

# **A STUDY ON SAFETY AND HEALTH IN PORTS IN INDIA**

(With special reference to Mumbai Port Authority)

*A dissertation submitted to the Indian Maritime University in partial fulfilment of the requirement for the award of the degree of Master of Business Administration in International Transportation and Logistics Management*

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**CERTIFICATE**

This is to certify that the dissertation titled —A STUDY ON SAFETY AND HEALTH IN PORTS WITH SPECIAL REFERENCE TO MUMBAI PORT AUTHORITYI is a bonafide record of project done by ATHIRA K and is submitted in 4<sup>th</sup> semester of MBA International and Logistics Management. It is also certified that the above work has not previously formed the basis for the award of any degree, diploma, fellowship or other similar titles, and it is an independent work done by the internee.

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## DECLARATION

I, **ATHIRA K (2105305011)** student of School of Maritime Management, Indian Maritime University, Cochin Campus hereby declare that the project report titled **A STUDY ON SAFETY AND HEALTH IN PORTS IN INDIA (WITH A SPECIAL REFERENCE TO MUMBAI PORT AUTHORITY)** submitted in partial fulfilment of the requirement for the degree of **Master of Business Administration in International Transportation and Logistics Management** is my original work carried under the guidance of my project guide. It has not formed the basis for the award of any degree, diploma or associate-ship of any University/Institution. The information submitted is true and original to the best of my knowledge.



**ATHIRA K**

Place: Kochi

Date: 10/04/2023

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## **EXECUTIVE SUMMARY**

Due to the considerable risk involved in port operations, Safety and Health in Indian Ports is a crucial problem that requires attention. Almost 90% of India's International Trade is handled through the port sector, which is vital to the country's economy. Yet, port operations also represent a serious risk to both the environment and the health and safety of workers.

Handling dangerous products, using large machinery, and being around noise and vibration are the main risks associated with port operations. The Indian government has passed a number of laws and regulations to protect the well-being and safety of port workers. The Factories Act 1948, the Dock Workers Regulations of 1990, and the Merchant Shipping Act of 1958 are the main legislative proposals.

In spite of these laws, accidents and fatalities are happening in Indian Ports. These mishaps have occurred as a result of inadequate training, a lack of personal protective equipment, poor equipment maintenance, and sufficient safety precautions.

A cooperative strategy involving the government, port operators, and employees is required to promote safety and health in ports. Port operators must make investment in cutting-edge machinery and tools, regular employee training programmes, and extensive safety and health management systems

In conclusion, continuing attention and investment are needed to address the issue of safety and health in Indian ports. To make sure that the port business is secure for the future, the government, port operators, and employees must all play a part.

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## **CHAPTER 1**

### **INTRODUCTION**

Safety and Health in Indian Ports are crucial aspects of the maritime Industry. Ports are essential hubs for global trade, and they handle a vast amount of cargo and passengers every day. Therefore, ensuring the safety and health of workers and visitors in Indian ports is of utmost importance. In India, the Directorate General of Shipping is responsible for regulating and ensuring safety and health in ports. The organisation establishes standards and guidelines for port operations and regularly inspects ports to ensure compliance with regulations. Safety in Indian Ports involves several aspects, including the prevention of accidents and injuries, fire safety, security measures, and safe handling of cargo.

Workers in ports face various hazards, including slips, trips, and falls, exposure to hazardous chemicals, and accidents involving heavy machinery. Therefore, proper training, personal protective equipment, and safety protocols are essential to prevent accidents and ensure worker's well-being. Health in Indian Ports includes the prevention of the spread of infectious diseases, proper sanitation facilities, and healthcare services for workers and visitors.

Ports are busy and crowded areas where the risk of diseases transmission can be high. Therefore, it is crucial to implement appropriate measures, such as regular disinfection, hand hygiene, and social distancing, to prevent the spread of diseases. Safety and Health in Indian Ports are crucial to ensure the smooth and efficient operation of the maritime Industry. By following proper guidelines and best practices, ports can provide a safe and healthy environment for workers and visitors while promoting Economic growth and global trade.

## **1.1 OBJECTIVES OF STUDY**

The objective of the Study on “Safety and Health in Ports” is to analyse and evaluate the safety and health hazards in Indian Ports and identify measures to mitigate those hazards. The study aims to provide a comprehensive understanding of the safety and health risks associated with port operations and identify areas for improvement.

The study will also assess the effectiveness of existing safety and health regulations and guidelines and make recommendations for their improvement. It will identify best practices in the maritime industry for safety and health management and suggest ways to implement them in Indian Ports. The study aims to promote awareness among workers, port authorities, and policymakers on the importance of safety and health in ports. It will highlight the economic and social benefits of providing a safe and healthy work environment, reducing the number of accidents and injuries, and preventing the spread of infectious diseases.

The study’s ultimate objective is to contribute to the development of a sustainable and safe port industry in India, which prioritizes the safety and health of workers and visitors, promotes economic growth, and supports global trade.

## **1.2 SCOPE OF THE STUDY**

The Study on Safety and Health conditions in Indian Ports covers a wide range of maritime related topics. The purpose of the study is to offer a thorough understanding of the health and safety risks that exist in ports and find countermeasure to these risks. The study will pinpoint the risk to safety and health that port activities pose, including slips, trips, and falls, exposure to dangerous chemicals, and incidents involving large machinery. Additionally, it will find ways to stop the spread of infectious diseases in ports and assess the danger of such diseases there.

The effectiveness of current safety and health laws and standards in Indian Ports will be evaluated by the study. It will highlight regulatory gaps and make suggestions for change. The study will analyse the safety and health management procedures used in Indian Ports and pinpoint industry's best practices. It will make recommendations for how to apply these techniques at Indian Ports. The study will evaluate the social and economic effects of ensuring a secure working environment at ports. It will emphasise the advantages of fewer accidents and injuries and the suppression of infectious diseases.

### **1.3 SIGNIFICANCE OF STUDY**

Due to the presence of enormous machinery, dangerous goods, and heavy machinery, ports are inherently risky places to work. At order to improve worker's safety and lower the frequency of accidents and injuries, studies on safety and health at ports can assist identify risks and hazards and develop measures to minimise them.

Due to the importance of ports as key nodes in the global supply chain, any delays to port operations may have serious economic and societal repercussions. In order to safeguard public safety and security, it is crucial to ensure the health and safety of port employees and tourists. Strict guidelines and rules for health and safety in ports have been set by governments and regulatory authorities.

