Analyzing the truck volume traffic types in tin can island container terminal (TICT)

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Abstract
The steady rise in international trade volume has led to the high rate of utility of the marine industry. The gate system operation section of the marine terminal is a very pivotal aspect as it helps in the completion of the supply chain network. The drayage activities of pickups and delivery are single or double move operations at the terminal in order to meet customer’s target. These operations are carried out by different types of trucks traffic: inbound and outbound trucks. This paper aims at investigating the flow pattern of these inbound and outbound trucks and their respective subdivision frequency at TICT in the year 2018. For the inbound trucks, 501-550 truck distribution had the highest interval with 34.5% as a daily percentage arrival within the operating hours. While with two-week interval, EMTIN (empty-in) dominated with a higher peak and CHIN had the least turn-out than the others inbound subdivisions. While for the outbound trucks pattern, it revealed that LDOUT (load-out) was domineering with a greater peak and the least was CHOUT (chassis-out). The rate of inbound to outbound truck volume for that year depicts the state of the countries dependency.

Keywords: Truck Traffic Types, Truck Volume Distribution, Tin can Island Terminal (TICT)

1. Introduction
The sea transport has encountered a nonstop development for the most recent years, since it gives low value transportation and it is a less dirtying procedure, notwithstanding different favourable circumstances, for example, diminishing street traffic [1]. Hence, the blockage in port stations has moved toward becoming in a typical issue. The gridlocks in ports may prompt other critical issues, for example, delays in the conveyance of the payload, with the outcome of the loss of significant worth in the items and the ascending of the expenses of berthing among others. So as to take care of appropriately these blockage issues a wide scope of arrangements may be connected [2].

Growth is indispensible for optimization and productivity in container transportation globally. Some of the key concerns among others are efficiency of stacking and transportation of large number of 20TEU or 40TEU Containers in and out of the seaside. Terminal operators aim at reducing container throughput cost from seaside to the landside in a bid to compete with other terminals. The connectivity of the seaside and the landside interface in a container terminal is via their various modes which are container, vessels and trucks, tankers respectively [3].
One supply of this delay is because of the lengthy waiting time of the transporting trucks at container terminals. A substantial evaluation of the preceding overviews available within the literature that focused on landside troubles in Container terminal is presented. After identifying some gaps, we conclude that the appearance pattern of outside trucks and its impact on the truck turn time wishes to be more understandable [4].

Seaports are the major interface associating transcendent carriage and hinterland transportation in sea supply chains. The amount of world seaborne exchange expanded over 2% in a large number of tons stacked in 2015 when contrasted with 2014 [5]. It joined with rising convey measurements, particularly for field vessels, seaports face extreme difficulties to achieve the productivities requested by methods for their customers. Moreover, different partners as the legislature, natural associations and neighbourhood residents force requests on port organizations with respect to ecological and social components. The continuous increment of field ship sizes prompts exorbitant tallness circumstances in landside field managing and in this manner to a high traffic load on the port street network. Moreover, port drayage is a crucial piece of sea conveys chains, which regularly cash owed for a high level of the general transportation cost and for an enormous offer of truck landings in compartment terminals [6].

The developing container truck volume has realized extraordinary blockages; truckers need to look for quite a while at port stations. Blockage decreases venture time unwavering quality for the two suburbanites and truckers that is a major test for colossal and little associations [7]. This defer because of blockage should considerably build the costs of the additional time spent in gridlocks reasons transporter bearers to make less brings with regards to day, following in higher costs for customers. For trucking, blockage has two impressive impacts: one is the expansion visit time so it would include direct charges; and two is the decrease in unwavering quality so as to bring down consistency, including more costs, a problem for truckers who must meet just-in-time conveyance plans set through shippers [8]. The landside task is famous for various negative inconveniences comprising of air contaminations, blockages, and capacity adjusting issues. At some phase in the stature span, lining overwhelming commitment drayage trucks holding up at front of the terminal's entryway make the circumstance even most noticeably awful. At these periods, the truck turn time is developing. Truck turn time is an ideal opportunity to be taken to finish an exchange (select up or drop off field) at compartment yards [9]. To abbreviate this truck turn time expanding the terminal's bearer charge is desperation. A few terminals pick including additional yard cranes as an answer. Regardless of the engaging choice, the underlying financing, security and working cost issues are hard.
A few papers concerning diverse gridlocks issue are, among others, [10] broke down the potential advantages of giving continuous entryway gridlocks data; [11] tended to the issue of limiting the trucks' administration times at compartment terminals while regarding certain dimensions of blockage. The terminal street cycle is depicted in detail and a spreadsheet is utilized for choosing, for each truck having executed the registration, on the off chance that it ought to be permitted to enter the terminal and, if truly, which administration level it will be given.

