**CHAPTER-I**

**INTRODUCTION**

* 1. **INTRODUCTION**

In the complex and dynamic environment of maritime logistics, the handling of high-risk cargo presents unique challenges and risks that necessitate specialized attention and protocols. High-risk cargoes, which include flammable, explosive, radioactive, toxic, and environmentally hazardous materials, require not only strict adherence to safety and security regulations but also demand sophisticated management techniques to ensure their safe transportation from one point to another. The efficiency of handling such cargoes is critical, impacting not only the safety of port operations but also the throughput capacity and overall operational success of maritime ports.

This investigation aims to evaluate the efficiency of high-risk cargo handling specifically at the Cochin Port Authority, assessing how well it manages the operational, safety, and regulatory challenges associated with such cargoes. By examining the strategies, technologies, and protocols employed by Cochin Port, this study seeks to understand its effectiveness in this critical area and propose potential areas for improvement or innovation.

In doing so, the study will contribute valuable insights into best practices in high-risk cargo handling that could be applicable not only at Cochin Port but also at other maritime ports facing similar challenges. This foundational introduction sets the stage for a deeper exploration of specific handling procedures, efficiency measures, and the impact of technological advancements in the field of maritime high-risk cargo management.

The global logistics industry is foundational to international trade, underpinning the seamless movement of goods across borders. Maritime ports serve as crucial junctures in this complex network, facilitating the flow of commodities worldwide. High-risk cargo, encompassing goods that pose potential hazards to health, safety, or the environment, necessitates superior management due to its inherent risks. The efficiency with which these cargoes are handled at maritime ports directly influences the operational efficacy, safety standards, and compliance of logistics companies with global shipping regulations.

Handling high-risk cargo involves navigating a myriad of challenges, from stringent regulatory compliance to the adoption of specialized handling techniques and safety protocols. For logistics companies, the efficiency of these operations at maritime ports is not just about regulatory compliance but also about achieving optimal operational velocity and minimizing risks to cargo, personnel, and the environment.

* 1. **AREA CHOSEN FOR STUDY**

This area is conducted at Cochin Port, Kochi

**1.2.1 INDUSTRY PROFILE**

**PORT INDUSTRY PROFILE**

Ports are one of the primary components of the general transportation sector and nowadays linked to the expanding world economy. In fact, ports are a way of incorporating the global economic structure. India has a rich sea-wide trading history. In coastal cities, ports are a significant economic activity. 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 and they are also vital part of country’s economy. The growths of ports will unerringly boost the country’s economy. Growth in (sea)(maritime)trade of a country is an important indicator of its overall growth. A country's trade is an indicator of its economic status. Since time immemorial, water transport has played a significant part in the Indian economy. It as an (economic way for export & import of heavy items) easy and cheap means of export and imports of heavy items. The function of ports is all the more relevant in this sense. A port is a gateway for entering into hinterland from sea. In fact, a Port is a (facilitator in maritime industry for EXIM cargo) place in a waterway where a ship can stop for loading and alighting goods. Ports are the land and sea trading nodal points. Approximately 95% of trade in India is by volume and 70% by value by maritime transport, according to the Ministry of Shipping. There are 12 main ports in India and 187 non-major ports in India. The Indian ports and shipping industry play a vital role in sustaining the growth in the country’s trade and commerce. India is the sixteenth largest maritime country in the world, with a coastline of about 7,517 km. New Mangalore Port is the seventh largest port of India, and it is the only major port of Karnataka, Situated at the convergence of Guru Pura and Netravati rivers to Arabian Sea.

**PORT FUNCTIONS**

Ports are an important part of freight distribution since they provide a maritime/land interference for export and import activities. They are locations of convergence of interior and coastal transportation system that define the hinterland of a port. In which freight arrives at port via an inland ports or traffics consolidation at a reginal port and is shipped via coastal transportation one or more organization play the following functions within the riots systems

• Private entry landlord providing a variety of service

• Regulator of economic activity and operations

• Operations of nautical services and facilities

• Marketer and promotor and port services and economics growth

• Cargo handler and storage

• Provider of ancillary activities

• Planning for future operations and capital investment

India has a coastline of 7516.6km (approx.)making it one of the world largest peninsulas. The Indian mainland has a shoreline length of 5422.6km while the total Arabian sea the west and the bay of Bengal on the east. Gujrat. Maharashtra. Goa, Karnataka, and Kerala, are the western coastal states where’s Tamil nandu ,Andre Pradesh Orissa and west Bengal are the Easters coastline states daman and Puducherry, the Lakshadweep islands and the Andaman and microbar island are the four union terrorist, positives traffic increase has been recorded at 9of the total 12 main ports. Cochin port saw the greatest increase in freight handling up 16,5 precent and Kandla the major ports, kamala ports (Deendayal port) handled the most cargo withy 110.10 million tones.

**A STUDY ON THE PERFORMANCE OF MAJOR PORTS IN INDIA.**

India has 13 major ports and 176 non-major ones. The major ports carry about 3/4th of the total traffic. Despite adequate capacity and handling facilities the average turnaround time of major Indian ports is less than 4 days which is very high compound to the average turnround time of the 10 hrs. is Hong Kong. This undermines the competitions of the ports. Since the ports are not adequately linked to the hinterland. The evaluations of cargo is slow leading to congestions to this end. All ports trust has set up groups with representatives from the national highway authority of India (NHAI) railways and state government to prepare comprehensive plans aimed at connectivity of ports. The NHAI has taken up ports connectivity as major component of the national highways development project traditionally most ports in the world are owned by the public sector in the recent years privatization of the ports