Port operators and authorities can comply with these rules and prevent potential legal and financial penalties by using studies on safety and health in ports. Ports may significantly affect the environment, causing pollution of the air and water as well as the discharge of greenhouse gases. Studying safety and health in ports can point forth ways to lessen their negative effects on the environment and courage sustainable port operations.

The study on safety and health in ports is essential for maintaining employee welfare, safeguarding the security and safety of the general public, adhering to rules, and encouraging sustainable port operations.

## **1.4 RESEARCH METHODOLOGY**

This study uses the secondary data to analyse and to understand the importance of safety and health in ports. The diverse data are collected and analysed with the help of information from the research papers, reports, journals, website, reference books written by industry experts, interview with the industrial players for the trends and suggestions.

## **1.5 LIMITATIONS OF STUDY**

- The study based on the limited sample.
- The study was done on the basis of secondary data.
- The study is taking only a limited time period.

## **1.6 CHAPTERISATION**

CHAPTER 1 – INTRODUCTION

CHAPTER 2 – REVIEW OF LITERATURE

CHAPTER 3 – INDUSTRIAL PROFILE

CHAPTER 4 – SAFETY AND HEALTH IN MUMBAI PORT

CHAPTER 5 – SAFETY GUIDELINES FOR PORT USERS OF MUMBAI PORT

CHAPTER 6 - FINDINGS AND SUGGESTIONS

CHAPTER 7 - CONCLUSION

## CHAPTER 2

### REVIEW OF LITERATURE

- **‘The importance of communication for the maintenance of health and safety in work operations in ports’ by Arlete Ana Motter, Marta Santos in 2017.** The work of transport and handling of goods at the port is collectively executed and so it requires good communication among workers to deal with the usual and unexpected situations of daily work. The aim of this study was to analyse the form and functions used in the communication between port workers and determine their importance for the preservation of workers' health and safety. During the investigation each port worker was observed not as an isolated individual but inserted into working relations with other port workers, who perform other functions, such as boarding, stevedores, inspectors, crane operators, among others.

These interactions among workers take place through various forms of communication: gestures, movements, looks, facial expressions, verbal or printed information, operative codes. The impact of these forms of communication is visible at several levels: the possibility of meeting deadlines; the quality of their work; and also for the safety of all those involved in work situations. There are variations in communication not only according to the type of load to be carried, but also according to the function of each team member.

- **Risk based methodology for safety improvements in ports by Vladimir M Trbojevic, Barry J Carr** published in journal of hazardous materials in 2000. With the introduction of the Formal Safety Assessment in the International Maritime Organisation decision making process regarding new regulations, and the recent tanker disasters resulting in extensive oil pollution, the public and political pressure to improve safety in ports and the shipping industry has increased.

Considering that some kind of Safety Report (case) regulations related to marine operations have not been established, and that the ports and shipping industry are at the onset of safety regimes utilised in other industries, a step wise methodology for safety improvements in ports has been developed. In the first step, the hazard identification and the qualitative risk assessment is carried out to establish hazard barriers which are or should be in place to prevent hazards from being released; the controls for managing these hazards are then developed and integrated into the Safety Management System (SMS).

- **Human Factors in Ports :Published By: Shri Ram Centre for Industrial Relations and Human Resources** .Human factor plays a significant role in ports and docks. The casual nature of employment, erratic earnings, of employers are a few of the myriad special features in ports and docks which have been subjected to research and inquiry in several countries. This paper briefly reviews the research and literature on various human aspects of dock workers. The striking feature of many of the studies is that most of the traditional characteristics and problems of dock workers have not changed despite the advent of technological changes.

Though most of the shortcomings in the work organization such as duplicity of employers, discrimination in working conditions, divided movement of cargo, etc., have been responsible to a great extent for the differences in the characteristics and attitudes of workers, unrest among certain sections of the work force, disturbing features in unionism, low productivity, strained industrial relations.

- **Study on the Safety and Security of Indian Ports Dr. J. Rengamani Associate Professor, AMET Business School, AMET University V. Venkatraman Research Scholar, AMET University** published that Ports constitute an important economic activity in coastal areas. The higher the throughput of goods and passenger's year-on-year, the more infrastructures, provisions and associated services are required. These will bring varying degrees of benefit or disadvantage to the local and regional economy and to the environment.

Ports are also important for the support of economic activities in the hinterland since they act as a crucial connection between sea and land transport. The safety of port facilities, port workers and the surrounding community, and the protection of the environment are interconnected and synergistic elements in the management and operation of today's ports. Therefore, they are an integral part of an effective Port Management System.

Ports have an ever-increasing responsibility nationally and internationally with regard to policy, legal instruments and objectives covering maritime safety, protection of the marine environment, and sustainable development. Safe operations, in addition to safeguarding people, the environment and port installations, also enhance the quality of services provided by a port. Many ports have undertaken safety, health and/or environmental reviews or audits to assess their performance.

On their own, however, such reviews and audits may not be sufficient to provide an organization with the assurance that its performance not only meets, but will continue to meet, its legal and policy obligations. To be effective, reviews and audits need to be conducted within a structured management system that is integrated within the organization. Presently, there are no common international standards against which port authorities and companies operating in ports can measure the performance of their operation with regard to safety, health and the protection of the environment.

- **Shipping and COVID-19: protecting seafarers as frontline worker by Cleopatra Doumbia-Henry** published an article which provides an overview of the impact on and the response to the COVID-19 pandemic on the maritime industry—merchant shipping, the cruise industry and ports as at the end of July 2020. With shipping being responsible for 80% of global trade, the article addresses issues relating to the response of the maritime industry, governments and international organizations to the pandemic.

It also addresses the impact of the pandemic on the world's almost 2 million seafarers who as key workers enable global trade. The article examines the serious challenges seafarers have faced relating to quarantine requirements, restrictions on border

crossings with border closures, repatriation and crew changeovers, abandonment, renewals of certificates and licensing of seafarers, resupply and ship surveys. The article includes the response of governments and that of United Nations agencies and in particular the World Health Organization, the International Maritime Organization, the International Labour Organization and the International Civil Aviation Organization. The significant role played by the maritime industry in providing substantive guidance is commended.