[12] uncovered the issue of estimating every window has been understood by limiting the absolute number of moved entries and the complete truck holding up time. The creators demonstrate that great outcomes as far as truck lingering emanation can be acquired by moving likewise few trucks from top to off-top periods.

[13] uncovered another system used to get an alternate dissemination of truck entries, in view of time ward device estimating, is depicted. The creators propose a strategy that initially decides the landing dispersion down that limits the all out lines time and the drawbacks for trucks. Furthermore, they attempt to characterize the estimating devices ready to change the trucks' conduct and to acquire a truck entry procedure equivalent to d*, while limiting the normal cost paid by trucks.

[14] concentrated is on the significance of characterizing terminals methodologies to diminish gridlocks by including additionally choices and prerequisites of trucking organizations. A numerical model to make the arrangement framework modifications for truck landing times and to propose an exchange procedure among trucking organizations and the terminal, has been proposed. [15] proposed another arrangement procedure by which trucking organizations and terminals.

[16] proposed a multi-item system stream model for speaking to a general terminal where the assets are devoted to every modular transport, and trucks moving toward the terminal can choose to book or not their landings. A blended whole number straight programming model is proposed for deciding the quantity of arrangements to offer for each time window in such an approach to serve trucks in the most limited time as could be expected under the circumstances, consequently giving trucks a "decent" administration level.
2. Methodology

2.1 Tin Can Island Container Terminal (TICT)

Tin Can Island Terminal (TICT) is found North-West of Lagos Port Complex and has course of Scope 62°N Longitude 30° 23E. Its pre-concessioning appeared 1975 when the nation experienced increment in the monetary exercises amid the oil blast combined with the post-common war recreation. This prompted high volume of import and fare that came about to genuine Port blockage. The resultant impact made a circumstance where it wound up

Figure 1: Inbound and Outbound Truck Flow [17].
fundamental for the legislature to start genuine methods for decongesting the Port; by developing another Port on Tin Can Island. In 1976, the development of the new Port began and was charged on fourteenth October, 1977 and initiated Tin Can island Terminal Port, with the limit of taking care of 10-16 vessels at any given moment with the primary port complex possessing an absolute region of 73 hectares [18].

Tin Can Island compartment terminal today is an amalgam of what used to be Roro and Tin Can Island Ports. This merger accompanied the concessioning of the terminals to five (5) terminal administrators with various concessioning understandings, in May, 2006 after Nigerian Port Expert received the Land Master model as the favoured choice by the Government. However, the different divisions and their work force were converged in September, 2006. Private Terminal Administrators took over Terminal A, C and D on the 10th of May, 2006 while Terminal B was given over on the first of June, 2006. Port and Terminal Multi- services Restricted (PTML), which is a BOT, started task in September, 2006 [19].

2.2 TICT Gate System Features

The entryway is where lawful obligations and liabilities are exchanged starting with one gathering then onto the next. Thus, significant data handling happens at the entryway. Transportation data including container number, measure, proprietorship, sort of freight, weight, vessel, and voyage, and goal is additionally handled in the meantime. Besides, for risk reasons, the physical state of the container is checked also. This data is provided to the terminal's PC framework. To encourage the gate exchange, there are a few records issued at the entryway:

- Entryway security pass – look-in and check
- Equipment Exchange Receipt (EIR) - proof of hardware hand-over starting with one gathering then onto the next
- Terminal inspection Report (TIR) - equipment's operational condition to decide obligation if there should arise an occurrence of harm, if necessary
- Spot ticket or directing slip - guidance to trucker where to operational activities hardware at storage yard.

Likewise, the data accumulated at the gate additionally serves to encourage fundamental administration elements of the terminal concerning the accompanying:

- Compartment inbound and outbound moves/container abide time
- Stock change in the yard for different sorts of compartments and delivery lines
2.3 TICT Truck Traffic Types
In TICT the different type of truck traffic that goes through the gate station or booth are inbound and outbound trucks. The equipment the two containers and suspension going through the gate station is of the enthusiasm of the TICT the board, truckers, shippers and shipping lines, just as national organizations [21]. An instance, a shipper might need to know when its fare container is gotten by the terminal so as to meet the vessel plan; or the shipper needs to know when the import compartment leaves terminal so as to keep the stockroom prepared to get the freight for appropriation. Delivery lines additionally need to know what number of the fare compartments has been gotten at the terminal oppose all out fare appointments for a specific vessel. The TICT itself likewise needs to monitor the quantity of containers and gear all through the station in purposed monetary venture [22].

Inbound traffic incorporates returning void compartments (EMIN), send out stacked containers (LDIN), returning suspension CHIN, and bobtail (BTIN). Outbound traffic incorporates void compartments for fare appointments (EMOT), import container conveyances (LDOT), active case for hardware reposition reason (CHOUT), and bobtail (BOUT). BTIN and BOUT traffic are not viewed as an exchange since it doesn't include any hardware going through the gate, just the truck-tractors that claimed by drivers or trucking organizations. A trucker can come into the terminal to perform activities on a compartment or frame; this is known as a solitary move. While those inbound trucks with desires of undertaking two operations; bringing in goods for exports and also picking up cleared goods from the wharf is called a double move [23].

