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Turnaround Time of Container Vessels at Chattogram Port: Review and Assessment

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Abstract

Despite opportunities, Bangladesh has failed to become a regional hub or meet domestic demand to strengthen her national interest. The fact that the existing port management and infrastructure is proved inappropriate in present day's context let alone future context. Presently, vessel turnaround time is one of the global indexes of port efficiency. It is at present higher in Chattogram Port compared to international standard. The main objective of the study was to identify key determinant issues affecting the turnaround time of container vessels at Chattogram port. The study was intended to be descriptive and explanatory using primary and secondary data. Primary data was obtained using questionnaires, structured and semi-structured interviews, and limited observations while secondary data was sourced from port officials, website and libraries. The study findings indicates that direct delivery of export containers onboard, lack of export stow plan, stripping of Less Container Load (LCL) and Full Container Load (FCL) (except 37 items) containers, weak hinterland connectivity, poor IT infrastructure, inefficient gate operations, customs non-cooperation are the challenging issues that Chattogram Port is facing. It is expected that this research make an important contribution in improving turnaround time of container vessels and offering CPA an effective platform for identification of possible future directions. Emphasis has been given on having a "National Port Policy", robust hinterland connectivity, cent percent "on chassis" delivery, strong IT infrastructure. The study recommends for a "National Port Policy", maintaining firm cut off time and export stow plan, patronizing rail and waterways connectivity to reduce the turnaround time of container vessels.

Keywords: Container Vessels, Turnaround Time, Chattogram Port, Chattogram Port Development

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Background of the Study

Not many years prior, ports were simply used as the physical link amid land and ocean where they were predominantly associated with essential freight handling and giving haven to vessels. Since, globalization removed the trade barriers amongst the various countries; it has caused incredible growth in maritime transportation. This progress leads to a change in the patterns of trade. Today, shipping and trade are inextricably connected. It has shaped the development of sea going vessels. Presently, container vessels, bulk cargo vessels, specialized vessels like RO-RO, LNG each have a specific design and demands specific port infrastructure and port services to meet up the global trade. Adapting to the new model means that ports will need to upgrade their performance. Today, consistent and reliable services, competent cargo handling, on-arrival berthing or dedicated berths for vessels, competitive tariffs and rebates, packaging, insurance and so on are prerequisite for customers' satisfaction. It means modernizing the old one or building new one, taking into account turnaround time, dwell time, gate operations, hinterland connections, intermodal connectivity and many more.

With the onset of containerization, seaport terminals have undergone significant changes. Container terminals are working in a competitive background and are constantly contending with each other to maintain their customers. This inter port competition has led to an important role in the development of adequate facilities in ports all over the world. In England, London competes with Liverpool and Southampton. The same is true on the Continent where Rotterdam competes with Amsterdam and Antwerp; Bremen competes with Hamburg, and Genoa with Naples. Rivalry has been a major impetus in developing many other ports (The World Port, 1970). Globally, there are many instances where turnaround time caused profound changes to the relative importance of a port.

Around 80% of global trade by volume and over 70% of global trade by value is transported by sea and handled by ports all over the world (Review of maritime transport - 2018). That is why countries have undertaken modernization, expansion or building new ports in order to sustain economic growth and national development as it is considered to be the only cheapest gateway for global connectivity. Similar to the world, seaborne trade is the lifeline of Bangladesh. Presently, Chattogram and Mongla ports are the two main ports under separate authority handling country's sea-borne trade. Payra and Matarbari are the two sea ports which are under formation. It is no denying fact that when Chattogram Port Authority (CPA) is overburdened to meet domestic demand, Mongla Port remains under-utilized. Despite expansion and several modernizations of Chattogram Port,

yet increased turnaround time of container vessels, container congestion, and stevedores' inefficiency, complex customs procedures blur Chattogram Port's development potentialities before global maritime setting.

Under this backdrop, the purpose of this study is to identify the factors that are affecting "Chattogram Port" in terms of turnaround time of vessels, in specific container vessels. Indeed, failure to cope with global standard by CPA has brought to the fore the need for a detailed study on the subject despite many previous studies.

CPA is struggling to hold the opportunities to be a regional hub or meeting domestic demand to strengthen her national interest. Increased turnaround time, dwell time, inefficient gate operations, poor hinterland connectivity are the challenging issues that Chattogram port is facing. In view of the foregoing problems, this study seeks to find answers to the following question: What are the flaws that need to be addressed so as to improve turnaround time of container vessels at Chattogram Port?

The primary objective of the study is to identify the issues affecting turnaround time of container vessels regarding Chattogram port.

The study is limited only to turnaround time of container vessels in Chattogram Port. This study however attempts to give a fair idea of what Chattogram Port has in terms of infrastructure, equipment and institutional framework at present and what would be required for improving turnaround time for future survival.

Research Methodology

Function of Research. The study is intended to be descriptive and explanatory.

Nature of Data Collection. Data collected for this paper is mainly qualitative. However, researcher also collects some quantitative data.

Research Design. The study intends to review websites of regional and Bangladeshi port authorities consisting information on various performance indicators of ports. Data is also collected through one-to-one interviews.

Sources of Data

The study relied on both primary and secondary sources of data. Primary data is obtained using questionnaires, structured and semi-structured interviews, observations while secondary data is sourced from port officials, website and libraries.

Methods of Data Collection

The methodology adopted for this study is both the field survey and document analysis.

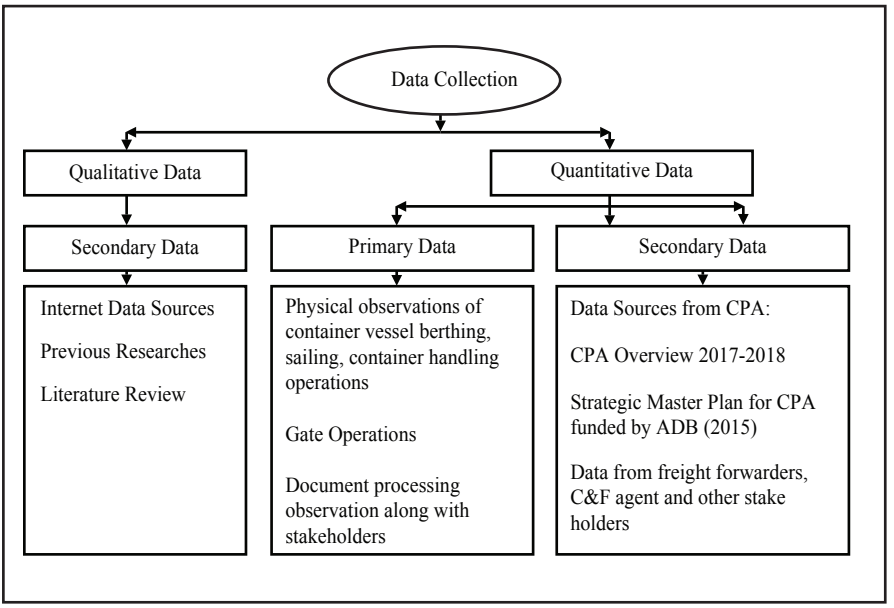

Figure 1: Data Collection Flow Chart

Sampling Techniques

The research sample consist of personnel related to administrative and management bodies of Chittogong Port Authority, academicians of Maritime University and resource personnel having knowledge on port management, staffs, Shipping Agent, Clearing and Forwarding (C&F) agent, Freight Forwarders, Trailer Operators, Importers/Exporters and Feeder Operations. Convenience and purposive both method of non-probabilistic sampling were used to get a true representative of the population and meet the necessary requirement for external validity.

Methods of Data Analysis

Statistical data collected from various official sources were quantitatively analyzed. Statistical data of container vessel operations at Chattogram Port mainly includes the number of vessels handled, number of container moves, number of cranes allocated and all the possible time measure such as berthing times, cargo handling times and delay times are collected. Data from semi-structured interviews and secondary sources were analyzed descriptively.

Method of Data Presentation

The data generated were presented in either tabular format or by use of charts, graphs, pictures and other forms of illustrations as appropriate.

Review of Existing Literature

"The Evolution of Ports in a Competitive World"- Port Reform Toolkit, Module 2 clearly indicates that customs procedures and standards frequently limit a port's capacity to operate on a worldwide scale. On the other hand, monopolies held by a small number of stevedoring companies and equipment operators make it difficult for entrants to compete. Simultaneously, future ports must be efficient in IT logistics networks in order to keep up with the advanced information technology used by the maritime transportation industry.

Heather McLaughlin and ColmFearon (2013) noticed the shift of the port business from direct rivalry to inter port cooperation in order to remain competitive in this volatile sector in their paper "Understanding the Development of Port and Regional Relationships: A New Cooperation/Competition Matrix." A port in the current environment, competitiveness is dependent on a few key services, such as transportation links between the hinterland and the foreland, as well as relationships with terminal operators and shipping lines. An organization simply cannot afford to bail out or stagnate in this competitive environment unless it is proactive or reactive to a significant change.

In the article "Examining container vessel turnaround time across the world," Ducruet, C., and Merk, O. (2013) presented three main approaches to improve turnaround time: ship-to-shore operations, other terminal operations, and port functions.

Faster turnaround times are of interest to ports, according to the Review of Maritime Transport 2020 (Chapter III); because they effectively improve throughput capacity with the same fixed assets. Though the amount of time spent in port is proportional to the number of containers loaded and unloaded during each port call, port efficiency and quick turnarounds are mutually beneficial.

Md. Jewel Ahmed Sarker and Mohammad Mizanur Rahman (2015) wrote an article titled "Analysis of Port Management in Bangladesh: Challenges and Potentials," which highlighted a few factors. Between Chattogram seaport and Dhaka metropolis, the railway network is grossly underutilized. Communication along the waterways is possible, although it is slower. Ironically, Chattogram port lacks modern ICT-based operations and hence falls short of global standards. If the current rate of traffic increase in Chattogram Port continues, the port's current infrastructure will be unable to meet future demand. While the report cites a strong endogenous port user community based on export import as strength, it also finds operational inefficiencies, infrastructural bottlenecks, backward transportation networks, poor ICT usages, and overall finance system challenges, as the most significant issues in Chattogram port administration.