The article concludes that COVID-19 will continue to have a huge impact on the maritime industry and on world trade for the foreseeable future. The expectation is that the industry will hopefully emerge stronger and become more robust to enable world trade to be efficient and sustainable. It is also expected that the pandemic will enable a greater recognition of the world's seafarers who facilitate world trade, while ensuring a better future for humanity.

- **An Internet-of-Things (IoT) Network System for Connected Safety and Health Monitoring Applications by Fan Wu, Taiyung Wu, Mehmet Rsit Yuce** published about a hybrid wearable sensor network system towards the Internet of Things (IoT) connected safety and health monitoring applications. The system is aimed at improving safety in the outdoor workplace. The proposed system consists of a wearable body area network (WBAN) to collect user data and a low-power wide-area network (LPWAN) to connect the WBAN with the Internet. The wearable sensors in the WBAN are exerted to measure the environmental conditions around the subject using a Safe Node and monitor the vital signs of the subject using a Health Node. A standalone local server (gateway), which can process the raw sensor signals, display the environmental and physiological data, and trigger an alert if any emergency circumstance is detected, is designed within the proposed network. To connect the gateway with the Internet, an IoT cloud server is implemented to provide more functionalities, such as web monitoring and mobile applications etc.

## **CHAPTER 3**

### **INDUSTRIAL PROFILE**

#### **3.1 INTRODUCTION**

Mumbai port has historically served as India's primary gateway, playing a vital role in the nation's economic, trade, and commercial development, particularly in Mumbai City. The port's success can be attributed to its continuous efforts to adapt to changing maritime trade needs. Initially designed to handle general cargo, Mumbai port has evolved to accommodate shifting shipping trends such as unitization, palletization, and containerization. Additionally, it has established specialized berths for handling POL (Petroleum, Oil, and Lubricants) and chemicals. Despite facing competition from neighbouring and private ports, changing traffic patterns, physical limitations, and labour-intensive operations, Mumbai Port has encountered challenges it has implemented various measures to provide cost-effective and high-quality services to the trade.

#### **3.2 HISTORY OF MUMBAI PORT AUTHORITY**

The Mumbai port, also known as the Port of Mumbai or the Mumbai Port Trust, dates back to ancient times when Mumbai was a group of islands and a fishing village. Over the centuries, Mumbai port has grown from a small fishing harbour to a bustling, modern port that plays a crucial role in India's maritime trade and economy.

##### 1. Ancient and Medieval Period:

The natural harbour of Mumbai, located on the west coast of India, was known to ancient Indian seafarers as a safe anchorage for ships. It was referred to as "Heptanesia" (a cluster of

seven islands) by the Greek geographer Ptolemy in the 2<sup>nd</sup> century CE. The islands of Mumbai were ruled by various Hindu dynasties, including the Mauryas and the Silharas, and later by the Sultanate of Gujarat during the medieval period. However, the port of Mumbai did not play a significant role in maritime trade during this time

## 2. Colonial Period:

The fortunes of Mumbai port changed with the arrival of European powers in India during the 16<sup>th</sup> and 17<sup>th</sup> centuries. In 1661, the British East India Company secured possession of Mumbai as part of the dowry of Catherine of Braganza, who married King Charles II of England. The British developed Mumbai as an important trading and commercial centre, and the port of Mumbai began to flourish. In 1873, the Bombay Port Trust was established as a statutory body to oversee the development and management of the port.

## 3. Modern Era:

In the 19<sup>th</sup> and 20<sup>th</sup> centuries, Mumbai port witnessed significant expansion and modernization. Several infrastructure projects were undertaken to improve the port's facilities and make it more efficient. The construction of docks, wharves, warehouses, and other port facilities was undertaken to cater to the increasing maritime era in 1914, the Prince's Dock, the first wet dock in Mumbai was opened.

Dock, the first wet dock in Mumbai, was opened. In the 1920s and 1930s, the Ballard Pier Extension, Victoria Docks, and the Princess Docks were constructed, further enhancing the capabilities of the port. After India gained independence from British rule in 1947, the management and control of Mumbai port were transferred to the Government of India. Over the years, Mumbai port continued to modernize and expand, with the addition of new facilities such as container terminals, liquid cargo handling facilities, and modern cargo handling equipment. Today, Mumbai port is one of the largest ports in India and handles a wide range of cargo, including containers, petroleum products, coal, chemicals, and automobiles, contributing significantly to India's international trade and economy. In recent years, the Indian government has also initiated plans to develop other ports in the vicinity of Mumbai, such as the Jawaharlal Nehru Port Trust (JNPT) and the Mumbai International

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Today, Mumbai port is one of the largest ports in India and handles a wide range of cargo, including containers, petroleum products, coal, chemicals, and automobiles, contributing significantly to India's international trade and economy. In recent years, the Indian government has also initiated plans to develop other ports in the vicinity of Mumbai, such as the Jawaharlal Nehru Port Trust (JNPT) and the Mumbai International Container Port (MICT), to further enhance the maritime trade and logistics capabilities of the region. However, Mumbai port continues to be a vital hub of maritime activity in India, with a rich history that spans several centuries.

### **3.3 ERA OF CONSTRUCTION**

The era of construction from 1873 to 1914 witnessed several significant developments in the Bombay Port Trust as a Body Corporate. These included the establishment of the Sassoon Dock in 1875, which was the first wet dock for sailing vessels and had four berths with an entrance of 12.2 meters. In 1880, the Prince's Dock for steam ships was opened, featuring an entrance of 20.1 meters and a depth of 6.4 meters, along with 14 berths. The Victoria Dock was inaugurated in 1888, boasting a designed entrance of 24.4 meters and depth of 7.3 meters, with 15 berths. In 1891, the Merewether Dry Dock was setup in Prince's Dock, providing by dry docking facilities with a length of 160 meters. The Alexander Dock, later renamed as Indira Dock, was opened in 1914, featuring an entrance lock gate with a width of 30 meters, along with 20 berths, including a passenger berth.

