Journal of Contemporary Issues in Business and Government Vol. 28, No. 04, 2022
https://cibgp.com/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2022.28.04.083

# Enhancing Efficiency of Karachi Port (Pakistan)

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**Abstract**

Shipping is the driving force for the global economy. Without shipping, worldwide trade would not be practicable. Globalization has increased trade activities and given rise to phenomenal growth and development in maritime transportation. Recent reports suggest that seaports are responsible for over 90 % of world trade. Disorganization in port operations excites a high cost of business, which destroys the economy. There are many ways to gauge the efficiency of ports and there are also several important factors, which require to be analyzed for enhancing the efficiency of ports. The study of port performance and key contributors is not similar for every port, because of different infrastructure and facilities. This research aims to identify and assess the key determinants of performance, which apply to Pakistan's Karachi Port, and finds out ways to improve upon the delay causative factors for enhancing efficiency.

**Keywords:** Shipping, port, Karachi, maritime, efficiency

## Introduction

Seaports offer the berthing spaces and infrastructure that is required for the shipping business. After the dawn of containerization in the 1950s, areas of seaports that were used for loading and unloading with containers particularly, are called container terminals. Ports are viewed as the gateway to economic growth and handle millions of tons of cargo that boosts national and international trade. Ports play the most crucial role in developing business expansion. Therefore, it is essential to run the port operations efficiently, and cost-effectively.

Generally, seaports have five primary roles, i.e., (a) handling of passengers and cargo, (b) delivering services like bunkering and repair for ships, (c) providing shelter for ships under demanding conditions such as storm conditions, (d) terminals shaping sea-transport chains, and (e) become foundations for industrial development.

Three major ports, i.e., Karachi Port, Bin Qasim Port, and Gwadar Port, handle all terminal operations of Pakistan's shipping. Pakistan's coastline is over 1000 km and bears high geostrategic importance. It is located along the world's most crucial chokepoints in the Strait of Hormuz. Port and shipping operations in Pakistan should reflect this geostrategic significance through the constant growth and development of this industry. However, presently, Karachi Port and Port Qasim have a utilization capacity of around 65 percent and handle most of the inbound and outbound cargo. This capacity can be enhanced up to 80 to 85 percent.

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**Karachi Port Trust (KPT)**

The Karachi Port Trust, which is overseen by the federal government, manages the port's operations. However, the Ministry of Maritime Affairs of the Islamic Republic of Pakistan is responsible for its operations. It acts as a trust with a Board of Trustees. From 1880 until 1887, the Karachi Harbour Board administered Karachi Port. Act IV of 1886, which became effective on 1 April 1887, established the Karachi Port Trust.

Karachi Port has an 11.5-kilometer-long canal that is 13.5 meters deep. The port has 30 dry cargo berths, 13 on West Wharves and one on East Wharves, and three liquid cargo berths for both POL and Non-POL cargo. There are currently 33 available seats. 24 hours a day, seven days a week, ships up to 75,000 DWT may traverse the port securely. The port's non-container handling activities are handled by independent private stevedoring businesses. Karachi International Container Terminal (KICT), which is run by Hutchison, and Pakistan International Container Terminal (PICT), which is operated by International Container Terminal Services (ICTS), were both created on a BOT basis.

**Port Qasim Authority (PQA)**

Established in 1973, the Port Qasim Authority Karachi manages the second deep seaport of Pakistan. Around 40 percent of Pakistan’s shipping needs are catered by Port Qasim. Port Qasim reflects a public-private partnership to establish the facilities like Coal and Iron Ore berth, multi-purpose terminal, Fauji Oil Terminal (FOTCO), Qasim International Container Terminals, Engro Vopak Chemical Terminal, Liquid Cargo Terminal, and Fertilizer and Grain Terminal. Despite having a huge physical room for extension, its speed of expansion is obstructed by its upstream location, which exceeds 40 km from the open sea, causing a prolonged Turnaround Time (TAT) for incoming ships.