International trade is a cornerstone of the global economy. Exchange of goods amongst countries widen the choice of supply and ensure that production takes place where it is cheapest and best. This is reflected in the intensification of globalization where it is cheapest and best. And the fact that world trade is growing faster than the world output. World trade relies on cheap secure transport. Maritime transport, enabled by technological developments and competitive transport cost, is estimated to handle over 80% world trade by volume and over 70% by value. As trade grows, the demand for maritime transport also grows, technological developments in bulk and container transport have made maritime transport cheaper. Bulk transport involves shipping one homogenies commodity at any on time, but in large quantities; in contract container transport that are easy to load and unload. However the slower growth in world seaborne trade compared to world trade in general reflects that the rising trade in processed goods like electronic items medicines apparel gems and jewelry trade in processed goods like electronics items, medicines weight International trade is a cornerstone of the global economy. Exchange of goods amongst countries widen the choice of supply and ensures that production takes place where it is cheapest and best. This is reflected in the intensification of globalization and the fact that world trade is growing faster than the world output. World trade relies on cheap and secure transport. Maritime transport, enabled by technological developments and competitive transport costs, is estimated to handle over 80% world trade by volume and over 70% by value. As trade grows, the demand for meantime transport also grows. Technological developments in bulk and container transport have made maritime transport cheaper. Bulk transport involves shipping one homogeneous commodity (e.g. grain, ore etc) at any one time, but in large quantities; in contrast, container transport entails transporting different goods at the same time. but in standard containers that are easy to load and unload. However, the slower growth in world seaborne trade compared to world trade in general reflects that the weight of the goods transported increases at a slower rate than their value due to rising trade in processed goods like electronic items, medicines, apparel, gems and jewelry etc. Besides, greater use of lighter materials and lower material intensity in the manufacturing process has also led to slower increase in weight. Ports are economic and service provision units of a remarkable importance since they act as a place for the interchange of two transport modes, maritime and land, whether by rail or road. Therefore, the essential aspect of ports lies in their intermodal nature. India has a coast-line of around 7517 Kms with 13 major ports and notified non-major ports along the coast-line and sea-islands. India is a major maritime nation by virtue of its long coast line of around 7517 Kms on the western and eastern shelves of the mainland and also along the islands, bejeweled with 13 major and 176 non-major ports, strategically located on the world's shipping routes, its long tradition of seafaring with a large pool of trained maritime personnel, and its dynamic and rapidly globalizing economy with a vast potential to expand its participation in trade and development.

India has been an emerging and vibrant economy with a huge market, a billion plus population and strong GDP growth rates of over 9% for three consecutive years up to 2008-09. However, due to the global melt-down and recession, the GDP growth slowed down to 6.7% in 2008-09. But, with global recovery under way and backed by strong decisive policy responses, the economy performed better in 2009-10 and achieved growth rate of 7.1% , it is likely to grow at 9.2% during 2010-11. As forecast made by many global institutions, India along with China will lead Asia's economic expansion from 2010 onwards.

Ports play a vital role in the overall economic development of the country. About 90% by volume and 70% by Value of the country's international trade is carried on through maritime transport. Development of India S ports and trade related infrastructure will continue to be critical to sustain the success of accelerated growth in the Indian economy. Despite record growth rates, the merchandise trade intensity of India's GDP is still below 30 per cent. This indicates that there is still a lot untapped potential for trade growth, and consequently the demands on the country ‘sports and trade infrastructure will continue to mount as trade diversifies and grows. Hence, there is a need to expand the Country's ports in a timely and efficient manner.India's ports comprise of 13 major ports including Port Blair Port Trust which was declared as a Major Port on 1-06-2010 and around 176 non-major ports along the coast and islands.

The total volume of traffic handled by all the Indian Ports during 2009-10 was 849.9 million tonnes. Non-major ports account for around one-third of the total seaborne trade. The growth in cargo handled at Major and Non-major Ports in 2009- 10 was 5.8% and 35.4% respectively as compared to 2.2% and 3.3% achieved in 2008-09.

Ports in India

Backdrop

India has a long coast line of 7517 km spread over 13 states and Union Territories. There are two categories of ports in India. The ports under the category major ports are under the control of the Union Government. They are regulated by the Major Port Trust Act 1961, of India. The non-major ports come under the purview of State Governments. Twelve major ports and about 200 non-major ports serve the long coastline of India. However, only 60 per cent of the non-major ports are functioning actively. About 95 percent by volume and 70 percent in terms of value of India’s total traded commodities are transported by sea. During the period 1950-51 to 2012-13 the cargo handled by Indian Ports has increased from 21.30 million tonnes to 972.61 million tonnes at a compound annual growth rate of 6.25 percent. During 2000-01 to 2013-14 it has increased at a compound annual growth rate of 7.75 percent (Table 1.1 and Table 1.2). During 1950-51 to 2013-14 the traffic through the major ports increased from 19.38 million tonnes to 555.49 million tonnes at a compound annual growth rate of 5.47 percent whereas the traffic through the non-major ports has increased from 1.92 million tonnes in to 417.12 million tonnes at a compound annual growth rate of 8.92 percent (Table 1.1 and Table 1.2). During the same period the share of the major ports decreased from 90.99 percent to 57.11 percent whereas the share of the non-major ports has registered a growth from a 9.01 percent to 42.89 percent (Table )

Major Ports of India

The twelve major ports are Kolkata Port Trust (KoPT), Paradip Port Trust (PPT), Visakhapatnam Port Trust (VPT), Ennore, Chennai Port Trust ChPT), V.O. Chidambaranar Port Trust (Tutucorin - TPT), Cochin Port Trust (CoPT), New Mangalore Port Trust (NMPT), Mormugao Port Trust (MgPT), Jawaharlal Nehru Port Trust (JNPT), Mumbai Port Trust A Computational Framework for Assessing Impact of Port Efficiency on Maritime Logistics,, Mrinal Kumar Dasgupta, IIFT 17 MbPT), and Kandla Port Trust (KPT). The first six of these are on the eastern coast of the country whereas the rest are on the western coast. Under Kolkata Port Trust there are Kolkata Dock System (KDS) and Haldia Dock Complex (HDC) which are 60 km apart. The port customers however view these two dock systems as separate entities owing to the difference in their service level. Three major ports, namely, Kolkata, Mumbai and Chennai are more than 100 years old. The 12 major ports of India together handled 545.79 million tonnes of cargo in the year 2012-13. Table 1.3 shows the composition of cargo handled by the major ports of India during 2012-13.

Containerisation in India

 One significant development in the cargo handling process is the containerization of cargo which has significantly improved the rate and efficiency level of cargo handling from the traditional (manual) cargo handling method. As a result, more and more break bulk cargo are being containerized and India is no exception to it.