### **3.4 ERA OF EXPANSION**

The era of expansion from 1915 to 1950 saw further growth and development in the Bombay Port Trust, including the commissioning of the port's own railway system that connected with Trunk Railways in 1915. From 1916 to 1922, there was extensive

construction of roads, transit sheds, warehouses, and other supporting infrastructure. In 1923, a berth for handling POL products was commissioned at Pir Pau, located north of Mumbai, with a maximum permissible length of 170.69 meters and a draft of 6.4 meters. Another significant development during this era was the construction of a second dry dock called Hughes Dry Dock, with a length of 304 meters, in the Indira Dock in 1950

### **3.5 FUTURE PLANS OF MUMBAI PORT**

The port of Mumbai's future development program has been devised by the Japan International Co-operation Agency. The proposed initiatives consist of building two offshore container terminals designed to accommodate ships of 6,000 TEU capacity, revamping four harbour wall berths at Indira Dock to handle larger and deeper-draft vessels, constructing a new berth at Pir Pau for handling chemicals or specialized grades of POL. Additionally, the plans entail a phased development of a new cruise terminal in the Gateway of India, construction of a fifth oil berth at Jawarhar Dweep to enhance crude oil handling capacity, and modernization of the BPX and BPS container berths.

## **CHAPTER 4**

### **SAFETY AND HEALTH IN MUMBAI PORT AUTHORITY**

The Safety and Health Department in Mumbai Port plays a acritical role in ensuring the well-being and safety of the port workers, visitors, and the environment. The Safety and Health Department is responsible for implementing and monitoring OHS policies and regulations to prevent workplace accidents, injuries and illnesses. This includes conducting risk assessments, providing training and awareness programs, ensuring compliance with OHS laws and regulations, and investigating incidents and accidents to identify and address root causes.

The department handles the management of hazardous materials, including their storage, handling, transportation, and disposal. This involves ensuring proper labelling, handling procedures, storage facilities, and emergency response plans for hazardous materials to prevent and harm to workers, visitors, and the environment. The department oversees fire safety measures in the port, including fire prevention, fire fighting equipment, emergency response plans, and fire drills. They also conduct regular inspections of fire safety systems and equipment, and provide training to port personnel on fire safety procedures and protocols.

They ensure compliance with environmental regulations to protect the surrounding environment. This includes monitoring air and water quality, waste management, noise pollution, and other environmental factors. They also implement measures to mitigate any potential negative impacts on the environment and promote sustainability. They oversee medical service for port workers, including medical examinations, first aid services, emergency medical response, and occupational health programs to monitor and manage the health of the workers.

The Safety and Health Department plays a critical role in emergency preparedness and response, including coordinating emergency drills, developing emergency response plans, and providing training to port personnel on emergency response procedures. They also work closely with other emergency services, to ensure a coordinated response in case of

emergencies. They are responsible for maintaining record, reporting on safety and health performance, and ensuring compliance with relevant laws, regulations and standards. This includes preparing and submitting reports to regulatory authorities, conducting internal audits, and implementing corrective actions as needed.

#### **4.1 SAFETY POLICY OF MUMBAI PORT**

The Chairman and Board of Trustees of Port of Mumbai hold the belief that human life is valuable asset to the organisation. The primary goal of the organization is to promote a culture of safety awareness and ensure that employees are always knowledgeable about the general and specific rules, procedures, and practices for safely carrying out their work both for their own well-being and for the benefit of the community as a whole. The organizations policy includes the following principles:

- Recognizing safety as an integral part of every job, just as important as daily work and completing assigned tasks.
- Taking measures to prevent accidents to employees and damage to property.
- Providing training and motivation to employees to adopt safe work practices.
- Maintaining clean, safe, healthy, and pleasant working conditions.
- Ensuring compliance with all statutory safety requirements.

#### **4.2 UNDERSTANDING ABOUT ACCIDENTS**

Accidents are events that are unexpected, beyond control, and not planned, which disrupt work and may result in injury to individuals or damage to property. Accidents are not random occurrences, nut rather, they are caused by identifiable factors or circumstances.

Causes of accidents can be categorised in to various factors, including:

1. Unsafe Acts

- Not following applicable safety rules, working guidelines, safety instructions, and regulations such as Dock Workers Regulations 1990.
- Failure to use Personal Protective Equipment, safety guards, gadgets, or using worn-out tools or misusing tools.
- Poor housekeeping practices.

2. Personal Attitude:

- Faulty attitude towards safety, such as thinking that accidents only happen to others.
- Belief that accidents are acts of God or punishment.
- Failure to recognize potential dangers.
- Engaging in horseplay or disturbing the concentration of others by talking.
- Operating machinery or equipment without proper training, knowledge, experience, or authorization.

3. Personal Factors

- Impulsiveness, lack of attention, or irresponsibility.
- Defective vision or lack of sleep.
- Temperamental instability or proneness to accidents.
- Food and drink or drug habits that may impair judgement of physical ability.
- Psychophysical characteristics, worry, and emotion.
- Age, sex, and physical fitness.

Unsafe Conditions can also be significant causes of accidents in the workplace, including:

1. Bad selection of man, machine, material and methods.
2. Flaws of deficiencies in the design of machinery or equipment that can lead to accidents.
3. Lack of proper safety guards or protective devices on machinery or equipment.
4. Insufficient ventilation or lighting in work areas, leading to poor working conditions that can increase the risk of accidents.

5. Failure to provide warning signs or notice boards to indicate potential hazards or dangers in the workplace.
6. Neglecting regular maintenance or inadequate maintenance of machinery, equipment, or facilities, leading to increased risk of accidents.
7. Choosing equipment or materials solely based on cost without considering safety features or quality.

In addition to human factors and unsafe acts, natural calamities such as heavy rainfall, lightning, floods, landslides, collapsing of buildings, earthquakes, tornadoes, and other unforeseen events can also cause accidents in the workplace. Addressing unsafe conditions through proper design, maintenance, and selection of equipment, as well as being prepared for natural calamities, is crucial in preventing accidents and ensuring a safe work environment. Compliance with safety regulations, regular inspections, and risk assessments can help identify and mitigate unsafe conditions in the workplace.