Mohammad Monirul Islam Monir (2017) names Chattogram as the country's only major sea port in "The Role of Port of Chattogram on the Economy of Bangladesh." Despite being a vital aspect of the national economy, it is sad that port performance and development have not improved significantly. Chattogram Port has some natural restrictions, and as a result, it is unable to serve larger vessels. CPA's usage of IT systems is very weak, resulting in a great deal of mismanagement and avoidable delays. Another two major challenges at the port are a shortage of skilled labor and modern cargo handling equipment.

Poor equipment maintenance culture, lack of skilled manpower, weak equipment inventory, too old equipment, no standard system in maintenance, non-availability of replacement parts, poor leadership, long chain of command, lack of control in the supervision, lack of skilled manpower, corruptions, bad budget implementation, poor working environments, government involvement, and other discoveries were found in Shahjahan's (2000) dissertation on the cargo handling equipment productivity of the port of Chattogram.

The majority of studies on ship time in port points to port inefficiency as the cause. At a study funded by the Social Science and Humanities Research Council of Canada; Comtois, Claude, and Slack, Brian (2019) found that some carriers regularly accomplish faster turnarounds even in ports with high average turnaround times. Clearly, this implies that carriers themselves may be an issue to consider.

Summary of the Literature Review

All of the foregoing literatures were evaluated not to detect gaps, but to assess the relationship between factors and container vessel turnaround time to determine whether these factors are contemporary or not. In the case of Chattogram Port, whether homegrown factors are adding up with contemporary. Carriers as a factor for minimizing turnaround, as proposed by Comtois and Slack, are not measured throughout the study. Vessels of very big size, on the other hand, have not been considered, since it is a persistent issue for Chattogram Port that has draft, Length Overall (LOA), night navigation restrictions, and many other natural constraints.

According to a review of the literature, container vessel turnaround time is related and affected by a number of factors, the most time-consuming of which is unloading and loading containers between ship and shore. The efficiency of port operations, which includes not only ship-to-shore gantry cranes, but also operations in the terminal area from container stacks to berth-side, as well as patterns of arrival and departure of containers through entry gates may influence vessel turnaround time. It's important to remember that the number of moves, the quantity of Quay Gantry Cranes (QGC), and other factors all affect vessel turnaround time. The importance of the human component on container terminal productivity should not be ignored, despite the fact that it is difficult to define, collect data and analyze.

The primary issues facing Chattogram Port today as a result of rising containerized transportation are a lack of space at terminals and increased congestion in the port's land-side transportation infrastructure. Their back door is the weakest link in their transportation chain, with congested roads and insufficient hinterland connections causing delays.

An Overview of Chattogram Port

The Chattogram Port is located on the right bank of the river Karnaphuli, about 11 kilometers from the Bay of Bengal's shore line (CPA Overview, 2020). It

is the country's primary international maritime gateway, linking 106 ports around the world (Citizen Charter, CPA). However, due to natural constraints (dominated by the tidal phenomena) and its remote location from the world's major international sea route, attracting mainline container vessels and being an international hub port is difficult. Chattogram port is unable to serve larger vessels due to the same constraints. As a result, it serves as a feeder port for container transportation.

Figure 2: View of Chattogram Port (Source: CPA)

Figure 3: Various Port Location (Source: Google)

Figure 4: Chattogram Port Location (Source: Google)

Transformation from Cargo to Container. Containerization is a significant advancement in the maritime industry. CPA first began handling with six containers in 1977, having no container handling facilities of its own (CPA Planning Department). The adventure was possible with the use of private shipping lines such as Cobra Consortium, US Lines, Maersk Lines, APL, Sea Land, Container and Terminal services and others who used their own equipment to handle. CPA currently manages over 3 million 20-foot Equivalent Units (TEU) a year. In 2023, the port was ranked as the world's 67th busiest port in terms of container handling.

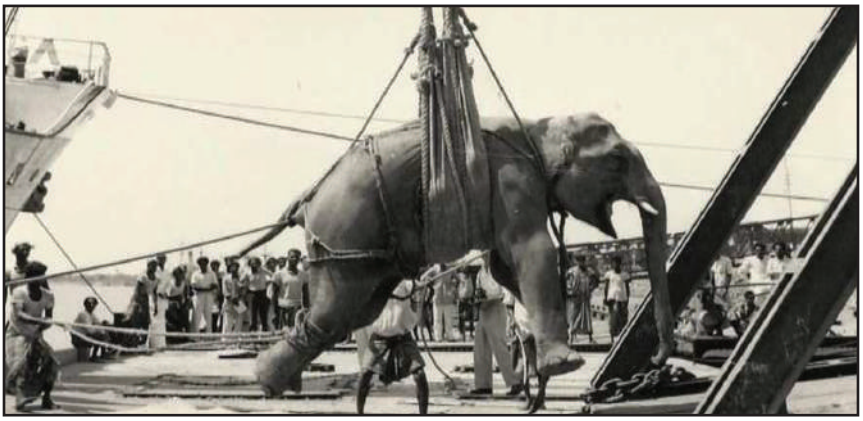

Figure 5: An Elephant Loading in 1960 (Source: CPA)

Present CPA Management. It is currently headed by a chairman and four other members. The port's operations are managed by 15 departments. According to the CPA ordinance of 1976 (as amended in 1995), it is a self-governing body that reports to the Ministry of Shipping of the People's Republic of Bangladesh.

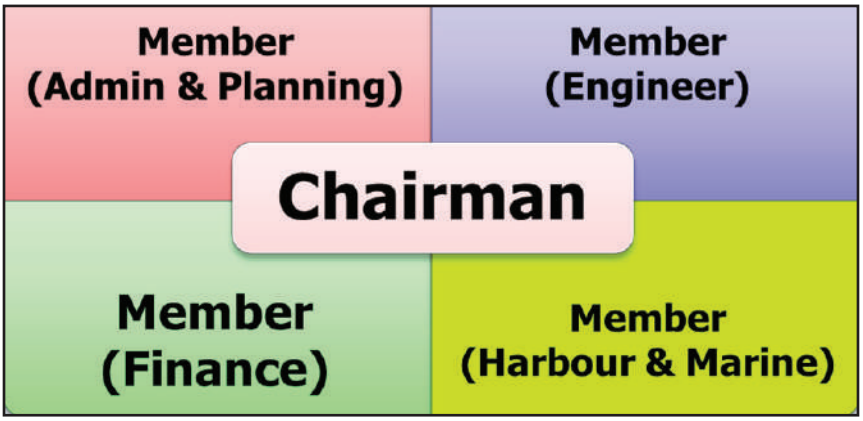

Figure 6: CPA's Board of Directors (Source: Author's Compilation)

Port Administration Model. Chattogram Port had operated as a service port since its inception until 2008. The port currently runs on a tool port model.

Geo-Strategic Importance

The location of Chattogram port serves as a link between countries in South and Southeast Asia. Given the vast landlocked area that comprises India's north eastern states, Nepal, Bhutan, and a portion of Myanmar and China, Chattogram

Figure 7: Global Connectivity of Chattogram Port (Source: UNCTAD)

port has the potential to become a regional hub port serving the contiguous regions if properly built with strong inland connections. The port is also strategically located at a crossroads of the much-discussed Maritime Silk Road and the Trans-Asian highway, which will link Bangladesh to neighboring ports (Trans Asian Highway). All of these factors are causing a power struggle in the Indian Ocean between regional and extra regional forces. As a result, all of the players are attempting to develop international relations strategies in various ways in order to gaining influence region.

Figure 8: Connecting South and South-East Asia (Source: Google)

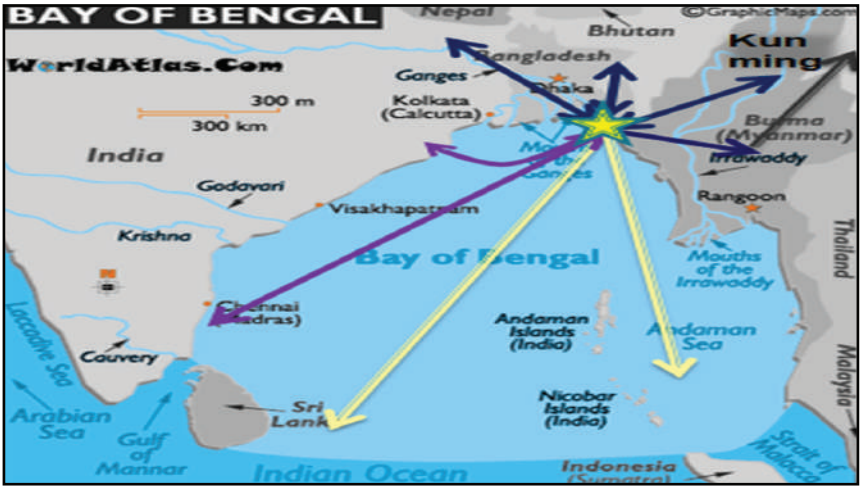

Figure 9: Regional Connectivity of Chattogram Port (Source: Google)

Figure 10: Maritime Silk Road (Source: http://chinausfocus.com)

Major Exports & Imports

Chattogram port currently handles over 92% of Bangladesh's international trade and 98% of the country's container trade (CPA Overview, 2020). It should be noted that Chattogram Port only handles national cargo at the moment. Ready-made garments, knitwear, fertilizer, jute & jute products, hides and skins, tea, light engineering products, pharmaceutical products, naphtha, molasses, frozen goods, and other items are among Bangladesh's main exports. Food grain, cement clinker, sugar, fertilizer, general cargo, iron materials, cotton, chemicals, coal, edible oil, POL, and other primary imports are among them (CPA Overview, 2020).

