabaya
2. The process that will be assessed is only limited for import containers, the process starts from container discharging, cargodoring, until delivery
3. Multimodal transportation used in the form of trucks
4. The selection of container unloading equipment is only to determine the type and its amount
5. The data used is 2018 data

1.5 Benefits

The benefit of this Final Project is to provide a dwelling time analysis that can occur in Terminal Petikemas Surabaya (TPS), so it can be used as a consideration in reducing dwelling time. The author will then give a recommendation in order to reduce the dwelling time as dwelling time has a negative effect on port management and operation. The research also has a good benefit for academic purpose in order to give a reference for knowledge development in the process of the supply chain.

CHAPTER II
LITERATURE STUDY

2.1 Container Terminal

Container Terminal is a modal transfer (interface) land transport to unload the containers from the vessel then transported through the land transportation until it is brought out pier gate (Haerany & Adisasmita, 2017). When the ship arrives at the container terminal, the import containers need to be unloaded from the ship. As the growth of containerization, Port of Tanjung Perak also affected it. 10,000 TEUs – 15,000 TEUs can be served in the port. Such container ships must be unloaded quickly, with high-speed and giant container cranes, on a terminal and capable of handling the containers at the same rate as the cranes (Ibrahimi & Castilho, 1991).

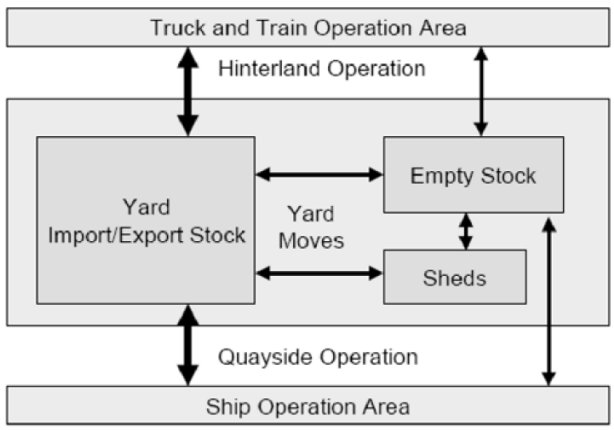

Figure 2.1. Container Terminal Flow
Source: (Steenken, Voß, & Stahlbock, 2004)

In the common container terminal, the unloading process will be done by Quay Cranes (QC), in which the crane will lift off the containers from the ship's hold or off the deck. Then QC will lift the container from the ship to the land transportation modes to transfer the containers to the stack to be stored for certain times. The stack has the number of lanes in which it has the configuration of bay, tier, and row to position the containers. The stack also facilitated by systems to transfer the containers itself. The system can be like Rubber Tyred Cranes or straddle carriers (SC) or Reach Stacker. A Rubber Tyred Crane can be used to transport containers or store them in the stack. The other transportation modes like a dedicated vehicle can also be used to transport containers. After a certain time of period, the containers from the stack need to be sent to the consignee. The crane will be used to lift off the containers from the stack then put it on the

vehicles like barges, deep-sea ships, trucks or trains to be carried out of the port gates to the consignees. The process can also be vice versa, to load the export container onto a ship (Vis & Koster, 2002).

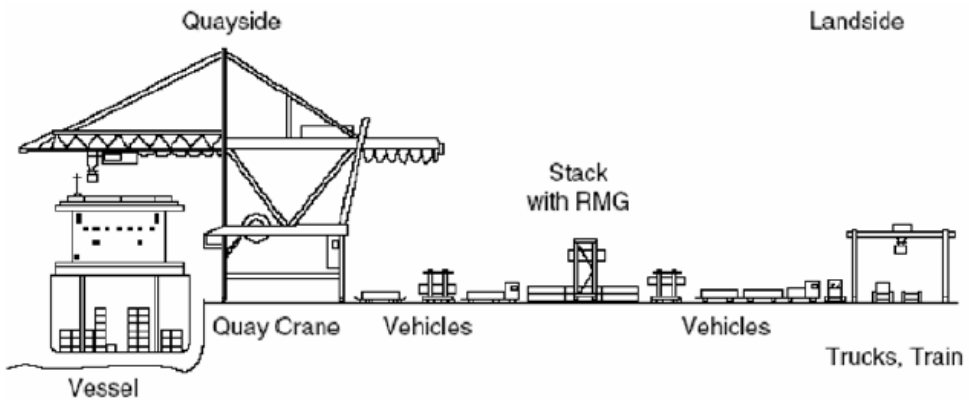

Figure 2.2. Handling Chain of a Container
Source: (Steenken, Voß, & Stahlbock, 2004)

2.2 Containers

The containers have standardized dimensions so that they can be loaded and unloaded, stacked, transported to long distances, and transferred from one transportation to another efficiently. Its transportation mode including container ship, rail transport, and truck. The growing use of internationally standardized containers has made enormous dramatic changes in ports, including the mechanized facilities. The mechanized system has made to handle containers in lifting such as crane and forklift. As containers have standardized dimension, the term twenty-feet-equivalent-unit (TEU) is used to refer to one container with a length of twenty feet. A container of 40 feet is expressed by 2 TEU (Vis & Koster, 2002).

The growth of containerization has impacted both goods transportation and port management tremendously. The growth of the container trade in TEU (Twenty-foot Equivalent Unit) has been affected by economic growth as the growth of traded goods has approximately in line with the growth of GDP (Gross Domestic Product). The World Trade Organization (WTO) reports that the volume of merchandise trade rose by 1.3 percent in 2016. If we talk about value, global seaborne container trade is believed to account for approximately 60 percent of all world seaborne trade, which valued for around 12 trillion U.S. dollars in 2017.

As the shipping industry grow the usage of the container in transporting goods also increased as the demand for the type of transportation will increase throughout the years. The growth of global containerization can be seen in Figure 2.3 where it keeps growing in the last years.

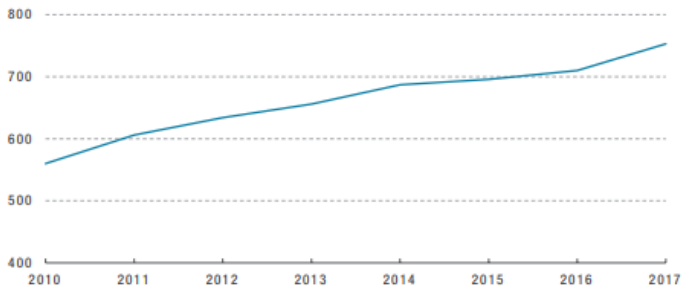

Figure 2.3. World Container Throughput 2010-2017 (millions 20-foot equivalent units)
Source: (UNCTAD, 2018)

According to (UNCTAD, 2018) throughout the years of 2015 and 2016 the containerization grew at 1.1 per cent and 3.1 per cent, on the other hand, container market conditions improved in 2017, and significant growth in volumes was recorded across all routes. World containerized trade volumes have shown its growth by a strong 6.4 per cent in 2017, the highest rate since 2011. World container throughput reached 753 million TEUs in 2017.

2.2.1. ISO Standard

The containers dimensions are standardized by ISO Standard. There are five common standard lengths: 20ft (6.10m), 40ft (12.19m), 45ft (13.72m), 48ft (14.63m), and 53ft (16.15m). Twenty-foot equivalent units (TEU) is commonly used to express container capacity (Elentably, 2016). Table 3 explains the summary of the container dimension.

Table 2. Container Dimension
Source: (Elentably, 2016)

20 Foot Container = 1 TEU		
Length:	20ft	6.09m
Width:	8ft	2.44m
Height:	8ft 6in	2.6m
40 Foot Container = 2 TEU		
Length:	40ft	12.18m
Width:	8ft	2.44m
Height:	8ft 6in	2.6m

2.3 Dwell Time

Port terminal capacity has the definition as the amount of cargo that can be handled by a port per time period (Bassan, 2007). As the number if stacking containers is estimated as a function of container dwell times, and other factors such as storage capacity at the yard (Gaete, González-Araya, González-Ramírez,

& Astudillo, 2017). Container dwell time measures the total time spent on removing containers, from the time a vessel arrives in port to the point when the container leaves the port premises (World Bank, 2015). An analysis that has been conducted by Raballand et al. (2012) of dwell time at the ports in Sub-Saharan Africa has results highlighting that dwell times in that ports are more than 2 weeks, and it affects to sort of dispersion which increases the inefficiencies of port operations and, in result, total logistics costs.

Dwell time influenced by two aspects, which are the technical aspect and non-technical aspect. As the non-technical aspect has resulted in administrative processes related to various checking requirements. The port facilities and infrastructure do influence the speed of unloading the container as stead of the technical aspect. The technical aspect of container dwell time is related to the loading and unloading equipment, starts from container unloaded onto the apron, the truck into the yard, in the container yard, and the container out of the port gate (Haerany & Adisasmita, 2017). According to Chen et al (2000), the storage density in the container yard is the effect of unproductive movements during ship loading and unloading operations. This density related to the number of containers stacked in the yard and ground slots of storage that is used. Moreover, their findings also show that housekeeping moves represent the majority of unproductive moves that have been done.

2.3.1. Dwell Time by Countries Outside Indonesia

Because of dwell time is a vital measurement in the efficiency of a port, so various ways have been implemented in reducing the dwell time in the sort of countries.

- Port of Virginia, USA
  In 2015, a port of Virginia grew the size of its chassis pool nearly 1500 units or a 10 percent increase compared to the previous year. The larger pool allows trucks to more quickly access the appropriate container to be loaded. Moreover, the empty container yard located adjacent to the marine terminals. Therefore, it able to cut the truck turn time roughly in half compared to a trip onto terminals. At the Virginia International Gateway, the rail container has been expanded to provide 308 additional space for containers arriving from or awaiting movement by, rail to provide the flexibility.

- Jawaharlal Nehru Port Trust, India
  Jawaharlal Nehru Port Trust (JNPT) has decreased its dwell time by implementing a Direct Port Delivery (DPD) scheme. DPD makes the delivery of the container go through from the port to importer's warehouse directly instead of initially holding it at a Container Freight Station (CFS). This method has made importers can reduce the customs clearance time by clearing containers directly from the

port. The scheme has made overall dwell time in November 2015 decreased from 2.91 days to 2.53 days in the same month a year ago.

- Port of Singapore, Singapore
  In 2005 port of Singapore has reached import dwell time for 0.85 day for transshipment. At the same year, total containers handled was 23.2 million TEUs. The work process of Port of Singapore has been digitized with the entire operation and management of terminals has conducted with Electronic Data Interchange (EDI) environment. The technology ensures that there is no paper and human interface transaction. The whole documents required of a container processed by EDI and planning begins 72 hours before a vessel arrives. The fully automated process linked electronically to the port's computerized system called Portnet.

- Port of Rotterdam, Netherlands
  The dwell time in Port of Rotterdam reached 4 days. As the information exchange in the port has been completed computerized using EDI, so the information exchange is paperless. All payments are also done electronically. Under the European Union Customs formalities, Customs clearance is no need to take place at the port, it may be done beyond the port premises.

- Douala International Terminal, Sub-Saharan Africa
  The container dwell time in Douala International Terminal (DIT) exceeds around 20 days from 2005 until 2009. From a customs clearances side, the two main components for a long dwell time are time between ship arrival and lodging of declaration, and time between payment of customs dues and gate exit. To distinguish the dwell time contributors, there is operational dwell time (physical operations), transactional dwell time (customs clearance) and discretionary dwell time (storage). According to (Aminatou, Jiaqi, & Okyere, 2018) that in Douala Port, operational (2-3 days) and transactional (2-4 days) dwell times are tend to be limited, in which that most contributor of the dwell time can be attributed to discretionary time by the C&F or the shippers.

2.3.2. Dwell Time in Surabaya Container Terminal (TPS)

The dwelling time in container terminal TPS is divided into three stages. Starts from the container unloaded from vessel to the apron then delivery to be stacked in Container Yard (CY) then the delivery from stack to customs clearance (pre-customs clearance), customs clearance to job delivery, then the job delivery to out of the port gate (post-customs clearance). The customs clearance including

the documents verification, tax payments, physical inspection, and other customs inspection. The document inspection is described as below:

- **Pre-Custom Clearance**
  Pre-custom clearance is the time required as the container being unloaded from the vessel until the custom submitting for documents of notifications for import goods or Pemberitahuan Impor Barang (PIB).

- **Custom Clearance**
  Customs clearance is the process of administration documentation, tax payment, and other required documents for import goods. The time of customs clearance starts from PIB acquired until the letter of approval for issued goods or Surat Persetujuan Pengeluaran Barang (SPPB) has approved.

- **Post-Custom Clearance**
  Post-custom clearance is the process when the SPPB acquired until the import goods embark from container yard and leaving the port gates.

The author will focus on Pre-Custom Clearance and Post-Custom Clearance where the container is unloaded from vessel to the apron, the delivery of the container to CY, the delivery from stack to customs clearance. The process of the import dwell time that occurred in Surabaya Container Terminal can be seen in Figure 2.4.

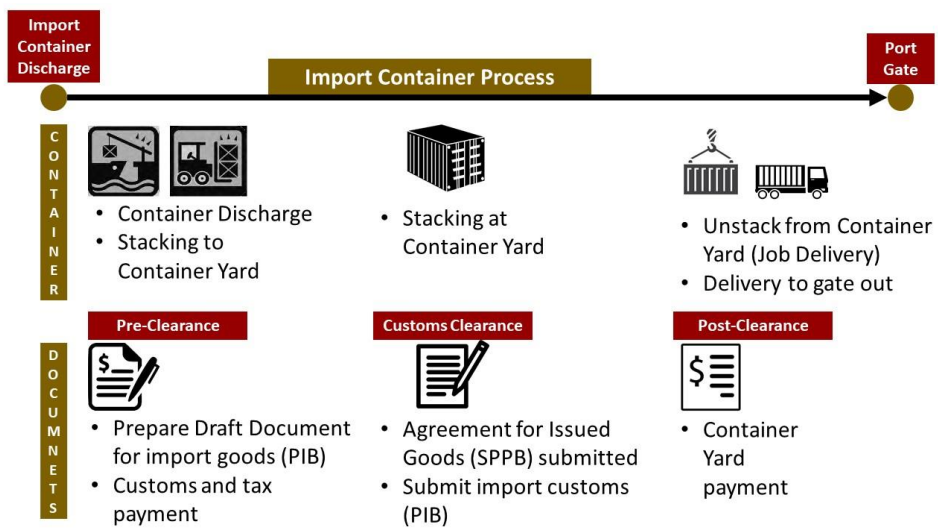

Figure 2.4. Dwelling Time Process in TPS
Source: (Fajar, 2015)

This study will conduct an analysis that will be focused on the technical aspect. Then this study will be focused on the equipment of unloading facilities that applied in the container terminal Terminal Petikemas Surabaya. To be more focused, the import container process that occurred in the Surabaya Container Terminal or TerminalPetikemas Surabaya (TPS) will be the material of analysis and improvement. The determination of pre-customs and the post-customs been selected to be studied because of the pre-customs and post-customs clearance stage is contributing the most time on average to the dwelling time of Terminal Petikemas Surabaya. It can be seen in Figure 2.5.

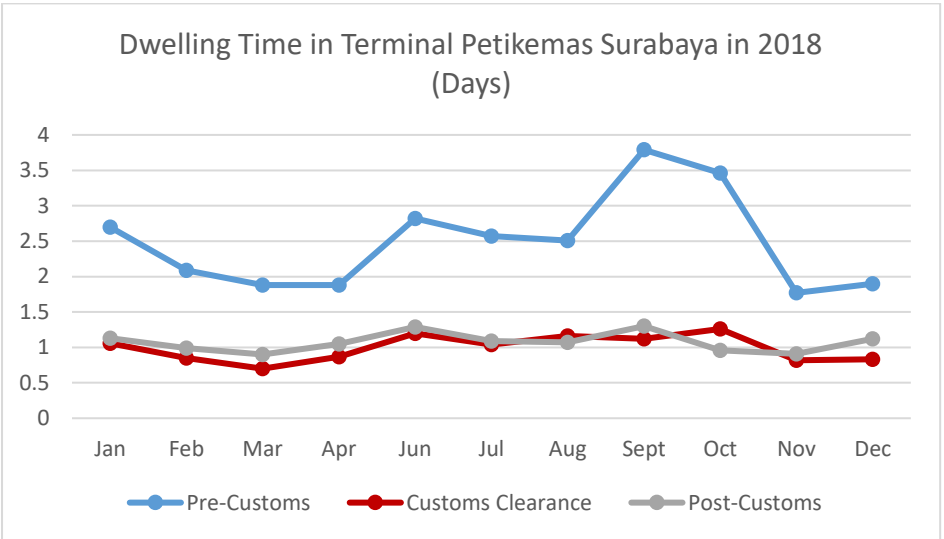

Figure 2.5. Dwelling Time in TPS in 2018
Source: Pelindo III

From Figure 2.5, the average of Pre-Customs Clearance in container terminal Terminal Petikemas Surabaya throughout 2018 is 2.28 days and the Post-Customs Clearance is 0.98 days. Meanwhile, the average of Customs Clearance is 0.91 days. It can be concluded that Pre-Customs and Post-Customs stages are the most contributors for the dwell time that occurred in Surabaya Container Terminal. So that these factors have become an important thing to be analyzed. Merckx (2005) has estimated the dwell time impact on the capacity of a terminal based on a sensitivity analysis, by creating five scenarios with different container types and dwell times. The analysis from the author will be different, which will be focused on the container handling equipment.

2.4 Ship Unloading Types

The time that spent by containerships or transportation trucks in marine container terminals for unloading their cargo is a cost scenario that affects both the smooth operation of ports and the overall cost of container trade (Nooramin

& Moghadam, 2012). Usually, the crane is the common facility available in the container terminal to mobilize containers. The cranes that available in Terminal Petikemas Surabaya including Ship to Shore (STS) Crane, Harbour Mobile Crane, and Rubber Tyred Gantry Crane (RTG). Reach Stacker also available to transport containers within the yard or store containers to the stack in the container yard.

2.4.1. Quay Crane (QC)

Quay Crane is a type of large crane located at the dockside. This type of crane is being used to loading or unloading containers from the container vessel. In 2018, in marine container terminal Terminal Petikemas Surabaya, there are 5 units of QC with the capacity of 40 ton of each specification.

Figure 2.6. Ship-to-Shore Crane
Source: PT Terminal Petikemas Surabaya

2.4.2. Harbour Mobile Crane (HMC)

Harbour Mobile Crane (HMC) is a crane where this crane can be mobile because it has a wheel driven by the engine. It is usually used to unload the container from container vessel onto the apron. In Terminal Petikemas Surabaya there is 1 unit of Harbour Mobile Crane with the capacity of 100 ton in 2018.

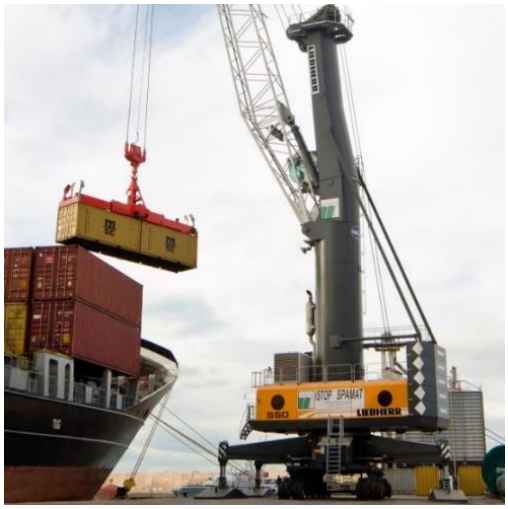

Figure 2.7. Harbour Mobile Crane
Source: Property of Liebherr

2.4.3. Rubber Tyred Gantry (RTG) Crane

Rubber Tyred Gantry (RTG) Crane is usually located at the container yard. It is used to ground the container from container yard or stack the container from the truck. RTGs typically constructed with multiple lanes, and one of the lanes reserved for container transfers by trucks. In 2018, in Terminal Petikemas Surabaya there is 30 unit of RTGs with the capacity of 35 ton.

Figure 2.8. Rubber Tyred Gantry Crane
Source: Property of Konecranes

2.4.4. Reach Stacker

Reach Stacker is one of a kind of vehicle that is used to handling containers. Reach stackers are usually used to transport a container for a short distance without taking a lot of time and pile it in the stack. Reach stackers has higher flexibility and higher stacking capability compared to forklift trucks. The facility of Reach Stackers in Terminal Petikemas Surabaya is available for 6 unit with the capacity of 35 ton in 2018.

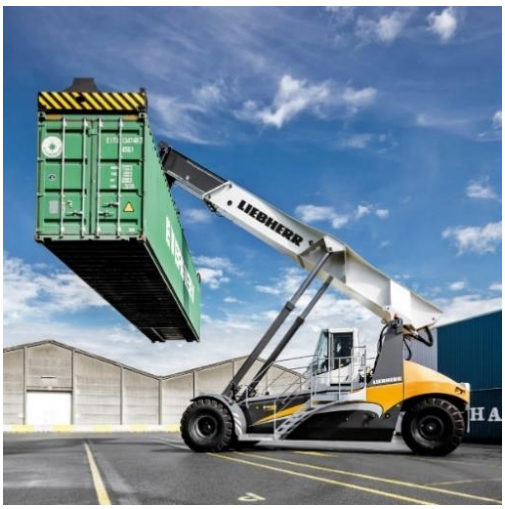

Figure 2.9. Reach Stacker
Source: Property of Liebherr

2.5 Terminal Petikemas Surabaya

Terminal Petikemas Surabaya (TPS) located in Port of Tanjung Perak, Surabaya, East Java. As the location in the east part of Indonesia, TPS has also called the Gate of Eastern Part of Indonesia. The location of TPS is directly connected to the freeway of Surabaya and railway. This strategic location creates a competitive advantage for this terminal in order to create connectivity for containers that managed to enter Java Island. Geographically, marine container terminal TPS located in the western part of Port of Tanjung Perak with the coordinate of 7;12; S, 112;40E, and at the edge of shipping line between Java Island and Madura Island through the length of 25 mils.

Figure 2.10. Terminal Petikemas Surabaya
Source: PT Terminal Petikemas Surabaya

Marine container terminal Terminal Petikemas Surabaya has contributed significantly to support Port of Tanjung Perak is the second busiest port in Indonesia. *PT Pelabuhan Indonesia III* (PELINDO III) or known as the Indonesian Port Corporation has reported in their annual report, reported that Terminal Petikemas Surabaya has created a positive growth for the container throughput. It is recorded that in 2018 container terminal in TPS has the number of 1,464,258 TEUs, where it gives a significant increment that is 5.67% compared to 2017's container throughput where it has the number of 1,385,689 TEUs. This growth also increased 6% from the target that has been set at the beginning of the year of 2018 in which 1,381,315 TEUs.

To support the operational activity inside the terminal, this marine container terminal has two docks including the domestic and international dock. The domestic dock has a length of 450 m, a width of 45 m and 7.5 m LWS for the water depth. Meanwhile, the international dock has the length of 1000 m, the width of 50 m, and 10.5 m LWS for the water depth. Besides, TPS has been equipped with a sort of facilities in handling containers including cranes. The type of cranes that available are Rubber Tyred Gantry Crane, Harbour Mobile Crane, and Ship-to-Shore Crane. Other facilities in handling containers including 75 unit of trucks and 6 unit of reach stacker. Marine container terminal Terminal Petikemas Surabaya also has adequate infrastructure in storing containers with the 45 Ha of Container Yard and 1 Ha of Container Freight Station.

The summary of facilities that are available in Surabaya Container Terminal or Terminal Petike3as Surabaya can be seen in Table 3 and the sort of equipment that are available can be seen in Table 4.

Table 3. Facilities in Terminal Petikemas Surabaya in 2018
Source: Pelindo III

Dock	**Length**	**Width**	**Water Depth**
Domestic	450 m	45 m	7.5 m LWS
International	1000 m	50 m	13.5 m LWS
Railway (2 track)	**Length**		
	420 m		
Behandle Area (Customs Clearance Area)	**Capacity**		
	1068 TEUs		
Container Yard	**Width**	**Capacity**	
Domestic	4.7 Ha	2029 TEUs	
International	35 Ha	32,223 TEUs	
Reefer Container Yard	**Export**	**Import**	**Reefer Plug**
	330 TEUs	882 TEUs	909 Plug
Container Freight Station	**Area**		**Dangerous Goods**
	10,000 m^2		6500 m^2

Table 4. Equipment in Terminal Petikemas Surabaya in 2018
Source: Pelindo III

	Unit	**Capacity**
Ship to Shore Crane	15	35 Ton
Rubber Tyred Gantry	30	35 Ton
Reach Stacker	6	35 Ton
Truck	81	N/A

2.6 Arena Software

The Arena is a simulation software to model generic ports operations. It will be used to create models of containers movement throughout the various way in handling the containers. It will be used in creating the simulation when the container arrives at the port and being handled by sort of facilities until it arrived at the container yard. It also will be used to create a simulation for post-customs clearance until the container out of the port gate. Several simulation models will be made and will be compared to find the least time of its operational process in order to decrease the dwell time in marine container terminal Terminal Petikemas Surabaya.