### **4.3 CONSEQUENCES OF ACCIDENTS**

1. Physical suffering
  - Pain resulting from workplace injuries
  - Loss of bonuses or rewards
2. Tangible consequences
  - Permanent disability or amputation
  - Medical expenses incurred for treatment
  - Compensation for damages
3. Indirect consequences
  - Disruption of family harmony
  - Frustration and dissatisfaction in personal life
  - Upsetting of future plans
  - Financial burden on family in case of death or disability
4. Social consequences
  - Children left orphaned
  - Loss of a parent for a child
  - Burden on society as a whole

## **4.4 PREVENTION OF ACCIDENTS**

Accidents can be prevented through the various systems, including:

1. Engineering method
  - Continuous monitoring and guarding of danger zones
  - Keeping individuals away from hazardous areas
  - Maintaining the workplace in good condition
2. Enforcement ( statutory)
  - Implementing legislations at international, national, and state levels
  - Collaborating with associations, institutions, and standing orders for enforcement
3. Education and Training
  - Conducting safety orientation programs for new employees, educating them about safety rules, procedures, and accident reporting systems
  - Providing workers with intensive, need based, and special training
4. Demonstration
  - Conducting seminars and industrial visits to raise awareness and provide practical demonstrations of safety measures

## **4.5 SAFETY TIPS**

- It is prohibited to enter the docks without a valid Dock Entry Permit or smart card
- Smoking is not allowed within the port premises
- Follow traffic signals and refrain from driving personal vehicles such as bikes or cars on the wharfs
- Adhere to the speed limits of 20 Kmph on dock roads and 8 Kmph on wharfs
- All vehicles must be parked only in designated parking areas
- Climbing, resting, or sleeping on stacked cargo is strictly prohibited.
- Sleeping below vehicles or on piles of cargo is not allowed
- In case of injury, immediately seek “FIRST AID” assistance and inform your supervisor

- Keep gangways and aisles clear of obstructions
- Exercise caution when walking on wet or oily floors
- Avoid taking shortcuts when safer roads or methods are available
- Report any unsafe working conditions or practices by colleagues to your supervisor immediately
- Foster good teamwork and mutual cooperation among workers
- Refrain from distracting workers while they are working
- Comply with all warning signs displayed within the port
- Avoid using make-shift arrangements, such as barrels as ladders or spanners as pliers
- When descending stairs, hold on to the railings and descend slowly
- Follow all safety practices and rules, actively participate in safety activities, and insist on adherence to safety measures
- Sleeping inside the dock area is strictly prohibited during breaks or shift changes
- After completing a shift, workers should not remain on board without valid permission from the approval authority
- Only authorized security guards should be deployed for the security of cargoes and containers
- When operating hatch covers, ship's officers or crew members must ensure that no one is on the hatch cover
- Resting, sitting, or sleeping on the hatch cover is not allowed, regardless of whether loading/unloading operations are in progress or not
- Contractors engaged by agents for lashing, dunnage supply, etc should closely supervise and control their workers
- Before starting a vehicle or equipment, the driver must ensure that no one is sleeping below or near the vehicle/equipment
- Two-wheeler riders must wear helmets at all times when riding inside the docks and CFS areas
- Trucks/trailers should not be left parked in the docks without drivers/cleaners
- Encourage workers to use nearby rest shelters for resting purposes

## **4.6 SAFETY AND HEALTH DURING COVID-19 PANDEMIC**

The safety and health precautions in place at Mumbai ports have been significantly impacted by the COVID-19 outbreak. To guarantee the health and safety of port employees and visitors, the Indian government and the Mumbai Port Trust have put in place a number of precautions.

The screening of everyone accessing the port premises is one of the primary precautions put in place. Checking their body temperature, making sure they are wearing masks, and engaging in social distancing are all part of this. To stop the virus from spreading, the port's facilities and equipment are routinely sanitised.

The port has also provided instructions for port employees, including the usage of PPE including gloves, masks, and face shields. These recommendations also call for the use of social isolation techniques and, whenever practical, remote working. The port has established quarantine centres for suspected or verified COVID-19 cases in addition to these actions. These facilities contain the medical tools needed to give those in need of assistance the treatment they need.

Despite these precautions, there have been reports of 19 cases of COVID among Mumbai port workers. The port and the government are trying to resolve these problems and put additional precautions in place to protect everyone participating in port operations' health and safety. To assist its employees in coping with the stress and anxiety brought on by the pandemic, the port has established counselling facilities. To encourage mental health and wellbeing among their employees, they ran awareness campaigns and workshops. To help its employees in times of need, port has implemented employee assistance programmes.

By putting an emphasis on both physical safety and mental and emotional wellbeing. For the duration of the COVID-19 pandemic, the Mumbai Port Authorities have adopted a comprehensive strategy to protect the health and welfare of their staff. The effectiveness of the Mumbai Port's COVID-19 reaction has been attributed to these measures' ability to foster a work environment that promotes health and wellbeing.

## **CHAPTER 5**

### **GUIDELINES FOR HANDLING OF DIFFERENT TYPES OF CARGOES IN THE PORT**

#### **❖ GUIDELINES FOR HANDLING STEEL CARGO**

Followings are the procedures on board the ship:

- a. Slings and chains used to move freight must meet all legal criteria.
- b. All belts, chains, and slings used to move freight must undergo proper testing by an expert. Additionally, test certificates, registers, etc., must be made available to port authorities upon request.
- c. All machinery and equipment utilised on board must meet legislative requirements.
- d. On board, winchmen and signal foremen must be properly trained.
- e. PPEs are required for every personnel deployed on board. The use of a helmet, safety shoes, and hand gloves is required while working on a ship.
- f. No one should draw a sling, chain, etc. when creating a kachha / pacca sling, nor should they go below the cargo. The sling or chain must be pulled to the other end using a pulling tool or metal stick.
- g. No unauthorised individual shall be permitted to enter the hatch.
- h. Inside the hatch or the ship, no one should be permitted to relax or sleep.
- i. On board a ship, nobody should be allowed to read or listen to music.
- j. Stacking should be done in accordance with the stowage plan while loading cargo inside the hatch.
- k. Proper dunnage should be utilised and lashing must be done under direct supervision when stacking freight inside the hatch.
- l. On board, loitering is strictly forbidden.
- m. It is not permitted to sit or walk on the hatch cover or beam.

Followings are the procedures while unloading the steel cargo:

- a. The sling, chain belt, etc. that is utilised must comply with legal requirements.
- b. Slings, chains, belts, and other tools used in operations must be tested by a qualified individual.
- c. During hoisting, lowering, slinging, and other activities, winchmen and signalmen must be educated and employ standard signals.
- d. No one is allowed to move or stand close to any hanging cargo.

Followings should be considered while transporting steel cargo:

- a. The RTO Authorities must certify that the vehicle is fit to transport steel cargo before it may be used.
- b. Only drivers with valid licences are allowed to operate vehicles in the docks, and they must have a cleaner with them.
- c. No vehicle may be loaded above the limit of its design.
- d. On trailers used to transport cargo like steel pipes, angles, etc., stanchions must be available.
- e. All steel cargo, particularly coils, must be securely tethered to the trailer for transportation.
- f. Vehicles must not be parked in forbidden areas or in the middle of the road because this will cause traffic.
- g. It's against the law to cook inside a car.
- h. No vehicle shall pass through a queue or a queue. Line/queue breaking is a serious infraction.