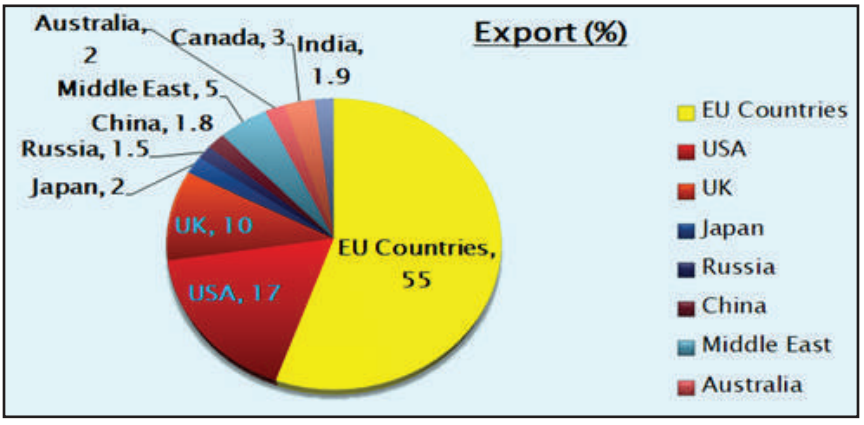

Figure 11: Worldwide Export through Chattogram Port
(Source: Primary and Compilation)

Lloyd's Ranking

The port entered into the llyod's list of 100 ports in 2009 with a ranking of 98th.The year 2019 is measured to be a good year for volume growth to break the 3 million TEU barriers. According to Lloyd's, it was the world's 58th busiest port in 2019. However, according to the 2023 edition of Lloyd's List of the world's top 100 Ports, Chattogram Port is ranked 67th in terms of container handling.

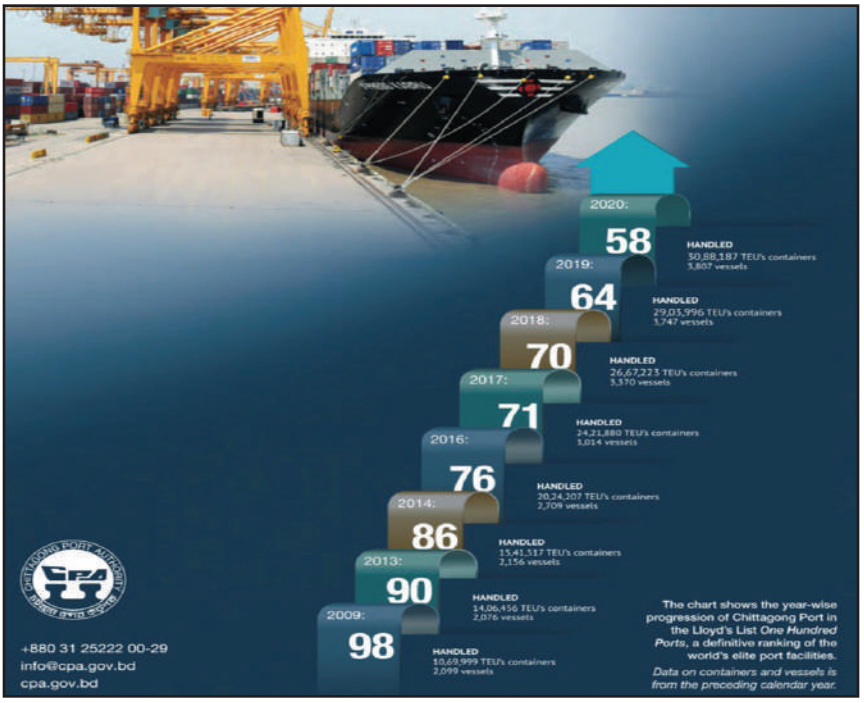

Figure 12: Lloyd's Ranking (Source: Llyod's List)

International Container Routes

Due to vessel waiting and dwell time, mainline operators are having difficulty maintaining weekly fixed-day services in Chattogram port . They have switched to feeder services, which are easier for them to handle sailing schedules. It now acts as a feeder port for container cargoes up to 2,548 TEUs. As a result, feeder capacity in Chattogram port via Singapore, Tanjung Pelepas (Malaysia), and Port Klang (Malaysia) increased from 1.02 million to 1.24 million TEUs in 2017 (Preparatory Survey on Matarbari, 2018).

Chattogram Port Operation System

The port cannot operate efficiently unless all stakeholders are working properly. Presently, Chattogram Port Authority (CPA), Customs House Chattogram (CHC), Ship's Agent, Clearing and Forwarding Agents, Freight Forwarders, Terminal Operators, Berth Operators (Stevedores), Trailer Operators, Truck Operators, Main Liner Operators (Feeder Operators), Exporters/ Importers and Inland Container Depots (ICD) are identified as major stakeholders of Chattogram port. The operation system of Chattogram port consists of aquatorium, berthing system and info-structure to a limited extent.

Aquatorium System. The maximum allowable draft of vessels in the port varies between 8.5m and 9.2m, and is subject to change depending on position (New Mooring Terminal (NCT), Chattogram Container Terminal (CCT), and General Container Berth (GCB)) and tide of the day. The maximum permissible length is 190m. Ships, especially larger bulk carriers and tankers, that are unable to reach the port channel due to vessel length, width, or draft restrictions, anchor within the port limits at the outer anchorage.

Tidal Range. It is a tidal port with a tidal range of about 2 to 5.5 meters (CPA Overview, 2020).

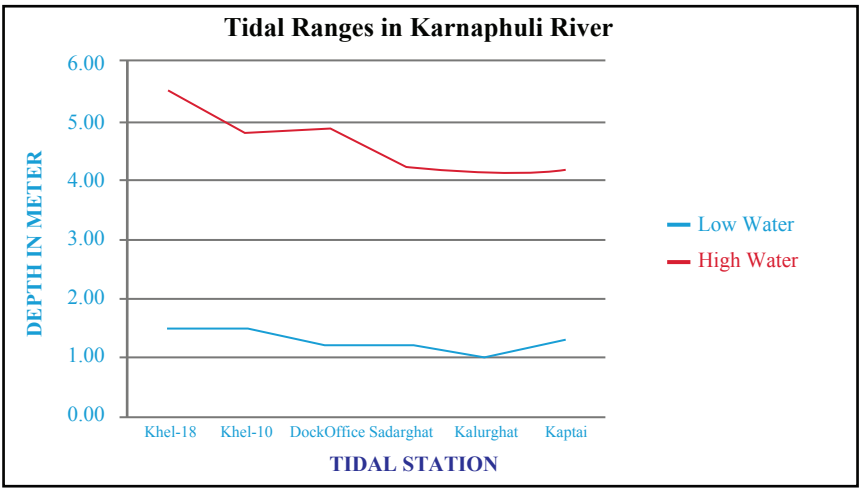

Figure 13: Tidal Range (Source: CPA Overview 2020)

Night Navigation. The permissible vessel length is limited to 170m. At night, vessels with a bridge on the bow and vessels with a container on deck that blocks a clear view are not dealt. Mooring vessels and tankers are not allowed to move at night (CPA Overview 2020).

Vessel Traffic Management Information System (VTMIS). To ensure maritime protection and navigational safety in the river Karnaphuli, modern VTMIS has been installed in 2013 at Chattogram port and its anchorage areas. The system includes vessel scheduling, radar surveillance systems, CCTV observation on the Karnaphuli river as well as radio communication systems.

Berthing System. The berthing sub-system of Chattogram port embraces:

- Ship Operation
- Quay Transfer Operation
- Storage Operation
- Receipt /delivery Operation

Ship Operation. For geared less vessels, PCT, NCT and CCT are preferred, while GCB is preferred for geared vessels. Bulk cargo is also transported using GCB. Every day, 24 hours before the schedule, a berth plan against vessels is published in the CPA website.

Quay Transfer Operation. The physical discharge is carried out in accordance with the discharge list. Quay Gantry Crane (QGC) transports containers to and from ships. Each berth at the PCT, NCT, and CCT terminals is assigned two QGC, with no backup in case of machinery failure. At the moment, FCL containers carrying any of the 37 listed items by National Board of Revenue (NBR) are qualified for on chassis delivery to off docks.

It is important to underline that owing to the limited depth at Chattogram port, the majority of the large volumes of bulk cargo are handled at the "outer anchorage," where these volumes are discharged and loaded onto other vessels. Then, roughly 70% to 80% of these volumes are transported to the Dhaka area.

Storage Operation. The yard's administration and preparation are handled using Container Terminal Management System (CTMS) in the container terminal areas and manually in the port's general cargo areas. The storage operation mostly takes place for stacking after the container has been discharged,

as well as for internal moves. The yard's stacking capability is determined by the real dwell times. With Rubber Tyred Gantry (RTG) and Straddle Carrier, the maximum stacking height at Chattogram port is four tiers and three tiers, respectively. External trucks carry a large percentage of export containers directly to the quay. This leads to 30% less moves in the yard (CPA traffic department).

Receipt/ Delivery Operation. Following the discharge operation, the terminal receives a distribution request document from the shipping agent. The distribution process will be done in the One-Stop Service Center located in the port operation area. Customs officials may wish to inspect any container before delivery. When all of the paper work for the container's release and payments has been made, the truck driver can enter the port, register at the gate, and proceed to the terminal area to receive the container.

For Export Containers. Officially, the cut-off time is 24 hours prior to the arrival of the vessel. It does, however, stretch to 24 hours after arrival, when discharge is completed. In reality, all export containers are delivered directly to the quay side. Henceforth, it is difficult to execute stow plan. Therefore, the assigning of containers to slots on board is performed on the fly, according to the order in which containers are transported by external trucks with varying arrival times.