**Gwadar Port Authority (GPA)**

Gwadar is located on the Makran Coast 533 km west of Karachi and 120 km east of the Pakistan-Iran maritime border. It is one of the most important seaports in the Arabian Sea. Gwadar Port began its commercial operations in March 2008 after its inauguration on March 20, 2007, with 3 berths in the first phase. The government of Pakistan initially decided to import bulk cargo consisting of Wheat, Urea, and Coal through Gwadar. Operational rights of the port were handed over to the Chinese Overseas Port Holding Company (COPHC) on 18th February 2013. While fulfilling its purpose as a transshipment port for China, the Gwadar Port can support the fragile economy of Pakistan. Gwadar can provide the quickest access to warm waters to the land-locked Central Asian States and Russia.

**Objectives of Study**

This study aims to evaluate the performance of the Karachi Port.

**Significance of Study**

This study will help measure the variables involved that affect the capacity of a Karachi Port as a way forward to enhance the port’s capacity and efficiency.

**Materials and Methods**

This is a longitudinal study and refers to several time intervals that affect the experiences of both users of a port and the service provider. To measure the performance of Karachi Port and

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extract clear and scalable results, both random interviews and a five-point Likert Scale are used. The data is collected through random calls rather than in-person sampling due to COVID-19 restrictions. All results are recorded manually by the author. A 5-point Likert Scale was devised for the handling of Liquid Cargo at Karachi Port. The scale was based on 6 critical questions.

**Table 1**

**Standard 5-point Likert Scale Questionnaire for Liquid Cargo**

| # | Question | Strongly Disagree | Disagree | Can't Decide | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | Are you satisfied with the storage facility sufficient? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 2 | Are you satisfied with the discharging capacity of Oil Companies? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 3 | Do you find ease in berth availability? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 4 | Do the deep-draft tankers reach the harbor easily? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 5 | Has the TAT been reduced? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 6 | Has the handling capacity increased at the port? | ◯ | ◯ | ◯ | ◯ | ◯ |

Another 5-point Likert Scale was devised for handling general cargo at the Karachi Port. Three critical questions were added for all the samples.

**Table 2**

**Standard 5-point Likert Scale Questionnaire for General Cargo**

| # | Question | Strongly Disagree | Disagree | Can't Decide | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | Are multiple factors involved in time consumption? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 2 | Are there some breakdown and maintenance issues? | ◯ | ◯ | ◯ | ◯ | ◯ |
| 3 | Is loading/unloading goes smoothly on time? | ◯ | ◯ | ◯ | ◯ | ◯ |

Performance measurements of Karachi Port and factors which affect its productivity have been discussed both with users and service providers. For this, 51 individuals were contacted through random phone calls out of which 40 individuals agreed to share their input and insights to effectively help the researcher. However, all respondents requested that their names or affiliations must not be quoted. As the author does not have a conflict of interest, the data is presented in this research according to the needs of respondents. All the respondents were specifically enquired of their demographic details. The table below shows the demographics of all respondents.

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2022.28.04.083

**Table 3**

**Demography of Respondents**

| | Breakup | Number | Percentage |
|---|---|---|---|
| **Age** | 25-35 Y | 12 | 30 |
| | 36-50 Y | 14 | 35 |
| | 51-65 Y | 14 | 35 |
| **Education** | Undergraduate | 32 | 80 |
| | Graduate | 8 | 20 |
| **Gender** | Female | 3 | 7.5 |
| | Male | 37 | 92.5 |
| **Location** | Multiple Locations | | |

## Results & Discussion

### *Major Indicators of Performance Measurement of Ports*

Volume and Time are the two crucial aspects of measuring the performance of ports. Volume, which is a measurement of throughput or a port's handling capacity, is expressed in either TEUs (Twenty-foot Equivalent Units) or weight (Tons). Measuring how long a vessel spends time in port and how much cargo is transferred is the first step in the global assessment of port performance. The major indicators of measuring a port's performance are discussed below.