Storing of steel cargo in the shed and open spaces:

- a. Before stacking steel freight in multiple layers or stages, the floor strength must be evaluated.
- b. To prevent stack failure, the appropriate wedges must be offered.

Delivering of steel cargo:

- a. No one shall be permitted to stand below the slinging route of the steel coil during the delivery of steel cargo.
- b. Everyone must wear PPE.

❖ GUIDELINES FOR HANDLING PROJECT CARGO

When handling project cargo, the next safety precaution must be taken. Safe unloading from Ship to Vehicle or Shore:

- a. The Foreman or Vessel Supervisor shall continuously monitor the activity. When risky behaviour is observed, the sectional assistant manager should be consulted before taking any action.
- b. According to the packing instructions provided, project cargo must be hired for lifting or relocation. To raise freight, the proper size of gears must be used.
- c. The vehicle used to transport project cargo must have all necessary features, such as multiple wheels and a unique braking mechanism.
- d. Examining the condition of the trailer bed will ensure that the cargo is stable before being loaded onto the trailer.
- e. Before moving the truck or trailer, the cargo must be securely fastened to it.
- f. If goods is to be unloaded on a wharf or stored inside a dock, the strength of the surface should be first assessed to determine its load capability. Additionally, if the cargo doesn't have a firm, stable basis, it needs to be supported from all sides.
- g. The responsible Shed Supt. Labour Supervisor of MbPT and the supervisor(s) of the port user shall take all essential steps for the safety of the cargo while delivering project cargo.

❖ DRY BULK CARGO HANDLING GUIDELINES

- a. The wire ropes used to secure grabs should be in good condition and should have been examined, tested, and certified by a professional.
- b. The 'save all' net used for ship to shore transfer should be in good condition and securely tied using nylon ropes.
- c. Hopper/sling nets, wherever they are utilised, should be in good shape and defect-free.
- d. Only approved drivers may operate trucks used for transportation, and they must be in good condition.
- e. To prevent spills and dust flying, trucks should only be loaded up to the body level, be correctly trimmed, and be covered with tarpaulin.
- f. Spilled over cargo needs to be cleaned up right away.
- g. Trucks shouldn't be allowed to travel faster than 20 kph on roads inside of docks and 8 kph on the wharf.
- h. It is utterly forbidden to transport workers in the pay loader or JCB bucket.
- i. The coordination between the signalman and the winch operator needs to be improved.
- j. It is required to wear personal protective equipment, such as a dust mask, safety shoes, gloves, and helmets.

❖ GUIDELINES FOR HANDLING OF CONTAINERS

- a. Always handle containers with appropriate, tested, and certified spreaders.
- b. To prevent containers from slipping off the chassis, twist lock trailers should only be used for shipping containers.
- c. Before shipping, containers must be properly fastened using twist locks to the truck or trailer's chassis.
- d. When necessary, only use sturdy ladders with anti-skid features to get to the top of the containers.
- e. Use of single or multiple legged slings to hoist containers is not recommended

- f. Men or employees should not be allowed to ride over spreaders or containers when handling at the berth or yard.
- g. Trucks and trailers should travel no faster than 20 kph on roads inside docks and 8 kph on wharf.
- h. Keep an eye on the corners of containers as you hoist, clew, and lower them.
- i. Improved coordination should be kept between the winch operator, the signalman, and the employees.
- j. Personal protective equipment use is required.
- k. Before unloading or loading containers onto/from vessels, twist locks on the containers should be removed.
- l. No worker or employee shall unwind or sleep in an empty container.
- m. In the container yard, loitering is not permitted.
- n. While handling containers on board, on land, and while operating container trailers, equipment, and other vehicles, using a cell phone is banned.
- o. It is not permitted to cook within the cabin of a container trailer.
- p. Only licensed drivers are allowed to operate container trailers.
- q. Drivers should be advised not to give the keys to the vehicles to the housekeepers.
- r. Nobody should stay overnight near or below a container trailer or other piece of equipment.

❖ AUTOMOBILE HANDING RECOMMENDATIONS

- a. Vehicles should be parked inside the docks in such a way that there is a smooth movement during loading.
- b. When loading a vehicle, the drivers should adhere to safety regulations and drive slowly.
- c. Drivers who are deployed to load the vehicle shall have training on how to load cars.
- d. Driving at high speeds is not permitted.
- e. Agents shall station their own personnel to supervise the movement of vehicles.

❖ DIRECTIVES FOR USING TRANSPORTATION TECHNIQUES

- a. On dock roads and wharves, forklift trucks and automobiles shouldn't travel faster than 20 kph and 8 kph, respectively.
- b. Horns must be used by drivers at all junctions, around blind turns, and when backing up.
- c. At road intersections, drivers should come to a stop, have a look, and then go.
- d. No one is allowed to enter or exit moving vehicles.
- e. Vehicles must not be left parked close to gangways, aisles, or the wharf.
- f. When following another truck, maintain a safe distance and drive at a pace that will allow you to stop quickly in an emergency.
- g. Horseplay and driving while standing should be avoided.
- h. While reversing, the driver should check behind to make sure everything is clear.
- i. No one should be allowed to ride in a forklift truck as a passenger or fellow employee. The motorist has a duty to stay clear of the passenger.
- j. Set the brakes and gears and block the wheel if the vehicle is left on the incline.
- k. No one may ride on the spreader, according to the driver of the mobile crane handling containers.
- l. The operators of cargo handling equipment, such as cranes, forklifts, pay loaders, etc., shall pass over the equipment's keys to the reliever or operator of the following shift rather than leaving them on the equipment when it is left unattended.

❖ DIRECTIVES FOR USING GEAR

- a. The gear must be suitable for the type of goods being handled.
- b. Gear must be strong enough and built of reliable materials.
- c. A qualified individual must test each piece of equipment for the Safe Working Load (SWL) before it is used for cargo handling.
- d. Gears used to handle cargo must not be overloaded.
- e. A responsible person must periodically check the cargo handling equipment, and if any defects are found while working, they must be reported right away to the supervisor.
- f. Tandem lifting should ideally only be done under close observation throughout the day.