A freight container is defined by the International Organization for Standardisation (ISO) as: “An article of transport equipment, (a) Of a permanent character and accordingly strong enough to be suitable for repeated use; (b) Specially designed to facilitate the carriage of goods by one or more modes of transport; (c) Fitted with devices permitted its ready handling, particularly its transfer from one mode of transfer to another; (d) So designed as to be easy to fill and empty; (e) Having an internal volume of 35.3 cu ft or more.” The general purpose freight container is defined as – “A freight container of rectangular shape, weatherproof, for transporting and storing a number of unit loads, packages or bulk materials, that confines and protects the contents from loss or damage, that can be separated from the means or transport, handled as a unit load and transhipped without re-handling the contents.” Report by National Transport Development Policy Committee (NTDPC - 2014) suggests that, as on 2010 India has only three container ports which handle container traffic of one million TEU and over, in comparison with six such ports in Europe and 12 such ports each in the US and China. In India break bulk cargo constitutes a significant portion implying lower rate of container penetration. However, with the present trend of increasing interconnectivity of the Indian economy with worldwide logistics chain sharp growth in container traffic is expected in future. It concluded that “careful and strategic selection and development of the best locations for this additional capacity is of utmost importance”. Container traffic through major ports increased from 2468 thousand TEUs in 2000-01 to 7704 thousand TEUs in the year 2012-13 (Table 1.5). Port wise growth of container traffic for the period 2008-2009 to 2012-2013 is given in Table

Policies for the port sector –

 A Review The Government of India from time to time has led down policies for the major ports of the country. These policies in nutshell reflect its objectives and key result areas as perceived from time to time. In 1996, the Indian government opened the port sector for private participation in select areas with the expectation of improved delivery of service for users and commercial viability for the private investor. It was decided by the government to move towards the concept of landlord port, enabling new ports to be established as companies under the Companies Act. It planned to corporatize the existing port under its fold. So far (in 2001) one new port, namely, the Ennore Port Ltd., now re-named as Kamrajar Port limited (KPL) has been set up under the Companies Act. None of the existing ports under its purview have been corporatized. However, the central government and the maritime states have taken many isolated initiatives since then.

Global Scenario

Warehousing primarily refers to the storage of goods to be transported, whether inbound or outbound. The Warehousing and Storage industry includes establishments operating warehousing and storage facilities for general merchandize, refrigerated goods and other warehouse products. Warehouses are one of the major segments of the rapidly growing logistics industry. Currently the segment has evolved from providing not only custody for goods but also offering value added services such as sorting, packing, blending and processing. With evolution of an organized retail sector modern warehouses for the storage of perishable goods have become indispensable In 2017, the global warehousing and storage market was estimated to be around $475 billion. The global warehousing

and storage accounted for approximately 8% of the overall logistics market in 2017. The warehousing and storage market was the fifth largest market in the global logistics market in 2017. North America is the largest geographic region accounting for nearly 28% of the global market.

Globally, warehousing has moved ahead from single storey to multi-story warehouses in densely populated cities and expensive land spaces. A multi-story warehouse consists of more than one floor and is designed to increase the available floor space. It results in better land utilization rate and enhances operational efficiency. Multi-story warehouses have been successful in densely populated cities predominantly in Asian countries such as China, Japan, Hong Kong and Singapore, due to high land and construction costs, small site areas and limited industrial land availability.

Domestic Scenario

The warehousing market in India is highly fragmented with most warehouses having an area of less than 10,000 sq.ft. Approximately 90% of the warehousing space in the country is controlled by unorganized players with smaller sized warehouses which have limited mechanization. Fragmented warehousing footprint results in higher average inventory holding, in addition to resulting in higher storage and handling losses, driven by lower level of mechanization.

National Maritime Development Programme (NMDP)

 In 2005 the Ministry of Shipping, Government of India, formulated NMDP to provide guidelines for capacity augmentation and improvement of hinterland connectivity at Major Ports. The programme mandated that private participation be increased to over 60 percent and the port authority be provided with more autonomy for faster decision making and implementation. This policy also announced a series of measures for promoting foreign investment in the port sector. For example, it was decided that no approval would be required for foreign equity up to 51 per cent in projects providing supporting services to water transport. It was also decided that for construction and maintenance works at ports and harbours automatic approval would be given for foreign equity up to 100 per cent. However, for investments exceeding Rs 15 billion it was mandated that the proposal needs to be referred to FIPB. For private sector participation, the policy stressed for invitation of open tenders on build-operate-transfer (BOT) basis and permitted formation of joint ventures of various types such as between Major Ports and companies, between Major Ports and foreign ports and between Major Ports and Non-Major Ports.

History

National economic development of India fully depends on a healthy functioning of harbor system. According to the Ministry of Shipping, approximately 95 per cent of India's quantity by trade and 70 per cent by value are made up through marine transport.

India has got 13 major and 200 non-major ports and Cargoes traffic, which is documented in 1,052 million metric tons (MMT) in 2015, and it is predicted to reach 1,758 MMT by 2017. The Indian ports and shipping industry, very important role is played in supporting growth in the country’s trade and commerce. The sixteenth largest marine country in the world is India, having a shoreline of about 7,517 km. The Indian Government plays a significant role in sustaining the ports sector. The Foreign Direct Investment (FDI) of up to 100 per cent under the usual route for port and harbor construction and maintenance projects are permitted by Indian ports. It also facilitates a 10-year tax holiday to enterprise that develops, maintains and operates the ports i.e. inland waterways and inland ports.

The past

The ancient port of the Harappan culture refers to flourishing trade through sealine in 2000 BC, according to historical references, reflecting the port related developments centuries ago. The coast of India, with long history of maritime activities, has been listed along with several ancient ports. The evidence for the existence lies in port related structures in the seashores. At Dwaraka, Rupen Bandar, Porbandar and Sulthanpur and offshores have been revealed the existence of jetties by the marine archaeological explorations in the last three decades.

On the east coast during the Sangam age, in Tamilnadu, had been the ocean commerce for the area. The ancient literature Akananuru of Sangam era also suggest us about existence of 20 to 25 ports in this region. In Ptolemy geographical accounts, the notion was further documented in Greco Roman, which clearly mentions the existence of 15 ports.