2.7 Performance of Cargo Services

The ability and speed of the implementation of cargo goods handling can be achieved from the activities of unloading cargo from the ship to the warehouse or stacking field or vice versa (Budiyanto & Gurning, 2007). Several factors can be done in calculating goods service container terminal performance:

1. Unloading Time

$$\text{t unloading} = t\ unloading + t\ preparation + t\ delay$$

2. The productivity of a crane can be defined by Box/Crane/Hour (B / C / H) where it is the amount of charge in a box that is able to be moved by one unloading device or crane within one hour.

$$\text{B/C/H} = \frac{\text{Total Moves}}{\text{Working Time}}$$

3. The productivity of the berth can be defined by Box/Ship/Hour (B / S / H) where it is the amount of cargo in a box that can be moved in each shift in one hour.

$$\text{B/S/H} = \frac{\text{Total Moves}}{\text{Berthing Time}}$$

4. Container Yard Occupancy Ratio (CYOR)

$$\text{CYOR} = \frac{TEUs\ x\ Days}{\text{CY capacity x day in a year}} \text{x } 100\%$$

5. Total Container Dwelling Time

$$\text{TDT} = \text{tPreCleareance} + \text{tClearance} + \text{tPostClearance}$$

6. There also the calculation for container yard annual capacity developed by Dally (1983):

$$\text{Container Yard Area} = \frac{Cs\ x\ H\ x\ W\ x\ K}{\text{T x F}}$$

Cs: the number of container ground slot (TEU)
H: the mean profile height
W: the working slots (TEUs) in the container storage (0.8 – 0.9)
T: the mean dwell time (day)
F: the peaking factor (approximately 20 per cent)

2.8 Identify Cargo Handling Delay Time

Identification of delay in cargo handling can be obtained by conducting field surveys, direct interviews with workers and looking at the delay time data at Terminal Petikemas Surabaya. Preliminary research will be carried out on parties that are directly related to the loading-unloading of container process. The identification of problems that need to be obtained as follows:

1. The problem in ship movements (ship's arrival, berthing time, and ship's departure)
2. Problems with the unloading process
3. Problems with handling cargo from the dock to warehouse
4. Problems with the storage process in the warehouse

2.9 System

The system is a collection of several components or elements that operate simultaneously in order to achieve a goal.

2.9.1. System Components

1. Elements are objects observed in a system, these components or elements affect and are affected by other components or elements.
2. An attribute is a characteristic or characteristic of an element. Attribute values can follow certain elements whose values are specifically attached.
3. The activity presents an event that is carried out by an element within a certain time period. The period is very important because the simulation usually includes the amount of time. And this activity also in other words is a process that can cause changes in the system.
4. The state of the system is defined as a collection of variables - variables used to describe the system at any time.
5. A resource is a tool used to handle elements in a certain amount. Elements can move from one process to another in the system if the resource has seize-delay-release properties.
6. Control is the things that control the system, regulate how, where, and when the system activity runs.

2.9.2. Model

The model is a result of interpretation of a real system consists of logic combination and mathematics that takes into account. Those factors are influenced by the problem beforehand. The model itself must be done carefully and in detail, in order for the simulation model that obtained have a least different with the real one. In order to create a good model, the criteria are easy to understand, having clear objectives, contains clear problem solving, and easy to be controlled and manipulated by model users.

Modeling is the process of producing a model that is a representation of the structure and system that works. Verification and validation also need to be done to find out that the model made has no different from the real system. Verification

is the process of checking the data of whether the operational logic of the model is in suitability with the logic of the flow chart. Verification needed to check the translation of conceptual models into programming languages correctly (Law & Kelton, 1991). On the other hand, validation is the determination process of whether the model that has been made is in accordance with the real system being modeled (Law & Kelton, 1991).

The purpose of system modeling:

1. Shorten the trial time.
2. Can widen time according to expected input data other than actual conditions.
3. Minimizes the resources that must be spent.
4. Smaller risk.
5. Explain, understand and improve the system.
6. Knowing the performance and information shown by the system.
7. Can monitor various sources.
8. Can be stopped and run again without affecting the input data that has been obtained.
9. Easy to reproduce.

2.10 Simulation

The simulation will be used to improve the performance of dynamic and complex systems like intermodal container terminals. The simulation will help imitate the port operations and provide predictions of outcomes and performances. The various scenarios will be made in order to analyze the performances outcome and the baseline of improvement recommendations.

2.10.1. Discrete Simulation

Discrete systems are state variables which only change at the set point. The model of this system exists when the state variable changes in a discrete-time set. Discrete event simulations regarding system modeling are events that exceed representative time where state variables change instantly and separately per time point. It is called a system that can change only in numbers that can be calculated per time point in the mathematical language. The time point here is the form of an event that occurs immediately and can change the state of the system. Events that occur in random time intervals. According to (Fishman, 2001), there are seven concepts that embody in the discrete-event system:

- Work
- Resources
- Routing
- Buffers
- Scheduling
- Sequencing

- Performance

Work means for items, jobs, etc. that is in the system seeking service. Resources include equipment, conveyances, and manpower that can provide the services. Route means for the collection of required services in each unit or batch of work, and the order of services that need to be done. Buffers are capacity that holds work awaiting service. Scheduling means for the pattern of resources availability. Sequencing denotes for the order on which resources provide services to their waiting work.

2.10.2. Simulation Process

Some steps are taken in the simulation process (Law & Kelton, 1991), are:

1. Determination of limits and identification
2. Study planning of both primary and secondary data
3. Building the system
4. Model designing in accordance with the charts
5. Verification and validation

   Verification is examining the translation of conceptual simulation models (flow diagrams, constraints, and assumptions) into the programming language correctly, aiming to ensure that the model that has been created can be run (Law & Kelton, 1991). While validation aims to ensure that the model is in accordance with existing real conditions (Law & Kelton, 1991). The *interval estimates* will be used in the process of replication and its validation. Where the half-width needs to be discovered at the first hand with the equation of:

$$hw = \frac{(t_{n-1,a/2})s}{\sqrt{n}}$$

   Then the *Absolute Error (β)* will be used to determine the error with the equation of:

$$\frac{\left(t_{n-1,\frac{a}{2}}\right)s}{\sqrt{n}} \leq \beta$$

   If $hw > \beta$ then another replication needs to be done by using the formula of:

$$n' = \left[\frac{\left(z_{\frac{\alpha}{2}}\right)s}{\beta}\right]^2$$

   If the number of n'has been discovered, then simulation needs to be done as many as $n'$and iterative process needs to be done until $hw \leq \beta$
6. Simulation analysis
7. Model interpretation by comparing each scenario
8. Documentation

2.10.3. Simulation Results

On this stage, the analysis will be done for the output of the existing model simulation include another scenario model, which are:

1. Unloading process for import container in the container yard
2. Cargo throughput in Terminal Petikemas Surabaya
3. Service time and dwelling time in Terminal Petikemas Surabaya
4. The comparison between scenarios

2.11 Root Cause Analysis (RCA)

In choosing an RCA framework, the comprehensiveness, academic citations, and availability must put into concern. Based on that, this study chose to follow the seven-step RCA process proposed by Andersen and Fagerhaug (2006). The steps in this framework can be seen in Figure 2.11. Each step consists of a set of tools to produce the results needed, whereas the seventh step is outside the scope of this study.

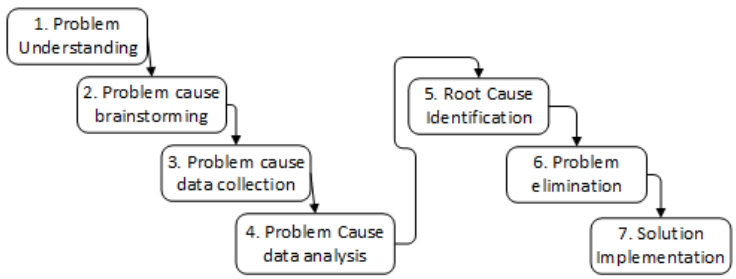

Figure 2.11. Seven Step Process of RCA
Source: (Andersen & Fagerhaug, 2006)

The following are the explanations of the RCA steps that will be taken in this study.

1. **Problem Understanding**
   The goal of this step is to understand the problem and prioritize the issues. The field observation and interviews are used to have a better understanding of the issues.
2. **Problem Cause - Brainstorming**
   The goal of this step is to cover other possible issues that may have to cause the problem. On this step, the unstructured Brainstorming, which is a technique where the verbally suggested all possible causes they could think of by an open-ended question, which the results of these will be noted and summarized.
3. **Problem Cause Data Collection – Data Analysis & Interviews**
   This study will use the primary data in which the breakdown data of dwelling time inside container terminal. From the primary data, the author will only focus on the major problem to make a mutually exclusive and completely exhaustive problem identification. And secondary data in which

interviews as the data collection approach as the study required an in-depth understanding of the root problem of the dwelling time. The interviews were conducted in a face-to-face and were designed with open-ended interview questions for sharing knowledge about the problem. The interview subjects were focusing on the stakeholders who directly involved in the container terminal operations.

4. Problem Cause Data Analysis

For Descriptive analysis of continuous type questions, the author applied the median as the primary measure of central tendency. The IBM SPSS software then will be used for the statistical analysis. The questionnaire had several open-ended questions which the answers are treated by listing and categorizing the responses. The Bivariate analysis is done to do the analysis of analyzing the questions. Ten questions also made in Likert-scale to define the measurement of the event occurred and the uncertainty. The author also analyzed the median together with an analysis of scale, standard deviation, and variance. The author used Pearson two-tailed Correlation test to reveal relationships between pairs the variable as this test does not assume normality in the sample.

5. Root Cause Identification

The goal of this step is to discover the root cause(s) of the problem. At this step, the author applied the Problem Tree (Snowdown et al, 2008) as can be seen in Figure 2.12 which is a tool for identifying the causes of a big problem, together with the causes/factors influencing the problem. The results from this process should map to the problem.

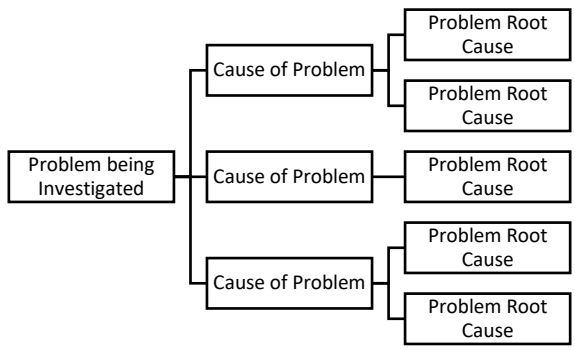

Figure 2.12. Problem Tree
Source: (Snowdown et al, 2008)

6. Problem Elimination

The end goal of this step is to offer solutions to deal with the root causes of the problem. According to Andersen and Fagerhaug, the primary two types of tools for drafting treatments; first, design the solution to stimulate creativity for new solutions, second, is designed for developing solutions.

CHAPTER III
METHODOLOGY

3.1 General

The structured methodology will be taken place in this bachelor thesis. For the step-by-step process of the study of An Analysis of Container Dwell Time at Container Terminal by Using Simulation Modelling will be described as figure 3.1.

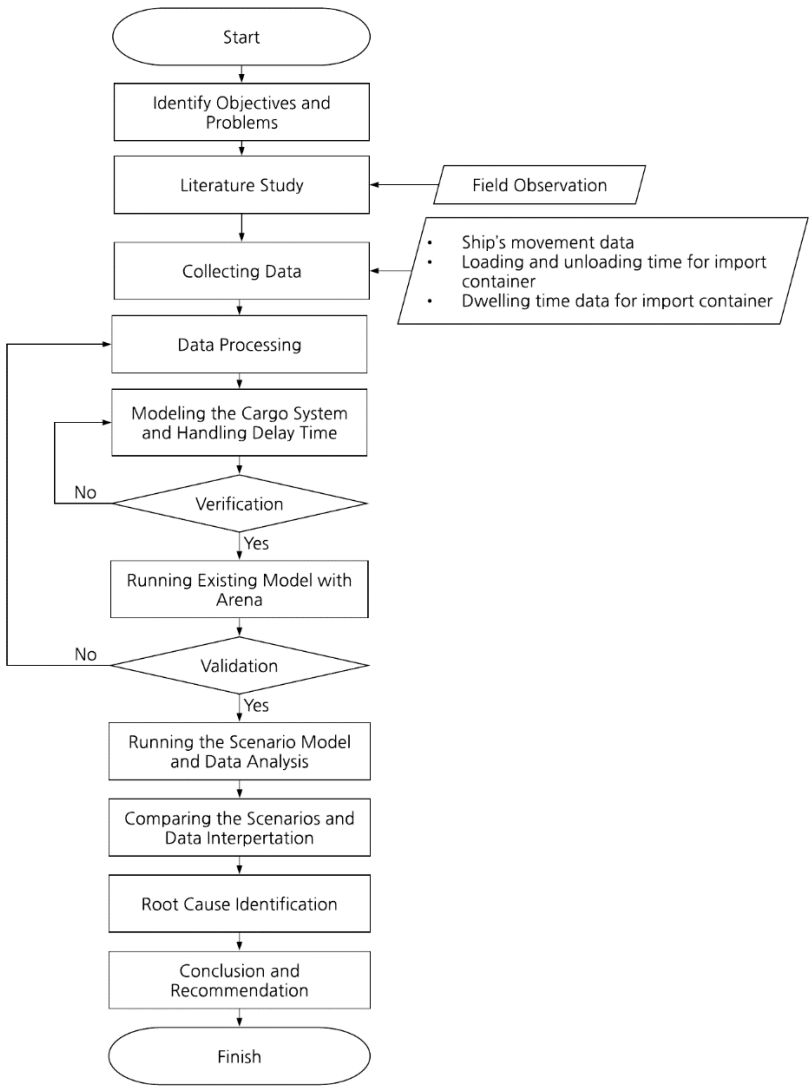

Figure 3.1. Methodology Flowchart

3.2 Identify Objects and Problems

The idea was coming up from the prolonged dwell time that occurred in Indonesia ports. The author deep down into a specific port in Indonesia in which Terminal Petikemas Surabaya that located in the city of Surabaya, Indonesia. According to the data that has been published by Pelindo III, in handling the import container in the Terminal Petikemas Surabaya per October 2018 was required until 5.53 days. The number is relatively low compared to the other Asia countries like Singapore in which has dwelling time of 1,5 days and Hong Kong has dwelling time of 2 days (Artakusuma, 2012). Therefore, this study will be focusing on the dwelling time simulation and modeling in order to find the recommendation of which how the dwell time could be decreased.

3.3 Literature Study

At this stage, the author will identify the existing problems by doing a literature study that will be done by reading some references that sourced from journals and papers that related to dwelling time and other relatable topics.

3.4 Collecting the Data

At the Collecting the Data stage, there will be data gathering activity in which will be obtained from PT Terminal Petikemas Surabaya. The data that will be needed in this study are:

1. Ship's movement data (arrival time, berthing time, and departure time) of a container ship at 2018
2. Unloading time in Terminal Petikemas Surabaya
3. Dwelling time data of import container in 2018

Interviews with related stakeholders and field observations are being done to know the deep understanding about the problem of dwell time inside the Terminal Petikemas Surabaya

3.5 Data Processing

The data processing process is the next stage after the data collected from PT Terminal Petikemas Surabaya. The data will be processed into data needed as a consideration in determining the simulation model of Terminal Petikemas Surabaya.

3.6 Modelling the Cargo System and Handling Delay Time

In this stage, modelling the cargo handling will be done. The existing data from PT Terminal Petikemas Surabaya will be used for the initial cargo handing modelling. As the cargo handling system has been modelled, the analysis of the delay time needs to be identified as the data has been modelled.

3.7 Verification

This verification has a purpose to ensure that there is no mistake in the model that has been designed. If there's no error in the model that the study can proceed into the next stage of the methodology.

3.8 Running Existing Model with ARENA

After the verification process, then the existing modelling will be done using simulating that made with ARENA simulation software which based on the flow diagram of the cargo handling process. The simulation will identify the dwell time of each existing scenario.

3.9 Validation

The validation process will be conducted to find out whether the model made is able to represent the real system that studied. This validation will be done by comparing the model output. A model is valid if the comparison result between the simulation model and the real model has no difference. So that this validation has a goal to make sure that there is no assumption and strengthen the confidence level of the model itself.

3.10 Running Scenario Model and Data Analysis

After the existing model has been made, then designing and running the scenario model will be done, where the output of this scenario is to conduct an analysis and determining the least dwelling time.

3.11 Comparing the Scenarios and Data Interpretation

At this stage, the analysis of the model simulation output will proceed on both existing and other scenario models. The scope of analysis will be

1. Each scenario output comparison
2. Problems in the unloading process
3. Problems in handling the container from the dock to container yard
4. Problems in handling the container from the warehouse to out of the port gate (delivery)

3.12 Root Cause Analysis

Root Cause Analysis (RCA) is related a broad range of approaches, tools, and techniques to uncover causes of issues, ranging from standard problem-solving paradigms, business process improvement, benchmarking, and continuous improvement (Andersen & Fagerhaug, 2006). A framework is being used to uncover the root of problems inside the prolonged dwell time inside the container terminal.

3.13 Conclusion and Recommendation

The result of this Bachelor Thesis will be described at this stage. The conclusion will be the result of the analysis that has been conducted. The best recommendation of the scenario will be provided as the least dwell time in the simulation has been identified. Then the advice of this proposal will be given so that in the future this research study can be improved.

CHAPTER IV
DATA PROCESSING AND SIMULATION MODELING

4.1.General Description

Simulation modeling in this bachelor thesis is using Discrete Event Simulation (DES) to create the model of the container handling process at the container terminal. Simulation modeling that will be carried out at this bachelor thesis is a comparison of number of cranes in handling activities at Terminal Petikemas Surabaya so that the optimum number of each type of container handling equipment can be identified then the output will be the optimum state of terminal service performance that based on the service time or the speed of unloading resulted then Container Yard Occupation Ratio (CYOR) can be calculated to determine the how productive the container terminal is.

4.2.Data

The data that will be used to create considerations in obtaining accurate results needed is the secondary data obtained from the container terminal of Terminal Petikemas Surabaya. The data that will be used as the research object is general data from the name of the ship, size of cargo (in TEUs), unloading time, truck delay, crane delay, and discharging rate.

Table 5. Summary of Time Consumed in Container Discharging at PT TPS
Source: PT Terminal Petikemas Surabaya

Month	Disc to Stack	Stack to Customs Clearance	Customs Clearance to Job Delivery	Job Delivery to Gate In	Gate In to Gate Out	Total Dwelling Time
January	0.02	2.66	1.06	1.1	0.03	4.86
February	0.02	2.07	0.85	0.95	0.04	3.92
March	0.02	2.04	0.7	0.87	0.03	3.47
April	0.02	2.10	0.87	1	0.05	3.8
May	0.02	2.37	0.92	1.11	0.06	4.31
June	0.02	3.37	1.2	1.24	0.05	5.31
July	0.02	2.63	1.04	1.04	0.05	4.7
August	0.02	2.70	1.16	1.03	0.04	4.73
September	0.02	3.88	1.12	0.99	0.04	5.94
October	0.02	8.32	1.26	0.93	0.03	9.68

Month	Disc to Stack	Stack to Customs Clearance	Customs Clearance to Job Delivery	Job Delivery to Gate In	Gate In to Gate Out	Total Dwelling Time
November	0.02	2.06	0.82	0.87	0.04	3.5
December	0.02	1.88	0.83	1.08	0.04	3.84
Average	**0.02**	**3.01**	**0.99**	**1.02**	**0.04**	**5.08**

Terminal Domain

It can be seen from Table 5 that the average dwelling time or the time consumed for a container being removed from the time a vessel arrives in port to the point when the container leaves the port premises for the container in Terminal Petikemas Surabaya from January until December 2018 is 5.08 days. As the government regulations of Ministry of Transportation that stated in Nomor PM 25 Tahun 2017 in Article 2 Paragraph 1 explains that the maximum time of transfer goods which related to a long stay at the port must not exceed than 3 days. It can be concluded that the time consumed in container handling in Terminal Petikemas Surabaya is exceeded the ratified regulation. This happens because there are some delays that affect the current container handling process, such as lack of utilization of transportation modes and problems with cranes.

Table 6. Summary on Container Discharging
Source: PT Terminal Petikemas Surabaya

2018		
Month	**Number of Ships**	**Total Boxes**
January	89	30,860
February	88	34,408
March	90	37,381
April	93	42,846
May	95	44,618
June	77	32,066
July	87	45,774
August	85	41,754
September	88	43,691
October	57	27,088
November	86	43,970
December	89	46,833

2018		
Month	**Number of Ships**	**Total Boxes**
Total	**1024**	**471289**
Average	**85.3**	**39274.1**

The data that will be used for the simulation model is data from Terminal Petikemas Surabaya, the detail of its data can be seen in Table 6. The total container throughput for the import is 39,274 boxes. The data that will be used will focus on the container throughput, ship's call, container's crane's performance including STS and RTG, and the multimodal transportations in which truck.

Table 7. Crane Performance
Source: PT Terminal Petikemas Surabaya

Month	**B/S/H**	**GMPH**	**Vessel Working Time (hour)**
January	36.6	27.28	17.3
February	39.27	27.95	19.6
March	37.54	27.58	18.5
April	48.95	26.01	17.3
May	42.73	25.86	21.4
June	47.34	28.34	19.2
July	45.53	25.99	23.1
August	49.32	29.44	23.1
September	49.53	29.53	20.0
October	52.3	30.27	18.48
November	47.95	29.33	21.24
December	45.25	28.8	22.05
Total	**542.3**	**336.4**	**241.2**
Average	**45.2**	**28.0**	**20.1**

Table 7. Described the crane performance in Box/Ship/Hour or B/S/H. The average time of B/S/H is 45.2. Gross moves per hour (GMPH) that focus on a crane's ability to move containers over the quay wall each hour at the number of 28 on average. The average vessel working time is 20.1 minutes or 0.013 days. While Box/Ship/Hour at Terminal Petikemas across 2018 is 45.2 on average.

Table 8. Type of Container in Box
Source: PT Terminal Petikemas Surabaya

2018				
Month	**Full Container (Dry)**	**Empty Container**	**OH/OW**	**Reefer**
January	22,081	1,795	112	6,872
February	26,900	3,114	110	4,284
March	27,854	3,995	120	5,412
April	31,246	3,129	145	8,326
May	28,985	2,482	113	13,038
June	18,633	1,325	125	11,983
July	29,497	3,158	183	12,936
August	32,457	2,665	104	6,528
September	34,800	2,178	137	6,576
October	17,710	1,660	59	7,659
November	32,608	4,492	158	6,712
December	34,232	1,581	136	10,884
Total	**337,003**	**31,574**	**1,502**	**101,210**
Average	**28,084**	**2,631**	**125**	**8,434**

Table 8. Described the type received by the terminal, which are the empty, dry, OH/OW, and reefer container. The total of Dry Container at the number of 337,003 boxes, Empty Container at 31,574 boxes, The Overweight/Overheight at 1,502 boxes and Reefer at 101,210 boxes.

Table 9. Yard Occupancy Ratio of 2018
Source: PT Terminal Petikemas Surabaya

Month	**YOR**	**Dwell Time**	**TRT (minute)**
January	44.63	4.82	29.73
February	40.52	4.06	31.72
March	35.47	3.65	31.72
April	51.59	4.04	37.44
May	57.36	4.39	40.80
June	57.80	5.88	35.67

Month	YOR	Dwell Time	TRT (minute)
July	68.45	4.78	38.06
August	65.86	4.94	34.20
September	63.24	6.05	33.34
October	48.13	10.56	29.94
November	45.20	3.81	32.50
December	53.38	3.96	37.23
Average	**52.63**	**5.08**	**34.36**

It can be seen from Table 9. that Yard Occupancy Ratio for import container in Terminal Petikemas Surabaya across 2018 has the average number of 52.63 in which the dwell time at the number of 5.08. While the time of ship arrival berthing at the dock until the ship finishes its unloading process or Turnaround Time is 34.36 minutes.

4.3.Surabaya Container Terminal (Terminal Petikemas Surabaya)

Terminal Petikemas Surabaya is a container terminal owned by PT Pelindo III has an international dock with a length of 1,000 meters, width 50 meters, and depth -13.5 meters. This terminal has services including container receiving, loading, unloading, and container delivery.

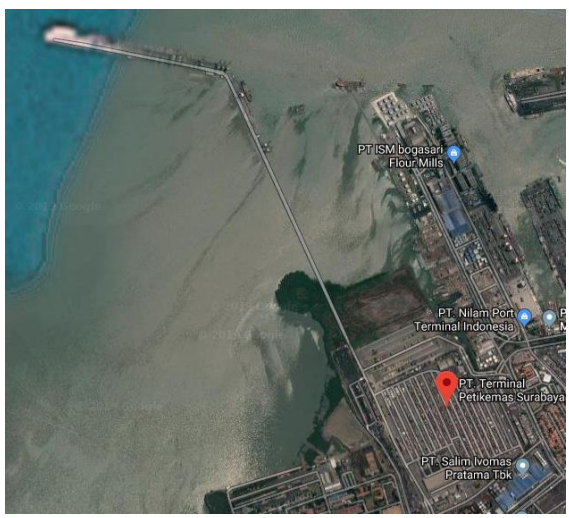

Figure 4. 1 Terminal Petikemas Surabaya Location
(Source: PT Terminal Petikemas Surabaya)

4.4.Container Yard

Marine container terminal Terminal Petikemas Surabaya has contributed significantly to support Port of Tanjung Perak is the second busiest port in Indonesia. PT Pelabuhan Indonesia III (PELINDO III) or known as the Indonesian Port Corporation has reported in their annual report, reported that Terminal Petikemas Surabaya has created a positive growth for the container throughput. It is recorded that in 2018 container terminal in TPS has a number of 1,464,258 TEUs, where it gives a significant increment that is 5.67% compared to 2017's container throughput where it has the number of 1,385,689 TEUs. This growth also increased 6% from the target that has been set at the beginning of the year of 2018 in which 1,381,315 TEUs.

The author will focus on the import container operational flow. The international dock has the length of 1,000 m, a width of 50 m and -13 m LWS for the water depth. Marine container terminal Terminal Petikemas Surabaya also has adequate infrastructure in storing containers with the 45 Ha of Container Yard and 1 Ha of Container Freight Station.

Table 10. Quay Crane Allocation at International Wharf
Source: PT Terminal Petikemas Surabaya

Berth	1	2	3	4
Number of QC	3	4	3	3

Terminal Petikemas Surabaya has the number 9 blocks at the yards in import international which each block is served by the RTG, while each block has 50-80 slots and 4 tiers. The capacity of the import blocks itself is 11,925 TEUs. With the number of trucks is 81, it has the function to transport container from the wharf to the container yard and vice versa.