**Port Performance.** "The port industry like any other industry measures its performance. Such measurement has been focused on productivity indicators" (Omary, 2019). The performance of a port is calculated by the number of containers and cargo handled during a specific time. The performance measurement includes productivity, efficiency, level of utilization, and quality. For port users, it does not matter how many resources the terminal operator is using if it is managing to reduce the ship's Tire Anchor Timber Wall (TAT). Their focus is on minimum TAT. It results in fewer port dues.

**Ship Turn Over Time (TAT).** The TAT of a vessel is crucial as it reflects the port's capacity to provide services with productivity and performance (UNCTAD 1976). Variables of performance and efficiency are directly related to TAT. Shippers looking for a port that provides fast TAT to reduce voyage. For a competitive container terminal, fast TAT is vital. It is a critical element to reduce maritime transportation costs. "No single cause more directly affects the cost of living of a maritime country than the speed with which ships are turned round in her ports" (Oram & Baker, 1971).

### *Variables to Regulate Port Performance*

The following variables, both dependent and independent, contribute towards the efficiency, effectiveness, and productivity of ports.

- Waiting or per berth detention time (average)
- Berth occupancy rate
- Working overtime at berth
- Container handled per day

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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- Size of a ship
- Cargo type, i.e., twenty-foot equivalent container (TEU), bulk, break-bulk cargo, liquid, etc.
- Port facilities, i.e., quay crane, berth availability, dredging, maintenance of berths, storage facilities, backup area, skilled workers, etc.
- Port users, i.e., shipping agents, clearing agents, stevedore, etc.
- Port services, i.e., tugging, piloting, mooring, un-mooring, etc.
- Tidal impact

Besides the variable mentioned above, some additional variables that affect the ship's TAT are as under.

- The geographical location of the port
- Hinterland connectivity
- Law and order situation of the port area
- Maintenance of channel & berths
- Labor management
- Impact of economic zone contagious to ports

The results of the analysis of data, acquired through interviews and actual shipping details, have been interpreted according to the 5-point Likert Scales as described in "Materials and Methods". Performance measurements of Karachi Port and factors which affect its productivity have been discussed with eminent port professionals. The factors applicable for liquid cargo ships/tankers reveal the following:

1. The storage facility of POL is not sufficient.
2. Pipelines of Oil Marketing Companies (OMCs) like PSO, SHELL, PARCO, etc., are old. Hence, they do not discharge liquid cargo to respective refineries with full capacity. Therefore, more time is consumed due to a low transfer rate. In addition, the pumping-out rate of liquids is sometimes slow because of defective pumps fitted onboard.
3. Lack of availability of berth with a particular facility many a time becomes a hurdle. If a ship carrying edible oil arrives at port and while berths are occupied, the ship is compelled to wait off the port.
4. Some deep-draft tankers i.e., 13 meters of draft and above, must wait for a high tied if the ship arrives during low water. The channel of Karachi Harbour can only accommodate deep-draft ships during high water.
5. Because of the latest and more liquid cargo handling facilities including loading arms and heavy pumps, the TAT of ships visiting Karachi Port has been reduced. However, it needs to be further reduced for better competitiveness with other ports of the region.
6. Despite handling the increased volumes of the cargo in comparison to the past, berth occupancy has reached 70 percent in contrast to the previous 65 percent.

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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**Table 4**

**The breakup of Responses to the Questionnaire for Liquid Cargo**

| # | Question | Strongly Disagree | Disagree | Can't Decide | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | Are you satisfied with the storage facility sufficient? | 10 | 12 | 4 | 7 | 7 |
| 2 | Are you satisfied with the discharging capacity of Oil Companies? | 5 | 16 | 3 | 5 | 11 |
| 3 | Do you find ease in berth availability? | 12 | 10 | 2 | 6 | 10 |
| 4 | Do the deep-draft tankers reach the harbor easily? | 5 | 10 | 3 | 12 | 10 |
| 5 | Has the TAT been reduced? | 5 | 5 | 3 | 7 | 20 |
| 6 | Has the handling capacity increased at the port? | 3 | 7 | 6 | 10 | 14 |