❖ DIRECTIVES FOR MANAGING HAZARDOUS CHEMICALS

- a. Alkalies and acids can be very corrosive. A chemical splash on the skin could result in burns. Avoid handling them without wearing safety gear.
- b. Get medical assistance after an acid or alkali splash and then cleanse the area with lots of cold water.
- c. Use just a soda ash and sand mixture to absorb acid spills.
- d. In areas where flammable solvents or chemicals are handled or stored, do not smoke or carry an open flame.
- e. Make sure you take the highest level of safety precautions before beginning maintenance work on chemical or gas pipelines, etc. where chemicals are handled or stored.
- f. Anyone working in a gas tank or holder where there is a chance that poisonous gas may be present is required to wear a gas mask with a life belt attached to a safety line, and at least one man should remain on top of the tank or holder as a watchman who can control the safety line in case someone needs to pull him out.
- g. If you suspect the presence of a harmful gas, stay away from the area and use mask.
- h. Inform the appropriate authority right away if you suspect or notice a gas leak.
- i. Use only a 6V torch or flameproof light for lighting a chemical or gas tank for maintenance purposes.

❖ DIRECTIVES FOR USING CRANES

- a. A crane shouldn't be loaded more than it can handle.
- b. The cargo should be secured to the hooks using tried-and-true slings or other tools that have been approved by a professional.
- c. Before being hoisted, the load must be properly balanced and secured in the sling or other lifting apparatus.
- d. When hoisting, caution should be used to ensure that the burden does not suddenly accelerate or decelerate and that it does not obstruct anything.
- e. Every time, the operator should lift the load a few inches and apply the brakes to test the brake.
- f. Side pulls shouldn't be performed with the crane.
- g. The operator should make sure that slingers and others are far away from the cargo before hoisting or lifting it.
- h. Less than two complete turns of rope should still be on the drum before the load is dropped.
- i. While the load is suspended, the operator must remain at the control.
- j. Never utilise the hoist limit switch as an operating control.
- k. Signals to the crane operator should only be given by one person.
- l. A warning signal should be heard before setting off on the journey or if the hook comes close to or crosses over personnel.

❖ DIRECTIVES FOR HOUSE KEEPING

- a. It is the duty of every employee or worker to keep their workplace clean. Cleanliness is essential for safe working conditions.
- b. Water pipe line leaks, chemical spills and oil leaks should all be reported right away to the appropriate departments.
- c. Make sure to gather tripping hazards like nails, wire fragments, scrap, etc. and dispose of them in a safer location.
- d. A major accident may result from a slip. Oil, water, or chemical spills need to be cleaned up right away.
- e. Please inform the section heads or maintenance staff of any conduits, pipes, or materials that are projected onto or running through the work area. They will be able to embed and prevent tripping hazards as a result.
- f. Keep your lockers organised and spotless.

- g. Please report any worn-out or damaged stair treads and work areas.
- h. They need to be fixed right now.

❖ DIRECTIVES FOR USING LADDER

- a. For any task that you cannot reach, get a ladder. But be sure you are using the right kind of ladder and that it is securely fastened.
- b. Never use boxes, drums, or barrels as makeshift ladders or climb on machinery.
- c. Check a ladder for broken spreaders, cracked rungs or missing studs before using it.
- d. Before utilising a straight ladder, the space between the base and the wall should always be kept at one-fourth its length.
- e. A person should maintain a facing-the-ladder position while climbing or descending a ladder, maintain a strong grasp on the ladder with their hands, and make sure their feet are properly in touch with the rungs.
- f. Step ladders taller than ten feet need to be held by a second person. Never take the last rung down from the top.
- g. The person using the ladder should not extend their reach beyond what is safe. Avoid excessive tilting or swaying to the side.
- h. Don't leave the ladder at the office after work.
- i. Never combine two short ladders to create a longer ladder.
- j. Only an extension ladder may be utilised in this situation.
- k. You shouldn't paint a ladder.
- l. Electrical equipment repairs shouldn't be done on metallic ladders.

❖ DIRECTIVES FOR MATERIAL HANDLING

- a. Examine the item you intend to lift to ascertain its dimensions, weight, etc.
- b. When handling materials, a decent pair of hand gloves should be used to prevent hand injuries.
- c. Determine whether you can lift a material without strain by giving it a try before you raise it. Keep your feet apart and bend your knees if you can't acquire a firm hold. Then lift while keeping your back reasonably straight so that your powerful leg muscles perform the work instead of your back muscles.
- d. If the stuff is heavy, ask for assistance or help.

- e. People operating below a crane where it is being used for material handling should avoid the region around the crane's swing circle.
- f. Never put your feet underneath a crane-borne load.
- g. The cranes should only be handled by authorised personnel.
- h. Wear safety shoes, goggles, and hand gloves when handling materials.
- i. When handling materials by more than two people, there should be good cooperation and a sense of teamwork.

❖ TIMBER LOG HANDLING RECOMMENDATIONS

- a. Only properly inspected and certified wire ropes or slings in excellent condition should be used for cargo handling.
- b. The tag or punch mark on the wire rope slings should indicate the maximum safe working load. (SWL)
- c. Before being hoisted, timber logs must be carefully slung, and while swinging, they must be kept parallel to the ground.
- d. To prevent ditch development, which causes logs to roll over, the timber logs inside the hatch must be releasing levelly. Cargo Supervisor/Hatch Tindel should make sure of this.
- e. Transport-related trailers must be in good condition and can only be used by licensed drivers.
- f. To prevent the lumber from rolling off the trailer and onto the dock or the road, secure it correctly using rope.
- g. Use of a stanchion with a 90 cm minimum height. It is required that there should be three on each side of the caravan.
- h. It is required to use a red flag or light to signal hazard for any logs that extend beyond the trailer platform.
- i. The dock and roadways should have a 20 Kmph speed limit for trailers.
- j. It is required to wear personal protective equipment, such as a safety helmet, safety boots, and hand gloves.
- k. Winch operator, signalman, supervisory staff, and workers should maintain better coordination.
- l. Private cars and anyone not involved in cargo handling operations should not enter the workplace.