Figure 4.2. Terminal Petikemas Surabaya Layout
(Source: PT Terminal Petikemas Surabaya)

4.5.Performance of Cargo Services

The ability and speed of the implementation of cargo goods handling can be achieved from the activities of unloading cargo from the ship to the warehouse or stacking field or vice versa (Budiyanto & Gurning, 2007).

1. The productivity of a crane can be defined by Box/Crane/Hour (B / C / H) where it is the amount of charge in a box that is able to be moved by one unloading device or crane within one hour.

$$\text{B/C/H} = \frac{\text{Total Moves}}{\text{Working Time}}$$

2. Container Yard Occupancy Ratio (CYOR)

$$\text{CYOR} = \frac{TEUs\ x\ Days}{\text{CY capacity x day in a year}} \text{x } 100\%$$

3. There also the calculation for container yard annual capacity developed by Dally (1983):

$$\text{Container Yard Area} = \frac{Cs\ x\ H\ x\ W\ x\ K}{\text{T x F}}$$

Cs: the number of container ground slot (TEU)
H: the mean profile height
W: the working slots (TEUs) in the container storage (0.8 – 0.9)
T: the mean dwell time (day)
F: the peaking factor (approximately 20 per cent)

4.6.Existing Simulation Model

The simulation model will be made based on the existing import operational model. This simulation model is made with the ARENA simulator and used as a reference model. There are several things that were put into consideration in making the simulation. Which are:

- Each block diagram in the conceptual model can represent each of the simulation block.
- Each simulation block must correspond sequentially according to the process flow at the conceptual model.
- All events that have the possibility to occur must be calculated to connect the process flow.
- Input and output data on computer models must be placed on the correct simulation block, according to the data flow in the conceptual model.
- The computer model must be able to run, so it is known that the logical structure of the model is represented correctly.

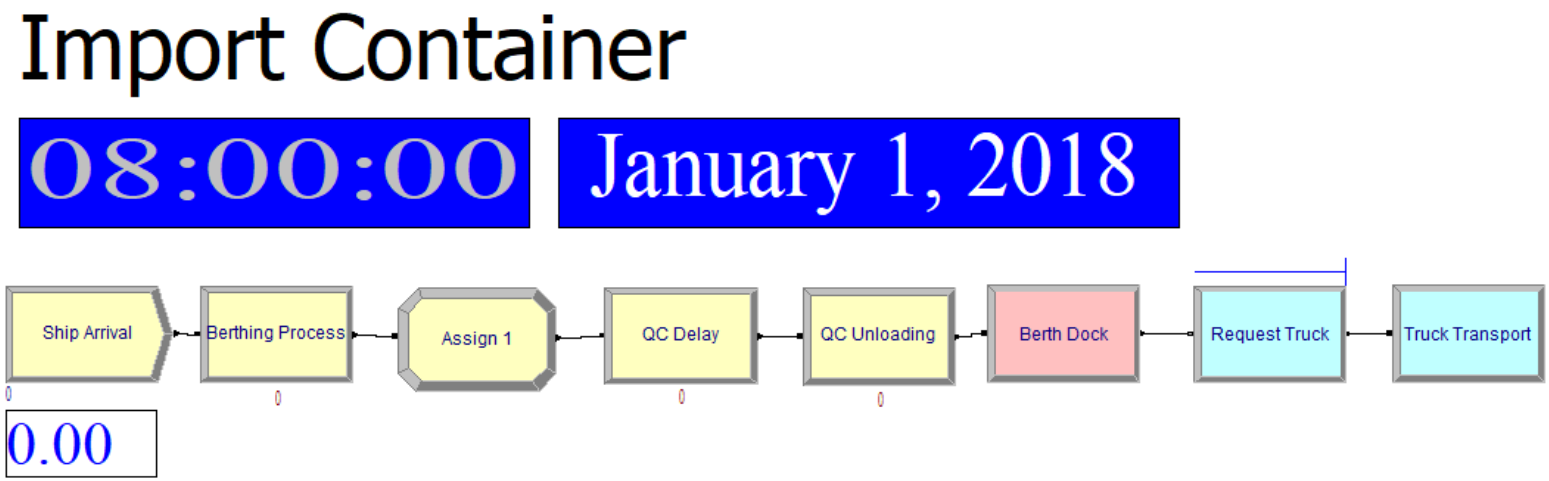

Figure 4.3. Existing Condition of Simulation Model from Vessel Berthing to Truck Request

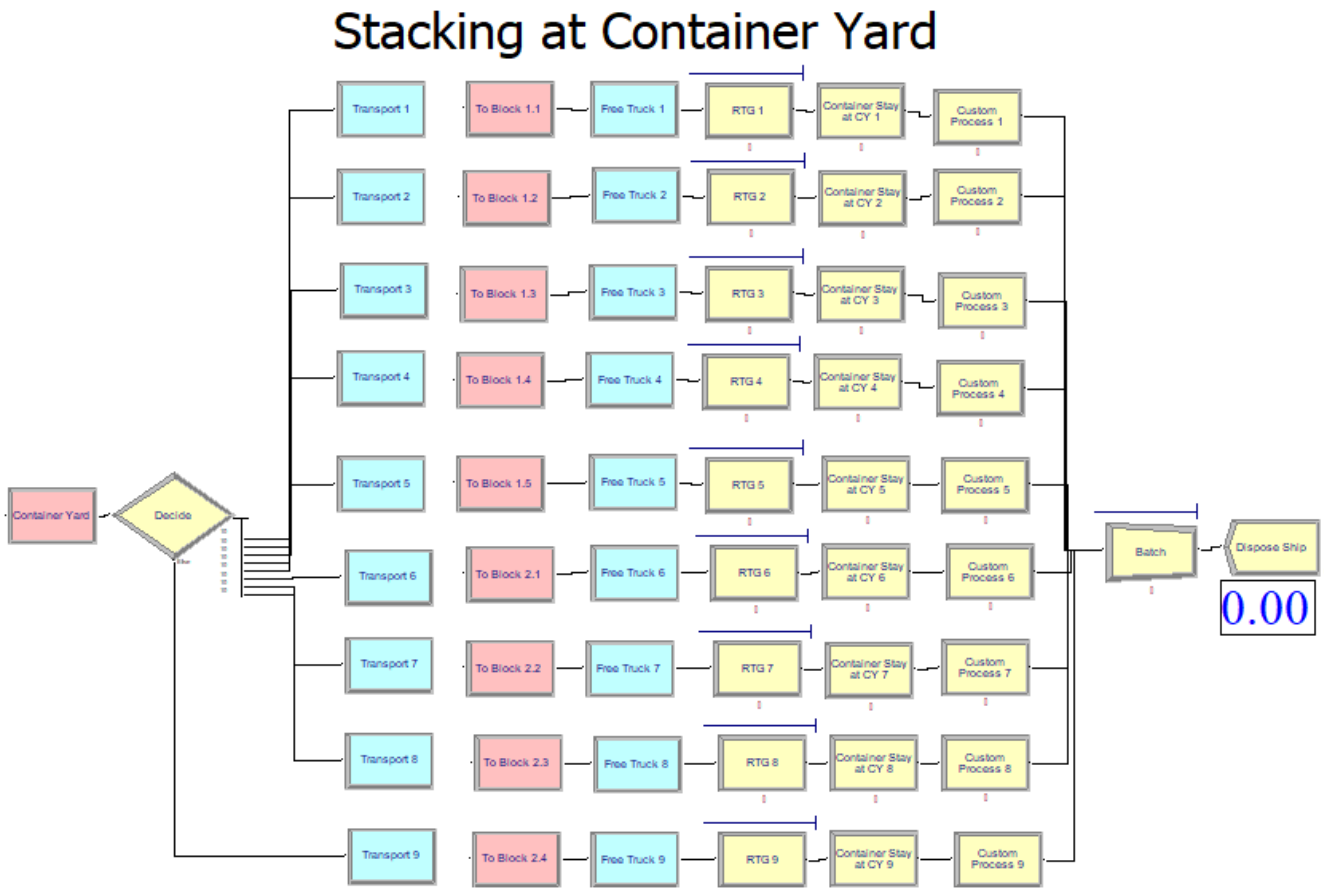

Figure 4.4. Existing Condition of Simulation Model in Container Yard

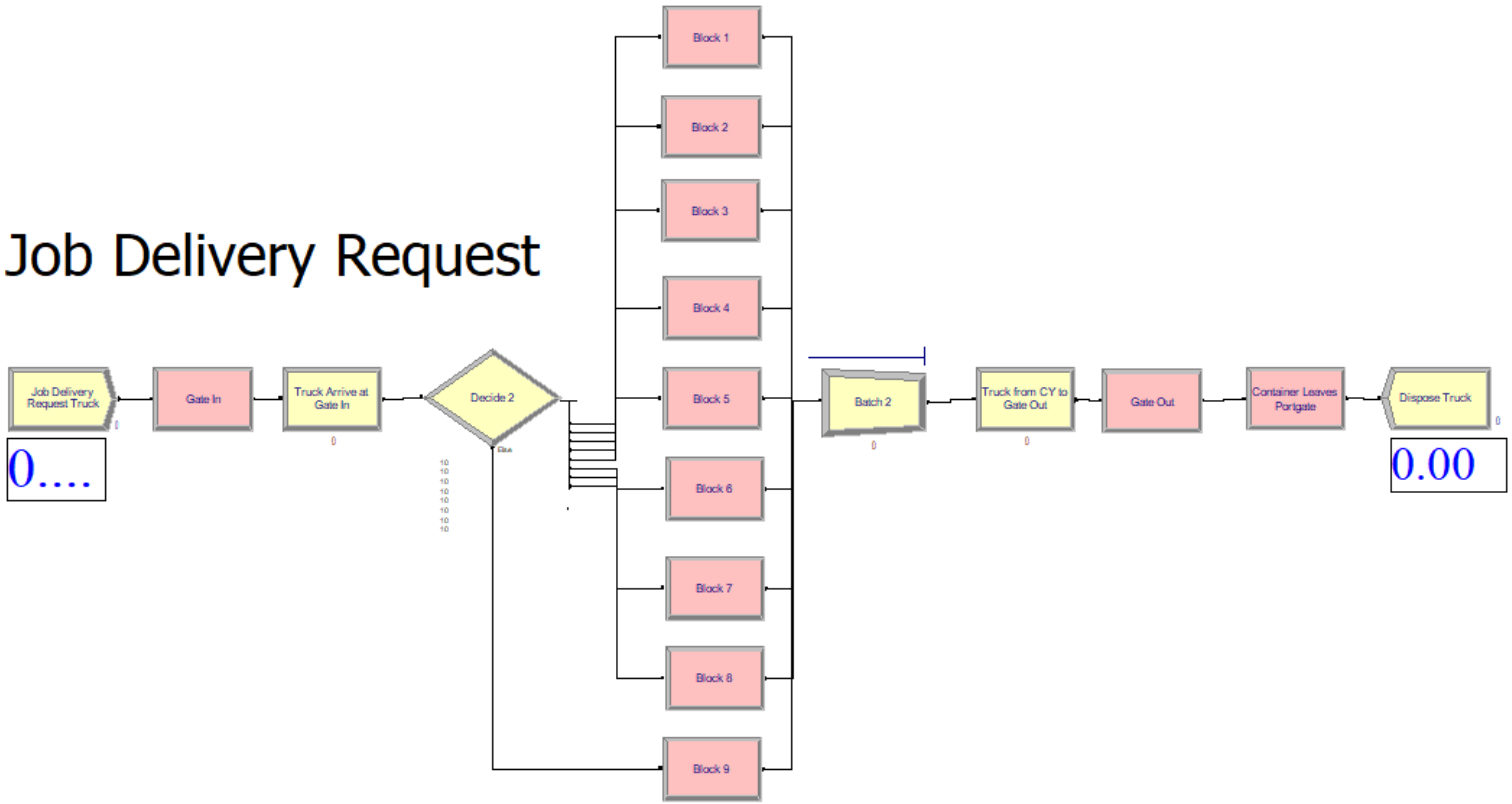

Figure 4.5. Existing Condition of Simulation Model of Port Gate

4.7.Validation

4.7.1. Existing Data Distribution

The probability data distribution that has been collected must be known. In this thesis, the data distribution will be using fitting distribution then the parameters are determined. The pattern of the probability distribution is used to generate random changes that will be used in the simulation. At this thesis, the vessel will be used to be the sample in the model. The data needed from a vessel will be the inter-arrival, berthing process, QC delay, and discharging rate in hour per box unit.

Table 11.Distribution of Ship Time Arrival

Vessel	Inter-Arrival	Unloading Time
CSCL	169 + 3.53e+003 * BETA(0.0446, 0.468)	0.01 + 0.03 * BETA(5.26, 3.49)

Table 11. shows the distribution data of the vessel as per the year of 2018. This table consists of the data distribution of ship inter-arrival and unloading time. It can be seen that as the data from PT Terminal Petikemas Surabaya the distribution of data for the inter-arrival of vessel CSCL is 169 + 3.53e+003 * BETA(0.0446, 0.468) in hour unit and the unloading time is 0.01 + 0.03 * BETA(5.26, 3.49) in hour per box unit.

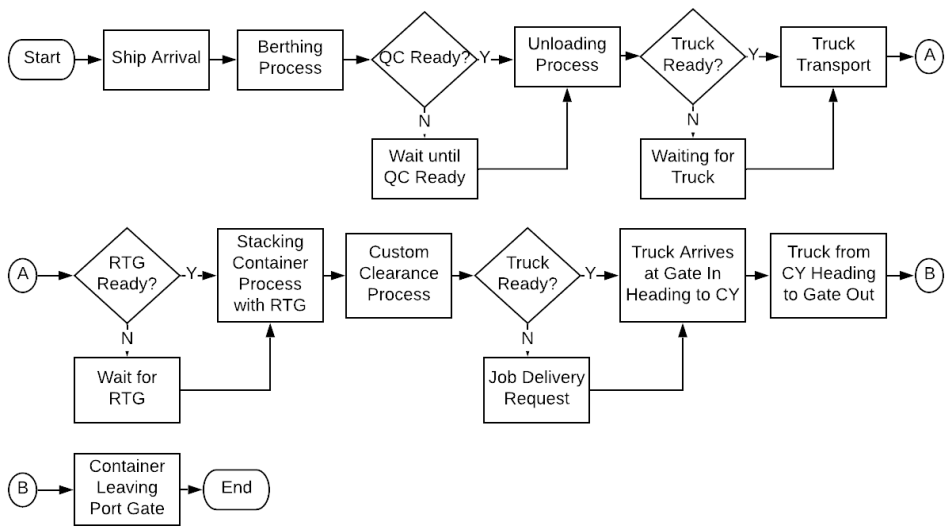

Figure 4.6. Simulation flowchart

Figure 4.6. is the chart that will be used as a basis to create the simulation in the ARENA Software. As the flow will starts at the Ship Arrival, Berthing

Process, Unloading Process, Truck Transport, RTG Stacking, Customs Process, then finished with Job Delivery then the container leaves the port as it reaches the Port Gate.

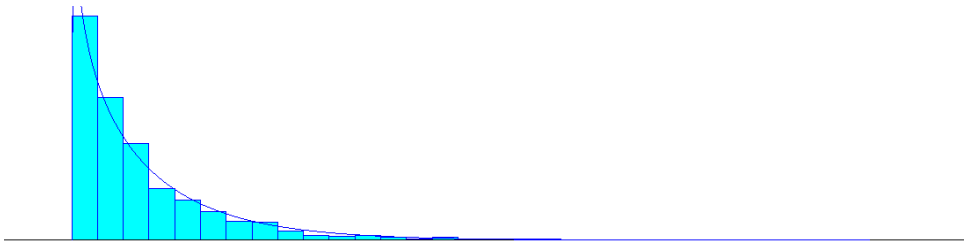

Figure 4.7. Fitting Distribution of Crane Delay

The type of distribution obtained is in accordance with the distribution shown in data processing using ARENA software. The shape of the fitting distribution can be seen in Figure 4.7. shows the results of processing data for the time spent of crane delay before operating. The input analyzer in ARENA software shows the fitting distribution of Weibull that is -0.001 + GAMM(1.47, 0.796) with unit hours.

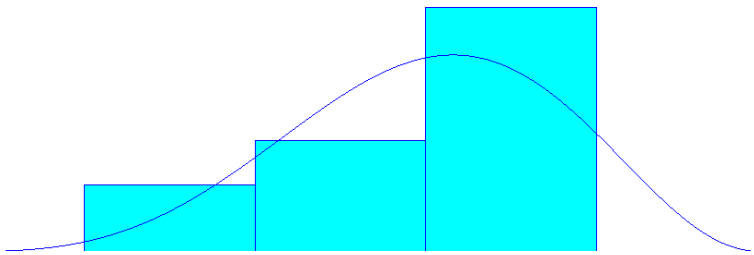

Figure 4.8. Fitting Distribution of Hour per Box Move per Crane

Figure 4.8. shows the data of crane in handling the container in Box Move per Crane unit of CSCL vessel and the distribution obtained is Beta Distribution, 0.01 + 0.03 * BETA(5.26, 3.49) with 5% of square error.

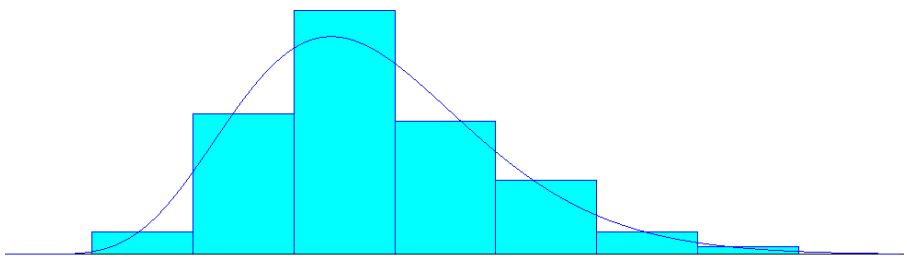

Figure 4. 9. Fitting Distribution of RTG Handling

Figure 4.9. shows the results of processing data for processing on RTG in handling the container in an hour per box unit. The input analyzer in ARENA software shows the fitting distribution of Gamma Distribution with 0.01 + GAMM(0.00356, 9.39).

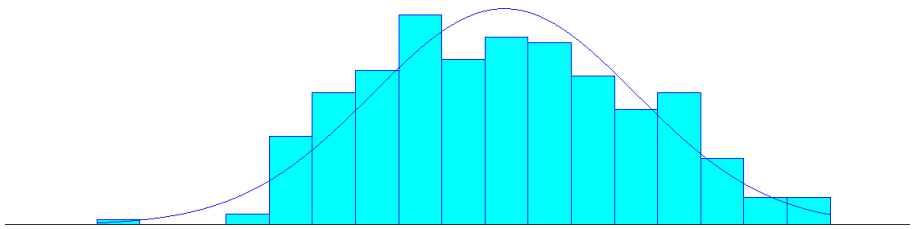

Figure 4. 10. Fitting Distribution of Time of a Container Stay at CY

Figure 4.10. shows the results of processing data for the time spent of a container stay in CY. The input analyzer in ARENA software shows the fitting distribution that is Normal Distribution with NORM(52.1, 13.3) in unit hours.

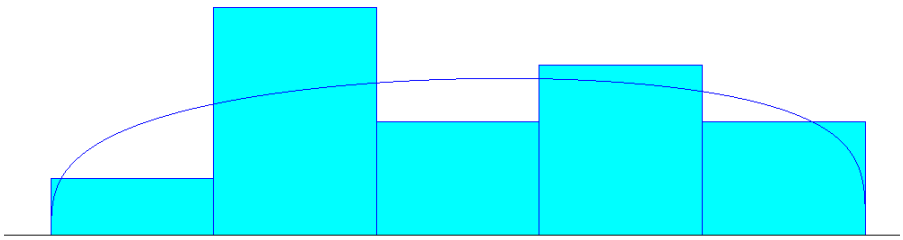

Figure 4.11. Fitting Distribution of Customs Clearance

Figure 4.11. shows the results of processing data for processing on time spent on customs clearance. The input analyzer in ARENA software shows the fitting distribution of Beta Distribution that is 16 + 15 * BETA(1.32, 1.26).

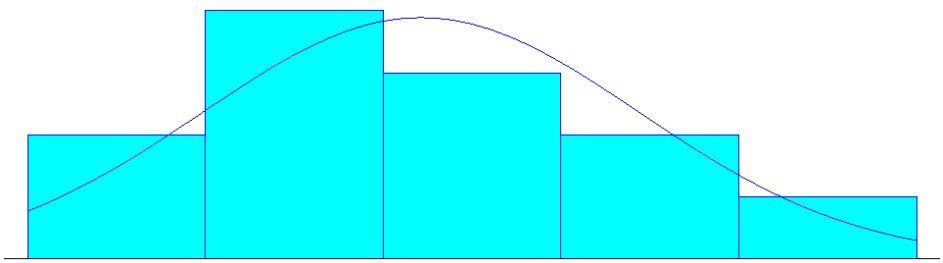

Figure 4.12. Fitting Distribution Job Delivery to Gate In

Figure 4.12. shows the results of processing data for processing on time spent on job delivery request until the truck arrives at the port gate (gate in). The

input analyzer in ARENA software shows the fitting distribution of Normal Distribution that is NORM(24.4, 2.46).

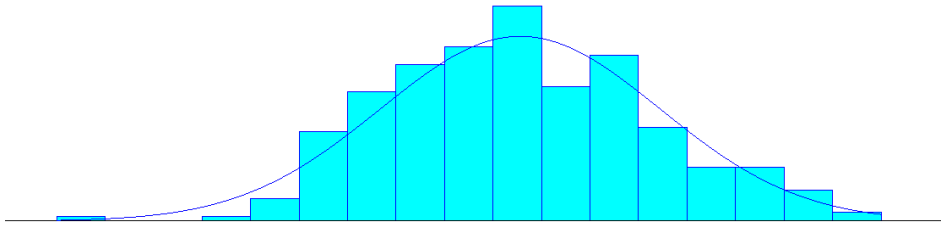

Figure 4.13. Fitting Distribution of a Truck Travel from Gate In to CY

Figure 4.13. shows the results of processing data for processing on time spent from truck travel from Gate In to Container Yard area. The input analyzer in ARENA software shows the fitting distribution of Normal Distribution that is NORM(34.1, 5.77).

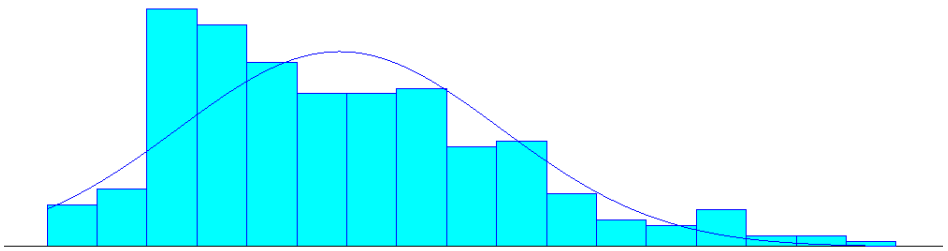

Figure 4.14. Fitting Distribution of a Truck Travel from CY to Gate Out

Figure 4.14. shows the results of processing data for processing on time spent from truck travel from Container Yard to Gate Out. The input analyzer in ARENA software shows the fitting distribution of Normal Distribution that is NORM(31.2, 16.1).

Table 12. Summary of Fitting Distribution

Type of Process	**Distribution**	**Unit**
QC Delay	-0.001 + GAMM(1.47, 0.796)	Hours
Crane Hours per Box	0.01 + 0.03 * BETA(5.26, 3.49)	Hours per Box
RTG Handling (Stack)	0.01 + GAMM(0.00356, 9.39)	Hour per Box
Container Stay at CY	NORM(52.1, 13.3)	Hours
Customs Clearance	16 + 15 * BETA(1.32, 1.26)	Hours
Job Delivery Request	NORM(24.4, 2.46)	Hours
Truck Gate-In to CY	NORM(34.1, 5.77)	Minutes
Truck from CY to Gate Out	NORM(31.2, 16.1)	Minutes

4.7.2. Number of Replications

In order to make sure, the model that has been made is simulated with the same data as the real conditions. The number of replications can be determined by:

Determine how many initial replications, for what being said the replications taken $n_0 = 5$ times replication. Table 13. Shows the results of running simulations 5 times and the number of dwell time inside the container terminal.

Table 13. Running Data Replications

Replications	Total Days (Replication)	Real Total Days
Replication 1	4.73293	5.08
Replication 2	4.72179	5.08
Replication 3	4.78456	5.08
Replication 4	4.93089	5.08
Replication 5	4.73987	5.08

The error rate of the simulation will be determined by:

1. Calculate the average, obtained 4.78201 days
2. Calculate the standard deviation (s), obtained 0.077439034
3. Calculate Half Width (hw)

$$hw = \frac{(t_{n-1,a/2})s}{\sqrt{n}}$$

hw = 0.078267843

4. The amount of replication will be determined by

$$n' = \left[\frac{\left(z_{\frac{\alpha}{2}}\right)s}{\text{hw}'}\right]^2$$

hw′ value is assumed to be 5% of the dwell time real condition. So that:
hw′ = 5% x 4.84 days
hw′ = 0.242

Zα/2 = 1.96 (obtained by using the normal table or excel function **=NORM.S.INV(Probability)** with the probability of 0.975)

Table 14. Overview Data Replications Needed

x bar	5.08
s	0.077230359
n	5
hw	0.078056935
hw′	0.254
Zα/2	1.96
n′	0.355157362

So, the replications needed will be $n' = 0.3556 \approx 1$ replication.