Stripping for Inspection. Stripping operations take place in a number of locations in the port, including LCL cargo sheds and areas adjacent to and near RTG areas. Some goods may also be stripped for inspection in customs bonded warehouses outside of the port. Many internal moves involving straddle carriers in relation to those operations, as well as external persons and vehicles crossing operational areas, are causing traffic congestion at the terminal. Internal moves are planned and performed manually, as are stripping operations, with no integration with CTMS system for real-time service using mobile data terminals.

One Stop Service Center. It is located inside the port operation area. At this point, the C&F agents prepare all necessary documents to release import containers for delivery instead of facing number of department located in different location. Fees related to import containers will be invoiced in the One-Stop Service Center and can be paid instantly at a bank also located in this service center. However, operational interface with CTMS is not implemented yet. As such, indication from the billing system to CTMS that a service has been charged and the container can be shipped is not possible. A local IT system oversees the billing and payment operation. The container is released based on paper documents.

Figure 14: Bird's Eye View of Chattogram Port (Source: CPA)

Berths /Jetties/ Moorings for Ocean-going Vessels

At Chattogram port bulk, break-bulk, ro-ro, container and containerized cargoes are handled in the following berths/ jetties/ moorings as shown in the table:

General Cargo Berths (GCB)	2100m	13 berths in a row. Between 1954 and 1979, these were constructed. Berth erections are currently in very poor condition. There are numerous holes in the GCB area, posing a significant risk to vehicle movement. At GCB, 50% of total container volumes are handled. Since GCBs do not have quay transfer cranes, general and container cargo is handled solely by ship's gear and operated by a stevedore's agency following the tool port governance model. Bulk carriers, break-bulk carriers, ro-ro vessels, and other geared less vessels are berthed at berth/jetty 02-07. Container vessels with gear/derrick use berth/jetty 08-13. There are 21 different types of sheds and warehouses. In the GCB area, there is also a central workshop.
Chattogram Container Terminal (CCT)	450m Quay wall	Built in 1986. For container handling, it has a 450m long quay with two berths. An inland container vessel can also be berthed here. Each berth has two quay gantry cranes (QGC) dedicated to it. There is, however, no backup QGC in case of equipment failure. The structures and services are in acceptable condition. A private terminal operator namely Saif Power Tech Limited handles 30% of total container volumes.

New Mooring Container Terminal (NCT)	1000m quay wall	Built in 2007. For container handling, it has a 1000-meter-long quay with five berths. Each berth has two quay gantry cranes dedicated to it. There is no backup QGC alike CCT. The infrastructure and services are in good condition. At NCT also, private terminal operator namely SaifPowerTec Limited handles 20% of total container volumes.
Patenga Container Terminal (PCT)	600m	The terminal is being built on 26 acres of land between Chattogram Dry Dock and the Boat Club in Patenga. It facilitates two container ships and a bulk carrier. It added 0.45 million TEUs of handling capability.

Table 1: Berths Owned and Operated by CPA/Private Operators (Source: Primary)

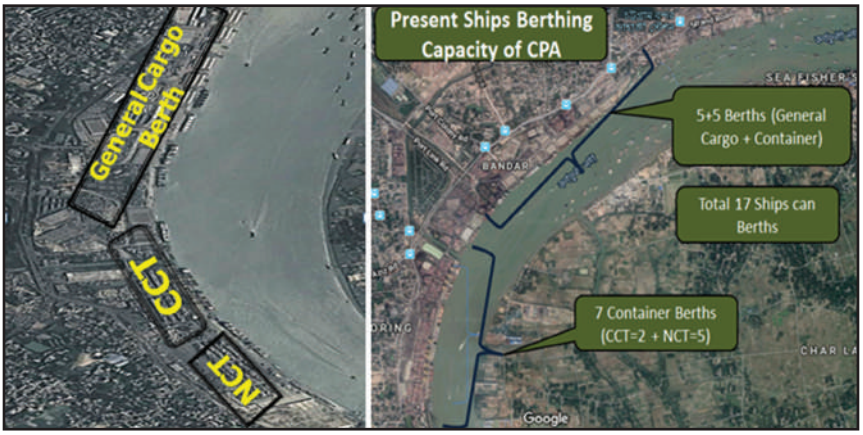

Figure 15: Number of Berths and Location (Source: Google Earth)

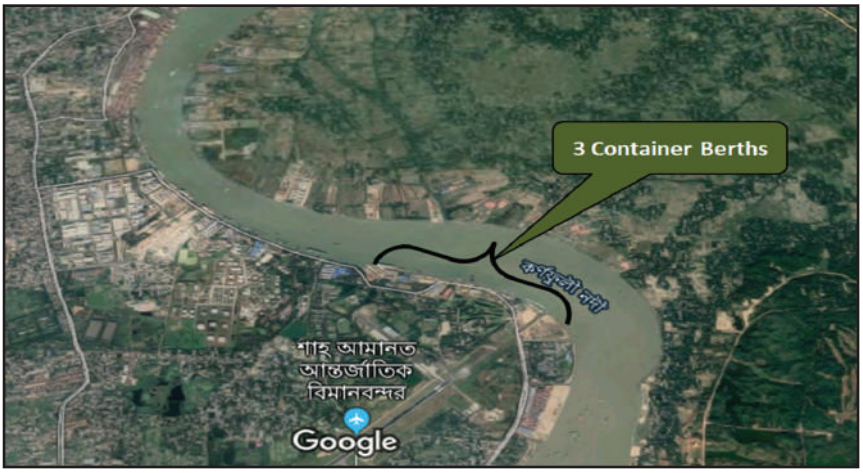

Figure 16: Patenga Container Terminal Site (Source: Google)

Figure 17: Present Condition of GCB Area (Source: Primary)

Dry Dock jetties	02	A public captive berth for repair & maintenance of sea-going vessels. Presently, bulk container ships are also using these jetties to unload their cargo, thereby reducing load on GCB.

Table 2: Repair Berths (Source: Primary)

Dolphin Oil Jetty for POL	03	Public captive berth for handling crude and product oil vessels of up to 186m.
Grain Silo Jetty	01	Public captive berth for vessels up to 186m.
Cement Clinker Jetty	01	Industrial captive berth (Private).
TSP Jetty	01	Industrial captive berth (Public) for vessels up to 175.25m.
CUFL Ammonia Jetty	01	Industrial captive berth (Public) for vessels up to 176m and can be loaded up to a maximum draft of 8.5m
KAFCO Urea Jetty	01	Industrial captive berth for vessels up to 186m and can be loaded up to a maximum draft of 9.2m.
Ammonia Jetty	01	

Table 3: Specialized Berths for Bulk Handling (Source: Primary)

River Moorings	05	

Table 4: Mooring Berths (Source: CPA Overview, 2020)

Handling ICD/ICT

Inland Container Depot. An Inland Container Depot (lCD) in Kamalapur, Dhaka, has been in service since 1987, with an annual handling capacity of 90,000 TEUs. Two container trains run daily each way between Chattogram port and Dhaka lCD.

Container Holding Capacity	4067 TEUs
Yard Area	136954 sq.m
Container Freight Station	6508 sq.m
Railway Wagon for Container Transportation	550 in no.

Table 5: ICD Kamalapur Capacity (Source: CPA & Compilation)

Private ICDs. Private ICDs are expected to help minimize dwell time and traffic congestion within port facilities. CPA promotes the establishment of Off-Dock facilities in the form of private container freight stations (CFSs) or inland container depots in response to this expectation. Customs currently allows 38 FCL products to be delivered to ICDs via on-chassis delivery. Currently, there are 19 private ICDs with an annual handling capacity of 76,000 TEUs of containers in the country (Pvt Inland Container Depots, 2023).

Handling of Import Consignments. Import items are taken out on-chassis from Chattogram Port to respective off-docks. At off-docks, imported products are physically inspected. At Chattogram Customs House, a customs assessment is performed and a release order is released. Unpacked goods are shipped from private off-docks.

Export Formalities. Customs officers posted at private ICDs oversee the packing of export products into containers and, if necessary, perform physical inspections. Stuffed containers are permitted to reach the port area after completing formalities at a private ICD, and are then transported on board for export after the remaining formalities are completed.

Handling of Empty Containers. Following the unloading and distribution of import consignments from the port area or private ICDs, shipping agents (Main Line Operator or MLO) transport the empty containers to designated depots or CFSs for storage. Some of these are later re-exported as empty containers, while others are used to stuff export consignments.

ICT Pangaon. The Bangladesh Inland Water Transport Authority and the Chattogram Port Authority collaborated to establish ICT Pangaon. The terminal is expected to play a positive role in reducing cargo movement pressure on the Dhaka-Chattogram corridor by opening up a new horizon in the transportation of exported and imported goods through waterways.

Container Holding Capacity	3500 TEUs
Yard Area	55000 sq.m
Container Freight Station	5815 sq.m

Table 6: ICT Pangaon Capacity (Source: CPA and Compilation)

Customs

The Chattogram Customs House (CHC) handles roughly half of all imports to Bangladesh and eighty percent of all exports, making it Bangladesh's most important customs station. Currently, all import containers pass through the yard, after which 19% are transported to off-dock depots, 6-8% to consignees' premises, 3-4% by rail to Dhaka, and 10% to customs inspection. The remaining 60-63% is stripped in the port and cargo is loaded on traditional trucks (CPA Statistics Department).

Figure 18: Stripped LCL Containers vs Containers under Scanning (Source: CPA)

CHC implemented an integrated manifest system for which the average customs clearance time for import containers is decreased. Four container scanners were put into use in June 2010. This enables CHC to deal with the increased volume of imports and reduced customs inspection time (Performance Evaluation Report, 2018). However, 100% LCL containers are unstuffed at CFS located inside port premises rather than off-dock for customs inspection. This requires more than 5000 trucks along with 5/7 labours against each truck to enter daily inside port to pick up and transport unstuffed goods.