The French came to Masulipatnam, Pondicherry, Chandernagore and Surat to establish their ‘company in 1667. The East India Company was established by the British in 1757; they fought with French for seven years continuously and acquired the control over several ports.

The present

While the important ports were regarded as the gateways of the country, during post- independence came under the union government, other ports were moved into control of respected states and administered by them. .

They evolved news ideas time to time and introduced several measures to improve infrastructure at the port, since the successive governments at the center were fully aware of the facts that ports are not just the places but the growth engines.

The measures have helped the government to project as country’s growth and it helped the policy makers to bring down their demand on the sectors to become an icon. India started witnessing the entry of contaminated cargoes into the country in the early 19803. For handling containers from ships Chennai port was the first port in India for having berth.

Major ports, which are in the control of union government, began awarding contracts to foreign players to manage container terminals in their wharves. After globalization in early 1990, the country opened up for investments. And it has helped the government to identify the market size for the segment. And it also helped the major ports to bring capacity addition in the container handling segments.

Meanwhile, non-major ports, which are in the control of maritime boards and privates, have expressed their role in increasing capacity in ocean eight movement. A few of them have also proved their role in handling multi cargo at their berths and challenged the supreme condition of major ports in their region.

The future

Major as well as non-major ports are working towards the same stream for economic development of the country, the system is in critical condition where there is a need to remove or eliminate the procedural failures to enhance the productivity in the ports.

The need for umbrella bodies is felt by the analysts where the issues and challenges related to the port could be taken with the primary program of benefitting the stakeholders. If the share of water in freight transport increases then it is undeniable fact that sustainable growth happens, clearing the barriers like colonial rules and regulations and variation in tariffs and other charges in the port sector is need.

Further, any setup where there will be a uniform in functioning of all the ports in the country on tariff and other economic aspects, it will contribute to the economy and prosperity of India.

Till 2013 Indian shipping industries has maintain a negative outlook by receiving low ratings. Capacity over flow brought by the low level of international trade and additions are expected to keep rates closed across the chief segments of dry bulk, tankers and container carriers in 2013. Due to high capacity adding dry bulk rates will keep on to be impacting in 2013, In US demand as well as in industrial activity in growing nations including China, container and tanker charge may exhibit greater steadiness around the current low levels determined by relative stability.

As they would be faced with high fuel costs on one hand and subdued revenue in others, the operating margins of shipping companies globally would carry on to be under pressure in 2013. Bunker fuel prices would remain high comparing with crude prices.

**LOGISTICS MANAGEMENT - INTRODUCTION**

Logistics management is that part of the supply chain which plans, implements and controls the efficient, effective, forward and backward (reverse) flow and storage of goods, services and information between the point of origin and the point of consumption in order to meet customers' requirements rather to the customers’ delight. A professional working in the field of logistics management is called a logistician.

Logistics, as a business concept, evolved only in the 1950s. This was mainly due to the increasing complexity of supplying one's business with materials, and shipping out products in an increasingly globalized supply chain, calling for experts in the field who are called Supply Chain Logisticians. This can be defined as having the right item in the right quantity at the right time at the right place for the right price and to the right target customers (consumer); and it is the science of process having its presence in all sectors of the industry.

The goal of logistics work is to manage the fruition of project life cycles, supply chains and resultant efficiencies. Logistics is concerned with getting (or transmitting) the products and services where they are needed or when they are desired. It is difficult to accomplish any marketing or manufacturing without logistical support. It involves the integration of information, transportation, inventory, warehousing, material handling, and packaging. The operating responsibility of logistics is the geographical repositioning of raw materials, work in process, and finished inventories where required at the lowest cost possible.

b. Origin and Definition of Logistics:

The term "logistics" originates from the ancient Greek "λόγος" ("logos"—"ratio, word, calculation, reason, speech, oration"). Logistics is considered to have originated in the military's need to supply themselves with arms, ammunition and rations as they moved from their base to a forward position. In ancient Greek, Roman and Byzantine empires, there were military officers with the title ‘Logistikas’ who were responsible for financial management and distribution of supplies.

The Oxford English dictionary defines logistics as: “The branch of military science having to do with procuring, maintaining and transporting material, personnel and facilities.”

The American Council of Logistics Management defines logistics as“the process of planning, implementing and controlling the efficient and effective flow, and storage of goods, services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.”

c. Objective of Logistics Management:

The primary objective of logistics management is to effectively and efficiently move the supply chain so as to extend the desired level of customer service at the least cost. Thus, logistics management starts with ascertaining customers’ needs till their fulfilment through product supplies. However, there are some definite objectives to be achieved through a proper logistics system. These can be described as follows:

1. Improving customer service:

An important objective of all marketing efforts, including the physical distribution activities, is to improve the customer service. An efficient management of physical distribution can help in improving the level of customer service by developing an effective system of warehousing, quick and economic transportation, and maintaining optimum level of inventory.

2. Rapid Response:

Rapid response is concerned with a firm's ability to satisfy customer service requirements in a timely manner. Information technology has increased the capability to postpone logistical operations to the latest possible time and then accomplish rapid delivery of required inventory.

3. Reduce total distribution costs:

The cost of physical distribution consists of various elements such as transportation, warehousing and inventory maintenance, and any reduction in the cost of one element may result in an increase in the cost of the other elements. Thus, the objective of the firm should be to reduce the total cost of distribution and not just the cost incurred on any one element.

4. Generating additional sales:

A firm can attract additional customers by offering better services at lowest prices. For example, by decentralizing its warehousing operations or by using economic and efficient modes of transportation, a firm can achieve larger market share. Also by avoiding the out-of-stock situation, the loss of loyal customers can be arrested.

5. Creating time and place utilities:

The products are physically moved from the place of their origin to the place where they are required for consumption; they do not serve any purpose to the users. Similarly, the products have to be made available at the time they are needed for consumption.

6. Price stabilization:

It can be achieved by regulating the flow of the products to the market through a judicious use of available transport facilities and compatible warehouse operations. By stocking the raw material during the period of excess supply and made available during the periods of short supply, the prices can be stabilized.