4.7.3. Model Validation

The model validation is used to determine that the simulation model is accurately represented the actual system. A model can be said valid if the model gives an average output of a real system. For this reason, a comparison test of the model and the real system is needed. From replicating this model 5 times, the results are as shown in table 11. to be the reference. From this table can be seen the output of dwell time in one year of operation. The first thing to do is to calculate the pooled standard deviation with the formula of:

$$\textbf{Spooled} = \sqrt{\frac{(n_1 - 1)\ x\ s^2 + (n_2 - 1)\ x\ s^2}{n_1 + n_2 - 2}}$$

$$\textbf{Spooled} = \sqrt{\frac{(5-1)\ x\ 0.077^2 + (5-1)\ x\ 0.077^2}{5+5-2}} = 1.74$$

To find out whether the data from the simulation is statistically accurate as of the real condition data, a hypothesis test is performed using the t-test. From the t-test calculation result is located between the critical two-tails, where -2.16 < t-test < +2.16, thus the model is valid. The formula of t-test will be used is:

$$\mathbf{t} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{Sp\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$\mathbf{t} = \frac{(4.78201 - 5.08) - 0}{1.74\sqrt{\frac{1}{5} + \frac{1}{5}}} = -0.1082$$

Like the t-test, the result is -0.021 then it will be compared with the two tails of t-critical in which for the upper t-critical is 2.16 and the bottom t-critical is -2.16. Then it will be summarized below.

$$\text{t-bottom critical} \leq \text{t-test} \leq \text{t-upper critical}$$

$$-2.16 \leq \text{t-test} \leq 2.16$$

$$-2.16 \leq -0.1082 \leq 2.16$$

From this comparison, as the t-test is between the two-tails of t-critical thus the model is valid.

CHAPTER V
DATA ANALYSIS AND INTERPRETATION

5.1 Dwell Time Root Cause Analysis

5.1.1. Step 1 & 2 - Problem Understanding and Cause Brainstorming

The goal of these steps is to scope the RCA and center on the preliminarily identified problem causes. These steps have been done by doing field observations inside the container terminal of PT Terminal Petikemas Surabaya. These steps resulting in founding the dwell time problem caused by the container terminal authority. Where the dwell time starts from the berthing process of the vessel until the container leaves the port gate. Then the detailed data of the process need to be collected as the secondary data so that the dwell time problem can be broken down in knowing the root causes.

5.1.2. Step 3 - Data Collection

Identification of detailed dwell time inside the container terminal is obtained by conducting field surveys, direct interviews with stakeholders and data analysis from the operation of PT Terminal Petikemas Surabaya in 2018. From those resources then the data can be broken down into smaller components so that the most dwell time can be discovered. The quantitative data provided by the Terminal Petimekas Surabaya then will be applied to the ARENA Software to simulate the real condition of container terminal operation. The result summary of the simulation can be seen in Table 15. This simulation is representing the real condition, run for 365 days throughout 2018, and be made for 5 replications with 5% maximum of error.

Table 15. Dwell Time Break Down at Terminal Petikemas Surabaya

Process Type	Average Time (in hours)	Average Time in Day(s)
Berthing Process	12.652	0.527
QC Delay	1.261	0.053
QC Unloading	0.036	0.001
Truck Waiting Time	0.000	0.000
Truck Transport	0.084	0.004
RTG Handling	0.047	0.002
Container Stay at CY	53.513	2.230
Custom Process	23.927	0.997
Job Delivery Request	22.191	0.925
Truck Arrive at Gate-In to CY	0.567	0.024
Truck from CY to Gate-Out	0.499	0.021

Process Type	Average Time (in hours)	Average Time in Day(s)
Total	**114.776**	**4.782**

From the data analysis, field observation, and interviews, the dwell time can be broken down and identified, then it can be seen in which the part of the process has the big proportion in contributing the dwell time. From the analysis that has been done, the percent of proportion on each process that contributing to dwell time can be made. The result analysis can be seen in Figure 5.1.

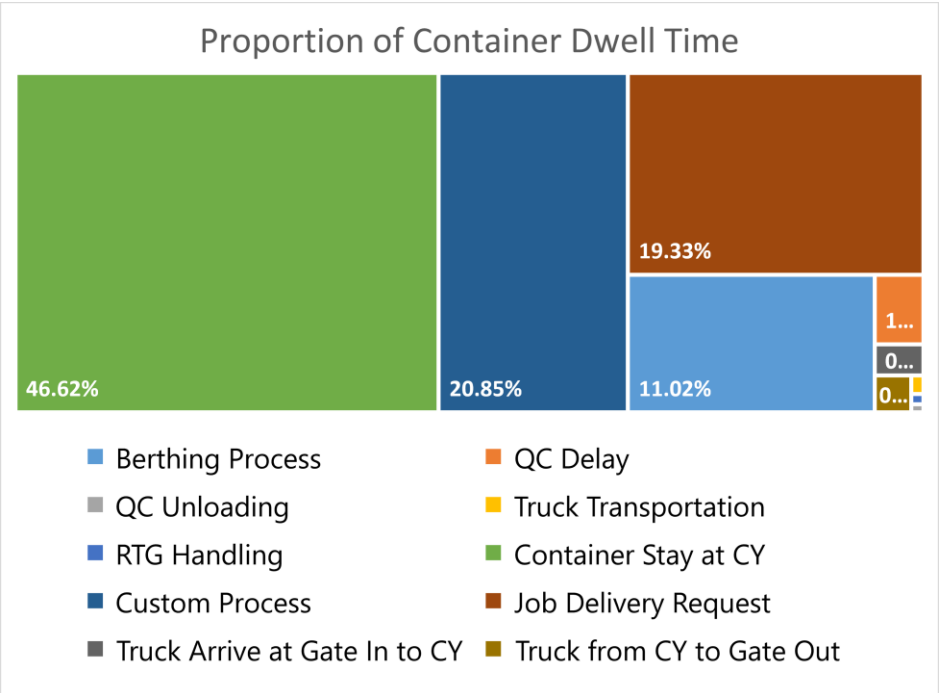

Figure 5.1. The proportion of Dwell Time in Terminal Petikemas Surabaya

From Figure 5.1., the biggest proportion of container dwell time resulted in the prolonged container stay at container yard with the number of 46.62% or 2.23 days. Then it followed by the customs process in which contribute for 20.85% of total dwell time or 0.997 day. The third biggest proportion is given by the job delivery request with the proportion of 19.33% of total dwell time or 0.925 day. While the quay crane unloading process only contributes for 0.03% and crane delay with the proportion of the contribution of 1.10%. There are also several other components in container dwell time which are the berthing process, quay crane unloading, RTG handling, truck transport from berth to the container yard, and truck turn-around from gate-in to container yard then to gate-out.

5.1.3. Step 4 – Problem Cause Data Analysis

5.1.3.1. Container Terminal Data Analysis

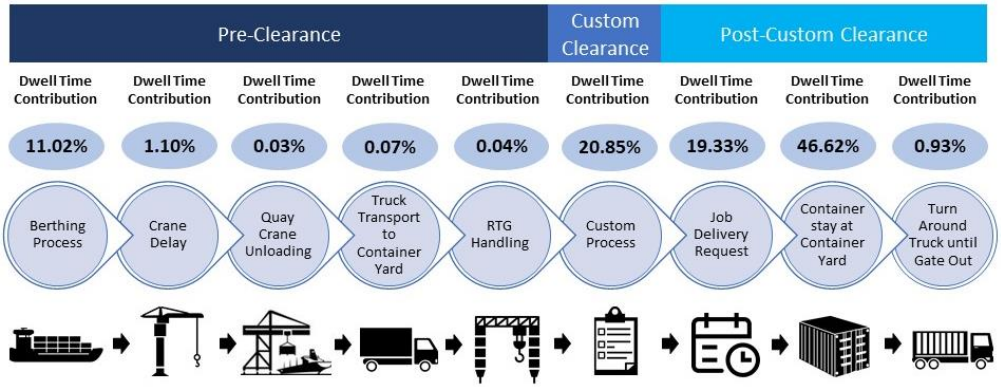

Figure 5.2. The sequel of Dwell Time Process in PT Terminal Petikemas Surabaya

At this step, the breakdown data is made into a sequel of the process so that the better understanding will be cleared out. Figure 5.2. tells about the sequel of the dwell time that happens in PT Terminal Petikemas Surabaya. As the definition from World Bank, 2015, the dwell time starts from the time a vessel arrives in port to the point when the container leaves the port premises. So that the dwell time in Terminal Petikemas Surabaya starts from the berthing process then it continues to several components. Crane delay also contributes to dwell time when it includes the time spent in crane breakdown, QC clash, and lashing. Then the dwell time continues to the quay crane unload the containers, then truck transport from the berth until the container yard and handled by the RTG. then the container continues to the second biggest dwell time, custom process, where it contributes 20.85% to dwell time. As the customs clearance has been done, the job delivery will be made. Then the container still stays at the container yard as of haven't taken by the consignee, where this stay contributes the largest contribution to dwell time with the number of 46.62%. Then if the truck from consignee arrives at the gate in, the truck needs to complete the administration until it will proceed to the container yard to take the container then continue to the administration process before proceeds to the gate out. At the time when the container leaves the port gate with the truck thus the dwell time ended.

As of this data analysis, the author will only focus on the major factor of the dwelling time, in this case, the author focuses on the prolonged stay of the container at the container yard. The in-depth interview is done in order to have a deep understanding of why the container is taking a long time in staying at the container yard.

5.1.3.2. Interviews Data Analysis

The goal of the interview is to have a deep understanding of the root cause of the problems in the prolonged dwelling time because of container stay at container yard. The author uses the categorical analysis in doing the interview, which are the position of the stakeholders and the length time of work. The author interviewed thirty people at the container terminal, Figure 5.3. displays the distribution of the positions of the stakeholders. The interview subjects to the Management of PT Terminal Petikemas Surabaya, External Contractors, Custom Officers and Representative from Customer.

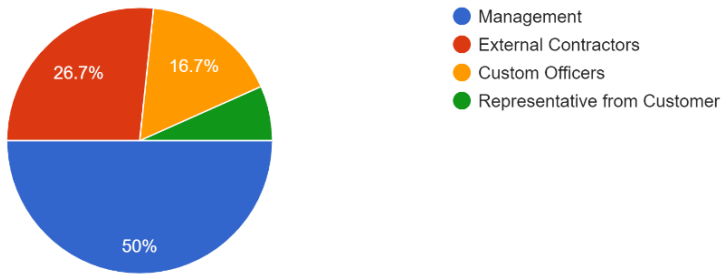

Figure 5.3. Position Distributions

As the secondary data collected from the PT Terminal Petikemas Surabaya, the most dwell time caused by container stay at the container yard. At this interview, the prolonged stay of container stay at CY is symbolized as variable D1. The author derived four topics to be asked to the participants: (i) basic knowledge of dwelling time, (ii) consignee external factor in leaving the container at CY, (iii) import document related, and (iv) process at the custom lane. As the field observations inside the container terminal and literature, the author has summarized the variable and indicators that resulting in the prolonged container stay at CY to be asked as a Likert-scale questionnaire. The summary is explained in Table 16. While Table 18 is the result summary of the happening frequency of the indicators. Table 19 is the result summary of the correlation where the questions are being asked to validate the correlation between the variable and the indicator, the Likert-scale also applied on this then it will be tested with Pearson Correlation value.

Table 16. Variable and Indicator of Likert-scale questionnaire

Variable Code	Variable Description	Indicator Code	Indicator Description
D1	Prolonged Dwell Because of Container Stay at CY	A1	Consignee deliberately store the container at CY because of cheap tariff
		A2	Consignee deliberately store the container at CY because their storage is full
		A3	The import document of the consignee hasn't completed yet
		A4	Long process at Red Lane because of the lack of human resources from custom
		A5	Long process at Red Lane because of the limited working hour or business day

Table 17. Variable and Indicator of Likert-scale questionnaire

Rating	Description
1	Rare
2	Unlikely
3	Moderate
4	Likely
5	Certain

Source: (Joshi, Kale, Chandel, & Pal, 2015)

Table 18. Summary of Indicator Occurrence

Indicator Code	Indicator Description	Value
A1	Consignee deliberately store the container at CY because of cheap tariff	4
A2	Consignee deliberately store the container at CY because their storage is full	4
A3	The import document of the consignee hasn't completed yet	4
A4	Long process at Red Lane because of the lack of human resources from custom	4
A5	Long process at Red Lane because of the limited working hour or business day	3

Table 19. Summary of Correlation between Variable and Indicator

Variable Code	Variable Description	Indicator Code	Indicator Description	Value
D1	Prolonged Dwell Because of Container Stay at CY	A1	Consignee deliberately store the container at CY because of cheap tariff	5
		A2	Consignee deliberately store the container at CY because their storage is full	5
		A3	The import document of the consignee hasn't completed yet	4
		A4	Long process at Red Lane because of the lack of human resources from custom	4
		A5	Long process at Red Lane because of the limited working hour or business day	4

A. Data Validation and Correlation Using IBM SPSS

The followings are the result of bivariate analysis using IBM SPSS in determining the validation and the Pearson's correlation value.

Table 20. IBM SPSS Correlations

		A1	A2	A3	A4	A5	D1
A1	Pearson Correlation	1	.436*	.515**	.382*	.155	.750**
	Sig. (2-tailed)		.016	.004	.037	.413	.000
	N	30	30	30	30	30	30
A2	Pearson Correlation	.436*	1	.653**	.503**	.059	.377*
	Sig. (2-tailed)	.016		.000	.005	.755	.040
	N	30	30	30	30	30	30
A3	Pearson Correlation	.515**	.653**	1	.509**	.147	.593**
	Sig. (2-tailed)	.004	.000		.004	.439	.001
	N	30	30	30	30	30	30
A4	Pearson Correlation	.382*	.503**	.509**	1	.312	.467**
	Sig. (2-tailed)	.037	.005	.004		.093	.009

		A1	A2	A3	A4	A5	D1
	N	30	30	30	30	30	30
A5	Pearson Correlation	.155	.059	.147	.312	1	.237
	Sig. (2-tailed)	.413	.755	.439	.093		.207
	N	30	30	30	30	30	30
D1	Pearson Correlation	.750**	.377*	.593**	.467**	.237	1
	Sig. (2-tailed)	.000	.040	.001	.009	.207	
	N	30	30	30	30	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 21. Correlation Value Interpretation

Size of Pearson Correlation	Interpretation
0.9 – 1.0	Very high correlation
0.7 – 0.9	High correlation
0.5 – 0.7	Moderate correlation
0.3 – 0.5	Low correlation
0.0 – 0.3	Negligible correlation

Source: (Hinkle, Wiersma, & Jurs, 2003)

On Table 20, the column that blocked by orange color describing the correlation value of the data that has been obtained. The Pearson's correlation value between A1 and D1 is 0.75 in which based on Table 21, the correlation interpretation, the correlation between A1 and D1 is on high correlation. It also applied to all indicators. Where, a correlation value of A2 and D1 is 0.377 means low correlation, the correlation value of A3 and D1 is 0.593 means moderate correlation, the correlation value of A4 and D1 is 0.467 means low correlation, the correlation value of A5 and D1 is 0.237 means negligible correlation.

B. Data Reliability Using IBM SPSS

The followings are the reliability result of the data collected using IBM SPSS. Reliability is a series of measurement of determining instruments that have consistency if the measuring instruments are carried out repeatedly.

Table 22. Reliability Statistics

Cronbach's Alpha	N of Items
.730	5

Table 23. Item Statistics

	Mean	Std. Deviation	N
A1	4.00	.643	30
A2	4.03	.615	30
A3	3.93	.521	30
A4	3.70	.702	30
A5	3.27	.691	30

Table 24. Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.93	4.892	2.212	5

Table 25. Cronbach's Alpha Range

Coefficient of Cronbach's Alpha	Reliability Level
More than 0.90	Excellent
0.80-0.89	Good
0.70-0.79	Acceptable
0.6-.69	Questionable
0.5-0.59	Poor
Less than 0.59	Unacceptable

Source: (George & Mallery, 2003)

Cronbach's Alpha coefficient is used to determine the level of reliability. From Table 23 the Cronbach's Alpha coefficient is 0.730 where according to George & Mallery (2003) this number is on the range of acceptable reliability level.

5.1.3.3. Data Interpretation

From the Section 5.1.3.2 Part A, it can be concluded on how to prioritize the issues that happened that resulting in prolonged container stay at container yard by using the Pearson's correlation value as the strongest correlation has the highest impact to the dwelling time. This prioritization can also be useful for the PT Terminal Petikemas Surabaya in focusing on and addressing the dwelling time in the container terminal. The prioritization is summarized in Table 26.

Table 26. Prioritization of Dwelling Time Causes

Number of Priority	Code	Event Indicator	Pearson's Correlation Value
1	A1	Consignee deliberately store the container at CY because of cheap tariff	0.750
2	A3	The import document of the consignee hasn't completed yet	0.593
3	A4	Long process at Red Lane because of the lack of human resources from custom	0.467
4	A2	Consignee deliberately store the container at CY because their storage is full	0.377
5	A5	Long process at Red Lane because of the limited working hour or business day	0.237

A. Descriptive Analysis

From the descriptive and the Likert-scale questionnaire analysis, it showed that all respondents know about the basic knowledge of dwelling time inside container terminal. The study also uncovered several uncertainties. where the consignee is leaving the container because of the tariff inside container terminal is far cheaper compared to if they lease a private container storehouse. The other reason of consignee leaving the container is that even the consignee has their own warehouse for their goods, their warehouse might be full, and the container terminal is the alternative for them to leaving their goods inside the container terminal. Beside the consignee case, there also a case where it caused the prolonged dwelling time on its import document processing by custom.

B. Qualitative Analysis

Management. This group consists of supporting, the middle and upper level which had all know the basic knowledge of dwelling time. When the author asked about how the container terminal dealing with the dwelling time, they had a similar opinion: the container terminal has an autonomy only on container handling equipment. In which the contribution of container handling process to the dwelling is very small. The most dwelling time caused by customer or consignee, where customer deliberately leaving their container in the container terminal because the tariff of container stay at container terminal is cheaper compared if the customer leases a container storehouse. Another case is that sometimes the customer's goods warehouse is already full so that the container terminal becomes their 'warehouse' for their goods. There is an interesting fact where this prolonged container stay at CY basically does not bring disadvantage to the container terminal as long as the yard occupancy ratio (YOR) is below the standard of PT Terminal Petikemas Surabaya, in which 65%. Instead, the more

time of container stays at container yard the more revenue received by the PT Terminal Petikemas Surabaya. The PT Terminal Petikemas Surabaya also applied the progressive tariff where the tariff will be increased as much as 900% if the container stays at the container terminal on the fourth day and on.

External Contractors. Consists of outsourcing employees and operators that have the stake inside the container terminal. It being said that the container terminal only focuses on handling container and it has increased its performance, in this box/crane/hour (BCH) of crane in handling container to be discharged from vessel and the move per hour (MPH) of a container inside the container terminal (the handling process from truck transport, RTG handling, until the container stacked on container yard's block). The rest of the dwelling time proportion is depending on customer and custom.

Custom Officers. This group is the one responsible for processing the import document inside the container terminal. When the author asked about why a long time spent in the dwelling time, the responses were the problem is on the red lane. When container on this lane, it required more documents to be completed by the customer. And the custom also facing another problem where there are more documents to be verified by the customs officers and it hampered by the lack of personnel of custom officers and the working hour and business days. Where the working hour only limited from 08:00 AM until 05:00 PM. And the business days, if there are many days off at a month, the process in finishing the documents also hampered. The custom also working faster as the President of the Republic of Indonesia instructed to minimize the dwelling time targeted at the maximum three days through the regulation of Ministry of Transportation. And it proven by the green lane container process is already below the target of this regulation. In facing dwelling time, the custom also provides the temporary container storehouse or *Tempat Penimbunan Sementara (TPS)* that controlled by the state's custom. Where this container storehouse will be the place for a container if the container stay is more than three days at the container terminal of PT Terminal Petikemas Surabaya because of unfinished import document process. The movement from the container terminal to the custom's container storehouse is the authority of the state's custom.

The representative from Customer. The customer is the one who owns the container and pays the tariff of container stay at the container yard. It was being said that the tariff inside the container terminal is cheaper than a private storehouse. Even if the container stays for more than three days, with the progressive tariff that applied by PT Terminal Petikemas Surabaya, the customer still considers that they still pay less money for container stay at the container terminal than container stay at the private container storehouse.

5.1.4 Step 5 – Identified Root Causes

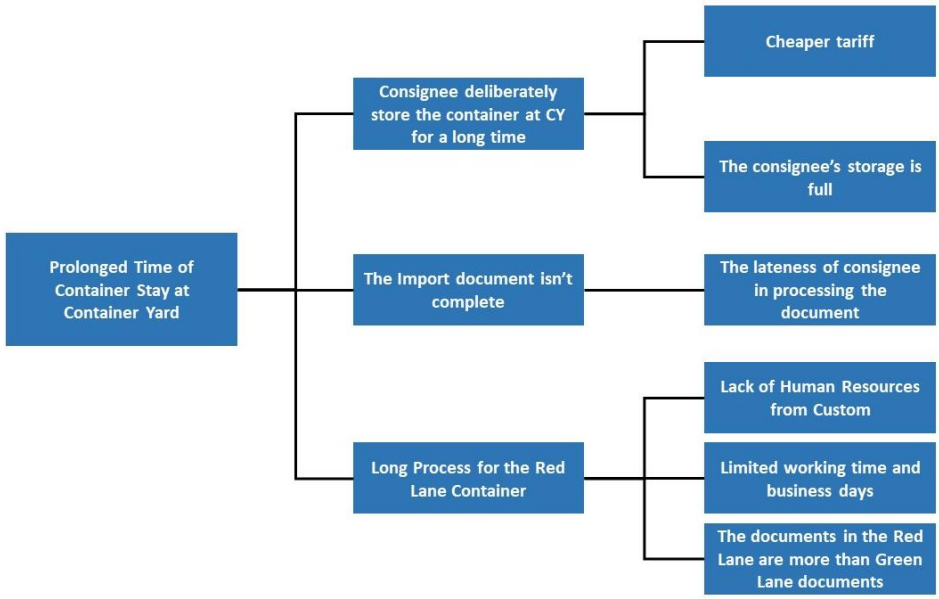

Figure 5.4. Problem Tree of Prolonged Time of Container Stay at Container Yard

The major of the problem of prolonged dwell time inside the Terminal Petikemas Surabaya is the prolonged time of container stay at container yard. Based on interviews with several stakeholders that involved in the PT Terminal Petikemas Surabaya and field observations there are several causes that result in prolonged dwell time, especially in container stay at container yard:

1. There are so many containers that already have *Surat Pemberitahuan Pengeluaran Barang (SPPB), Pemberitahuan Impor Barang (PIB)* and *Surat Penyerahan Petikemas (SP2)* but the containers haven't picked out of container terminal. For several importers, the container yard has intentionally made a place of container yard to store their goods in the containers or made this place as "warehouse" for their interest as the result of cheap rates of terminal stay.
2. The problem of custom documents that haven't completed yet because of the consignees hasn't processed the import document yet. It causes the container needs to stay at the container yard and wait until the all document need is completed.
3. The problem long processing time of red lane goods by the customs officer. Besides there is more document required in the red lane than a green lane, the problem also occurred where the human resources who handle those documents are limited. It results in congestion in processing the red lane documents.

5.1.5 Step 6 – Implemented Root Cause Treatments

In dealing with these problems, several steps have been taken by some involved parties, which are:

1. The uncontrolled cumulation of containers may disturb the traffic inside the terminal and this disturbance may be resulting in congestion and stagnation of activities of loading/unloading as well as be handle inside the container terminal. The current condition is that container terminal of Terminal Petikemas Surabaya can't be developed in terms of area. The terminal has taken several steps:
   a. The implementation of progressive tariff for container stay for more than 3 days. The progressive tariff will prevail after the third day of container stay and the increment of the tariff is 900% more expensive than the regular tariff.
   b. The Terminal Petikemas Surabaya has built a partnership with "Lini Kedua", a container storehouse as one of the business lines provided by PT PELINDO III. Container that stays more than 3 days then it will be moved into this storehouse in order to maintain the YOR inside container terminal.
2. While the container that stays more than three days that resulted by the incomplete custom documents or red lane container will be taken care of by the custom party. The container will be moved into temporary container storehouse or *Tempat Penimbunan Sementara (TPS)* that supervised by the customs officer. The container will remain stay at this temporary storehouse until the required document completed. This movement is fully the responsibility of the state's custom.

5.2 Operational Data Analysis

5.2.1. Alternative Simulation Model

The alternative model that will be created has a goal to obtain a better simulation model and optimize the handling operation of container compared to the existing model. The parameters that will be changed include the number of quay cranes utilized. In addition, the variable that will be changed is the variable of the crane in which it will be determined by the calculation of unloading volume, BCH and the working hour.

In this simulation model there are several variables that are used in each scenario, which are:

- *Container*: the amount of container that will be transferred. In this simulation the amount of container that will be used determined by sampling of a ship.
- *Crane*: the amount of crane that will be utilized in the simulation.
- *Velocity*: the speed of truck that moves in the container terminal.
- *Standard deviation*: the deviation of the result of initial replication
- *Replication*: the need for replications from the simulation model.

5.2.2. Input Data

In this scenario, the variable that will be changed is the amount of operated crane. There are also several vessels that will be used to be the sample of this model. The type of distribution and the parameter values are associated with each vessel, as these vessels have different sizes and schedules and, thus, carry a different quantity of containers in box. Table 27. shown the distribution if inter-arrival of vessels in Terminal Petikemas Surabaya, these distributions will be the input parameter to the model that has been created.

Table 27. Vessels Inter-Arrival Distribution

Vessel	Inter-Arrival	LOA	Avg. Container Discharge (Box)
CSCL	169 + 3.53e+003 * BETA(0.0446, 0.468)	200	527
SIAB	154 + WEIB(27.9, 0.443)	176	782
KOJA	162 + WEIB(106, 0.245)	193	808
NAAM	848 + GAMM(2.18e+003, 0.28)	261	579
STOL	495 + WEIB(65.8, 0.292)	168	416
PORT	641 + WEIB(149, 0.383)	200	204
SEDA	221 + WEIB(268, 0.518)	116	75
MSIM	193 + 819 * BETA(0.32, 0.849)	201	483
OLIV	510 + WEIB(157, 0.596)	216	274
LALA	658 + WEIB(214, 0.283)	216	187

5.2.3. Data Interpretation on Handling Time

Terminal Petikemas Surabaya has 13 of quay cranes and 4 berths in the international docks. In which the distribution of cranes is between 3-4 cranes for each berth. The input of crane in the simulation is between 2-4 and the simulation result will describe the BCH of each vessel in discharging the containers. Table 28. is describing the result of the simulation of 2 cranes utilized. Table. 29 is the result of 3 cranes utilized and Table 30. is the result of 4 operated cranes.