Figure 19: Impediments in LCL Goods Delivery System (Source: CPA)

Transportation of Container/Cargo from the Port

On average 70% containers are Dhaka bound/origin and the rest is destined for Chattogram. Though the port is connected with its hinterland by the rail, road and river; however it is still insufficient with lot of constraints. 94% of Dhaka bound container move through road. Road congestion increased the transport time and cost for truck transport. The railway system is mostly single track and only 6% container moves through railway. The inland waterways are not adequately maintained and cost higher than road. Percentage of container movement through this mode is negligible (CPA Statistic Department).

Statistical Information

Containers Handled. Compared to the 31,42,504 TEUs handled in 2022, Chattogram Port handled 30,50,793 TEUs (Twenty-foot Equivalent Units) in 2023, a little decline. This indicates a 2.9% decrease in container handling over the previous year (CPA Statistic Department).

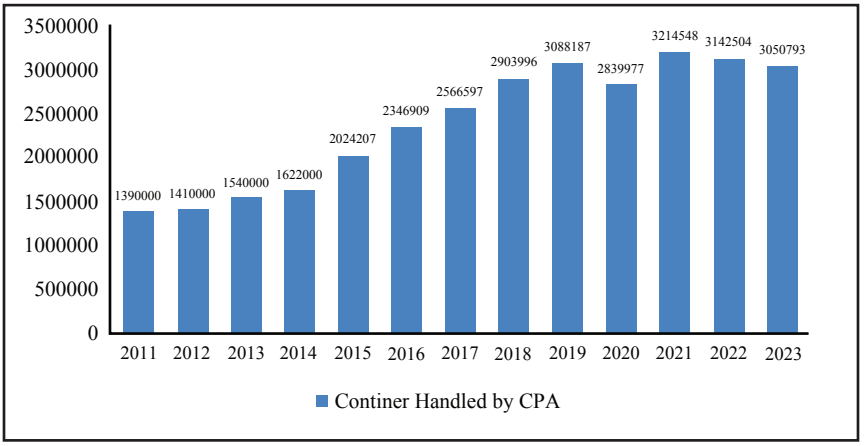

Figure 20: Container Handled by CPA (Source: CPA Statistics Department)

Vessels Handled. The Chattogram port handled 4253 vessels in the year 2022-23.

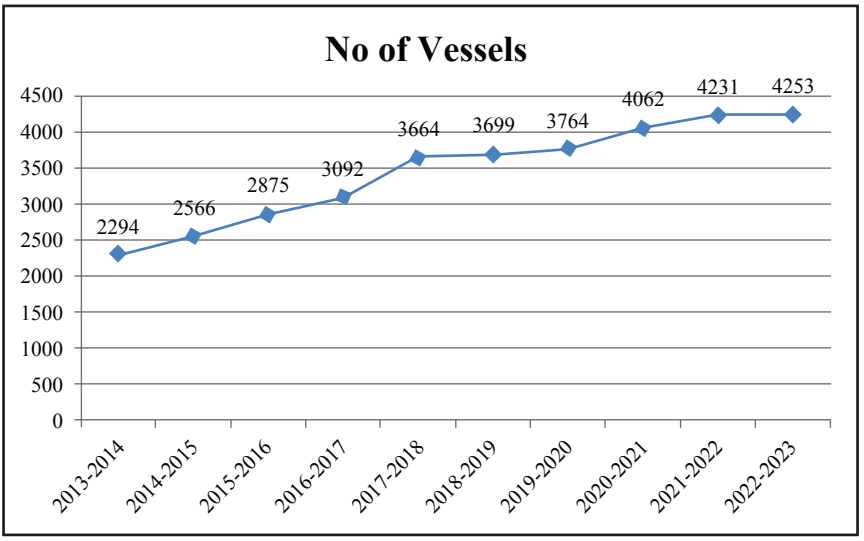

Figure 21: Vessels Handled at Chattogram Port (Source: CPA Statistics Department)

Vessels Waiting at Outer Anchorage. Graphical representation is given.

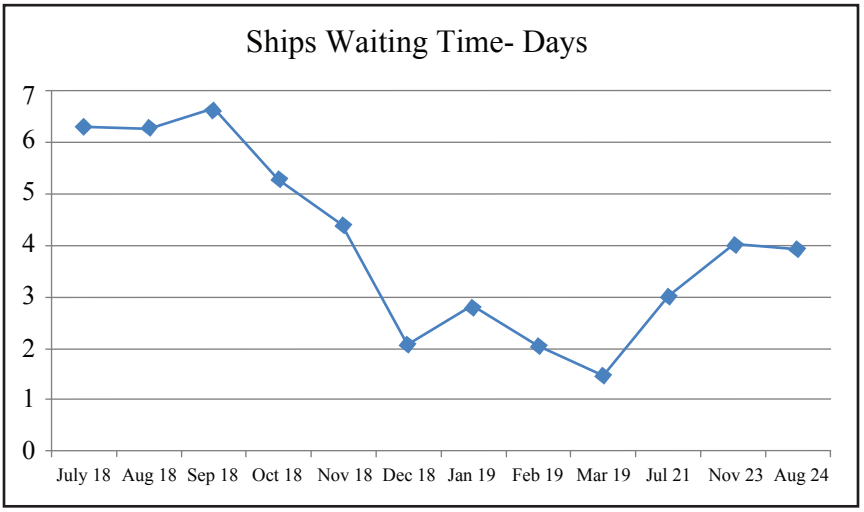

Figure 22: Graphical Representation of Ship's Waiting Time at Chattogram Port
(Source: CPA Statistics Department)

Vessel's Dwell Time. Graphical representation of vessel's dwell time is given.

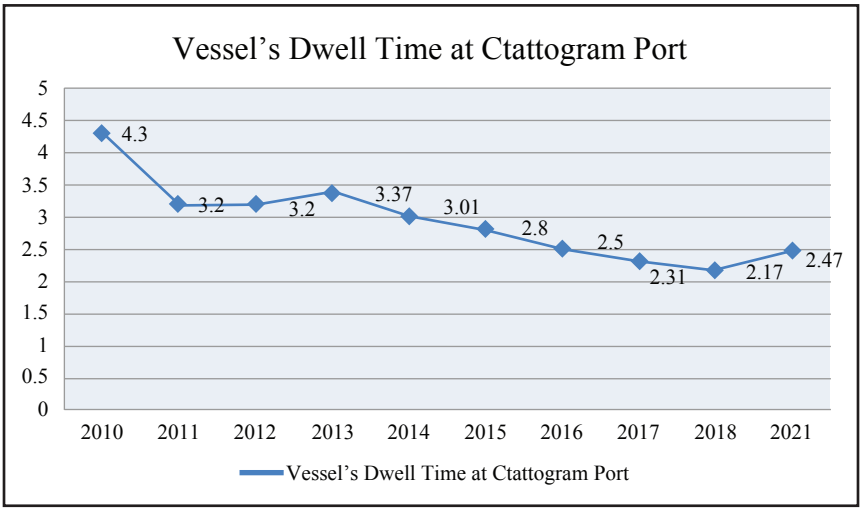

Figure 23: Vessel's Dwell Time at Chattogram Port
(Source: CPA Statistics Department)

Container Dwell Time. CPA offers free storage for 20-foot containers for seven days, and charges $6.00 a day from the eighth to the twentieth day, and $12.00 per day after that. The free storage period for 40-foot containers is the same as for 20-foot containers, but the subsequent fee is twice as much (CPA). Despite this tariff, container dwell times have remained high on average.

Info-Structure

Local Area Data Network. A data network is already in place in the Chattogram port, which is made up of fiber optic cables, copper cables, and wireless networks. The majority of the container-operated areas are accessible via wireless. Fiber optic cables are installed in the port and terminals; primarily to connect CCTV cameras. Some of the fiber optic cables are shared by the CTMS data network and telephonic connection.

CPA Data Center. CPA runs an age old data center that is mostly used to host administrative services, such as the billing system. Since there is no interface to the CTMS, all billing data must be manually entered into the system.

Container Terminal Management System (CTMS). Basically, CTMS named by CPA is a version of NAVIS N4. It is a container tracking system and a management information system that will improve cargo handling at Chattogram Port by allowing for computerized tracking of container loading, unloading, and movement inside the port. The system was planned to handle up to 1.0 million TEUs of container traffic; however, the significant rise in container traffic to 2.57 million TEUs by 2017 placed a strain on the system and its supporting hardware, resulting in occasional downtime. Since the current storage requirement is about 128 GB or higher, the server capacity of 64 gigabytes (GB) has been found to be insufficient. Existing workstations have 512 MB of random access memory, while newer versions have 2–16 GB. In addition, the CTMS system's operational outcome is inefficient in part due to a lack of information about container bookings during the export process. Consequently, CPA fails to provide an electronic departure bay plan for the vessel to sail.

Automated System for Customs Data (ASYCUDA). The United Nations Conference on Trade and Development (UNCTAD) developed an Automated System for Customs Data, which was introduced by the Customs House Chattogram (CHC). Only one of the six modules is active, though. The CTMS was intended to link with CHC's ASYCUDA++ and, later, ASYCUDA World systems. (Performance Evaluation Report, 2018). Once the other

ASYCUDA++ modules are activated, the system can connect to CPA's CTMS. The CTMS and ASYCUDA World's current interface is based solely on the Import General Manifest (IGM), which CHC sends to the CTMS via e-mail (Performance Evaluation Report, 2018).

Interface between Port and Customs IT System. Presently, CHC e-mails CPA regarding the specifics of the import general manifest. It then enters into the CTMS to manage vessel unloading of containers and slot allocations in the storage and back-up area. CHC, on the other hand, does not provide CPA with the specifics of the export general manifest (EGM), which would enable it to speed up the positioning and loading of export containers onto specified vessels. The loading procedure is entirely manual, resulting in the port's inability to include an electronic departure bay schedule for the vessel to sail. As a consequence, there are often delays in the departure of allocated vessels (Performance Evaluation Report, 2018).

Gate Operations. CPA gates are not integrated with CTMS system. Physical entry procedures for vehicles at the gates are causing regular heavy traffic congestion, which has a negative impact on operations.