7. Quality improvement:

The long-term objective of the logistical system is to seek continuous quality improvement. Total quality management (TQM) has become a major commitment throughout all facets of industry. If a product becomes defective or if service promises are not kept, little, if any, value is added by the logistics. Logistical costs, once expended, cannot be reversed.

8. Movement consolidation:

Consolidation one of the most significant logistical costs is transportation. Transportation cost is directly related to the type of product, size of shipment, and distance. Many Logistical systems that feature premium service depend on high-speed, small shipment transportation. Premium transportation is typically high-cost. To reduce transportation cost. It is desirable to achieve movement consolidation.

d. Logistics Management Function

Logistics is the process of movement of goods across the supply chain of the company. This process is consist of various functions, which have to be properly managed to bring effectiveness efficiency in the supply chain of organization. The major logistical function are shown in figure

1. Order processing:

The starting point of physical distribution activities is the processing of customers’ orders. In order to provide quicker customer service, the orders received from customers should be processed within the least possible time. Order processing includes receiving the order, recording the order, filling the order, and assembling all such orders for transportation, etc. the company and the customers benefit when these steps are carried out quickly and accurately. The error committed at this stage at times can prove to be very costly.

Order processing activity consist of the following

 Order checking in any deviations in agreed or negotiation terms

 Prices , payment and delivery terms

 Checking the availability in of the material stocks

 Production and material scheduling for storage

 Acknowledge the order, indicating deviation

2. Warehousing:

Warehousing refers to the storing and assorting products in order to create time utility. The basic purpose of the warehousing activity is to arrange placement of goods, provide storage facility to store them, consolidate them with other similar products, divide them into smaller quantities and build up assortment of products. Generally, larger the number of warehouses a firm has the lesser would be the time taken in serving customers at different locations, but greater would be the cost of warehousing. Thus, the firm has to strike a balance between the cost of warehousing and the level of customer service.

Major decision in warehousing is as follow:

* Location of warehousing facility
* Number of warehousing
* Size of warehouse
* Design of the building
* Ownership of the warehouse

3. Inventory Management:

Linked to warehousing decisions are the inventory decisions which hold the key to success of physical distribution especially where the inventory costs may be as high 15 as 30-40 per cent (e.g., steel and automobiles). No wonder, therefore, that the new concept of Just-in-Time-Inventory decision is increasingly becoming popular with a number of companies. The decision regarding level of inventory involves estimate of demand for the product. A correct estimate of the demand helps to hold proper inventory level and control the inventory costs. This is not only helps the firm in terms of the cost of inventory and supply to customers in time but also to maintain production at a consistent level. The major factors determining the inventory levels are: The firm’s policy regarding the customer service level, Degree of accuracy of the sales forecasts, Responsiveness of the distribution system i.e., ability of the system to transmit inventory needs to the factory and get the products in the market. The cost inventory consists of holding cost (such as cost of warehousing, tied up capital and obsolescence) and replenishment cost (including the manufacturing cost).

4. Transportation:

Transportation seeks to move goods from points of production and sale to points of consumption in the quantities required at times needed and at a reasonable cost. The transportation system adds time and place utilities to the goods handled and thus, increases their economic value. To achieve these goals, transportation facilities must be adequate, regular, dependable and equitable in terms of costs and benefits of the facilities and service provided.

5. Information:

The physical distribution managers continuously need up-to-date information about inventory, transportation and warehousing. For example, in respect on inventory, information about present stock position at each location, future commitment and replenishment capabilities are constantly required. Similarly, before choosing a 16 carrier, information about the availability of various modes of transport, their costs, services and suitability for a particular product is needed. About warehousing, information with respect to space utilization, work schedules, unit load performance, etc., is required.

In order to receive all the information stated above, an efficient management information system would be of immense use in controlling costs, improving services and determining the overall effectiveness of distribution. Of course, it is difficult to correctly assess the cost of physical distribution operations. But if correct information is available it can be analyzed systematically and a great deal of saving can be ensured.

6. Facilities:

The Facilities logistics element is composed of a variety of planning activities, all of which are directed toward ensuring that all required permanent or semipermanent operating and support facilities (for instance, training, field and depot maintenance, storage, operational, and testing) are available concurrently with system fielding.

Planning must be comprehensive and include the need for new construction as well as modifications to existing facilities. Facility construction can take from 5 to 7 years from concept formulation to user occupancy. It also includes studies to define and establish impacts on life cycle cost, funding requirements, facility locations and improvements, space requirements, environmental impacts, duration or frequency of use, safety and health standards requirements, and security restrictions. Also included are any utility requirements, for both fixed and mobile facilities, with emphasis on limiting requirements of scarce or unique resources.

**RELEVANCE OF LOGISTICS INTERNATIONAL MARKETING**

Marketing experts have recognized that for developing a position of sustainable competitive advantage, a major source is superior logistics performance. Thus, it can be argued that instead of viewing distribution, marketing and manufacturing as largely separate activities within the business, they need to be unified, particularly at the strategic level. One might be tempted to describe such an integrated approach to strategy and planning as ‘Marketing Logistics’. Business can only compete and survive either by winning a cost advantage or by providing superior value and benefit to the customer.

In recent years, numbers of companies have become aware that the market place encompasses the world, not just the India .As a practical matter, marketing managers are finding that they need to do much work in terms of conceptualizing , designing , and implementing logistics initiatives to market effective globally. Following are the reasons behind the extension of logistics activities at global level to do business internationally.

The magnitudes of global business are:

• Increase in the magnitude global business.

• Business is relying on foreign countries to provide a source of raw materials and markets for finished goods.

• Fall of global trade barriers.

• Increase in Global competition.

Prospects of Growth in the Industry

In years gone by, the traditional warehousing and logistics facility was located by railroad tracks, a water port, and/or freeways, usually in the least desirable parts of cities or large towns. This stereotype then faded as gigantic, state-of-the-art facilities began to sprout in more rural areas on the outskirts of transportation and population hubs. The World started beginning to see such facilities showing up in even less "traditional" areas. Modern warehouses now are being located in carefully manicured industrial parks that are sprouting as fast as the corn and wheat once did in these open spaces-often in out-of-the-way places. Why the emphasis on such locations for logistics companies?