Table 28. 2 Cranes Operated

Vessel	Hour per Box	BCH	Working Hour
CSCL	0.06704161	14.9161	20
SIAB	0.0625	16	24
KOJA	0.05558057	17.9919	22
NAAM	0.0833379	11.9993	24
STOL	0.0948	10.5485	23

Vessel	Hour per Box	BCH	Working Hour
PORT	0.05000907	19.9964	7
SEDA	0.0909	11.0011	4
MSIM	0.08332685	12.0009	20
OLIV	0.07697948	12.9905	12
LALA	0.055555556	18	6
AVERAGE	**0.072652016**	**14.2912**	**16.2**

Table 29. 3 Cranes Operated

Vessel	Hour per Box	BCH	Working Hour
CSCL	0.0359	27.8538	9
SIAB	0.04545	22.0037	16
KOJA	0.03853	25.9512	10.5
NAAM	0.03929	25.45	11
STOL	0.05552	18.0122	8
PORT	0.04149	24.1038	3.5
SEDA	-	-	-
MSIM	0.03925	25.4801	7
OLIV	0.04994	20.026	5
LALA	0.05018	19.9288	4
AVERAGE	**0.04294**	**23.8542**	**10.9**

Table 30. 4 Cranes Operated

Vessel	Hour per Box	BCH	Working Hour
CSCL	0.034583	28.9161	4
SIAB	0.035863	27.8836	7
KOJA	0.034458	29.0210	6
NAAM	0.035576	28.1086	5
STOL	0.035142	28.4562	4
PORT	0.03699	27.0349	2.4
SEDA	-	-	-
MSIM	0.0357	28.0075	4.5
OLIV	0.04008	24.9471	3
LALA	0.040085	24.9471	2.7
AVERAGE	**0.035124**	**28.4771**	**5.2**

From this simulation, the comparison between the results can be seen in Figure 5.5. that the difference if 3 cranes are utilized the increment of BCH would be 40.01% in average or 23.85 BCH and if 4 cranes are utilized the increment of BCH would be 49.82% in average or 28.48 BCH.

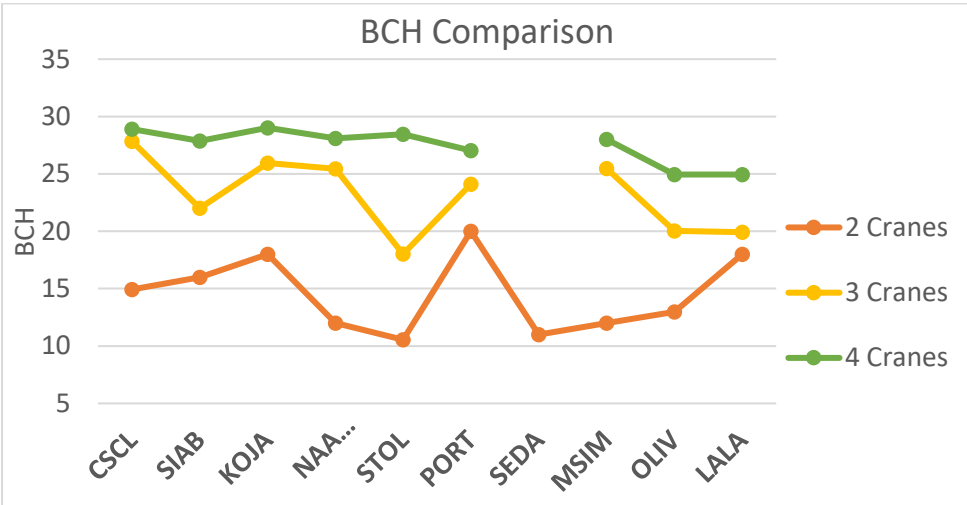

Figure 5.5 BCH Comparison

From the simulation results, it found that the containers shifted into the Terminal Petikemas Surabaya equal to 104,166 boxes which represent 365 days of real-time. Table 31. describe the difference of throughput volume in box on various cranes utilized. It can be seen from the table that the increase of throughput if 3 cranes utilized is equal to 21.73% or 133,083 boxes and if 4 cranes utilized the increase is equal to 35.33% or 161,070 boxes.

Table 31. Box Volume

Vessel	**2 Cranes Utilized**	**3 Cranes Utilized**	**4 Cranes Utilized**
	Boxes Throughput	**Boxes Throughput**	**Boxes Throughput**
CSCL	15,184	16,689	18,410
SIAB	50,662	64,864	78,683
KOJA	5,656	6,462	8,888
NAAM	3,474	7,527	8,369
STOL	2,912	3,744	9,568
PORT	4,284	4,428	4,692
SEDA	750	750	750

Vessel	2 Cranes Utilized	3 Cranes Utilized	4 Cranes Utilized
	Boxes Throughput	Boxes Throughput	Boxes Throughput
MSIM	14,007	19,338	20,769
OLIV	6,302	6,850	7,388
LALA	935	2,431	3,553

5.2.4. Handling Time Contribution to Dwell Time

As the handling time inside the terminal has been run in the simulation, then it will be compared to the total dwell time that happened in the Terminal Petikemas Surabaya.

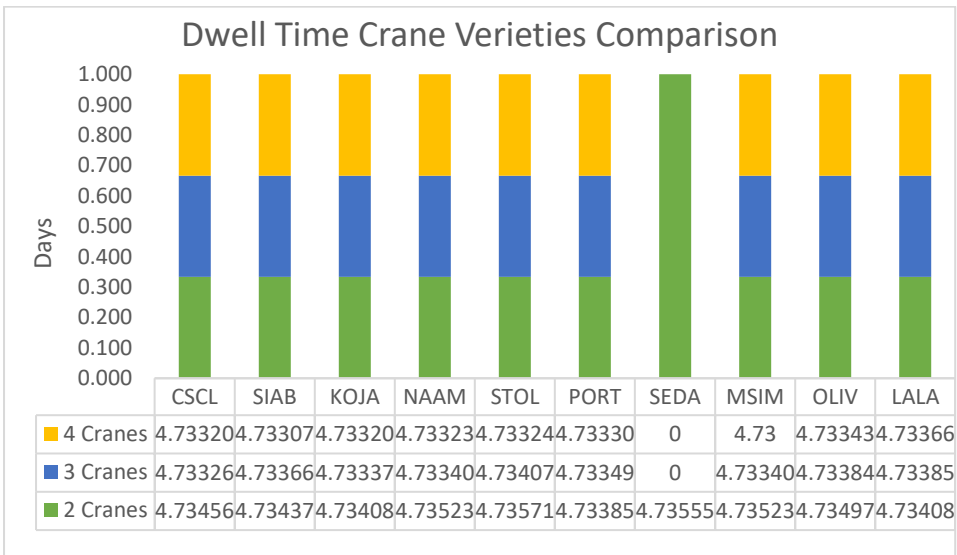

Figure 5.6. Dwell Time Comparison

At Figure 5.6. the dwell time can be decreased by crane utilization. It resulted that the average dwell time can be decreased as 0.023% if 3 QCs utilized and the decrement of 0.029% or 0.001 of a day can be achieved if 4 QCs utilized from 2 cranes utilized. But, the utilization of crane can't be implemented in all ships. SEDA vessel is a vessel with the length of 116 m where the 2 number of cranes is already optimized because of the constraint of the ship length and the number of containers brought. So, it can be concluded that the optimization of the number of cranes may decrease the dwell time, but it can't be implemented on all type of ship length.

5.3 Dwell Time Analysis, Yard Occupancy Ratio and Yard Capacity

5.3.1.The Correlation between Dwell Time, YOR and Yard Capacity

The analysis will focus on the yearly throughput where the throughput that will be used is the import throughput from 2018 with the number of 1,464,258 and the yard capacity that will be used is the capacity of the yard in 100% with the capacity of 11,784 TEUs Ground Slots (TGS). The average of dwell time in Terminal Petikemas Surabaya in 2018 is 5.08 days.

From the information gathered from PT Terminal Petikemas Surabaya, if the YOR has outreach the number of 65%, the container terminal will propose a terminal development initiative or overbrengen terminal. The development has a purpose to maintain the good performance of the terminal operation. Table 32. is describing the calculation of YOR that correlate to the assumption of dwell time in Terminal Petikemas Surabaya.

Table 32. YOR – Dwell Time Correlation

Dwell Time Assumption	Yard Capacity per Year (TEUs)	YOR
2	4,301,160.00	19%
2.1	4,096,342.86	21%
2.2	3,910,145.45	23%
2.3	3,740,139.13	25%
2.4	3,584,300.00	27%
2.5	3,440,928.00	29%
2.6	3,308,584.62	32%
2.7	3,186,044.44	34%
2.8	3,072,257.14	37%
2.9	2,966,317.24	39%
3	2,867,440.00	42%
3.1	2,774,941.94	45%
3.2	2,688,225.00	48%
3.3	2,606,763.64	51%
3.4	2,530,094.12	54%
3.5	2,457,805.71	57%
3.6	2,389,533.33	60%
3.7	2,324,951.35	64%
3.8	2,263,768.42	67%
3.9	2,205,723.08	71%
4	2,150,580.00	75%

Dwell Time Assumption	Yard Capacity per Year (TEUs)	YOR
4.1	2,098,126.83	78%
4.2	2,048,171.43	82%
4.3	2,000,539.53	86%
4.4	1,955,072.73	90%
4.5	1,911,626.67	94%
4.6	1,870,069.57	99%

It can be seen from Table 32. That the ideal dwell time in Terminal Petikemas Surabaya is below 3.7 days. As if the dwell time has exceeded 3.7 days then it will outreach the YOR of 65% and the container terminal need to consider about container yard terminal development.

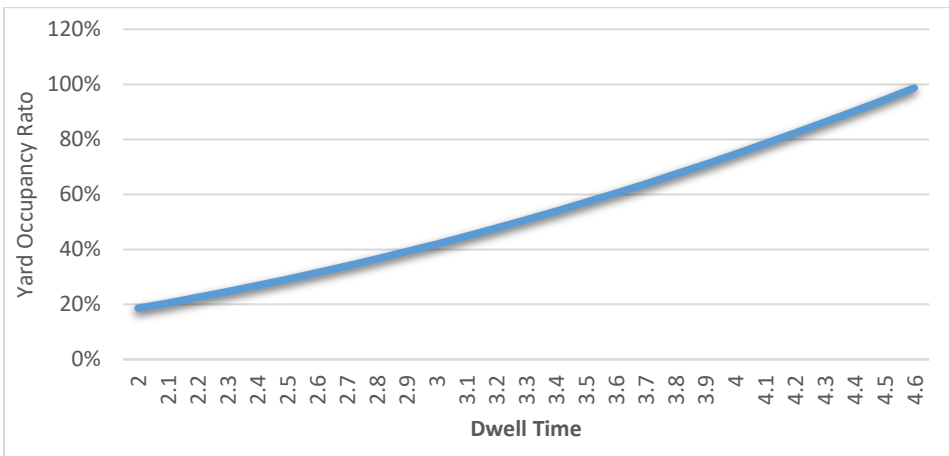

Figure 5.7. YOR and Dwell Time Correlation

Figure 5.7. tells about the correlation between the growth of yard occupancy ratio and the dwell time that happen inside the terminal. As the dwell time inside container terminal increases then the YOR increment also ensues.

5.3.2. Container Dwell Time Effect on Stacking Height

The container analysis on the stacking height inside the container yard of PT Terminal Petikemas Surabaya is taking place at this sub-section. The YOR inside PT Terminal Petikemas Surabaya is on the average of 52.63% with the average dwell time of 5.08 days in 2018. The next calculation is analyzing the correlation between the dwell time, YOR, and the height of stacking. The data used is the data throughout 2018 with the annual throughput of 1,464,258 TEUs and the yard capacity that will be used is the capacity of the yard in 100% with the capacity of 11,784 TGS. Table 33 is describing the correlation of YOR and configuration

of 3 tiers of stacking height if the dwell time can be pushed into varieties of days. While Table 34, Table 35, and Table 36 is consecutively the configuration of 4 tiers, 5 tiers, and 6 tiers.

Table 33. Three Tiers of Stacking Height Correlation with YOR

Dwell Time Assumption	Yard Capacity (TEUs) per Year	YOR
2	4,301,160.00	19%
2.5	3,440,928.00	29%
3	2,867,440.00	42%
3.5	2,457,805.71	57%
4	2,150,580.00	75%
4.5	1,911,626.67	94%
5.08	1,693,370.08	120%

Table 34. Four Tiers of Stacking Height Correlation with YOR

Dwell Time Assumption	Yard Capacity (TEUs) per Year	YOR
2	5,734,880.00	14%
2.5	4,587,904.00	22%
3	3,823,253.33	31%
3.5	3,277,074.29	43%
4	2,867,440.00	56%
4.5	2,548,835.56	71%
5.08	2,257,826.77	90%

Table 35. Five Tiers of Stacking Height Correlation with YOR

Dwell Time Assumption	Yard Capacity (TEUs) per Year	YOR
2	7,168,600.00	11%
2.5	5,734,880.00	17%
3	4,779,066.67	25%
3.5	4,096,342.86	34%
4	3,584,300.00	45%
4.5	3,186,044.44	57%
5.08	2,822,283.46	72%

Table 36. Six Tiers of Stacking Height Correlation with YOR

Dwell Time Assumption	Yard Capacity (TEUs) per Year	YOR
2	8,602,320.00	9%
2.5	6,881,856.00	15%
3	5,734,880.00	21%
3.5	4,915,611.43	29%
4	4,301,160.00	37%
4.5	3,823,253.33	47%
5.08	3,386,740.16	60%

The current condition of PT Terminal Petikemas Surabaya that the dwell time is 5.08 days on average and the average container stacking height is four tiers. The Table 34 is describing the calculation of four tiers container stacking height and from that table, it is shown that the dwell time of 5.08 days could reach the YOR of 90% with 2,257,826 container yard capacity per year. While Table 35 is describing the calculation of five tiers container stacking and it showed with the dwell time of 5.08 days, the YOR could be decreased until 72%.

In Table 33 is describing the calculation result of three tiers of container stacking height, but this stacking configuration is not increasing the YOR significantly and is not recommended to be implemented as the average tier stacking in the PT Terminal Petikemas Surabaya. While Table 36 is the calculation result of six container stacking. The six tiers could decrease optimize the YOR, but the container terminal can't implement it as the limitation of stacking height capability of RTG used in the container terminal.

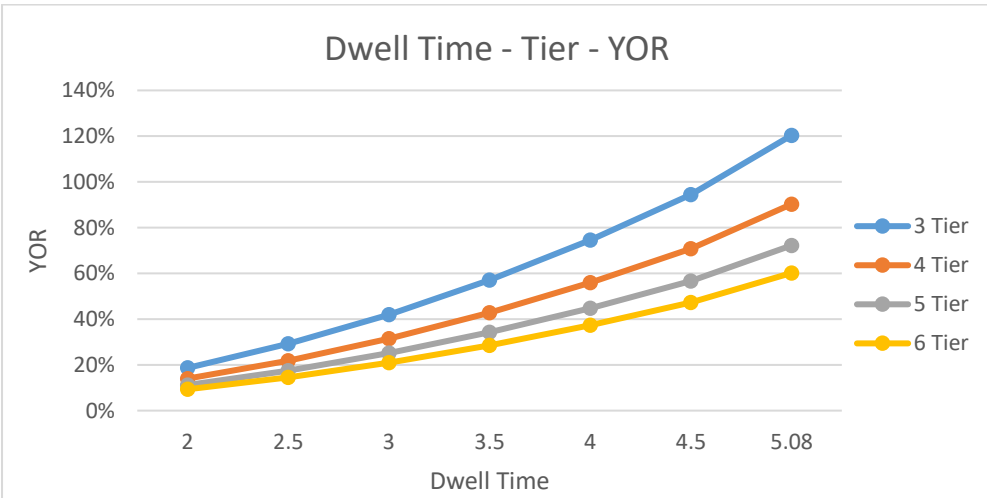

Figure 5.8. YOR, Stacking Tier and Dwell Time Correlation

Figure 5.8. is the summary of YOR, Tier, and Dwell Time correlation in the form of a graph. It is shown that as the tier of container stacking height increase, the YOR could be optimized with the same average of dwell time in 2018, in which 5.08 days. If the container terminal able to push the dwell time of container stay at container yard, the YOR could be more optimized as the stacking height increased.

5.4 Scenario Approach

5.4.1 First Scenario

Optimization of crane utilization. This scenario focuses on the quay crane utilization in unloading the containers from the vessel. From the created simulation model, the optimization of the crane by using 4 quay cranes the outcome of average dwell time decreases by approximately 0.001 of a day. The speed capability of a crane or box/crane/hour in unloading the containers increases by approximately 49.82% and the boxes throughput increases inside the container terminal by approximately 35.33%. However, the optimization of the number of quay cranes utilized can't be implemented in all type ships as the quay crane numbers have the limitation to the ship length.

5.4.2 Second Scenario

Increase the container stacking height in the container yard. The current condition in the container terminal uses 4 tiers of container stacking. This scenario discovered the potential of a container yard by increasing the height of container stacking. The increment of stacking tiers into 5 can possibly increase the yard capacity by approximately 69% with the stake of the dwell time decrement by approximately 0.58 of a day. Note that, the limit of YOR from the container terminal is 65% and if the YOR has exceeded that number, the container terminal needs to initiate a plan of terminal development, thus, a lot of costs will be incurred. The increment of container stacking into 5 tiers is a step to decrease the YOR as it can decrease the YOR from 87% of YOR into 57% of YOR.

The container terminal also may prefer to earn more revenue from the progressive tariff of prolonged container stay. As being said, the container terminal may implement to increase the basic tariff of container stay and the progressive tariff of prolonged container stay, at the same time as an attempt to decrease the dwell time and gain more space of yard capacity.

5.4.3 Third Scenario

Combination of crane optimization and increasing container stack. This scenario is a combination of the first and second scenario. The potential that can be unleashed is the speed capability of a crane, the increment of yard capacity without developed the container area and pushing the YOR into its optimal

number. As of this assumption, the dwell time decreases by approximately 0.581 of a day, the BCH increases by approximately 49.82%, the terminal capacity increases by approximately 69% and YOR decreases by approximately 30%. Put that in mind that the container terminal may increase their earning by increase the basic tariff of container stay and the progressive tariff of prolonged container stay and as a step to decrease the dwell time in one hand.

CHAPTER VI
CONCLUSION, RECOMMENDATION AND FUTURE RESEARCH

6.1 Conclusion

By conducting the field observations, interview with PT Terminal Petikemas Surabaya employees, and data analysis for container handling in 2018, it can be concluded that:

1. One of the components of the container terminal dwell time inside the Terminal Petikemas Surabaya is the quay crane unloading. Discrete event simulation is being used to simulate a model from the complex operation of the container terminal with Arena Simulation Software. From the simulation the author concluded:
   a. The quay crane utilization is impacting the time of unloading. 3 quay cranes utilization may increase the crane's BCH into 23.85 Box/Crane/Hour. 4 quay cranes utilization may increase the crane's BCH into 28.48 Box/Crane/Hour. The crane's optimization may also increase the box throughput inside the terminal. This crane optimization may also decrease the total dwell time by 0.029%.
   b. The current condition in the container terminal uses 4 tiers of container stacking. The increment of stacking tiers into 5 can possibly increase the yard capacity by approximately 69% with the stake of the dwell time decrement by approximately 0.58 of a day. Note that, the limit of YOR from the container terminal is 65% and if the YOR has exceeded that number, the container terminal needs to initiate a plan of terminal development, thus, a lot of costs will be incurred. The increment of container stacking into 5 tiers is a step to decrease the YOR as it can decrease the YOR from 87% of YOR into 57% of YOR.
2. The biggest proportion of container dwell time in 2018 that averaged 5.08 days resulted by the prolonged container stay at container yard with the number of 46.62% or 2.23 days. Then it followed by the customs process in which contribute for 20.85% of total dwell time or 0.997 day. The third biggest proportion is given by the job delivery request with the proportion of 19.33% of total dwell time or 0.925 day.

6.2 Recommendation

Based on the research results and data analysis, there are still several things that must be refined to obtain better results in the container terminal operation of PT Terminal Petikemas Surabaya. These recommendations are being provided to both party PT Terminal Petikemas Surabaya and customs elements. The recommendations that can be given by the author are:

1. For PT Terminal Petikemas Surabaya, the optimization of cranes inside the container must be done as it affects to optimized BCH of crane and the throughput volume.
2. It is found that the price rate of container stays and its progressive tariff at Terminal Petikemas Surabaya's container yard is far cheaper if it compared if the importer leases the other private container storehouse. So that the increment of the basic and progressive tariff could be implemented. Besides, it may increase the revenue of PT Terminal Petikemas Surabaya.
3. The increment of stacking tiers into 5 can possibly increase the yard capacity by approximately 69% with the stake of the dwell time decrement. as the limit of YOR from the container terminal is 65% and if the YOR has exceeded that number, the container terminal needs to initiate a plan of terminal development, thus, a lot of costs will be incurred. The increment of container stacking into 5 tiers is a step to decrease the YOR.
4. As the biggest proportion of dwell time is contributed by the container stay at container yard, the better planning of container allocation must be done. The yard planning can be done by dividing the containers on its day of stay, or types, or consignee destinations. The model simulation can be used to compare the time used between those plans.
5. The container terminal gates, both gate-in and gate-out, still using traditional administration. So that the implementation of auto gates system inside container terminal must be done by fully digitized the process through E-Document. It seamless the process of the container in and out by digitized the administration process and decrease the consumed time of truck in and out. This system may also be integrated with Inaportnet, a system information system provided by Indonesia's government so that it will support the National Single Window (NSW) program.

6.3 Future Research

There are points that did not cover by the author in this research, thus the future research must be done to make an appropriate research result. Those points are:

1. As the waiting time inside the container terminal can be decreased, there may be cost savings for container terminal and the shipping companies This issue has not been explored in this research and would be an important and interesting topic for future work.
2. The biggest proportion of dwell time has been identified in which in the process of container yard planning. Thus, future research about the simulation of container allocation inside the container yard can be done to find out the least time produced in order to decrease the dwell time.
3. Other research also can be done in the area of customs process as the customs clearance process also one of the biggest contributors to dwell time.