Weigh Bridge. There are 7 computerized road vehicle weigh-bridges (30T-100T) at different jetty gates and North Container Yard (NCY). One computerized railway wagon weigh-bridge (100T) located at the railway transit yard. There are also number of computerized truck weighing scales (100T) installed at two stage gate under custom over bridge at GCB area.

Port Development

Given the country's growing economic activity, volumes moving through the port are expected to triple in the next 15 years, reaching 5.4 million TEUs in 2040 (Strategic Master Plan, 2015). It is predicted that container throughput in the port will slow down to 5.0 million TEUs in 2043 due to the fact that Matarbari deep sea port will offer facilities for larger vessels.

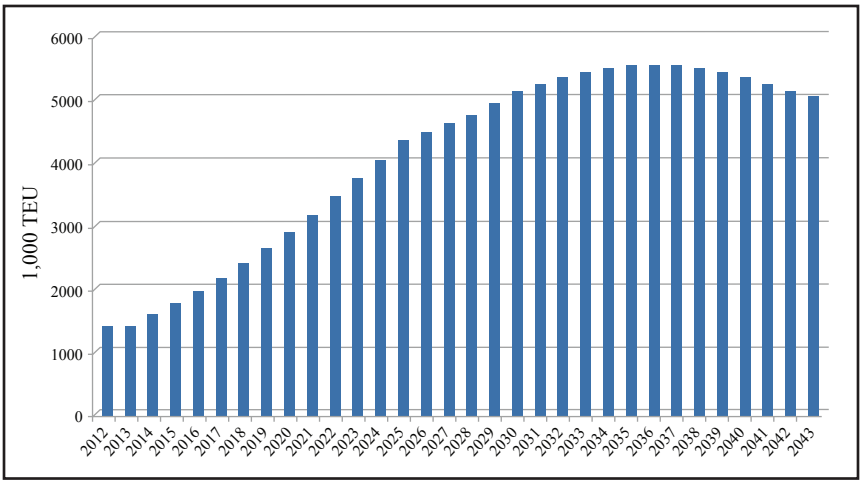

Figure 24: Chattogram Port Container Handling Potentials
(Source: Strategic Master Plan, 2015)

The Bay Terminal. On the coast of the Halishahhar district, six kilometers from Chattogram port, a Bay Terminal is being planned. The construction site would cover 871 acres of existing land, as well as 1600 acres of reclaimed land from the sea – a much larger area than the present Chattogram Port. Vessels with a draft up to 12m and a length of up to 190m will be able to dock, which is a significant improvement over the existing Chattogram port facilities. Mother vessels with a tonnage of up to 5000 TEUs will be able to dock here (CPA Planning Department). The Bay Terminal will have two container terminals, a multi-purpose terminal, and several other services, according to the master plan. There is a good chance that the bay terminal will be delayed because no progress has been made other than earth filling.

Terminals	Jetty Length	Handling Capacity
Bay Multi-Purpose Terminal	1500 meters	5 million tonnes (bulk)
Bay Container Terminal-1	1225 meters	1.85 million TEUs
Bay Container Terminal-2	800 meters	1.23 million TEUs

Table 7: Expected Capacity of Bay Terminals (Source: CPA Planning Department)

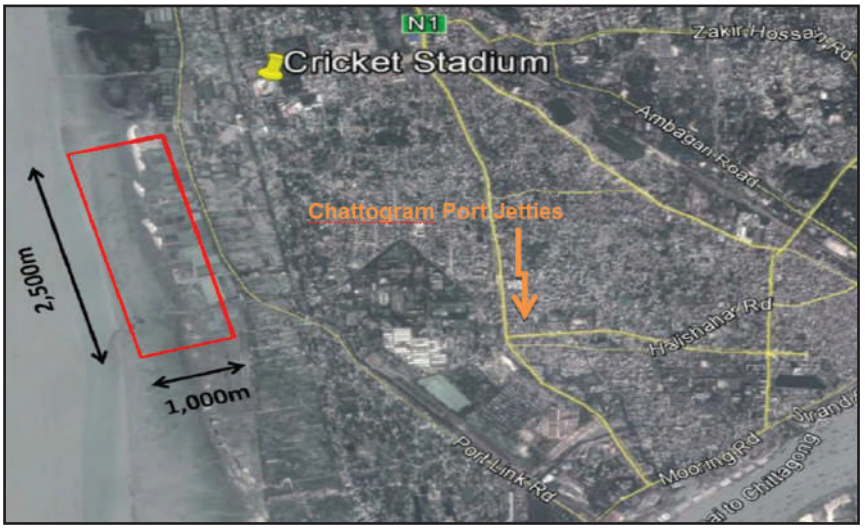

Figure 25: Bay Container Terminal Construction Site (Source: Google Earth)

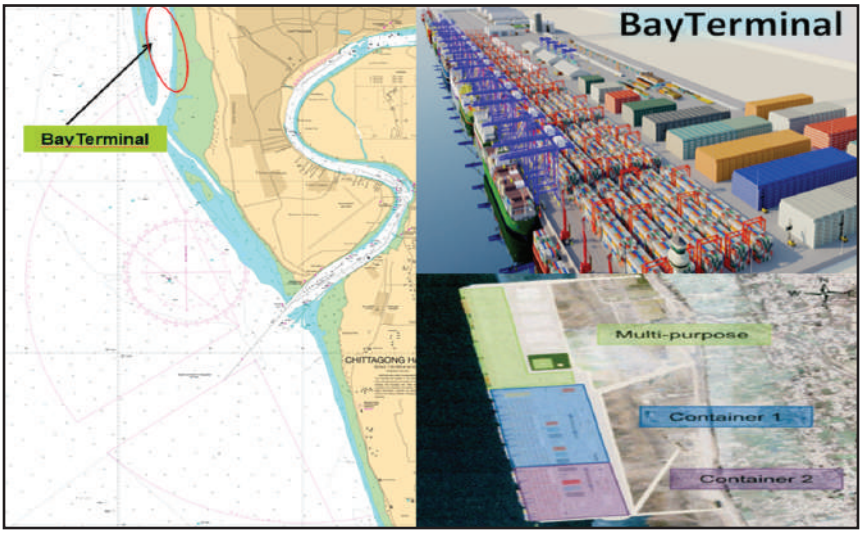

Figure 26: Proposed Plan for Bay Terminal (Source: CPA Planning Department)

Matarbari Deep Sea Port. It is a under construction deep-sea port in Matarbari, Maheshkhali Upazila, Cox's Bazar District, Bangladesh. It was designed for the Matarbari coal-fired power plant in the first place. The government later agreed to convert it into a deep sea port. The port of Matarbari is expected to be able to handle 8,000 TEU vessels. The "Matarbari Port Development Project," which will be completed by December 2026, is being

implemented by CPA under the Ministry of Shipping and the Roads and Highways Division. The navigation channel will be 350m length with a maximum permissible draft of 16m (CPA Planning Department).

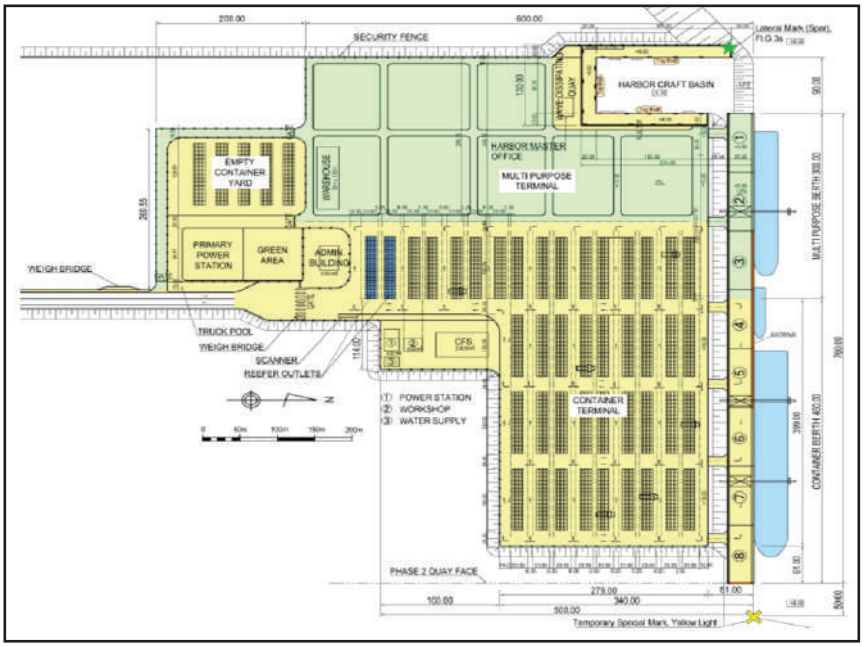

Figure 27: Matarbari Port General Layout Plan (Source: Preparatory Survey Report on Matarbari Port)

The container terminal will be constructed on 18 hectares and will have an annual capacity of 600,000 to 1.1 million TEUs, according to JICA. Later, the container terminal will be extended to 70 hectares, with a berth of 1,850m and a capacity of 2.8 million TEUs. The multi-purpose terminal, on the other hand, will be constructed on 17 hectares and will be able to handle vessels up to 70,000 dwt. (Preparatory Survey on Matarbari Port, 2018).

New Auction Shed. A new auction shed near Halishahar, Chattogram (outside port premises), has been installed vacating old one occupying approx 5 acres of land within the port premises near the GCB berth to increase yard capacity.

Figure 28: Old and New Auction Shed (Source: CPA and Author's Compilation)

ICD Dhirasram. CPA conducted a feasibility study for the construction of a new ICD near Dhirassram Railway Station (Dhaka) in 2007, with funding from the World Bank. The container terminal will be built on 55 acres of land and will have a capacity of 3,54,000 TEUs per year. This ICD's handling capacity would be nearly 20% of Chattogram Port's container handling capacity (CPA Planning Department).