## **CHAPTER 6**

### **FINDINGS AND SUGGESTIONS**

- The Mumbai Port, known for its high level of activity and constant movement, presents numerous occupational hazards to its workers. These hazards encompass operating heavy machinery and equipment, being exposed to hazardous substances like chemicals, gases and dusts, dealing with noise pollution, facing ergonomic issues, and being at risk of accidents and injuries.
- Working at the Mumbai Port may also have various health impacts on workers. Extended exposure to noise, dust, and other pollutants can result in respiratory problems, skin allergies, and other health issues. Additionally, workers may encounter mental health challenges due to stress, long working hours, and high-pressure work conditions.
- Research conducted on safety in Mumbai Port has underscored the significance of implementing safety measures to safeguard the health and well-being of workers. These measures may encompass providing proper training and certification for workers, conducting regular maintenance and inspection of machinery and equipment, ensuring the use of Personal Protective Equipment maintaining adequate ventilation and dust control, and establishing emergency response plans.
- Further investigations on safety and health in Mumbai Port may also centre on evaluating the compliance of port authorities, employers, and workers with local and national regulations and guidelines pertaining to workplace safety and health. This could involve adherence to safety standards, reporting of accidents and incidents, and the implementation of safety policies and procedures.

## **CONCLUSION**

The study on Safety and Health in Ports is a critical area of research and analysis to ensure the well-being and protection of workers, as well as the efficient functioning of port operations. Ports are complex and dynamic environments that pose various Safety and Health risks to workers, including hazards related to heavy machinery, handling of cargo, exposure to hazardous materials, noise, vibration, and other occupational health and safety concerns.

The findings of the study may highlight the importance of implementing effective safety and health management systems in port, including appropriate policies, regulations and procedures, to mitigate risks and protect worker's health and safety. Also includes training and education programs for workers, proper maintenance and inspection of equipment, appropriate PPE, and efficient emergency response plans.

This study also helped to identify where improvements can be made, such as identifying gaps in existing safety protocols, addressing potential hazards, and ensuring compliance with relevant laws and regulations.

In conclusion, the study on safety and health in port is crucial for understanding the risks and challenges faced by workers in the port industry and identifying measures to enhance safety and health outcomes.

By prioritizing and implementing appropriate safety and health measures, ports can strive to create a safer work environment and protect the well-being of their workers.

## **GLOSSARY**

### **Port:**

A port is a type of nautical facility with one or more wharves or loading docks where ships can load and unload passengers and cargo. Ports can be found far inland, despite the fact that they are often located on a sea shore or estuary.

### **Safety Management System:**

To maintain the safety of the ship and marine environment, shipping corporations have developed and implemented the safety management system (SMS). In order to maintain the safe operation of ships at sea, SMS is a crucial component of the International Safety Management (ISM) code. SMS outlines all the necessary rules, practises, and procedures that must be followed. Safe ship management practises must be established on all commercial boats. One of the key components of the ISM code is SMS. The safety management system (SMS) is responsible for ensuring that all ships adhere to the IMO, classification societies, and other relevant maritime organisations' recommended codes, guidelines, and standards as well as the necessary safety laws and regulations.

### **Docks:**

The word "dock" (derived from the Dutch "dok") in American English refers to a single or a collection of man-made buildings used for handling boats or ships, typically on or near a beach. The term "dock" can also refer to a dockyard, also referred to as a shipyard, where ships are loaded, unloaded, built, or repaired.

### **Seafarers:**

A person who works on a ship as a member of the crew is known as a sailor, seaman, mariner, or seafarer. Sailors can engage in a variety of occupations relating to ship maintenance and operation.

### **Harbour:**

A harbour, harbor, or haven is a protected body of water where vessels like ships, boats, and barges can be docked (see spelling variations). Ports, which are man-made structures designed for passenger drop-off and pick-up as well as vessel loading and unloading, are

frequently used interchangeably with the terms harbour and port. Harbours can be both natural and man-made. An artificial harbour may feature purposefully built breakwaters, sea walls, or jetty's, or it may have been built by dredging, which needs to be maintained from time to time.

#### Personal Protective Equipment (PPE):

Protection gear, helmets, goggles, and other items of clothing and equipment are referred to as personal protection equipment (PPE) because they are intended to shield the wearer's body from harm or illness. Physical, electrical, thermal, Chemical, biohazard, and airborne particle matter threats are all handled with protective gear. Wearing protective gear is permitted for sports and other recreational activities as well as for occupational safety and health purposes. Traditional clothing categories are considered protective clothing, and protective gear includes accessories like padding, guards, shields, or masks, among other things. PPE suits can resemble clean room suits in appearance.

#### Project Cargo:

The term "project cargo" refers to the internal or international transportation of substantial, robust, expensive, or complicated pieces of machinery. Materials for project freight can come from all over the world or just one place. In order to stay within planned timeframes, budgets, and safety constraints during the passage of commodities, project cargo requires meticulous planning.

One of the most difficult modes of transportation in the logistics sector is project cargo. They necessitate the most intricate shipment preparations because to barriers including time restraints, constrained delivery dates, and safety standards. Oversized products frequently need to travel by land, sea, or air to their destination to complete a project cargo shipment, and they may require extra arrangements like a road survey or police escort.

#### Safety Working Load (SWL):

In order to prevent overload, it is required by health and safety regulations that all makers of lifting equipment and lifting accessories state the equipment or accessory's safe operating load. If a piece of equipment is overloaded, the load may accidentally release or the lifting apparatus may topple over, resulting in significant damage or even death.

Every lifting activity must undergo a risk evaluation to ensure safety. The lifting equipment, lifting accessories, and the load are some factors to take into account during the risk assessment.

#### Hazardous Cargo:

Transporting substances that pose a risk to people's health, safety, property, or the environment is known as moving dangerous goods, or DG. Hazardous materials are specific unsafe items that provide risks even when not being transported. Chemical restrictions frequently apply to hazardous compounds. The handling of hazardous compounds, such as those that are radioactive, combustible, explosive, corrosive, oxidising, asphyxiating, poisonous, pathogenic, or allergic, requires the expertise of hazmat teams. Physical conditions like heated materials, pressurised gases, and liquids are also included, as are all products that include these substances or other chemicals or that may have additional qualities that make them hazardous under certain situations.

#### Twenty-foot Equivalent Unit (TEU):

Twenty-foot equivalent units, commonly referred to as TEUs , are an imprecise measure of cargo space that are frequently used on container ships and in container terminals. It is based on the volume of a 20-foot-long (6.1-m) container, a standard-sized metal box that can be easily transported between many modes of transportation, including ships, trains, and trucks.

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