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ATTACHMENT 1: Arena Software Report

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.01	6.06405	39.9577	301.93
Truck	5.6229	(Insufficient)	5.0109	6.4551

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0924	0.001253909	0	0.2955
Truck	875.82	(Insufficient)	813.88	933.30

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.19	6.06446	40.1264	302.10
Truck	195.59	(Insufficient)	184.15	205.51

Other

Number In	Value
Boxes	15,184
Truck	400

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Other

Number Out	Value
Boxes	15,640
Truck	400

WIP	Average	Half Width	Minimum	Maximum
Boxes	93.1748	(Correlated)	0	1,459.00
Truck	4.0490	(Correlated)	0	10.0000

Process

Time per Entity

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3450	(Correlated)	0	102.60
Container Stay at CY 1	53.1306	(Correlated)	12.8851	91.2476
Container Stay at CY 2	52.2097	2.30552	14.6291	93.4941
Container Stay at CY 3	51.5854	(Correlated)	13.3074	94.6844
Container Stay at CY 4	51.8704	1.72451	9.4289	94.7345
Container Stay at CY 5	52.2338	1.89608	14.4809	87.5931
Container Stay at CY 6	52.5679	2.24399	10.8163	92.3306
Container Stay at CY 7	52.4600	1.99149	8.6283	92.8406
Container Stay at CY 8	52.2186	2.18170	11.0629	99.59
Container Stay at CY 9	122.35	7.44549	83.0007	195.97
Custom Process 1	23.7893	0.397353763	16.0222	30.9492
Custom Process 2	23.6578	0.356727610	16.0917	30.9880
Custom Process 3	23.6865	0.296608803	16.0468	30.9746
Custom Process 4	23.6336	0.264585848	16.0820	30.9704
Custom Process 5	23.7055	0.359450807	16.0232	30.9684
Custom Process 6	23.5306	(Correlated)	16.0006	30.9569
Custom Process 7	23.6387	(Correlated)	16.0495	30.9955
Custom Process 8	23.8674	0.264808864	16.0707	30.9766
Custom Process 9	23.3478	0.241353567	16.0172	30.9870
QC Delay	1.2579	(Correlated)	0	16.6162
QC Unloading	0.06704161	0.001605665	0	0.4112
RTG 1	0.04363674	0.000898210	0.02110338	0.1042
RTG 2	0.04559374	0.001202306	0.02052069	0.1536
RTG 3	0.04905259	0.001676583	0.02259574	0.1888
RTG 4	0.05050245	0.002218330	0.02117145	0.1738
RTG 5	0.05856181	0.004987419	0.02062927	0.2411
RTG 6	0.05920179	0.004660826	0.02212415	0.2197

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04865869	(Correlated)	0.02214797	0.1450
RTG 8	0.04967354	0.002060924	0.02121043	0.1690
RTG 9	0.05675340	0.003392300	0.02042353	0.2411
Truck Arrive at Gate In	0.5674	0.009612734	0.3200	0.8409
Truck from CY to Gate Out	0.5172	(Insufficient)	0	1.1362

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.18	(Correlated)	34.0441	267.77
Truck	5.7109	(Insufficient)	4.8181	6.6354

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0904	(Correlated)	0	0.2340
Truck	867.79	(Insufficient)	815.89	932.05

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.35	(Correlated)	34.1285	267.94
Truck	194.78	(Insufficient)	185.88	208.88

Other

Number In	Value
Boxes	3,689
Truck	401

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.5092	(Correlated)	0	76.2212
Container Stay at CY 1	52.1305	(Insufficient)	17.0839	93.6858
Container Stay at CY 2	52.6055	(Insufficient)	18.4783	83.5154
Container Stay at CY 3	52.2713	(Insufficient)	16.7506	87.5493
Container Stay at CY 4	51.9537	(Insufficient)	15.3441	91.7966
Container Stay at CY 5	52.9226	(Insufficient)	15.7418	86.8339
Container Stay at CY 6	52.6360	(Insufficient)	19.5471	86.0186
Container Stay at CY 7	52.4448	(Insufficient)	15.2083	87.5673
Container Stay at CY 8	52.2582	(Insufficient)	16.1340	90.8524
Container Stay at CY 9	124.37	(Correlated)	83.0009	195.29
Custom Process 1	23.6428	(Insufficient)	16.0523	30.8917
Custom Process 2	23.3905	(Insufficient)	16.0341	30.7591
Custom Process 3	23.8653	(Insufficient)	16.0968	30.9866
Custom Process 4	23.7049	(Insufficient)	16.1057	30.9361
Custom Process 5	24.0466	(Insufficient)	16.0886	30.9870
Custom Process 6	23.7215	(Insufficient)	16.0764	30.7728
Custom Process 7	23.6607	(Insufficient)	16.4079	30.8743
Custom Process 8	23.5332	(Insufficient)	16.0603	30.9759
Custom Process 9	23.6728	0.426561540	16.0216	30.9618
QC Delay	1.2651	(Correlated)	0	13.0353
QC Unloading	0.03621600	0.000380406	0.00044615	0.07152989
RTG 1	0.04388784	(Insufficient)	0.02307862	0.07470423
RTG 2	0.04632191	(Insufficient)	0.02332965	0.0978
RTG 3	0.04502658	(Insufficient)	0.02212868	0.1025
RTG 4	0.04937330	(Insufficient)	0.02009986	0.1191
RTG 5	0.05525847	(Insufficient)	0.02294875	0.1704
RTG 6	0.05494060	(Insufficient)	0.02290228	0.1631

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04541247	(Insufficient)	0.02158698	0.1371
RTG 8	0.05046729	(Insufficient)	0.02214308	0.2253
RTG 9	0.05609529	(Correlated)	0.02126922	0.2030
Truck Arrive at Gate In	0.5722	0.011516478	0.3026	0.8659
Truck from CY to Gate Out	0.5568	(Insufficient)	0	1.0986

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.26	5.85955	34.0859	290.10
Truck	5.6304	(Insufficient)	4.6780	6.3113

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0960	(Correlated)	0	0.6718
Truck	876.11	(Insufficient)	800.35	933.36

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.44	5.85977	34.3545	290.27
Truck	195.89	(Insufficient)	181.49	208.48

Other

Number In	Value
Boxes	18,410
Truck	399

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.4473	(Correlated)	0	106.37
Container Stay at CY 1	52.7400	(Correlated)	12.6194	92.5964
Container Stay at CY 2	52.6754	1.84548	18.9487	94.4270
Container Stay at CY 3	53.0295	2.51963	0	101.12
Container Stay at CY 4	52.0351	2.04916	8.3341	94.7903
Container Stay at CY 5	52.1393	1.90446	11.0629	91.2756
Container Stay at CY 6	51.9820	2.13415	7.8633	93.8509
Container Stay at CY 7	52.8637	1.43107	0.2747	92.9952
Container Stay at CY 8	52.1907	(Correlated)	13.2435	88.0616
Container Stay at CY 9	123.33	5.43407	83.0025	195.97
Custom Process 1	23.8709	0.308703477	16.0790	30.9626
Custom Process 2	23.5355	0.334856195	16.0033	30.9492
Custom Process 3	23.4123	(Correlated)	16.0560	30.8917
Custom Process 4	23.5144	0.289706680	16.0060	30.9559
Custom Process 5	23.7093	0.332925890	16.1052	30.9580
Custom Process 6	23.6879	0.320340066	16.0082	30.9928
Custom Process 7	23.5986	0.318341100	16.0343	30.9574
Custom Process 8	23.5817	0.242926482	16.0308	30.9958
Custom Process 9	23.7165	0.213029239	16.0037	30.9759
QC Delay	1.2390	0.053153742	0	16.4662
QC Unloading	0.03133633	0.000253162	0	0.06782365
RTG 1	0.04359178	0.000929434	0.02144696	0.08696147
RTG 2	0.04566530	0.001163894	0.02191188	0.1582
RTG 3	0.04849058	0.001767448	0.02117241	0.1893
RTG 4	0.04967518	0.002264977	0.02088111	0.1873
RTG 5	0.06470564	0.009952811	0.02237967	0.5672
RTG 6	0.06869306	0.016804865	0.02315081	0.6268

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05002316	0.001506801	0.02110501	0.1791
RTG 8	0.04838699	0.001593040	0.02001285	0.2003
RTG 9	0.06757163	0.014779463	0.02066887	0.6240
Truck Arrive at Gate In	0.5664	0.009621929	0.3045	0.8014
Truck from CY to Gate Out	0.5331	(Insufficient)	0	0.9745

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.86	11.02777	37.2630	267.73
Truck	5.5397	(Insufficient)	4.7552	6.3479

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1004	(Correlated)	0	0.4620
Truck	886.42	(Insufficient)	812.68	966.76

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.05	11.02900	37.4316	267.95
Truck	198.09	(Insufficient)	183.56	215.50

Other

Number In	Value
Boxes	5,656
Truck	395

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.7483	3.85555	0	98.0497
Container Stay at CY 1	52.9557	3.81860	18.0998	88.3819
Container Stay at CY 2	52.8468	4.46081	14.6325	92.0270
Container Stay at CY 3	52.4168	3.88319	4.9440	84.5837
Container Stay at CY 4	53.8301	(Insufficient)	20.2388	102.59
Container Stay at CY 5	51.4764	(Insufficient)	11.5647	94.7345
Container Stay at CY 6	53.0349	3.66188	16.9155	96.1571
Container Stay at CY 7	51.1448	4.53297	15.3420	96.0319
Container Stay at CY 8	52.2352	(Insufficient)	18.6485	90.0236
Container Stay at CY 9	122.62	(Correlated)	83.0082	195.41
Custom Process 1	23.6808	0.524757961	16.0182	30.9759
Custom Process 2	23.4979	0.562323020	16.0421	30.9380
Custom Process 3	23.7627	0.529962046	16.0855	30.9733
Custom Process 4	24.1788	(Insufficient)	16.0409	30.9207
Custom Process 5	23.7568	(Insufficient)	16.2135	30.9713
Custom Process 6	23.6177	0.562770755	16.0523	30.9905
Custom Process 7	23.8753	0.435944922	16.1556	30.9866
Custom Process 8	24.0372	(Insufficient)	16.1426	30.9730
Custom Process 9	23.9541	0.338563666	16.0210	30.9958
QC Delay	1.2729	0.121440784	0	14.2860
QC Unloading	0.05598711	0.000329138	0.01391779	0.08935415
RTG 1	0.04351300	0.001145726	0.02110338	0.08068297
RTG 2	0.04615790	0.001938819	0.02236039	0.1382
RTG 3	0.05073381	0.002310334	0.02117241	0.1407
RTG 4	0.05391392	(Insufficient)	0.02427851	0.2204
RTG 5	0.07642559	(Insufficient)	0.02394408	0.4119
RTG 6	0.07686572	0.016200632	0.02575670	0.4030

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05119424	0.002779154	0.02317278	0.1492
RTG 8	0.05079566	(Insufficient)	0.02212480	0.1747
RTG 9	0.07657559	0.014482814	0.02222634	0.4205
Truck Arrive at Gate In	0.5644	0.009093929	0.3207	0.9062
Truck from CY to Gate Out	0.4743	(Insufficient)	0	0.9376

Accumulated Time

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.1929	2.46300	0	133.80
Container Stay at CY 1	51.9747	(Correlated)	3.6444	88.1047
Container Stay at CY 2	52.0915	2.19265	14.6325	88.8482
Container Stay at CY 3	51.5408	(Correlated)	1.7210	98.8251
Container Stay at CY 4	52.6120	(Correlated)	7.2076	90.6970
Container Stay at CY 5	51.7107	1.96221	5.4355	92.7721
Container Stay at CY 6	52.6812	(Correlated)	18.1717	92.9952
Container Stay at CY 7	51.6610	(Correlated)	11.7361	89.6666
Container Stay at CY 8	51.4224	2.20678	2.4298	97.0966
Container Stay at CY 9	124.21	7.84190	83.0116	195.66
Custom Process 1	23.7999	0.308136820	16.0408	30.9454
Custom Process 2	23.5991	0.359499679	16.0204	30.9836
Custom Process 3	23.4098	0.324781645	16.0274	30.9616
Custom Process 4	23.5730	(Correlated)	16.0036	30.9406
Custom Process 5	23.7797	0.328133348	16.0413	30.9960
Custom Process 6	23.6119	0.284887929	16.0250	30.9940
Custom Process 7	23.7178	0.349217675	16.0536	30.9789
Custom Process 8	23.7241	0.328191574	16.0006	30.9735
Custom Process 9	23.7404	0.237128806	16.0640	30.9773
QC Delay	1.2565	0.075780783	0	16.1765
QC Unloading	0.03840654	0.000226708	0	0.07173592
RTG 1	0.04318516	0.000621338	0.02090659	0.08837285
RTG 2	0.04826834	0.001214995	0.02090550	0.1903
RTG 3	0.05676484	(Correlated)	0.02124803	0.2799
RTG 4	0.05661835	(Correlated)	0.02104290	0.2502
RTG 5	0.2849	(Correlated)	0.02321996	3.4831
RTG 6	0.3005	(Correlated)	0.02197833	3.5466

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	102.73	7.31633	35.0441	320.54
Truck	5.6297	(Insufficient)	4.9176	6.6224

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.2003	(Correlated)	0	3.5753
Truck	882.04	(Insufficient)	804.20	937.72

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.02	7.32786	35.2479	320.70
Truck	197.16	(Insufficient)	183.55	208.00

Other

Number In	Value
Boxes	18,462
Truck	396

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05643440	0.006144506	0.02110501	0.2666
RTG 8	0.05586975	(Correlated)	0.02253379	0.2788
RTG 9	0.3227	(Correlated)	0.02096129	3.5115
Truck Arrive at Gate In	0.5734	0.011496492	0.2730	0.8479
Truck from CY to Gate Out	0.4796	(Insufficient)	0.04333486	1.0688

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.7051	3.15216	0	105.67
Container Stay at CY 1	51.9702	3.11507	7.7691	93.6858
Container Stay at CY 2	52.0657	2.95068	17.1513	88.9624
Container Stay at CY 3	51.6824	3.20562	13.9860	89.7996
Container Stay at CY 4	52.1309	3.07473	15.1273	87.1456
Container Stay at CY 5	52.0596	3.03835	16.0270	86.5194
Container Stay at CY 6	52.1474	3.34000	17.7249	102.58
Container Stay at CY 7	51.9373	2.88875	17.4046	100.74
Container Stay at CY 8	51.5879	3.36777	10.9496	92.1854
Container Stay at CY 9	121.18	8.78349	83.0124	195.91
Custom Process 1	23.6933	0.452514472	16.0291	30.7609
Custom Process 2	23.7945	0.400688598	16.0650	30.9207
Custom Process 3	23.5910	0.359967428	16.0182	30.9713
Custom Process 4	23.7830	0.513308797	16.0512	30.9385
Custom Process 5	23.4591	0.541413639	16.0166	30.9933
Custom Process 6	23.8087	0.509889268	16.0603	30.9296
Custom Process 7	23.7301	0.403436226	16.0421	30.9730
Custom Process 8	23.2923	(Correlated)	16.0558	30.9733
Custom Process 9	23.7590	0.337734300	16.0210	30.9958
QC Delay	1.2913	0.095920178	0	14.3753
QC Unloading	0.03458520	(Correlated)	0	0.06754863
RTG 1	0.04336389	0.001059477	0.02090659	0.07909967
RTG 2	0.04655720	0.001901079	0.02210940	0.1653
RTG 3	0.05107532	0.002637949	0.02070770	0.1480
RTG 4	0.05226937	0.002574701	0.02009986	0.1624
RTG 5	0.07926629	0.014689435	0.02289301	0.4955
RTG 6	0.07765482	0.014421427	0.02226472	0.4720

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.08	(Correlated)	39.6864	268.85
Truck	5.5988	(Insufficient)	4.4963	6.8612

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1012	(Correlated)	0	0.5394
Truck	882.22	(Insufficient)	807.52	950.12

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.26	(Correlated)	39.8551	269.02
Truck	197.23	(Insufficient)	184.37	211.03

Other

Number In	Value
Boxes	8,888
Truck	395

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05189442	0.003114674	0.02181657	0.1682
RTG 8	0.05324233	0.003736129	0.02212480	0.2478
RTG 9	0.07582393	0.013036051	0.02258189	0.4858
Truck Arrive at Gate In	0.5600	0.011259707	0.1497	0.8569
Truck from CY to Gate Out	0.5549	(Insufficient)	0	1.3027

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.62	(Correlated)	27.6960	295.53
Truck	5.6133	(Insufficient)	4.8421	6.4527

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1387	(Correlated)	0	3.4258
Truck	879.40	(Insufficient)	806.60	946.38

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.84	(Correlated)	27.8647	295.70
Truck	196.48	(Insufficient)	186.65	207.50

Other

Number In	Value
Boxes	50,662
Truck	399

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3248	(Correlated)	0	136.56
Container Stay at CY 1	52.2606	(Correlated)	0.2747	104.12
Container Stay at CY 2	51.9278	(Correlated)	3.3870	95.7366
Container Stay at CY 3	52.5167	0.968471433	11.5047	101.23
Container Stay at CY 4	52.2488	1.02300	4.8494	100.82
Container Stay at CY 5	51.8223	(Correlated)	13.1714	104.86
Container Stay at CY 6	52.2108	1.23173	10.2395	103.31
Container Stay at CY 7	52.3831	0.824112384	6.7003	96.0151
Container Stay at CY 8	52.2767	1.26256	3.3687	104.73
Container Stay at CY 9	124.31	(Correlated)	83.0019	195.98
Custom Process 1	23.7303	0.177858659	16.0166	30.9890
Custom Process 2	23.6273	0.177004078	16.0251	30.9945
Custom Process 3	23.5966	0.211257452	16.0371	30.9832
Custom Process 4	23.6806	0.176459898	16.0100	30.9357
Custom Process 5	23.6758	0.173154249	16.0298	30.9966
Custom Process 6	23.6662	0.168362379	16.0053	30.9781
Custom Process 7	23.5219	0.197173360	16.0560	31.0000
Custom Process 8	23.7150	0.171735618	16.0166	30.9668
Custom Process 9	23.6775	0.152136387	16.0072	30.9684
QC Delay	1.2733	0.032496896	0	16.5302
QC Unloading	0.06257293	0.000089232	0.02422848	0.1128
RTG 1	0.04352708	0.000404306	0.02097986	0.0982
RTG 2	0.04786761	0.000996391	0.02079721	0.1538
RTG 3	0.05282675	0.002142701	0.02051826	0.2297
RTG 4	0.05336922	0.001710071	0.02165778	0.2244
RTG 5	0.1613	0.140543982	0.02158705	3.3964
RTG 6	0.1667	(Correlated)	0.02071952	3.3799

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05235016	0.001820365	0.02129828	0.2269
RTG 8	0.05249160	0.002392075	0.02001285	0.2192
RTG 9	0.1609	(Correlated)	0.02073922	3.3521
Truck Arrive at Gate In	0.5611	0.010821072	0.2802	0.8482
Truck from CY to Gate Out	0.5673	(Insufficient)	0.02938372	1.2858

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.01	2.80823	27.0606	286.67
Truck	5.6167	(Insufficient)	4.9813	6.3695

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1013	(Correlated)	0	0.5958
Truck	876.34	(Insufficient)	796.25	974.88

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.20	2.80860	27.2664	286.93
Truck	195.29	(Insufficient)	182.45	210.00

Other

Number In	Value
Boxes	64,864
Truck	401

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.5355	(Correlated)	0	136.56
Container Stay at CY 1	52.0982	0.624674676	8.4159	101.60
Container Stay at CY 2	51.8370	0.790871165	4.9145	96.2587
Container Stay at CY 3	51.7752	0.931796542	3.6157	95.8401
Container Stay at CY 4	52.0141	0.891973395	1.3004	96.3839
Container Stay at CY 5	52.4714	0.620755541	0	99.35
Container Stay at CY 6	52.4743	0.625050748	3.7476	105.95
Container Stay at CY 7	52.3426	(Correlated)	6.5239	93.1692
Container Stay at CY 8	52.2908	(Correlated)	2.5405	104.56
Container Stay at CY 9	124.09	2.48274	83.0000	195.97
Custom Process 1	23.7527	0.165228248	16.0140	30.9855
Custom Process 2	23.6047	0.138229967	16.0100	30.9800
Custom Process 3	23.7496	0.141791208	16.0084	30.9933
Custom Process 4	23.7647	0.143875633	16.0108	30.9993
Custom Process 5	23.6494	0.167813086	16.0194	30.9996
Custom Process 6	23.6882	0.173772282	16.0148	30.9945
Custom Process 7	23.6674	0.137290860	16.0074	30.9850
Custom Process 8	23.7100	0.147456055	16.0028	31.0000
Custom Process 9	23.7009	0.115011680	16.0050	30.9982
QC Delay	1.2630	0.026824850	0	18.5688
QC Unloading	0.04543269	0.000130642	0.00709741	0.08501641
RTG 1	0.04402801	0.000396481	0.02063834	0.1042
RTG 2	0.04652824	0.000583527	0.02017025	0.1656
RTG 3	0.05056432	(Correlated)	0.02071422	0.1855
RTG 4	0.05081034	0.001144705	0.02009986	0.2358
RTG 5	0.07649571	0.005663213	0.02109738	0.5216
RTG 6	0.07640195	0.004707967	0.02091898	0.4659

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05058595	(Correlated)	0.02102703	0.1901
RTG 8	0.05185288	0.001238700	0.02105781	0.2905
RTG 9	0.07869817	0.004825470	0.02040289	0.5408
Truck Arrive at Gate In	0.5720	0.009430714	0.3019	0.8870
Truck from CY to Gate Out	0.4674	(Insufficient)	0	0.9812

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.67	2.82826	26.7564	285.25
Truck	5.5668	(Insufficient)	4.5882	6.4557

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1048	(Correlated)	0	1.1763
Truck	872.83	(Insufficient)	802.31	960.86

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.86	2.82927	26.9250	285.41
Truck	194.92	(Insufficient)	178.09	210.25

Other

Number In	Value
Boxes	78,683
Truck	401

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3743	0.687667371	0	146.54
Container Stay at CY 1	52.4347	0.640729950	11.9083	104.12
Container Stay at CY 2	52.0079	(Correlated)	1.7210	107.93
Container Stay at CY 3	51.6905	0.526248305	8.7285	97.5706
Container Stay at CY 4	52.2976	(Correlated)	6.8772	93.6718
Container Stay at CY 5	52.4233	0.799314044	8.6283	99.47
Container Stay at CY 6	52.0601	0.862876398	4.0045	95.8410
Container Stay at CY 7	52.0497	(Correlated)	0.2747	100.74
Container Stay at CY 8	52.0768	0.722574424	5.9428	105.95
Container Stay at CY 9	123.32	2.98887	83.0001	195.99
Custom Process 1	23.6627	0.139206375	16.0156	30.9906
Custom Process 2	23.7557	0.150378523	16.0111	30.9985
Custom Process 3	23.7383	0.134692841	16.0100	30.9926
Custom Process 4	23.6070	0.166436768	16.0028	30.9866
Custom Process 5	23.7167	0.119962840	16.0359	30.9964
Custom Process 6	23.6354	0.150220761	16.0157	31.0000
Custom Process 7	23.6409	0.153606751	16.0053	30.9851
Custom Process 8	23.6697	0.146616657	16.0058	30.9777
Custom Process 9	23.6944	0.087823304	16.0154	30.9897
QC Delay	1.2547	0.025428701	0	16.5302
QC Unloading	0.03587942	0.000084345	0	0.08612975
RTG 1	0.04343126	0.000439915	0.02033654	0.0917
RTG 2	0.04705992	0.000696394	0.02079721	0.1681
RTG 3	0.05201670	0.001613539	0.02036421	0.2073
RTG 4	0.05134770	0.001118327	0.02045581	0.2616
RTG 5	0.08504191	(Correlated)	0.02083295	1.1234
RTG 6	0.08423286	0.013145943	0.02110819	1.1072

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05223459	0.001348122	0.02036459	0.2436
RTG 8	0.05175194	0.000847062	0.02048413	0.2170
RTG 9	0.08535972	0.014183299	0.02040289	1.0943
Truck Arrive at Gate In	0.5607	0.014182859	0.2844	0.8445
Truck from CY to Gate Out	0.5206	(Insufficient)	0	1.0495

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.62	(Correlated)	36.2172	302.29
Truck	5.5903	(Insufficient)	4.4363	6.5602

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0909	0.001330389	0	0.2459
Truck	887.68	(Insufficient)	769.29	946.36

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.79	(Correlated)	36.3859	302.46
Truck	198.19	(Insufficient)	179.92	210.57

Other

Number In	Value
Boxes	3,474
Truck	396

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3841	(Correlated)	0	88.9810
Container Stay at CY 1	52.2745	(Insufficient)	7.7691	88.0917
Container Stay at CY 2	52.3432	(Insufficient)	17.4046	90.2145
Container Stay at CY 3	50.4447	(Insufficient)	17.2578	83.6486
Container Stay at CY 4	50.3129	(Insufficient)	15.4505	87.5619
Container Stay at CY 5	50.3750	(Insufficient)	14.4809	94.6844
Container Stay at CY 6	50.3331	(Insufficient)	13.4045	84.3427
Container Stay at CY 7	52.1424	(Insufficient)	9.6899	86.2142
Container Stay at CY 8	51.4764	(Insufficient)	16.0871	84.1562
Container Stay at CY 9	120.84	(Correlated)	83.0095	195.76
Custom Process 1	23.5978	(Insufficient)	16.1037	30.7001
Custom Process 2	23.7942	(Insufficient)	16.2321	30.8534
Custom Process 3	23.4763	(Insufficient)	16.1201	30.8917
Custom Process 4	23.7217	(Insufficient)	16.0215	30.8905
Custom Process 5	23.3819	(Insufficient)	16.0847	30.8747
Custom Process 6	23.7400	(Insufficient)	16.1661	30.9880
Custom Process 7	23.7092	(Insufficient)	16.2239	30.9801
Custom Process 8	23.5790	(Insufficient)	16.5568	30.9685
Custom Process 9	23.3861	0.445687801	16.0605	30.9156
QC Delay	1.2661	0.099703275	0	11.6346
QC Unloading	0.08333790	0.000478414	0.05258012	0.1199
RTG 1	0.04322599	(Insufficient)	0.02309237	0.08319528
RTG 2	0.04689511	(Insufficient)	0.02225949	0.1247
RTG 3	0.04820142	(Insufficient)	0.02117241	0.1401
RTG 4	0.04811301	(Insufficient)	0.02178827	0.1304
RTG 5	0.05284239	(Insufficient)	0.02574171	0.2077
RTG 6	0.05766043	(Insufficient)	0.02138429	0.1940

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04812209	(Insufficient)	0.02214797	0.1074
RTG 8	0.04646353	(Insufficient)	0.02416232	0.1398
RTG 9	0.05658064	0.004672661	0.02300712	0.1977
Truck Arrive at Gate In	0.5686	0.011153585	0.3413	0.8323
Truck from CY to Gate Out	0.4760	(Insufficient)	0	0.9474

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.15	8.52165	34.0977	254.51
Truck	5.7251	(Insufficient)	4.8931	6.7470

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0930	0.000927037	0	0.3195
Truck	879.25	(Insufficient)	794.97	971.85

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.33	8.52199	34.2664	254.67
Truck	196.96	(Insufficient)	181.83	213.10

Other

Number In	Value
Boxes	7,527
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.2134	2.95576	0	124.94
Container Stay at CY 1	51.9941	3.42060	19.4540	87.5619
Container Stay at CY 2	52.7544	2.46008	18.8863	92.6421
Container Stay at CY 3	51.9376	2.73672	16.6777	84.5561
Container Stay at CY 4	52.6292	2.98142	13.4720	96.0319
Container Stay at CY 5	53.1480	3.06373	16.8644	90.3131
Container Stay at CY 6	51.7477	3.01277	15.7507	90.3879
Container Stay at CY 7	51.5525	2.77901	11.4018	92.0151
Container Stay at CY 8	52.0248	3.18332	7.8633	92.9262
Container Stay at CY 9	123.09	9.76570	83.0257	195.99
Custom Process 1	23.7593	0.533868870	16.1037	30.9435
Custom Process 2	23.5855	0.362897336	16.0300	30.8861
Custom Process 3	23.6208	0.484409596	16.1646	30.9971
Custom Process 4	23.8214	0.489454774	16.0969	30.8499
Custom Process 5	23.3291	0.544528953	16.0343	30.9730
Custom Process 6	23.3879	0.506502258	16.0215	30.9509
Custom Process 7	23.6396	0.492127534	16.0393	30.9589
Custom Process 8	23.8760	0.528708500	16.0473	30.9057
Custom Process 9	23.5667	0.340830966	16.0291	30.9618
QC Delay	1.2548	0.094580336	0	16.1765
QC Unloading	0.03929276	0.000246842	0.00186964	0.07492346
RTG 1	0.04403991	0.001300743	0.02462696	0.08644757
RTG 2	0.04609128	0.001762050	0.02233816	0.1426
RTG 3	0.04832806	0.002743125	0.02175263	0.1545
RTG 4	0.05143525	0.002668355	0.02105489	0.1754
RTG 5	0.05812597	0.005145873	0.02354622	0.2760
RTG 6	0.05949062	0.004079973	0.02288023	0.2346