3. Result and Discussions
3.1 Inbound and Outbound Trucks Volume
One basic issue confronting TICT gate activities is the volume of inbound truck. As referenced before, there are four sorts of inbound truck traffic. Figures 2 and 3 demonstrate the example and conveyance of the day by day truck exercises; the everyday inbound traffic volume displays an expanding pattern. These inbound truck traffic are four kinds of truck traffic to be specific BOIN, EMTIN, CHIN, and LDIN. EMTIN is the returned outing of an import conveyance and LDIN the returned excursion of fare activities with payload. Likewise, the
organization of inbound traffic gives a sign to the example of gate handling. BTIN requires minimal measure of handling time since there is no gear exchange required in transit in. Then again, LDIN results in the longest handling-time as enormous measure of data should be prepared at the gate. Hence, it is normal the service time won't be similarly circulated. Its dissemination is basic in figuring out what lining model would connect for the investigation.

In outbound truck traffic, quantity of trucks is equivalent to inbound truck traffic. Be that as it may, the level of breakdown of the outbound truck traffic is very extraordinary.

Figure 2: Distribution of Inbound Truck Volumes.

Figure 2: depicts that the highest daily truck inbound for a certain day was 34.5% on the truck arrival range of 501-550 while the least was 4.10% of above 450 trucks. It means that a greater frequency of a mean interval if 501-550 inbound trucks enters the terminal. These shows an average of 501-600 inbound trucks expecting pickups or already delivered goods for export goods of the interval of 501-550 trucks as a daily statistics within the gate operating hours of 6am -5pm.
Figure 3: Inbound Truck Traffic Pattern.

Figure 3: depicts that steepness flow pattern of the inbound truck traffic types over the number of trucks arrival. EMTIN is the most domineering and a deeper steep through while the least is CHIN. This figure above explains the nature of inbound trucks on arrival, the type and level of populace on the inbound truck pattern. EMTIN meaning Empty-in trucks were domineering while fluctuating from period/hour-hour from the course of interval of weeks for the year 2018. CHIN meaning chassis-in was the lowest on the mean interval of two weeks for that year.

Figure 4: Outbound Truck Traffic Pattern.
Figure 4 depicts that steepness flow pattern of the outbound truck traffic types over the number of trucks arrival. Here, LDOUT is the most domineering and a sharper steep through while the least is CHOUT. This figure above explains the nature of outbound trucks on arrival, the type and level of populace on the outbound truck pattern. LDOUT meaning Load-out trucks were domineering while fluctuating from period/hour-hour from the course of interval of weeks but rises the most towards the end of the year 2018, showing its greater rate or higher influx of import goods at such quarter. CHOUT meaning chassis-out was the lowest on the mean interval of two weeks for that year.

4 Conclusion

For the purpose of adequate management at TICT, the operational activities of pickups and delivery of goods as import and export functions respectively are done by the truck traffic types in existence. There are two existing types of truck traffic, inbound and outbound trucks. These inbound trucks are goods/commodities entering the terminal for exports. They are sub-divided into four sections. The four types of inbound trucks are BOIN, EMTIN, CHIN and LDIN. While for the outbound trucks are goods/commodities leaving the terminal as imported goods into a certain cities/districts for adequate utility/consumption. They are also four sub-divisions which are BOUT, EMOUT, CHOUT and LDOUT.

From the figure above, it was observed that for the year 2018 it showed the flow pattern of the two types of truck traffic types and their relative sub-divisions. This result explains that there is a high rate on the arrival of empty trucks for pick-ups depicting that there is a rise in truck distribution arrival for hourly, weekly or quarterly than any other sub-divisions for the inbound trucks through that year. So if there is no corresponding service medium to carter for these influx, congestion and gridlocks at the gate system proved to be the resultant effect.

5 Recommendations

The unavailability of this modern gate strategies known as `TAS` (Truck appointment system) at TICT gate system that assists in scheduling and assigning of several arrivals. TAS helps in decongesting the norm of trucks just loitering and parking along the gate lanes waiting for customers to dispatch service. These inbound trucks volume observed during the course of the year will operate with a appointment as when their cargoes or goods are available and ready for pickups.
Secondly, due to the unavailability of designated truck/trailer parks to accommodate trucks coming from a far distance that arrived earlier before their pick-up time and also empty trucks searching for clients. If there are designated spaces or area to berth these earlier arrived trucks before they are attended to and those without any business around the gate terminal it will help in allowing a free flow of traffic around such premises and along to the highways.

Thirdly, the bad nature of the road connecting the highways to the gate lanes of TICT is highly dilapidated and has needed urgent attention from one administration to another.

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