Karnaphully Container Terminal. The Karnaphully Container Terminal (KCT) project has been proposed to rebuild the old dilapidated GCB jetties in stages. CPA currently has no plan to undertake this project in the near future. The project, however, has not yet been canceled.

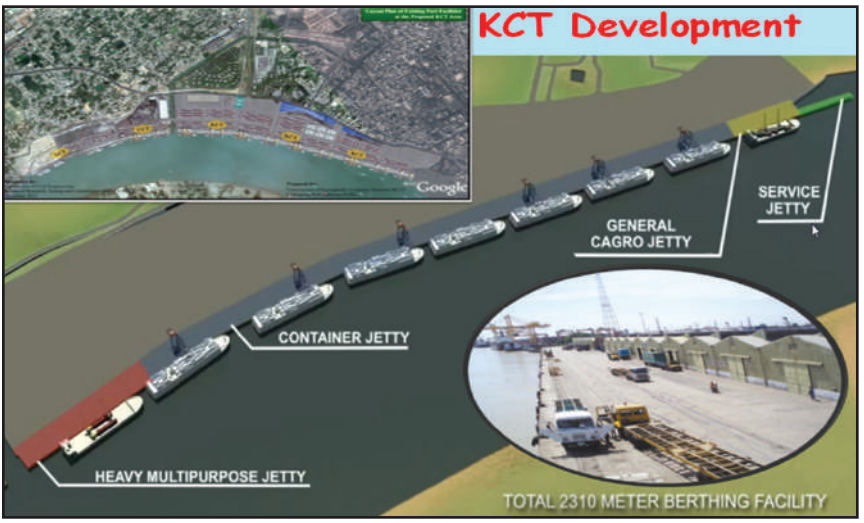

Figure 29: 3-D View of KCT (Source: CPA)

Key Informants Interview & Analysis

Interviews & Findings. The researcher conducted Key Informant Interviews (KII) among port stakeholders in order to obtain current situation and related problem. The results of the interview study into the operational aspects of the Chattogram port are not surprising, but they do highlight the importance of resolving the long-standing problem of container vessel turnaround times. A brief summary of the interview findings is highlighted for better assimilation.

Head of Planning, CPA. Bangladesh, however, still lacks a "Port Policy" after 50 years of independence. A tiny portion of it is mentioned in the National Shipping Policy-2000, although it does not go into detail on port issues. The container idea has been applied as a "door-to-door" shipment. The Chattogram Port Authority, on the other hand, failed to carry out the "door-to-door" idea. It's now being used by the stakeholders as storage instead. At the Chattogram port, statistics can provide a solid picture of demand versus capacity.

Year	Demand (TEUs)	Capacity of Chattogram Port (TEUs)	Remarks
2016	2109000	2074000	
2017	2369000	2333000	
2018	2654000	2616000	
2019	2964000	2925000	
2020	3289000	3249000	Karnaphuli Container Terminal (KCT) is expected to be built and put into service. However, it has not yet been executed.
2021	3637000	3595000	
2023	4396000	4351000	The first phase of the Bay Container Terminal (BCT) must be constructed and put into service.
2025	5234000	5186000	
2028	6617000	5968000	The BCT's second phase must be completed and put into service.
2030	7603000	6412000	Mongla and Pyra Port need to take load of the remaining cargoes.
2035	10177000	7231000	Mongla and Pyra Port need to take load the remaining cargoes.
2036	10692000	7311000	Matarbari deep sea port needs to be fully operational.
2043	13935000	6918000	---

Table 8: Capacity of Chattogram Port (TEUs) (Source: CPA Planning Department)

Chattogram port cannot be used as storage by port users. CPA should remain on set plan and need to build and renovate new and existing terminals/berths in order to address the capacity gap. As there is a capacity gap between supply and demand, the port is likely to be congested at all times unless major build up. More so, the port is having tendency to act on an ad hoc basis rather than strict to a set plan.

Terminal Manager, CPA. The complete loading process is affected by such a very flexible unwritten policy for BGMEA containers. Between CPA and CHC, the link between Asycuda world and CTMS is certainly a key issue. Direct loading of export containers slowed quayside performance at all of the port's container berths. There is no standard stow planning for export. Port efficiency is substantially stalled by the un-stuffing of LCL containers and the movement of 5000 or more trucks/covered vans, as well as labours, inside the port area.

Deputy Conservator, CPA. The pilot at Chattogram port can navigate vessels at night. Due to the fact that Chattogram port is a tidal port, vessels loaded

and ready to sail during the day cannot be sailed at night due to draft and LOA constraints. Otherwise, vessel turnaround times could be shortened even more. It is very much evident that congestion, delays, and higher costs are the effect of draft and LOA restrictions.

Ex-Chairman, CPA. The apparel sector takes advantage of its economic position by not adhering to deadlines. 100% "On Chassis" delivery will reduce traffic congestion inside the port, allowing terminal operations to move more quickly. CPA and Customs are separated by a thin psychological layer. Chattogram port can meet international berth time standards if Customs, CPA and BGMEA co-operate each other.

An Apparel Industry Owner. It is not true that apparel industries takes advantage and are not adhering to cut off time. However, it is rather other way around. CPA indirectly encourages direct delivery of export items due lack of export stow yard and poor stow planning. In most of the cases appointed freight forwarder liaison with designated ship and maintains schedule for loading and CPA officials are not willing to be part of it. Apparels owners are reluctant to maintain cut off time as there are no strict compulsions by CPA.

Terminal Manager (Operations), Saif Power tec Limited (Container Terminal Operator). BGMEA goods for export are one of the main reasons (from the off dock to the terminal for direct loading) for increased turnaround time. As such, this also contributes for poor figure in terms of moves/hour for loading. Ill-disciplined truck drivers and space shortage inside port premises are also major issues. No export departure bay plan is a concern to take care of. In the event of routine maintenance or out of order, there is no replacement QGCs available. It appears that when QGC is unavailable due to maintenance or out of order, container move per hour slows, resulting in prolonged berthing times.

Vice President, Bangladesh Freight Forwarders Association (BAFA). In the containerization era, CPA is not adhering to "door-to-door" concept. Unstuffing LCL containers inside port premises leading to preventable congestion are a concern to address seriously. CPA needs to unleash many leased storage for port users. Port users are neither getting necessary benefit from Assycuda world system nor from CTMS. To some extent, existing hinterland connection also contributes long turnaround time.

Clearing & Forwarding Agent. One of the primary problems in processing cargo rapidly from the Chattogram port area is customs bureaucracy.

Following illustration depict a clear picture about bureaucracy:

D-Day	Action	Remarks
D	C&F agent receives Copy document (bill of lading) from concern bank. Agent then checks Import General Manifest (IGM) through Assycuda World system.	Onward process for customs assessment cannot be done against IGM, unless CPA assigns a rotation number. Commonly, it takes one day.
D+1	Placed for customs assessment on import goods.	On the first day, the evaluation can be completed subject to the importer's goodwill, industrial commodities, and a few specific items. Conversely, If the imported goods are appraised on the first day, C&F agent may bypass the next two onward processes and go straight to the delivery order. Else, a choice will be made for examination based on the assessment inspection. C&F agent time and again claims that due to the bureaucratic mind, customs habitually selects for examination. Point to note that due to a scarcity of examination sheds, commonly assessments are conducted outside. Consequently, during bad weather, C&F agent also may defer the assessment schedule considering the safety of the goods.
D+2	Import container is placed at the examine point to collect samples for a thorough examination by a customs lab technician.	Considering the assessment has not been done on D+1 day.
D+3	Lab technician may examine on the basis of sample. If not satisfied, sample goods will undergo lab test.	Depending on the speed money, the results of a lab test can take anywhere from 5 to 10 days. Let's say it takes n days to complete.
D+4+n	Lab test report will be sent to customs assessment department. Importer will be notified.	Delivery charge (if beyond free time), port charges (handling charge, storage charge, extra movement charge) need to be paid.
D+5+n	After delivery order, indent issued on completion of tax, shipping agent payment and port payment.	

Table 9: Illustration Depict Clear Picture (Source: CPA Planning Department)

The above table represents the duration (D+5+n) of a container that occupies port area after unloading. Clearly it shows that goods can be delivered completing customs formalities within 5-7 working days if n can be removed. Again, In case of LCL container, the goods are unstuffed from container and kept in the shed. As a result, importers need not to pay shipping agent for container. As the port storage charge is negligible, it encourages importers to occupy port shed.

Questions on customs assessments, leading to lengthy negotiations to reduce assessments. Many importers are willing to occupy port sheds due negligible stowage charge.

Ex-President & Secretary General of CBA, CPA. Political meddling stymies CPA's decision. Export containers delivered directly to the port have an adverse effect on loading performance. On the other side, terminal operators are not in competition. Sizable amount of port land is leased out that need to be unleashed.

Analysis of the Findings

The findings of the key informants' interview into the operational aspects of the Chattogram Port may not be surprising, but they do highlight the importance of resolving the port's long-standing issues, effect and challenges. "The Chattogram Port has no export stow plan for containers"- the statement itself is a stoppage for smooth operation of loading export goods. Super flexibility for BGMEA goods seems major contributor for long berth time. Analysis reveals that there may be a reason to allow direct delivery of export containers to the hook is due to high volume of RMG goods and Chattogram Port lacks in container yard capacities. It is evident that due to insufficient number of export containers at the starting time of loading, loading of export container is postponed to a later point of time. On the other hand, empty container cannot be loaded before laden containers. This is an effect of direct deliveries of export containers. Due to late arrival of BGMEA export goods, empty containers scheduled for loading also cannot be loaded. The effect combines when the tidal sailing window is missed due to such unplanned extension of the port stay.