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04847192	0.002446291	0.02068679	0.1386
RTG 8	0.05129124	0.003535401	0.02326909	0.1865
RTG 9	0.05967465	0.004498789	0.02184820	0.2362
Truck Arrive at Gate In	0.5644	0.010512446	0.3061	0.8278
Truck from CY to Gate Out	0.6431	(Insufficient)	0.08243471	1.3046

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.79	9.90978	33.4386	281.12
Truck	5.6622	(Insufficient)	4.7393	6.3798

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.0930	0.001386642	0	0.2966
Truck	875.61	(Insufficient)	820.36	972.76

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.97	9.91057	33.6073	281.28
Truck	196.35	(Insufficient)	183.26	215.85

Other

Number In	Value
Boxes	6,369
Truck	399

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3927	3.22877	0	124.94
Container Stay at CY 1	53.1224	2.97173	13.4720	87.5619
Container Stay at CY 2	52.4516	2.98275	16.6289	93.9749
Container Stay at CY 3	52.2546	3.87024	4.8494	88.1251
Container Stay at CY 4	52.1119	2.75808	18.3121	102.58
Container Stay at CY 5	52.1000	4.09711	17.5617	93.4941
Container Stay at CY 6	51.7190	3.00695	15.7791	90.8524
Container Stay at CY 7	52.7245	3.77427	7.8633	94.5418
Container Stay at CY 8	52.2569	3.89507	22.2195	96.1571
Container Stay at CY 9	122.83	10.58143	83.0035	195.95
Custom Process 1	23.2492	0.471156054	16.0473	30.9770
Custom Process 2	23.8382	0.449503704	16.0258	30.9659
Custom Process 3	24.0125	0.627069009	16.0753	30.9296
Custom Process 4	23.2394	0.401805050	16.1966	30.8747
Custom Process 5	23.5858	0.422778680	16.0389	30.9966
Custom Process 6	23.3819	0.570766876	16.0215	30.8917
Custom Process 7	23.5076	0.465738104	16.0847	30.7698
Custom Process 8	23.5407	0.555666212	16.0790	30.9509
Custom Process 9	23.5231	0.393491792	16.0298	30.9945
QC Delay	1.2438	0.096651873	0	16.4662
QC Unloading	0.03557630	0.000383788	0	0.06680626
RTG 1	0.04404792	0.001596991	0.02090659	0.08319528
RTG 2	0.04706052	0.001791649	0.02268007	0.1327
RTG 3	0.04985180	0.002537661	0.02117241	0.1564
RTG 4	0.04791422	0.002306160	0.02272481	0.1364
RTG 5	0.06027263	0.005156388	0.02120485	0.2609
RTG 6	0.06084829	0.006040880	0.02224222	0.2466

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04895379	0.003030085	0.02228426	0.1424
RTG 8	0.05092355	(Insufficient)	0.02295698	0.1705
RTG 9	0.05878091	0.005597841	0.02042353	0.2169
Truck Arrive at Gate In	0.5677	0.013279186	0.2487	0.8566
Truck from CY to Gate Out	0.5513	(Insufficient)	0	0.9458

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.59	(Correlated)	32.5562	264.52
Truck	5.7465	(Insufficient)	4.8234	6.9173

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.08976476	(Correlated)	0	0.2063
Truck	866.39	(Insufficient)	786.17	932.27

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.77	(Correlated)	32.7248	264.69
Truck	193.78	(Insufficient)	178.14	205.14

Other

Number In	Value
Boxes	2,912
Truck	403

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.7545	(Correlated)	0	76.2212
Container Stay at CY 1	50.4211	(Insufficient)	4.9440	77.4681
Container Stay at CY 2	53.5620	(Insufficient)	24.1433	84.3427
Container Stay at CY 3	51.7689	(Insufficient)	14.4809	88.5285
Container Stay at CY 4	53.4537	(Insufficient)	18.7368	85.0909
Container Stay at CY 5	52.3705	(Insufficient)	18.1299	88.1251
Container Stay at CY 6	53.6094	(Insufficient)	12.0117	88.9624
Container Stay at CY 7	52.2241	(Insufficient)	16.4264	94.6844
Container Stay at CY 8	51.5942	(Insufficient)	15.3441	94.2495
Container Stay at CY 9	124.71	(Correlated)	83.0217	193.59
Custom Process 1	23.6540	(Insufficient)	16.1597	30.8861
Custom Process 2	23.9854	(Insufficient)	16.1724	30.8747
Custom Process 3	23.7201	(Insufficient)	16.0841	30.8879
Custom Process 4	23.4818	(Insufficient)	16.2152	30.5347
Custom Process 5	23.8728	(Insufficient)	16.1804	30.8205
Custom Process 6	23.5870	(Insufficient)	16.0605	30.9621
Custom Process 7	23.9064	(Insufficient)	16.0488	30.7756
Custom Process 8	23.7242	(Insufficient)	16.1615	30.9057
Custom Process 9	23.3064	0.498874372	16.0033	30.9066
QC Delay	1.2716	0.113607229	0	12.0006
QC Unloading	0.0948	0.000391877	0.05971136	0.1291
RTG 1	0.04302693	(Insufficient)	0.02490203	0.08132884
RTG 2	0.04541761	(Insufficient)	0.02236039	0.1257
RTG 3	0.04694178	(Insufficient)	0.02363458	0.1212
RTG 4	0.05103825	(Insufficient)	0.02310693	0.1348
RTG 5	0.05464751	(Insufficient)	0.02717956	0.1479
RTG 6	0.05106183	(Insufficient)	0.02138429	0.1575

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04867760	(Insufficient)	0.02662302	0.1383
RTG 8	0.04927663	(Insufficient)	0.02486044	0.1202
RTG 9	0.05379127	0.003488601	0.02365948	0.1549
Truck Arrive at Gate In	0.5780	0.010094300	0.3157	0.8860
Truck from CY to Gate Out	0.5369	(Insufficient)	0.1432	1.2006

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	105.04	11.16866	37.2801	299.94
Truck	5.6866	(Insufficient)	4.8569	6.9069

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.08875318	(Correlated)	0	0.2336
Truck	877.67	(Insufficient)	821.60	933.75

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	105.21	11.16888	37.4488	300.11
Truck	195.49	(Insufficient)	179.86	206.20

Other

Number In	Value
Boxes	3,744
Truck	400

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3652	3.06979	0	97.7581
Container Stay at CY 1	52.4042	(Insufficient)	22.5271	90.2588
Container Stay at CY 2	53.1026	(Insufficient)	19.4540	92.9262
Container Stay at CY 3	51.9351	(Insufficient)	13.5840	88.1966
Container Stay at CY 4	50.4175	(Insufficient)	20.7585	94.6844
Container Stay at CY 5	52.7598	(Insufficient)	18.8863	89.0096
Container Stay at CY 6	53.1320	(Insufficient)	13.7675	88.0917
Container Stay at CY 7	52.4828	(Insufficient)	23.0860	91.7966
Container Stay at CY 8	52.6639	(Insufficient)	14.1332	87.6094
Container Stay at CY 9	125.33	10.65870	83.0060	195.38
Custom Process 1	23.5266	(Insufficient)	16.2191	30.9444
Custom Process 2	23.4336	(Insufficient)	16.4697	30.9435
Custom Process 3	23.0207	(Insufficient)	16.0497	30.8506
Custom Process 4	23.9596	(Insufficient)	16.0942	30.9525
Custom Process 5	23.1968	(Insufficient)	16.0753	30.9479
Custom Process 6	23.9891	(Insufficient)	16.1222	30.8150
Custom Process 7	23.7980	(Insufficient)	16.1343	30.9621
Custom Process 8	23.6165	(Insufficient)	16.1354	30.9905
Custom Process 9	23.9021	0.482129201	16.1057	30.9317
QC Delay	1.2448	0.098876890	0	11.8666
QC Unloading	0.05577133	0.000465428	0.02447760	0.08916371
RTG 1	0.04309979	(Insufficient)	0.02187015	0.08319528
RTG 2	0.04503989	(Insufficient)	0.02403677	0.1033
RTG 3	0.04586644	(Insufficient)	0.02420672	0.1566
RTG 4	0.04557588	(Insufficient)	0.02295593	0.1084
RTG 5	0.05524322	(Insufficient)	0.02225996	0.1586
RTG 6	0.05389356	(Insufficient)	0.02413656	0.1371

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04748843	(Insufficient)	0.02181657	0.1812
RTG 8	0.04575926	(Insufficient)	0.02280920	0.1346
RTG 9	0.05087347	0.003190101	0.02256541	0.1618
Truck Arrive at Gate In	0.5702	0.011916459	0.3218	0.8732
Truck from CY to Gate Out	0.5533	(Insufficient)	0.1244	1.3300

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.10	7.15266	29.8450	263.21
Truck	5.6210	(Insufficient)	4.6407	6.7514

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.08845781	(Correlated)	0	0.2285
Truck	879.51	(Insufficient)	786.57	976.54

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.08433333	(Correlated)	0.08433333	0.08433333
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.27	7.15285	30.0137	263.38
Truck	196.35	(Insufficient)	176.33	216.03

Other

Number In	Value
Boxes	9,568
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.4666	(Correlated)	0	90.2853
Container Stay at CY 1	51.9465	(Correlated)	18.9587	92.0151
Container Stay at CY 2	52.3807	(Correlated)	3.6444	92.1854
Container Stay at CY 3	51.1149	(Correlated)	14.0165	90.1364
Container Stay at CY 4	52.4829	(Correlated)	18.2661	90.7270
Container Stay at CY 5	52.2371	(Correlated)	18.4003	92.1292
Container Stay at CY 6	52.4474	(Correlated)	4.1631	92.7751
Container Stay at CY 7	52.1706	(Correlated)	18.1922	88.0917
Container Stay at CY 8	51.0078	2.32912	4.7922	86.1115
Container Stay at CY 9	124.22	(Correlated)	83.0039	195.81
Custom Process 1	23.5346	0.378720974	16.0912	30.9038
Custom Process 2	23.4850	0.401370482	16.0708	30.9221
Custom Process 3	23.4815	0.481434703	16.0033	30.9812
Custom Process 4	23.5900	0.427135557	16.0462	30.9322
Custom Process 5	23.4888	0.342708415	16.0232	30.9525
Custom Process 6	23.5903	0.425088952	16.1013	30.8219
Custom Process 7	23.8498	0.447047632	16.0886	30.9310
Custom Process 8	23.8395	0.417698692	16.0304	30.9815
Custom Process 9	23.7997	0.266213505	16.0324	30.9798
QC Delay	1.2740	0.066170967	0	15.0925
QC Unloading	0.03523461	0.000273667	0	0.06817323
RTG 1	0.04402824	(Correlated)	0.02187015	0.0939
RTG 2	0.04568389	0.001643788	0.02084808	0.1160
RTG 3	0.04603086	0.001454551	0.02117241	0.1383
RTG 4	0.04760151	0.002219081	0.02178827	0.1952
RTG 5	0.05118742	0.002044223	0.02184179	0.1597
RTG 6	0.04956730	0.002513664	0.02218658	0.1734

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04663852	0.001750481	0.02214797	0.1403
RTG 8	0.04630913	0.001715175	0.02213164	0.1266
RTG 9	0.05017667	0.001674562	0.02206957	0.1633
Truck Arrive at Gate In	0.5695	0.013166511	0.2485	0.8375
Truck from CY to Gate Out	0.4930	(Insufficient)	0	1.3044

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.27	7.14985	34.9383	260.23
Truck	5.6360	(Insufficient)	4.9340	6.3067

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1143	(Correlated)	0	0.2003
Truck	877.14	(Insufficient)	811.61	944.24

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000137739	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.48	7.15015	35.1519	260.45
Truck	196.08	(Insufficient)	181.90	212.43

Other

Number In	Value
Boxes	4,284
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

VA Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04357994	(Insufficient)	0.02310693	0.08749041
RTG 8	0.04404162	(Insufficient)	0.02240412	0.06796426
RTG 9	0.04379904	0.000966717	0.02345082	0.08280851
Truck Arrive at Gate In	0.5648	0.010951383	0.2963	0.8376
Truck from CY to Gate Out	0.5405	(Insufficient)	0.1762	0.9952

Wait Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 1	0	(Insufficient)	0	0
RTG 2	0.00056788	(Insufficient)	0	0.03627771
RTG 3	0.00069777	(Insufficient)	0	0.03353988
RTG 4	0.00214250	(Insufficient)	0	0.05267779
RTG 5	0.00357877	(Insufficient)	0	0.06812803
RTG 6	0.00257465	(Insufficient)	0	0.08892481
RTG 7	0.00134359	(Insufficient)	0	0.05771454
RTG 8	0.00110988	(Insufficient)	0	0.03345617
RTG 9	0.00322339	0.001109391	0	0.07649309

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.2546	(Correlated)	0	72.0669
Container Stay at CY 1	53.9199	(Insufficient)	16.0871	81.3861
Container Stay at CY 2	51.6714	(Insufficient)	18.6453	88.6110
Container Stay at CY 3	51.4899	(Insufficient)	18.6171	90.1444
Container Stay at CY 4	52.5486	(Insufficient)	17.5921	94.2495
Container Stay at CY 5	52.9744	(Insufficient)	22.8268	92.6421
Container Stay at CY 6	53.4468	(Insufficient)	11.1982	87.7859
Container Stay at CY 7	51.4596	(Insufficient)	21.7805	84.8374
Container Stay at CY 8	50.7146	(Insufficient)	12.0117	82.5730
Container Stay at CY 9	125.08	(Correlated)	83.0103	195.76
Custom Process 1	23.6261	(Insufficient)	16.0476	30.7576
Custom Process 2	23.5011	(Insufficient)	16.0558	30.9854
Custom Process 3	23.5597	(Insufficient)	16.0753	30.9435
Custom Process 4	23.7868	(Insufficient)	16.4421	30.8735
Custom Process 5	23.8492	(Insufficient)	16.5167	30.8579
Custom Process 6	23.2884	(Insufficient)	16.1037	30.9176
Custom Process 7	23.7480	(Insufficient)	16.1060	30.8994
Custom Process 8	23.8777	(Insufficient)	16.3674	30.9479
Custom Process 9	23.6921	0.359449787	16.0409	30.9182
QC Delay	1.2323	0.088784212	0	14.3753
QC Unloading	0.05000907	0.000447232	0.01454436	0.08657654
RTG 1	0.04397150	(Insufficient)	0.02188391	0.08576693
RTG 2	0.04368082	(Insufficient)	0.02346911	0.1005
RTG 3	0.04469082	(Insufficient)	0.02365704	0.1092
RTG 4	0.04572050	(Insufficient)	0.02295593	0.0903
RTG 5	0.04822882	(Insufficient)	0.02070770	0.1009
RTG 6	0.04670593	(Insufficient)	0.02312627	0.1522

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	102.99	10.27626	29.9049	243.47
Truck	5.6783	(Insufficient)	4.7837	6.9069

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1131	(Correlated)	0	0.1790
Truck	880.52	(Insufficient)	809.88	957.42

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000223851	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.20	10.27705	30.0063	243.69
Truck	196.60	(Insufficient)	186.11	213.37

Other

Number In	Value
Boxes	1,428
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.7872	3.39283	0	72.0669
Container Stay at CY 1	52.0471	(Insufficient)	12.3959	78.7158
Container Stay at CY 2	55.8270	(Insufficient)	27.2605	90.8524
Container Stay at CY 3	53.1837	(Insufficient)	19.4178	88.1251
Container Stay at CY 4	52.7432	(Insufficient)	18.4783	85.4861
Container Stay at CY 5	52.7529	(Insufficient)	30.4702	80.6157
Container Stay at CY 6	52.0277	(Insufficient)	10.8163	83.4830
Container Stay at CY 7	49.9929	(Insufficient)	29.6716	87.4600
Container Stay at CY 8	53.6130	(Insufficient)	21.7880	85.9675
Container Stay at CY 9	121.70	(Insufficient)	83.2679	195.20
Custom Process 1	23.1974	(Insufficient)	16.1804	30.9182
Custom Process 2	24.0674	(Insufficient)	16.1262	30.8870
Custom Process 3	23.4401	(Insufficient)	16.0558	30.7129
Custom Process 4	23.8141	(Insufficient)	16.2895	30.5043
Custom Process 5	23.7089	(Insufficient)	16.1255	30.9221
Custom Process 6	23.8046	(Insufficient)	16.3366	30.9815
Custom Process 7	23.4241	(Insufficient)	16.0857	30.4716
Custom Process 8	23.1827	(Insufficient)	16.1057	30.8579
Custom Process 9	23.3172	(Insufficient)	16.3195	30.8445
QC Delay	1.2047	0.126282779	0	11.8417
QC Unloading	0.04148719	0.000704454	0.01251952	0.07267289
RTG 1	0.04442732	(Insufficient)	0.02450567	0.07650140
RTG 2	0.04374580	(Insufficient)	0.02363458	0.0978
RTG 3	0.04488398	(Insufficient)	0.02590464	0.0943
RTG 4	0.04581566	(Insufficient)	0.02319743	0.07896751
RTG 5	0.04506655	(Insufficient)	0.02225996	0.0972
RTG 6	0.04496382	(Insufficient)	0.02573481	0.08928682

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04502231	(Insufficient)	0.02605444	0.08722143
RTG 8	0.04191232	(Insufficient)	0.02487934	0.07679821
RTG 9	0.04787165	(Insufficient)	0.02344644	0.1137
Truck Arrive at Gate In	0.5742	0.009535017	0.2670	0.8368
Truck from CY to Gate Out	0.5104	(Insufficient)	0	1.3300

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.62	7.01346	39.7468	272.21
Truck	5.5281	(Insufficient)	4.5937	6.6074

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1147	(Correlated)	0	0.2194
Truck	879.79	(Insufficient)	781.38	950.99

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000127837	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.84	7.01375	39.8502	272.43
Truck	196.16	(Insufficient)	180.91	208.96

Other

Number In	Value
Boxes	4,692
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.4939	(Correlated)	0	72.0669
Container Stay at CY 1	52.6871	(Insufficient)	14.7545	99.33
Container Stay at CY 2	53.7097	(Insufficient)	25.4603	86.3986
Container Stay at CY 3	51.6586	(Insufficient)	15.3649	86.2142
Container Stay at CY 4	51.7580	(Insufficient)	19.0691	81.8318
Container Stay at CY 5	51.9444	(Insufficient)	15.7791	94.5465
Container Stay at CY 6	52.9487	(Insufficient)	12.3959	85.2391
Container Stay at CY 7	53.0934	(Insufficient)	20.5354	99.59
Container Stay at CY 8	52.7222	(Insufficient)	22.5098	92.6421
Container Stay at CY 9	122.37	(Correlated)	83.0150	195.75
Custom Process 1	23.6900	(Insufficient)	16.0946	30.8841
Custom Process 2	23.3291	(Insufficient)	16.0291	30.9251
Custom Process 3	23.3964	(Insufficient)	16.0940	30.9444
Custom Process 4	23.1787	(Insufficient)	16.3539	30.9730
Custom Process 5	23.6962	(Insufficient)	16.1100	30.7381
Custom Process 6	23.3695	(Insufficient)	16.0340	30.9198
Custom Process 7	23.6268	(Insufficient)	16.0166	30.9733
Custom Process 8	23.6851	(Insufficient)	16.0857	30.9933
Custom Process 9	23.7048	0.346435192	16.0822	30.9440
QC Delay	1.2918	0.084843557	0	11.8417
QC Unloading	0.03698912	0.000435050	0.00512122	0.07086907
RTG 1	0.04355621	(Insufficient)	0.02188391	0.07918739
RTG 2	0.04536286	(Insufficient)	0.02249372	0.1051
RTG 3	0.04508166	(Insufficient)	0.02070770	0.0984
RTG 4	0.04552619	(Insufficient)	0.02310693	0.1185
RTG 5	0.04906840	(Insufficient)	0.02264557	0.1547
RTG 6	0.04912405	(Insufficient)	0.02284755	0.1446

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04434195	(Insufficient)	0.02287338	0.0986
RTG 8	0.04445540	(Insufficient)	0.02186157	0.1174
RTG 9	0.04727143	0.001571122	0.02184820	0.1300
Truck Arrive at Gate In	0.5616	0.013448650	0.2670	0.8586
Truck from CY to Gate Out	0.4820	(Insufficient)	0	1.0133

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	100.28	7.99121	35.4668	249.24
Truck	5.6683	(Insufficient)	5.0931	6.6389

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1098	(Correlated)	0	0.2046
Truck	870.33	(Insufficient)	803.81	946.49

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1031	0.000202931	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	100.49	7.99272	35.6804	249.46
Truck	194.35	(Insufficient)	181.64	205.72

Other

Number In	Value
Boxes	750
Truck	402

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	11.4155	3.45597	0	67.4801
Container Stay at CY 1	53.1523	(Insufficient)	30.4910	87.2214
Container Stay at CY 2	49.7511	(Insufficient)	12.0117	85.1712
Container Stay at CY 3	49.6267	(Insufficient)	21.1130	78.9187
Container Stay at CY 4	51.9938	(Insufficient)	15.6924	75.1011
Container Stay at CY 5	54.4607	(Insufficient)	25.3928	77.5415
Container Stay at CY 6	52.2685	(Insufficient)	9.4289	86.6178
Container Stay at CY 7	53.9219	(Insufficient)	17.9288	85.6607
Container Stay at CY 8	52.7308	(Insufficient)	31.5603	78.8985
Container Stay at CY 9	114.68	(Insufficient)	83.0762	192.74
Custom Process 1	22.8497	(Insufficient)	16.0293	30.6978
Custom Process 2	23.2936	(Insufficient)	16.5102	30.7200
Custom Process 3	23.6403	(Insufficient)	16.2846	29.9501
Custom Process 4	22.8127	(Insufficient)	16.2095	29.8490
Custom Process 5	25.6574	(Insufficient)	18.1400	30.9206
Custom Process 6	24.0384	(Insufficient)	16.5110	30.3155
Custom Process 7	24.6955	(Insufficient)	16.9368	30.6103
Custom Process 8	23.3406	(Insufficient)	16.2192	30.5780
Custom Process 9	23.1259	(Insufficient)	16.2132	30.8078
QC Delay	1.2543	0.139099507	0.00073184	8.8640
QC Unloading	0.0909	0.000848224	0.06105637	0.1209
RTG 1	0.04343736	(Insufficient)	0.02336243	0.06941084
RTG 2	0.04427532	(Insufficient)	0.02365549	0.07744286
RTG 3	0.04596562	(Insufficient)	0.02558833	0.07039519
RTG 4	0.04325026	(Insufficient)	0.02222924	0.1089
RTG 5	0.04618093	(Insufficient)	0.02777669	0.1254
RTG 6	0.04682764	(Insufficient)	0.02708555	0.07413646

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04123852	(Insufficient)	0.02388270	0.08019155
RTG 8	0.04585362	(Insufficient)	0.02658416	0.07617599
RTG 9	0.04455796	(Insufficient)	0.02132240	0.0922
Truck Arrive at Gate In	0.5733	0.009155997	0.3083	0.8252
Truck from CY to Gate Out	0.5102	(Insufficient)	0.06117945	1.1361

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	104.28	3.49976	26.7073	293.39
Truck	5.7047	(Insufficient)	4.9196	6.5558

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1204	(Correlated)	0	0.4377
Truck	873.11	(Insufficient)	812.35	971.78

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000052510	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.50	3.49968	26.9245	293.60
Truck	195.01	(Insufficient)	182.54	219.41

Other

Number In	Value
Boxes	20,769
Truck	400

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.1225	0.950775662	0	107.96
Container Stay at CY 1	51.6360	(Correlated)	8.3738	89.6666
Container Stay at CY 2	51.9835	(Correlated)	13.8870	93.4523
Container Stay at CY 3	52.1878	1.48439	13.4270	97.2063
Container Stay at CY 4	52.0983	(Correlated)	0.2747	96.2352
Container Stay at CY 5	51.9206	1.57247	13.0977	97.5706
Container Stay at CY 6	52.1431	1.53437	9.6899	88.6368
Container Stay at CY 7	52.2270	1.23928	13.3721	95.7366
Container Stay at CY 8	51.9613	1.50471	11.7021	93.0799
Container Stay at CY 9	123.33	(Correlated)	83.0033	195.93
Custom Process 1	23.6401	0.242455353	16.0037	30.9870
Custom Process 2	23.6019	0.339026415	16.0251	30.8782
Custom Process 3	23.5350	0.322291280	16.0243	30.9237
Custom Process 4	23.7507	0.273741285	16.0546	30.9750
Custom Process 5	23.7725	0.200314087	16.0136	30.9806
Custom Process 6	23.6141	(Correlated)	16.0580	30.9206
Custom Process 7	23.7643	0.247736436	16.0467	30.9879
Custom Process 8	23.7028	0.262552807	16.0340	30.9386
Custom Process 9	23.6401	0.166766730	16.0222	30.9997
QC Delay	1.2816	0.043040628	0	16.4662
QC Unloading	0.08332685	0.000174670	0.04167055	0.1203
RTG 1	0.04345499	0.000657529	0.02078588	0.08958780
RTG 2	0.04534458	0.001018910	0.02090550	0.1373
RTG 3	0.04778344	0.001572531	0.02124803	0.1858
RTG 4	0.04814567	0.001238814	0.01992883	0.1445
RTG 5	0.05532821	0.004102031	0.02068679	0.3600
RTG 6	0.05655897	0.003717661	0.02154988	0.3431

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04922706	0.001343951	0.02184820	0.1939
RTG 8	0.04739270	0.001439830	0.02063551	0.1515
RTG 9	0.05641208	0.003882908	0.02126922	0.3171
Truck Arrive at Gate In	0.5776	0.009731468	0.2669	0.9117
Truck from CY to Gate Out	0.5096	(Insufficient)	0	1.1701