Much of it is due to the great flux that the logistics industry has been undergoing in the first three years of the 21st century. Most of these changes are being driven by a growing trend in the manufacturing and retail sectors to form partnerships with companies to which they can outsource non-core logistics competencies-3PL providers.

In turn, 3PL providers are continually looking to provide innovative supply chain solutions to customers by focusing on value-added capabilities, differentiating themselves from the competition. They focus on key objectives, such as implementing information technologies, instituting effective management processes, integrating services and technologies globally, and delivering comprehensive solutions that create value for 3PL users and their supply chains. This need to partner with customers and become more integrated into their supply chain processes has created the ancillary need to locate close to these customers.

That isn't to say the need for easy access to transportation hubs and different modes of transportation won't continue to be important. But the above shift in business strategy, along with the advances in technology and enhanced communication, has opened the door for logistics facilities to operate effortlessly in a myriad of locations.

Profit warnings, share price pressures, mergers, reorganizations, relocations, disposals, painful layoffs and great geopolitical uncertainties can sweep away even the most comprehensive logistics strategies – and that’s despite outstanding management over many years. These are exceptionally difficult times and it has never been more important to connect logistics and freight planning to executive board thinking than now. It’s easy to lose sight of the bigger picture in the rush to cut infrastructure cost and conserve cash. Hopefully organization succeed in protecting the business, satisfying shareholders and analysts, but what about capacity and flexibility, morale and momentum?

To be a logistics winner in the coming years organizations need to use the downturn to reshape for growth, propelled by an unshakeable conviction that the mission is still important, that more prosperous times lie ahead, and that in some way the company infrastructure is helping to build a better kind of world.

Own passion for running the race matters most of all in a downturn, when people are insecure, see only savage cost savings, and loyalty is tested. The corporation’s future will be dominated by six factors, or faces of a cube, spelling F U T U R E.

Logistics is inevitable in the future and essentially the management policy also has a significant role in the future of world. Generally the study is being featured with all aspects of management in Logistics and Freight areas. (Logistics include Transportation, Warehousing, Network Design, Cross docking, and Value Adding)

**SIZE OF THE LOGISTICS MARKET IN INDIA:**

Indian Supply Chain and Logistics Industry is more than USD 100 Billion in size and is the backbone of Indian Economy. Our industry is growing at a rate of 8-10% annually and has been a crucial contributor in the growth and development of the Indian economy. In the near future, Traditional Logistics services like Transportation and Warehousing would continue to growth at a good rate. However, the big ticket growth would come from the Value Added Logistics services in the near future.

At present, Outsourced Logistics accounts for only one-third of the total Logistics market in India, which is a significantly lower proportion vis-à-vis the developed markets. Growth in this industry is currently being driven in India by over USD 300 billion worth of infrastructure investments, the phased introduction of VAT, the development of organized Retail and Agro-processing industries, along with a strong manufacturing growth. In addition, we expect strong Foreign Direct Investment inflows in the Indian markets, which would lead to increased market opportunities for providers of Third-Party Logistics in India.

Therefore, India possesses substantial opportunities for growth in the Supply Chain & Logistics industry in the coming years, notwithstanding the temporary jolt due to the economic slowdown.

**LOGISTICS ON A HIGH GROWTH TRAJECTORY**

The Indian logistics sector grew by 8 to 10 per cent annually between 2002 and 2007. Several factors have favourably impacted the growth of the logistics industry, like the country's changing tax regime, growth across major industry segments such as automobile, pharmaceutical, fast moving consumer goods (FMCG) and the emergence of organised retail. With escalating competition and cost pressures, companies are increasingly focusing on their core competencies by outsourcing their logistics requirements to third party logistics (3PL) players.

The future of the Indian logistics and warehousing industry is currently governed by three key factors

**a) BURGEONING DOMESTIC DEMAND**

**Emergence of organised retail:**

Globally, retail has been a key growth driver for the logistics industry and India is no exception to this phenomenon. Organised retail in India has been growing at over 30 per cent year-on-year. The total retail industry in India is expected to 1 grow from US$ 320 billion in 2006 to US$ 421 billion by 2010. The growth of organised retail has created demand for specialised logistics services, wherein every retailer relies on strong logistics and warehousing infrastructure for the success of its business. This changing business environment should give further impetus to the logistics sector by generating increased demand for high-quality and efficient logistics and warehousing services.

**Increase in foreign trade:**

In 2007, the Indian economy witnessed a growth of 13 per cent in exports and 17 per cent in imports. India's current share in global trade is around 0.8 per cent and is expected to increase to 1.6 per cent by 2012. Robust growth in foreign trade will increase the demand for good quality and timely logistics and warehouse services.

**India becoming a manufacturing hub:**

The world over, India is being recognised as a destination for outsourcing of custom-based, high-technology manufacturing activities. According to Confederation of Indian Industries (CII), India will emerge as one of the global 'manufactured product' outsourcing hubs and reach revenues of approximately US$ 50 billion by 2015. In order to remain cost-competitive, contract manufacturers will be required to provide integrated logistics solutions that will bolster the cost savings potential of the outsourcing initiative. The increasing trend of outsourcing will, in turn, drive strong demand for logistics solutions in the country.

**b) Reducing logistics costs**

The logistics cost in India – which includes inventory holding, transportation, warehousing, packaging, losses and related administration costs – is estimated at approximately 13 per cent of GDP and is high when compared to the corresponding figures for major economies India's multi-layered tax regime, infrastructure bottlenecks and other inefficiencies have been the primary reasons in keeping logistics costs high in India.

Under the existing tax structure, 2 per cent Central Sales Tax (CST) is levied on inter-state sales. As a result, companies have had to maintain small warehouses and depots in every state in order to avoid paying CST on Inter-state sales. These multiple warehouses have resulted in high inventory costs, increased working capital and other overheads. A simplified tax regime will help logistics players service multiple markets and offer end-to-end solutions far more efficiently and at much lower costs.

 As per the World Bank's report on the Logistics Performance Index, a 0.5 per cent decrease in logistics cost leads to 2 per cent growth in trade and a 40 per cent increase in the range of products that get exported out of the country.