Then again, space shortage inside port premises is a major issue to be solved. Considerable amount of port land is leased out to influential private stake holder's contra port interest. Political influence may be a reason. Over again, it becomes a culture for importers to use port sheds as their goods storage as stowage charge is negligible. Various sheds, stowage and CFS need relocation outside port area in order to create space inside port operation area. The main target of these measures is to establish regular container handling operations in the Chattogram Port, which includes the stacking of all export containers before commencement of loading operation. This is a condition for acceptable vessel turn-around times.

Then again, Chattogram port failed to adopt the concept of "door-to-door" service of containerization. A clear separation of areas between full-container

operation and cargo operation including stripping will provide major advantages for the container terminal areas. More containers stripped outside the port would reduce the road traffic inside the port. Again, truck drivers are ill disciplined and often try to bypass serial causing much delay. With this aim, 100% import commodities is prerequisite to be allowed for "On Chassis" delivery. In relation to that customs should acknowledge more depots in the Chattogram area.

The outcome of the Container Traffic Management System (CTMS) in operations is partly inefficient due to lack of information about container bookings in the export process. In order to be able to optimize the use of the CTMS system, a link on the existing assycuda world is required. One of the important point reveals from the analysis of the interviews is that the total export container loading arrangement and coordination with shipping liner is done by shipping agents and traffic department has little interest to be part of it. The increasing demand for containers demonstrates that Chattogram Port's throughput capacity surpasses its holding capacity. As a result, the Chattogram port is likely to be congested at all times, affecting vessel turnaround times due to capacity gap between supply and demand. Yet again, complex and overlapping customs procedures, nontransparent administrative requirements, and sluggish information processing due to limited automation at all levels of the CPA and customs operations further burden port users. According to the survey, clearing an import cargo takes D+5+n days (usually more than 11/12 days) on average. In order to straighten out the problems, the study reveals that introduction of a fully automated electronic declaration system, incorporating inputs directly from traders is required to resolve the issues. Informal discussions also reveal that few immoral customs and port officials have been delaying the automation move because it would limit their ability to have speed money from port users.

Although the 1976 Ordinance gives full financial and administrative autonomy to the CPA, the CPA is reluctant to exercise the authority. Legislative and political support for the CPA is required to exercise its authority to improve delays in making key decisions to run the port efficiently. Interview reveals the importance to improve the current waterways connections as the road and railway links between Chattogram and Dhaka are facing capacity bottlenecks. Presently, port users are not interested to avail ICT Pangaon facilities as the route costs higher than road and railway links. Natural limitations like draft, length, tide results longer turnaround time of vessels. It seems these limitations cannot be ruled out and container congestion in Chattogram port will continue unless Matarbari Deep Sea Port or Bay Container Terminal is in operation.

Conclusion

The research study aims to find Independent Variables (IV) that are influencing dependent variables (DV) i.e. container vessels turnaround time. Some IVs are under terminal operators' control, while others are beyond their control. Terminal operators can improve their terminal operations' performance in order to shorten container vessel turnaround times by increasing efficiency in container handling activities and removing or limiting unnecessary delays. However, external factors such as environmental factors, natural restrictions (tide, gupta bend, depth, etc.), direct loading of export containers, waiting for laden containers, and constraints imposed by client shipping lines, aging vessels, or vessels equipped with ship gears have no control over terminal operators in Chattogram port. Based on the findings of the literature review and the researcher's interview, the research study concerted not only on those IVs that are under the control of terminal operators but also under the control of CPA, customs and port users.

The study anticipated that factors such as bureaucracy among and between customs and port officials would persist since it is ingrained in the culture. Customer satisfaction has been overlooked for a long time, and port users will continue to engage in illegal activities such as speed money, manipulating customs assessments, manipulating ship schedules, container loading, and storing goods in yards and sheds. Even in the case of a private port (except foreign partners), no strategy will be able to overcome the aforementioned characteristics because corporate culture is infected by the entire culture and is extremely obvious in private ICDs.

The researcher also anticipated that political influence (IV) will endure in Bangladesh and will continue to have an impact in multiple processes, which will have a domino effect on vessel turnaround time. Previous history from the year 2007 shows that, despite the fact that port users originally experienced few noticeable changes during the era of caretaker government backed by the military; it eventually returned to its previous culture and experienced military influence. As a result, unless a legal mechanism is introduced to overcome external influence, CPA will continue to be subjected to external influence, which will limit her autonomy in exercising authority.

Interview reveals that even after 50 years of independence, Bangladesh failed to formulate a "National Port Policy." This has resulted in policymakers and CPAs making and breaking deals, going with one project and then changing their minds and going with another, numerous feasibility studies for projects, strategic

master plans by foreign consultants costing money, then again not following recommendations, among other things. The "Bay Terminal" project's slow progress, the stalemate over KCT and walkout on the Floating Harbor Project, and the Over-Head Conveyor System after a feasibility study are just a few instances. However, transition of parts of the GCB area into a container terminal (KCT) was critical in order to boost handling capacity and minimize Chattogram port's vessel turnaround time. The solution to all of these problems is to formulate a "National Port Policy," which will be a combination of strategic guidelines, decision-making authority, and, to some extent, legal protection against political influence.

Literature review reveals that ports may have remnants and each port has its own uniqueness that contributes to the overall efficiency of the port. In case of CPA, the uniqueness is that despite having no export stow plan, CPA handles more than its' holding capacity and was ranked 58th busiest port in Lloyd's rating in 2019. Interview findings reveals that presently, the assigning of containers to slots on board is performed on the fly i.e. directly to the quay. It leads to 30% less moves of containers in the yard and also contributes to overcome inadequate space. Despite such uniqueness, when vessel turnaround time is one of the global indexes of port efficiency, CPA must have export stow plan according to her capacity in order to reduce berthing time. Considering BGMEA's influence over administrative body, so as to break the established practice of these giant corporate, 100% RMG-laden containers must come under export stow plan. However, researcher is convinced that there will always be a mismatch between demand and capacity in CPA. As such, the rest export containers (other than RMG) to slots on board may be performed on the fly unless some other port authority takes the load. For itself, the first and foremost step is to firmly maintain cut off time and execute export stow plan for export containers - a condition for acceptable vessel turn-around time. In addition, there are few pre-actions that need to be done before execution. CPA gradually needs to unleash all leased out land/stowage in order to shift various sheds from quay side and CFS station from port premises and to create space.

An examination of the literature finds that customs procedures and standards frequently limit a port's operational capacity. CPA is no different. CPA's ability to work smoothly is limited by the fact that only 37 low-duty import items against FCL are permitted for "On Chassis" delivery to ICDs. More containers stripped outside the port will shorten the time it takes for imports to arrive at the port, as well as minimize port traffic by reducing the daily entry of up to 5000 trucks and their associated 50,000 workers (labours, drivers, helpers etc). 100

percent on-chassis delivery for LCL and FCL containers is required to reduce traffic congestion, expenses, and free up space within port premises, all of which have a cascading effect on vessel turnaround time. True, there will be a certain proportion of system loss, but this must be kept to an acceptable level. Overcoming the psychological barrier of customs may appear difficult but not impossible. It just needs CPA's strong strength of mind to convince head of government.

According to literature review as well as interviews, the hinterland connection is the weakest link in the transportation network, generating delays due to congested routes and insufficient capacity. The railway system is significantly underutilized. Communication is available along the rivers, however it is slower. Pangaon ICT presently has an annual handling capacity of 116,000 TEUs, which could be eventually increased to 160,000 TEUs. In the current circumstance, waterways appear to be more expensive and inconvenient than roads since the container does not travel directly to the consignee. As a result, since its inception in 2013, consignees have been hesitant to transport their containers over rivers. The road link, on the other hand, is overloaded. For the sake of greater national interest, overtaxing should be implemented against container transportation by road to facilitate other connectivity in specific waterways, taking into account traffic congestion, accidents, road maintenance costs, local pollution, and many other negative environmental effects.

An electronic departure bay plan for a vessel to sail does not exist. In the present Container Terminal Management System (CTMS), information input about container bookings in the export process is missing for unknown reasons. Despite having the "Asycuda World" system, many paper works are still in use at Customs House Chattogram. Furthermore, in order to maximize the effectiveness of the CTMS system, a link to the current "Asycuda World" is essential. IT integrated gate operation, adequate vehicle scanning machines, as well as a paperless document process, will all help to shorten container vessel turnaround time. These are well-established truths that CPA is also aware of.

Finally, in light of the study's limitations and suggestions for future research, it's worth noting that only qualitative aspects were considered in the analysis. Other non-considered aspects are thought to have insignificant influence; however the situation is more complex in reality, with several factors affecting container vessel turnaround time.

Recommendations

To reduce the turnaround time of container vessels at Chattogram Port, the following recommendations are made in line with significance:

Ministry of Shipping should take the leading initiative to formulate a comprehensive "National Port Policy" by 2023 taking onboard the representative of all port users and policy makers.

Through prior notice, CPA should firmly maintain cut off time and execute export stow plan for export containers by the end of 2022.

In coordination with customs and blessings from head of government, CPA should implement 100% on chassis delivery for LCL and FCL containers by 2025.

CPA should pursue for overtaxing on road transportation of containers immediately and host incentive package against waterways for a realistic time period.

CPA needs to outsource a professional IT firm immediately to handle CTMS and other IT support for paperless documents process including an IT integrated gate management by 2025.

CPA should seriously consider contracting a well-known worldwide port operator for a set length of time (say, 5 years) in order to develop human resource, ferment international best practices, eradicate obsolete mindsets, and sustain international best practices once the agreement ends.

The Bay Terminal should be designed in a way to accommodate RO-RO vessels where containers are to be loaded/ unloaded inside the RO-RO vessels, and will directly head to final destination or off docks (in case of LCL containers). It is to be mentioned that the customs and other port formalities has to be done through a one stop service facilitate by CPA inside RO-RO vessels.

Green channel may be introduced for listed valued customer.

On chassis delivery at selected berths may be introduced as pilot project to test feasibility before sealing up.

Port management should make frequent engagement with all stakeholders through workshops/ seminar in order to collaborate on various issues.

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