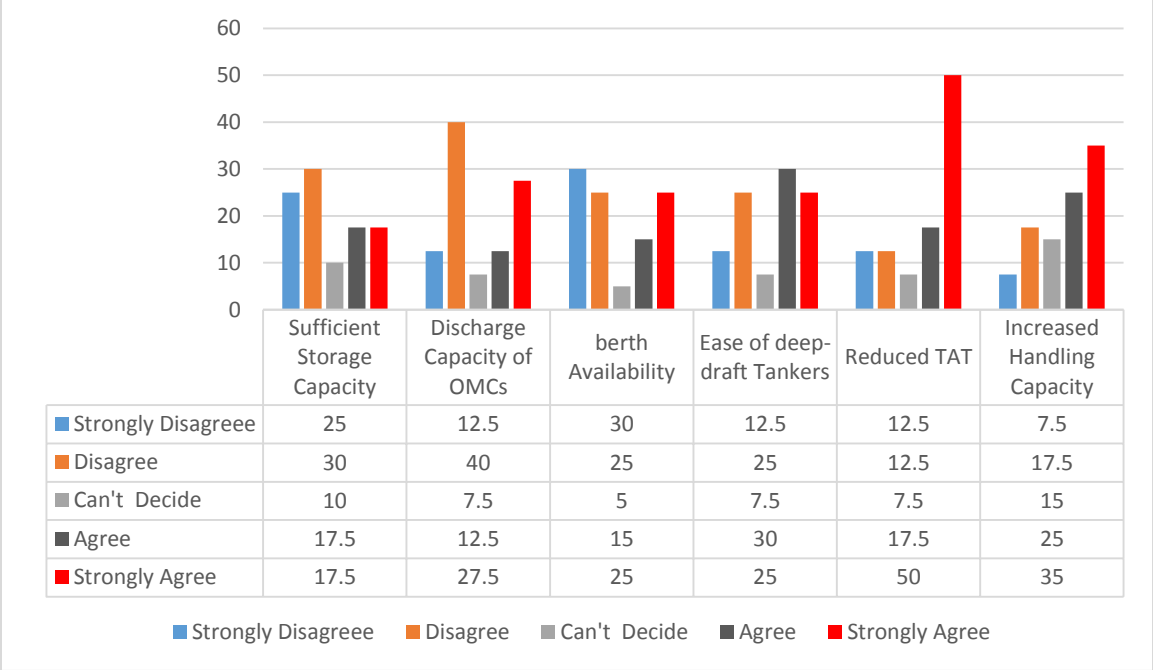


*Figure 1: Percentage of Responses to the Questionnaire for Liquid Cargo*

All the respondents were categorically asked about the issues at Karachi Port concerning General Cargo as well. The factors applicable to general cargo reveal the following.

1. A considerable amount of time is consumed during the opening of ship's holds or hatches of bulkers and preparation of onboard gears including deck cranes and other cargo handling equipment for loading and unloading. In the case of Dairy Carrier, the time

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consumed in veterinary/fumigation inspection by the governmental health officials of Port Health Officer sometimes consumes more time than anticipated. In the case of food items, time is consumed during the waiting/visiting of the federal ministry's food inspection staff. Limited stacking/storage facilities are available in or near the port. Time is also consumed during the arrest of any ship because of disputes between the concerned stakeholders. The Admiralty bench of Sindh High Court has the jurisdiction to decide any dispute between the stakeholders when ships are at the ports of Sindh and Balochistan Provinces. Moreover, the time spent in lab tests by Pakistan Council for Scientific and Industrial Research (PCSIR) laboratories sometimes becomes a problem. The payment procedures by the importer or consignee to the supplier also cause a delay if the ship arrives at the port before the clearance.