**From multiple taxes to a simplified tax regime:**

Union Budget 2008-09 has proposed the phasing out of Central Sales Tax (CST) 2010-11. Once implemented, this measure will promote outsourcing of logistics operations and encourage the creation of large warehouses at key strategic locations that could operate on the 'hub-and-spoke' model. The implementation of Value Added Tax (VAT) in 2006 has played a role in reducing logistics costs. The proposed implementation of Goods and Service Tax (GST) could lower logistics costs further. According to the Confederation of Indian Industry (CII), improvement of logistics and warehousing industry can make Indian industries more cost-competitive, thereby enabling a GDP growth of 11 to 12 per cent, from the existing 7 to 8 per cent.

c) Improvement in infrastructure

Transportation in India accounts for nearly 40 per cent of the total cost of production. One of the major barriers faced by the Indian logistics industry has been the lack of quality physical infrastructure. However, India's core sectors are witnessing a significant change. The country is expected to increase its infrastructure development spend from 4.7 per cent of GDP in 2007 to 8 per cent of GDP by 2012. This increased spend will help boost the logistics industry. However, delays in critical projects may lead to a failure of this measure to provide the much needed impetus to the growth of this sector.

Better connectivity to small towns and cities is another area planners need to work upon. Road transportation is currently the most dominant form of transportation with more than half of the goods in the country being moved by road. Almost every mode of transportation in India is fraught with inefficiencies.

For instance, ports – that are vital for foreign trade—have very high turnaround times when compared with statistics for other countries. Similarly, the railways, which were a popular mode for freight transportation (especially the movement of bulk goods), have lost ground to road transportation due to limited access to smaller towns. Air, on the other hand, is a costly mode and its use is restricted to courier shipments. It is rarely used for bulk transportation.

**Competitive dynamics and other issues**

The following problems existing in the Indian logistics industry make it unattractive for investments and also create entry barriers.

Logistics is a high-cost, low-margin business. The problem of organized players is compounded by unfair competition with unorganized players, who can get away without paying taxes and following operating norms stipulated in the Motor Vehicles Act such as quality of drivers and vehicles, volume and weight restrictions, etc.

Economies of scale are absent in the Indian logistics industry. Even the organized sector that contributes slightly more than 1% of the logistics cost, is highly fragmented. Existence of the differential sales tax structure also brought in diseconomies of scale. Though VAT (Value Added Tax) has been implemented since April 1, 2005, failure in implementation of a uniform VAT structure across different states has let the problem persist even today.

Apart from the non-uniform tax structure, Indian LSPs have to pay numerous other taxes, octrois, and face multiple check posts and police harassment. High costs of operation and delays involved in compliance with varying documentation requirements of different states make the business unattractive. On an average, a vehicle on Indian roads loses 24-48 hours in complying with paperwork and formalities at different check posts en route to a destination. Fuel worth USD 2.5 billion is spent on waiting at check posts annually. A vehicle that costs USD 30,000 pays USD 7,500 per annum in the form of various taxes, which include the excise duty on fuel. This is why freight cost is a major component of the cost of a product in India.

There is lack of trust and awareness among Indian shippers with regard to outsourcing logistics. The volume of outsourcing by Indian shippers is presently very low (~ 10%) compared to the same for the developed countries (> 50%, sometimes as high as 80%). The unwillingness to outsource logistics on part of Indian shippers may be attributed to skepticism about the possible benefits, perceived risk, and losing control, of sensitive organizational information, and vested interests in keeping logistics activities in-house.

Indian shippers expect LSPs to own quality assets, provide more value-added services and act as an integrated service provider, and institute world-class information systems for more visibility and real-time tracking of shipments. However, they are unwilling to match the same with increased billings; even pay little attention to timely payments that leave LSPs short of adequate working capital.

Indian freight forwarders face stiff competition from multi-national freight forwarders for international freight movement. MNCs, because of their size and operations in many countries, are able to offer low freight rates and extend credit for long periods. Indian freight forwarders, on the other hand, because of their smaller size and lack of access to cheap capital, are not able to match the same. Moreover, clients of MNCs often want to deal with a single service provider and especially for FOB (Free on Board) shipments specify the freight forwarders, which most of the time happen to be the multi-national freight forwarders. This is sort of a non-tariff barrier imposed on Indian freight forwarders.

Poor physical and communications infrastructure is another deterrent to attracting investments in the logistics sector. Road transportation accounts for more than 60% of inland transportation of goods, and highways that constitute 1.4% of the total road network, carry 40% of the freight movement by roadways. Slow movement of cargo due to bad road conditions, multiple check posts and documentation requirements, congestion at seaports due to inadequate infrastructure, bureaucracy, red-tapeism and delay in government clearances, coupled with unreliable power supply and slow banking transactions, make it difficult for exporters to meet the deadlines for their international customers. To expedite shipments, they have to book as airfreight, rather than seafreight, which adds to the costs of shipments making them uncompetitive in international markets. Moreover, many large shipping liners avoid Indian ports for long turnaround times due to delays in loading/unloading and hence Indian exporters have to resort to transshipments at ports such as Singapore, Dubai and Colombo, which adds to the costs of shipments and also delays delivery.

Low penetration of IT and lack of proper communications infrastructure also result in delays, and lack of visibility and real-time tracking ability. Unavailability and absence of a seamless flow of information among the constituents of LSPs creates a lot of uncertainty, unnecessary paperwork and delays, and lack of transparency in terms of cost structures and service delivery. For example, a shipper has to pay a higher freight rate if it cannot ensure return load. At present, there is no real time process by which a shipper may know about the availability of trucks and going rates at the destination market. Therefore, it has to pay more. Had the market information been available to both the shipper and the service provider, the service provider’s cost structure would have been transparent to the shipper and it would have ended paying the actual market rate. Another example would be that LTL (Less than Truckload) shipments cost more than FTL (Full Truckload) shipments. Now, when a shipper books a LTL shipment, it has no idea about the status of its shipment after it leaves the warehouse at the origin and before it reaches the warehouse at the destination. The service provider may still convert this LTL shipment into a FTL shipment at its own warehouse before delivering at the destination. So, the shipper ends up paying LTL rates for a FTL shipment. Had there been visibility during delivery, this problem would not have occurred.