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.96	(Correlated)	31.9740	278.21
Truck	5.6301	(Insufficient)	4.6591	6.6284

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1198	0.000802648	0	0.3931
Truck	882.73	(Insufficient)	808.66	942.62

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	(Correlated)	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	104.18	(Correlated)	32.2377	278.42
Truck	196.89	(Insufficient)	176.38	210.95

Other

Number In	Value
Boxes	14,007
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.2214	(Correlated)	0	133.80
Container Stay at CY 1	52.1879	2.08844	13.5840	90.2588
Container Stay at CY 2	52.1713	1.48572	5.2563	97.2063
Container Stay at CY 3	52.1174	1.58226	5.8455	98.9376
Container Stay at CY 4	51.2267	1.77117	15.9150	94.2644
Container Stay at CY 5	51.9610	(Correlated)	12.7691	91.7661
Container Stay at CY 6	51.8824	2.04446	14.7368	91.9468
Container Stay at CY 7	52.0534	(Correlated)	15.2083	92.5825
Container Stay at CY 8	52.1848	2.01155	10.6083	91.2368
Container Stay at CY 9	124.16	(Correlated)	83.0079	195.62
Custom Process 1	23.8753	0.311438226	16.0654	30.9940
Custom Process 2	23.7728	0.393187814	16.0006	30.9318
Custom Process 3	23.5993	0.336838509	16.0523	30.9750
Custom Process 4	23.6955	0.398503429	16.0659	30.9626
Custom Process 5	23.6751	0.386163219	16.0340	30.9599
Custom Process 6	23.9808	0.452468299	16.0324	30.9684
Custom Process 7	23.7182	0.302821469	16.0700	30.8856
Custom Process 8	23.6285	0.250314714	16.1139	30.9866
Custom Process 9	23.6710	0.244616627	16.0036	30.9933
QC Delay	1.2640	(Correlated)	0	14.2501
QC Unloading	0.03924631	0.000230738	0.00276163	0.07350894
RTG 1	0.04391834	0.000968735	0.02183436	0.08849345
RTG 2	0.04571396	0.001195009	0.02176015	0.1368
RTG 3	0.04856783	0.001512491	0.02126887	0.1405
RTG 4	0.04690885	0.001474383	0.02195998	0.1325
RTG 5	0.05604663	0.002702727	0.02263722	0.3320
RTG 6	0.05444207	0.001926590	0.02154988	0.1975

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04569120	0.001322132	0.02270293	0.1199
RTG 8	0.04759687	0.001289390	0.02245665	0.1587
RTG 9	0.05580797	0.003085668	0.02142453	0.2973
Truck Arrive at Gate In	0.5681	0.009758662	0.2913	0.7873
Truck from CY to Gate Out	0.5161	(Insufficient)	0	1.1833

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.33	6.57046	29.5336	270.53
Truck	5.6633	(Insufficient)	4.9617	6.3765

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1229	(Correlated)	0	0.4009
Truck	873.72	(Insufficient)	804.66	940.80

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000126749	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.55	6.57118	29.7508	270.75
Truck	195.30	(Insufficient)	179.23	210.82

Other

Number In	Value
Boxes	19,338
Truck	399

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.3171	(Correlated)	0	133.80
Container Stay at CY 1	51.5411	1.69167	14.4682	94.2644
Container Stay at CY 2	51.5502	1.84708	11.2618	103.31
Container Stay at CY 3	52.1213	1.92071	7.8633	92.8816
Container Stay at CY 4	51.6554	(Correlated)	7.4201	94.7261
Container Stay at CY 5	51.8689	1.71057	8.7052	92.1854
Container Stay at CY 6	51.4434	1.93163	8.3341	94.2436
Container Stay at CY 7	51.7015	1.89248	13.4045	91.7661
Container Stay at CY 8	51.7857	1.72770	5.4355	89.7996
Container Stay at CY 9	122.54	6.44901	83.0039	195.85
Custom Process 1	23.7681	0.365998996	16.0136	30.9848
Custom Process 2	23.7733	0.315671363	16.0166	30.9997
Custom Process 3	23.4765	0.304586120	16.0415	30.8875
Custom Process 4	23.5494	0.302978923	16.0232	30.9806
Custom Process 5	23.6836	(Correlated)	16.0274	30.9793
Custom Process 6	23.7408	0.303113592	16.0282	30.9879
Custom Process 7	23.6042	0.337745645	16.0654	30.9704
Custom Process 8	23.7238	0.247339655	16.1040	30.9697
Custom Process 9	23.5486	0.239632774	16.0053	30.9775
QC Delay	1.2666	(Correlated)	0	16.1783
QC Unloading	0.03570462	0.000208961	0	0.07367218
RTG 1	0.04402506	0.000733052	0.02038867	0.08725281
RTG 2	0.04577575	0.001001589	0.02243241	0.1197
RTG 3	0.04924158	(Correlated)	0.02178827	0.1912
RTG 4	0.04906437	0.001472565	0.02105489	0.1449
RTG 5	0.06194103	0.006346288	0.02126763	0.2851
RTG 6	0.05990077	(Correlated)	0.02056587	0.2601

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.05021648	0.001955418	0.02162139	0.2203
RTG 8	0.05000205	0.002167466	0.02066887	0.2019
RTG 9	0.06076424	0.004601329	0.02154988	0.2955
Truck Arrive at Gate In	0.5648	0.008312506	0.3067	0.8300
Truck from CY to Gate Out	0.5808	(Insufficient)	0	1.4782

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.67	7.56229	35.5849	267.39
Truck	5.6141	(Insufficient)	4.7318	6.4502

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1171	(Correlated)	0	0.3211
Truck	875.50	(Insufficient)	785.58	948.51

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000148239	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.89	7.56283	35.8013	267.61
Truck	195.40	(Insufficient)	180.05	210.77

Other

Number In	Value
Boxes	7,388
Truck	401

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.1235	(Correlated)	0	100.18
Container Stay at CY 1	51.3109	(Correlated)	16.4264	92.0151
Container Stay at CY 2	51.2694	2.27565	15.4505	96.8488
Container Stay at CY 3	53.2451	1.85825	20.7617	92.6421
Container Stay at CY 4	51.2419	(Correlated)	17.5921	89.5100
Container Stay at CY 5	52.0903	2.21226	13.4225	102.59
Container Stay at CY 6	52.0894	1.95556	20.6204	96.1109
Container Stay at CY 7	52.2435	2.50864	15.2083	88.6720
Container Stay at CY 8	52.1400	(Correlated)	14.9867	83.4311
Container Stay at CY 9	123.04	7.46757	83.0022	195.05
Custom Process 1	23.9746	(Correlated)	16.2680	30.7107
Custom Process 2	23.9364	0.496142208	16.0033	30.9879
Custom Process 3	23.4657	0.450950119	16.0215	30.9685
Custom Process 4	23.4485	0.515431532	16.0509	30.8599
Custom Process 5	23.5802	0.534180390	16.0143	30.9940
Custom Process 6	23.6896	0.625466461	16.0968	30.7886
Custom Process 7	23.5178	0.457941079	16.0340	30.9865
Custom Process 8	23.7106	0.499197609	16.0701	30.9509
Custom Process 9	23.6435	0.319642491	16.0258	30.9119
QC Delay	1.3053	(Correlated)	0	16.1765
QC Unloading	0.07697948	0.000341934	0.03526022	0.1154
RTG 1	0.04384156	0.001116455	0.02138429	0.08342144
RTG 2	0.04362927	0.001402809	0.02233816	0.1015
RTG 3	0.04744912	0.001894349	0.02212868	0.1413
RTG 4	0.04601752	0.001649370	0.02319743	0.1174
RTG 5	0.05215750	0.004892856	0.02180253	0.2095
RTG 6	0.05097415	0.004276286	0.02276299	0.1853

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04768942	0.001961806	0.02197456	0.1295
RTG 8	0.04600588	0.001620057	0.02175263	0.1088
RTG 9	0.05024749	(Correlated)	0.02090659	0.2392
Truck Arrive at Gate In	0.5651	0.011727259	0.3472	0.8839
Truck from CY to Gate Out	0.5274	(Insufficient)	0.01438100	0.9825

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.66	(Correlated)	40.0475	265.13
Truck	5.7113	(Insufficient)	4.9436	6.6106

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1158	(Correlated)	0	0.2583
Truck	877.95	(Insufficient)	792.27	943.37

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1031	(Correlated)	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.88	(Correlated)	40.2619	265.35
Truck	197.32	(Insufficient)	180.27	211.01

Other

Number In	Value
Boxes	6,302
Truck	397

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.1329	(Correlated)	0	100.18
Container Stay at CY 1	53.1468	(Correlated)	22.8268	96.4440
Container Stay at CY 2	52.1652	2.56723	15.7418	93.4894
Container Stay at CY 3	52.8423	2.69015	13.4225	90.1364
Container Stay at CY 4	53.3287	(Correlated)	22.8908	95.0035
Container Stay at CY 5	51.1952	(Insufficient)	10.0826	94.6844
Container Stay at CY 6	51.7390	2.41096	17.5150	100.74
Container Stay at CY 7	52.0529	(Insufficient)	14.6325	90.4365
Container Stay at CY 8	52.5244	1.19796	19.3781	92.9262
Container Stay at CY 9	125.59	7.27522	83.0153	195.14
Custom Process 1	23.4103	0.359095913	16.0166	30.9880
Custom Process 2	23.2389	0.485548228	16.0675	30.9940
Custom Process 3	23.8394	0.324870433	16.0215	30.9370
Custom Process 4	23.4441	0.484235723	16.1561	30.9062
Custom Process 5	23.6649	(Insufficient)	16.0946	30.9848
Custom Process 6	23.5177	0.408356855	16.1684	30.9509
Custom Process 7	23.6511	(Insufficient)	16.2358	30.9854
Custom Process 8	23.8330	0.560599458	16.0487	30.9879
Custom Process 9	23.6300	0.303247958	16.0524	30.9821
QC Delay	1.2949	(Correlated)	0	11.6061
QC Unloading	0.04993514	0.000385258	0.01666850	0.08796043
RTG 1	0.04345782	0.001233334	0.02292363	0.07226342
RTG 2	0.04398883	0.001175512	0.02293615	0.1030
RTG 3	0.04640003	(Insufficient)	0.02221104	0.1204
RTG 4	0.04606089	(Insufficient)	0.02281227	0.1035
RTG 5	0.04991060	(Insufficient)	0.02225996	0.1400
RTG 6	0.05012001	0.002676256	0.02288023	0.1719

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04497114	(Insufficient)	0.02335987	0.1021
RTG 8	0.04580167	0.001554992	0.02186157	0.1326
RTG 9	0.04903103	0.002036260	0.02042353	0.1638
Truck Arrive at Gate In	0.5726	0.010179913	0.2614	0.8945
Truck from CY to Gate Out	0.5569	(Insufficient)	0	1.0343

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.57	(Correlated)	32.7373	263.70
Truck	5.5770	(Insufficient)	4.7880	6.9069

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1155	(Correlated)	0	0.2144
Truck	880.22	(Insufficient)	828.08	941.99

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1031	(Correlated)	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.79	(Correlated)	32.9509	263.91
Truck	197.00	(Insufficient)	184.50	210.94

Other

Number In	Value
Boxes	6,850
Truck	396

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.4077	(Correlated)	0	100.18
Container Stay at CY 1	52.1799	1.83453	11.1982	99.33
Container Stay at CY 2	52.3921	2.03713	6.9259	92.6421
Container Stay at CY 3	51.8552	(Correlated)	15.6839	94.7261
Container Stay at CY 4	52.5714	(Correlated)	18.7368	90.8524
Container Stay at CY 5	52.9149	(Correlated)	8.9398	90.3131
Container Stay at CY 6	51.8075	2.57152	13.4225	88.5317
Container Stay at CY 7	52.5894	2.36798	16.9155	96.8876
Container Stay at CY 8	51.8843	(Correlated)	20.9244	89.7996
Container Stay at CY 9	122.53	(Correlated)	83.0103	195.93
Custom Process 1	23.6267	0.515378484	16.0166	30.9940
Custom Process 2	23.6921	0.464257085	16.0497	30.9879
Custom Process 3	23.8151	0.436261328	16.0414	30.9773
Custom Process 4	23.7126	0.466624567	16.0393	30.9444
Custom Process 5	23.5366	0.557803489	16.0808	30.8461
Custom Process 6	23.4479	0.486815508	16.0753	30.8685
Custom Process 7	23.7688	0.434614889	16.0037	30.9370
Custom Process 8	23.7548	0.423773807	16.0847	30.9139
Custom Process 9	23.5763	0.331148662	16.0300	30.9659
QC Delay	1.2865	(Correlated)	0	15.0903
QC Unloading	0.04008491	0.000365449	0.00506820	0.07201832
RTG 1	0.04352306	0.001118043	0.02187015	0.0926
RTG 2	0.04451203	0.001371170	0.02371912	0.1117
RTG 3	0.04607750	0.001253630	0.02126922	0.1334
RTG 4	0.04742375	0.001857649	0.02009986	0.1488
RTG 5	0.04945351	0.001781147	0.02184820	0.1120
RTG 6	0.04839732	0.002198901	0.02221104	0.1263

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04615026	0.001728465	0.02303239	0.1065
RTG 8	0.04574596	0.001424381	0.02121043	0.1682
RTG 9	0.04787707	0.001440591	0.02188391	0.1387
Truck Arrive at Gate In	0.5671	0.010932960	0.3228	0.8711
Truck from CY to Gate Out	0.4620	(Insufficient)	0	1.3300

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	101.25	(Correlated)	42.4126	239.27
Truck	5.5872	(Insufficient)	5.0322	7.1577

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1125	(Correlated)	0	0.1731
Truck	885.26	(Insufficient)	837.88	933.26

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1031	(Correlated)	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	101.46	(Correlated)	42.6274	239.49
Truck	197.19	(Insufficient)	188.56	210.35

Other

Number In	Value
Boxes	935
Truck	395

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.2391	(Correlated)	0	67.6049
Container Stay at CY 1	51.9668	(Insufficient)	12.0117	90.2588
Container Stay at CY 2	49.6544	(Insufficient)	18.9408	90.2145
Container Stay at CY 3	48.5798	(Insufficient)	25.3928	76.6319
Container Stay at CY 4	51.3361	(Insufficient)	24.8874	85.2270
Container Stay at CY 5	51.7345	(Insufficient)	22.2195	83.4048
Container Stay at CY 6	52.2110	(Insufficient)	18.0536	82.7202
Container Stay at CY 7	51.4787	(Insufficient)	26.4372	78.8860
Container Stay at CY 8	53.2699	(Insufficient)	25.3155	84.2349
Container Stay at CY 9	120.65	(Insufficient)	83.0068	195.82
Custom Process 1	23.3804	(Insufficient)	16.0462	30.8579
Custom Process 2	24.0393	(Insufficient)	16.7515	30.7614
Custom Process 3	22.9802	(Insufficient)	16.4623	30.4434
Custom Process 4	25.0171	(Insufficient)	16.0701	30.8245
Custom Process 5	24.1022	(Insufficient)	16.4918	30.9221
Custom Process 6	22.8773	(Insufficient)	16.5361	30.9773
Custom Process 7	25.2212	(Insufficient)	16.0393	30.3857
Custom Process 8	24.2263	(Insufficient)	16.5604	30.0324
Custom Process 9	24.0599	(Insufficient)	16.1078	30.9156
QC Delay	1.2699	(Correlated)	0.00288300	8.9704
QC Unloading	0.05003440	0.000775333	0.02472055	0.07904285
RTG 1	0.04608975	(Insufficient)	0.02222924	0.07684467
RTG 2	0.04514437	(Insufficient)	0.02235165	0.08043909
RTG 3	0.04493524	(Insufficient)	0.02415482	0.07065656
RTG 4	0.04388786	(Insufficient)	0.02244456	0.07170540
RTG 5	0.04593286	(Insufficient)	0.02325901	0.1041
RTG 6	0.04917245	(Insufficient)	0.02487934	0.1054

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04466136	(Insufficient)	0.02376665	0.08019155
RTG 8	0.04317894	(Insufficient)	0.02409751	0.0953
RTG 9	0.04478017	(Insufficient)	0.02132240	0.1010
Truck Arrive at Gate In	0.5597	0.011020755	0.2698	0.8745
Truck from CY to Gate Out	0.5474	(Insufficient)	0	1.3520

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	103.55	7.22126	36.3085	264.22
Truck	5.7297	(Insufficient)	4.8917	6.4501

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1141	(Correlated)	0	0.1972
Truck	891.98	(Insufficient)	836.59	944.94

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1032	0.000155194	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	103.77	7.22144	36.5257	264.44
Truck	198.90	(Insufficient)	189.19	209.22

Other

Number In	Value
Boxes	3,553
Truck	393

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	11.9762	(Correlated)	0	83.7117
Container Stay at CY 1	52.2189	(Insufficient)	12.0117	90.2588
Container Stay at CY 2	50.8883	(Insufficient)	18.9408	90.2145
Container Stay at CY 3	52.6605	(Insufficient)	22.8496	85.7125
Container Stay at CY 4	52.1141	(Insufficient)	15.4505	85.2270
Container Stay at CY 5	52.2534	(Insufficient)	10.4272	86.6063
Container Stay at CY 6	52.9335	(Insufficient)	16.3373	88.3819
Container Stay at CY 7	52.1865	(Insufficient)	20.4105	84.6491
Container Stay at CY 8	51.0909	(Insufficient)	11.4018	88.6110
Container Stay at CY 9	123.43	7.51433	83.0068	195.82
Custom Process 1	23.0937	(Insufficient)	16.0462	30.9221
Custom Process 2	24.3006	(Insufficient)	16.2480	30.8698
Custom Process 3	23.8302	(Insufficient)	16.1653	30.8942
Custom Process 4	23.8534	(Insufficient)	16.2091	30.6908
Custom Process 5	23.5186	(Insufficient)	16.0560	30.8177
Custom Process 6	23.5078	(Insufficient)	16.2658	30.9773
Custom Process 7	23.7061	(Insufficient)	16.2881	30.9870
Custom Process 8	23.4281	(Insufficient)	16.0872	30.6082
Custom Process 9	23.7407	0.553505241	16.0822	30.9848
QC Delay	1.2875	0.101838070	0	11.2606
QC Unloading	0.05017872	0.000523721	0.01510260	0.08566250
RTG 1	0.04422379	(Insufficient)	0.02183436	0.07684467
RTG 2	0.04265695	(Insufficient)	0.02235165	0.08043909
RTG 3	0.04540180	(Insufficient)	0.02297660	0.1071
RTG 4	0.04475504	(Insufficient)	0.02244456	0.1168
RTG 5	0.04634286	(Insufficient)	0.02325901	0.1114
RTG 6	0.04385442	(Insufficient)	0.02284755	0.0997

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04486359	(Insufficient)	0.02062927	0.0909
RTG 8	0.04411070	(Insufficient)	0.02254592	0.1136
RTG 9	0.04542792	0.001632915	0.02312455	0.1315
Truck Arrive at Gate In	0.5768	0.009820708	0.3104	0.8945
Truck from CY to Gate Out	0.5365	(Insufficient)	0	0.9882

Accumulated Time

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Entity

Time

VA Time	Average	Half Width	Minimum	Maximum
Boxes	101.61	7.48533	42.0343	256.77
Truck	5.5766	(Insufficient)	4.7239	6.2558

NVA Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Wait Time	Average	Half Width	Minimum	Maximum
Boxes	0.1135	(Correlated)	0	0.2116
Truck	882.86	(Insufficient)	810.17	948.03

Transfer Time	Average	Half Width	Minimum	Maximum
Boxes	0.1031	0.000167533	0.1014	0.1046
Truck	0	(Insufficient)	0	0

Other Time	Average	Half Width	Minimum	Maximum
Boxes	0	0.000000000	0	0
Truck	0	(Insufficient)	0	0

Total Time	Average	Half Width	Minimum	Maximum
Boxes	101.82	7.48560	42.1357	256.98
Truck	197.48	(Insufficient)	178.26	209.21

Other

Number In	Value
Boxes	2,431
Truck	394

Import International Container Replications: 1

Replication 1 Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
Berthing Process	12.2189	2.78807	0	124.94
Container Stay at CY 1	51.8620	(Insufficient)	20.5009	90.2145
Container Stay at CY 2	55.4326	(Insufficient)	24.8997	82.5738
Container Stay at CY 3	52.4586	(Insufficient)	19.5471	90.2617
Container Stay at CY 4	53.3401	(Insufficient)	18.4783	85.4861
Container Stay at CY 5	52.6369	(Insufficient)	15.0561	86.3986
Container Stay at CY 6	51.8153	(Insufficient)	23.5812	89.2243
Container Stay at CY 7	51.5027	(Insufficient)	19.1053	80.1605
Container Stay at CY 8	50.7115	(Insufficient)	12.9119	87.0610
Container Stay at CY 9	119.97	(Insufficient)	83.0265	195.88
Custom Process 1	23.8565	(Insufficient)	16.1139	30.9283
Custom Process 2	23.5109	(Insufficient)	16.2152	30.9879
Custom Process 3	23.7778	(Insufficient)	16.1804	30.7541
Custom Process 4	23.1620	(Insufficient)	16.6395	30.7614
Custom Process 5	23.9975	(Insufficient)	16.0560	30.9685
Custom Process 6	23.5969	(Insufficient)	16.2413	30.7783
Custom Process 7	23.6004	(Insufficient)	16.3292	30.8198
Custom Process 8	23.5557	(Insufficient)	16.4181	30.9531
Custom Process 9	24.3637	(Insufficient)	16.0933	30.9880
QC Delay	1.3089	0.112846798	0	14.3753
QC Unloading	0.04544878	0.000597400	0.01219430	0.07928704
RTG 1	0.04405098	(Insufficient)	0.02187015	0.08161912
RTG 2	0.04463006	(Insufficient)	0.02346911	0.1052
RTG 3	0.04473076	(Insufficient)	0.02126922	0.1034
RTG 4	0.04540983	(Insufficient)	0.02412661	0.0960
RTG 5	0.04463207	(Insufficient)	0.02332965	0.1079
RTG 6	0.04482867	(Insufficient)	0.02249372	0.1199

Import International Container

Replications: 1

Replication 1

Start Time: 1.00 Stop Time: 8,760.00 Time Units: Hours

Process

Time per Entity

Total Time Per Entity	Average	Half Width	Minimum	Maximum
RTG 7	0.04521074	(Insufficient)	0.02228426	0.1204
RTG 8	0.04274966	(Insufficient)	0.02326376	0.08543671
RTG 9	0.04580988	(Insufficient)	0.02310033	0.1472
Truck Arrive at Gate In	0.5605	0.010177449	0.2645	0.8248
Truck from CY to Gate Out	0.5305	(Insufficient)	0.02363633	1.0579

Accumulated Time

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ATTACHMENT 2: IBM SPSS Report

Correlations

		A1	A2	A3	A4	A5	D1
A1	Pearson Correlation	1	.436*	.515**	.382*	.155	.750**
	Sig. (2-tailed)		.016	.004	.037	.413	.000
	N	30	30	30	30	30	30
A2	Pearson Correlation	.436*	1	.653**	.503**	.059	.377*
	Sig. (2-tailed)	.016		.000	.005	.755	.040
	N	30	30	30	30	30	30
A3	Pearson Correlation	.515**	.653**	1	.509**	.147	.593**
	Sig. (2-tailed)	.004	.000		.004	.439	.001
	N	30	30	30	30	30	30
A4	Pearson Correlation	.382*	.503**	.509**	1	.312	.467**
	Sig. (2-tailed)	.037	.005	.004		.093	.009
	N	30	30	30	30	30	30
A5	Pearson Correlation	.155	.059	.147	.312	1	.237
	Sig. (2-tailed)	.413	.755	.439	.093		.207
	N	30	30	30	30	30	30
D1	Pearson Correlation	.750**	.377*	.593**	.467**	.237	1
	Sig. (2-tailed)	.000	.040	.001	.009	.207	
	N	30	30	30	30	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Reliability
Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.730	5

Item Statistics

	Mean	Std. Deviation	N
A1	4.00	.643	30
A2	4.03	.615	30
A3	3.93	.521	30
A4	3.70	.702	30
A5	3.27	.691	30

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	14.93	3.306	.501	.680
A2	14.90	3.266	.562	.657
A3	15.00	3.379	.648	.638
A4	15.23	2.944	.604	.635
A5	15.67	3.816	.221	.790

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.93	4.892	2.212	5

AUTHOR BIOGRAPHY

Radifan Hassan (born in Jakarta, September 14th, 1997) is the third son from H. Dr. Nilmandjaja, Msc. and Hj. Drs. Nur Chasanah, Msc. Radifan completed his high school in SMAN 14 Jakarta (2012-2015). He continues in pursuing his Engineering Degree at Marine Engineering Department in Institut Teknologi Sepuluh Nopember. During his college life, he has been trusted to hold several positions in the campus organizations, namely Organizing Committee President of YouthSpeak 3.0 at AIESEC, Coordinator of International Paper Competition PETROLIDA at SPE ITS SC, and the President of ITS MUN Club 2017/2018 whereas under his leadership he created 121.5% growth of winning MUN awards. He actively joining competitions and received several awards of energy-based competitions from Universitas Indonesia, Universitas Gadjah Mada and Institut Teknologi Bandung. He also has been trusted to represent his campus as well as his beloved country, Indonesia, in the London International Model United Nations 2017, in London, UK. In 2018, he was rigorously selected as one of 64 high-performing Indonesian students in Southeast Asia and Australia to become a part of Young Leaders for Indonesia (YLI) by McKinsey & Company. His professional experiences including as an intern at Schlumberger as Field Engineer Vacation Trainee and then as a Consultant Team Leader for an education technology company where he helped its CEO and the Indonesia Country Manager for the future's company strategy. He is also the awardee of notable scholarships given by some leading companies namely, XL Future Leaders and Astra1st Development Program.

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