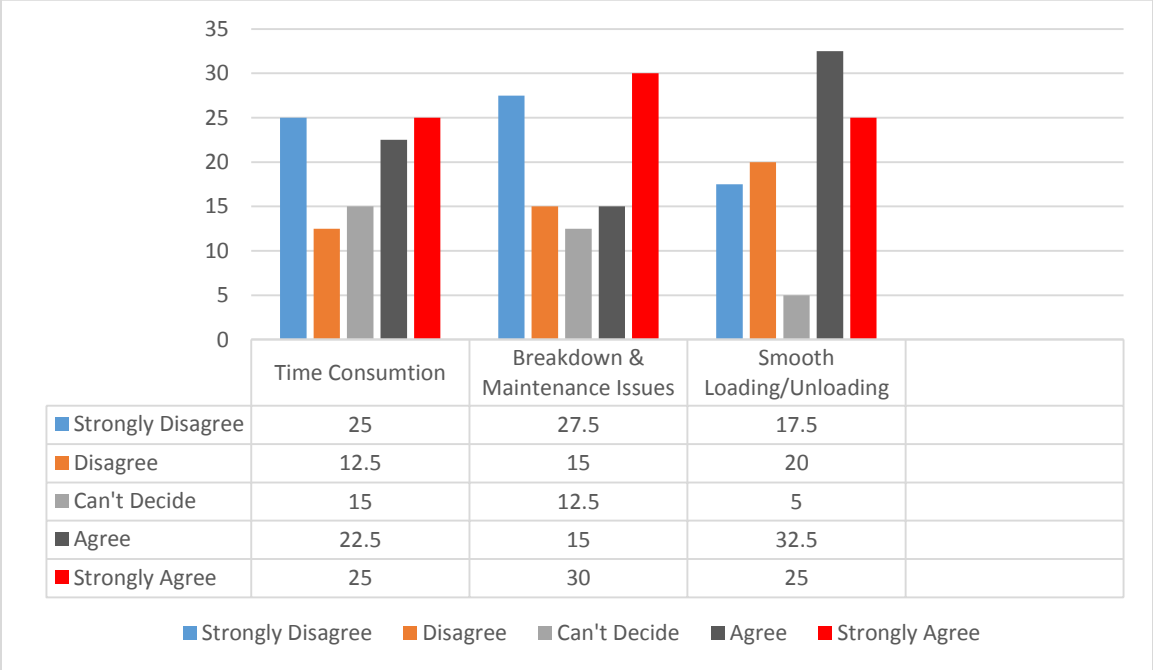
2. Many a time breakdown and maintenance issues of cargo handling gears fitted onboard emerge which also include crane and grab. Similar problems are associated with cargo handling gears e.g., mobile crane, evacuator, hopper, bagging plant, conveyer belt, etc.
3. Gangs (cargo handling teams) are not booked for loading/off-loading by stevedores on holidays. They also do not work during rains.

**Table 5**

**The breakup of Responses to the Questionnaire for General Cargo**

| # | Question | Strongly Disagree | Disagree | Can't Decide | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | Are multiple factors involved in time consumption? | 5 | 10 | 6 | 9 | 10 |
| 2 | Are there some breakdown and maintenance issues? | 11 | 6 | 5 | 6 | 12 |
| 3 | Is loading/unloading goes smoothly on time? | 7 | 8 | 2 | 13 | 10 |

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2022.28.04.083




| | Time Consumtion | Breakdown & Maintenance Issues | Smooth Loading/Unloading |
|---|---|---|---|
| Strongly Disagree | 25 | 27.5 | 17.5 |
| Disagree | 12.5 | 15 | 20 |
| Can't Decide | 15 | 12.5 | 5 |
| Agree | 22.5 | 15 | 32.5 |
| Strongly Agree | 25 | 30 | 25 |

*Figure 2: Percentage of Responses to the Questionnaire for General Cargo*

## Conclusion

The study validates that ship's TAT is the most critical Port Performance Indicator (PPI) at Karachi Port. Port performance has increased with modernization, better management, and some infrastructure changes. Simultaneously, cargo handling capacity has increased with the growing trade volume. Overall, the TAT of vessels coming to Karachi Port has been reduced. However, the Karachi Port is not being used up to its maximum capacity. The Karachi Port may be directly connected with highways without entering city areas. Moreover, labor-management strategies must be enhanced by neutral labor laws.

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