Since most of the LSPs are of relatively small size, they cannot provide the entire range of services. However, shippers would like service providers to offer more value-added services and a single-stop solution to all their logistical problems. The inability of service providers to go beyond basic services and provide value-added services such as small repair work, kitting/dekitting, packaging/labeling, order processing, distribution, customer support, etc. has not been able to motivate shippers to go for outsourcing in a big way.

Service tax levied on logistics service fees (currently 12.36% with educational cess) may make outsourcing costly and outweigh the possible benefits.

There is lack of skilled and knowledgeable manpower in the logistics sector. Management graduates do not consider logistics as a prime job. To improve the status of the industry, service providers have to move beyond the level of brokers and truckers to attract and retain talent.

**FUTURE PROSPECTS**

Despite problems, The Indian logistics industry is growing at 20% vis-à-vis the average world logistics industry growth of 10%. Since the organized sector accounts for merely 1% of the annual logistics cost, there is immense potential for growth of the sector. The major opportunities are highlighted below.

Many large Indian corporates such as Tata and Reliance Industries have been attracted by the potential of this sector and have established logistics divisions. They started providing in-house logistics services, and soon sensing the growth of the market, have started providing services to other corporates as well.

Large express cargo and courier companies such as Transport Corporation of India (TCI) and Blue Dart have also started logistics operations. These companies enjoy the advantage of already having a large asset base and an all-India distribution network. Some large distributors have also forayed into the logistics business for their clients.

Since logistics service can be provided without assets, there is growing interest among entrepreneurs to venture into this business.

Indian shippers are gradually becoming more aware of the benefits of logistics outsourcing. They are now realizing that customer service and delivery performance are equally important as cost to remain competitive in this global economy.

The Indian economy is growing at over 9% for the last couple of years (compared to the world GDP growth rate of 3%), which implies more outputs and more demand for specialized logistics services.

The Indian government has focused on infrastructure development. Examples include the golden quadrilateral project, east-west and north-south corridors (connecting four major metros), Free Trade and Warehousing Zones (FTWZ) in line with Special Economic Zones (SEZ) with 100% Foreign Direct Investment (FDI) limit and public-private partnerships (PPP) in infrastructure development. It is expected that infrastructure development would boost investments in the logistics sector.

In India, 100% FDI is allowed in logistics whereas in China, until recently, foreign investment was not allowed in domestic logistics. Almost all large global logistics companies have their presence in India, mainly involved in freight forwarding. For domestic transportation and warehousing, they have tie-ups with Indian companies. As the Indian logistics scenario looks promising, these MNCs are expected to play a bigger role, probably forming wholly-owned subsidiaries or taking the acquisition route. The latter may be the preferred route of investment since the target company is readily acquired with its asset base and distribution network, and the need for building everything from scratch can thus be avoided. The benefits for the acquired company include the patronage of an MNC and access to the MNC’s global network. As an example, DHL Danzas, the biggest logistics company in the world, has taken over Blue Dart.

**MODES OF TRANSPORTATION & WAREHOUSING:**

**ROAD :**

The road freight industry in India is worth about INR 1.42 trillion and is growing at about 6-8 percent year on year (refer figure 6). Manpower spends amount to only about 4 percent of sales as against the overall sector average of 8-10 percent. The industry has traditionally been extremely fragmented - almost 75 percent of the trucking 'companies' are single truck operators and almost 90 percent of trucking companies have a turnover of less than INR 10 million

A majority of players in this industry have been small entrepreneurs running family owned businesses. Given their small scale and limited investment capability, most of their investments have been focused on short term gains - direct and immediate impact on the top line / bottom line of the business being the key decision criterion. As a result, investments that pay off in the longer term, such as those in manpower development, have been minimal historically. Also, these businesses are typically tightly controlled by the proprietor and his / her family and as such, making it unattractive for professionals. Poor working conditions, low pay scales relative to alternate careers, poor or non-existent manpower policies and prevalence of unscrupulous practices have added to the segment's woes creating the image of a segment that holds few attractions for those seeking employment.

While industry players have been incapable of investing in manpower development, the government has also not focused sufficiently on the same. There exist very few formal training institutions for driver training and practically none for operational training on associated areas like loading / unloading supervisory, proper handling practices etc.

The result has been that in the current scenario, there exist gaps in core technical skills of the existing set of personnel. For example, the backbone of the trucking industry truck drivers lack knowledge of good driving practices and areas associated with driving like understanding of VAT. Taking a level-wise view of the skill issues, it is seen that in the road sector, skill issues are widespread across the board with the situation being most severe at the operational level

**Advantages:**

Road network of 3.3 million km is the second largest globally

55% of total freight movement is via roadways

Roads offer wide reach and easy accessibility to even small markets

**Disadvantages:**

High cost of transportation

National Highways account for only 2% of the total network but carries 40% of total freight

**Key Developments:**

National Highway Development Project to upgrade and modernise highways

24,000 km of National Highways are to be upgraded to four/six lanes. Connectivity to ports is also being improved

**Railway**

Rail freight traffic revenues stood at around INR 350 billion in 2006 having grown at around 8 percent in the recent past with the growth in the last couple of years being around 10 percent. It is the world's second largest rail network spread over 81,500 km and covering around 7000 stations. Manpower spends amount to about 45 percent of revenues as against the overall sector average of 8-10 percent. Also, non-salary expenditure comprises 36 percent of overall manpower expenditure compared to the sector average of 13-14 percent.

With the government being the only employer, recruitment systems in the railways segment are formalized and there exists an institutionalized training infrastructure and policy. Though the employee numbers are high (around 1.4 million) there are no significant skill gaps owing to this traditionally strong in-house training infrastructure. With technological up gradation, certain jobs are made redundant every year with the people on these jobs being absorbed in newer areas through training. However, the rapid introduction of modern technology that is creating gaps even in technical areas such as signalling and telecom. Also, the Railways is facing increase in attrition levels due to gradual opening of the sector.

To counter the emerging gaps, the Railways is overhauling the curriculum and infrastructure and rolling out training to the lowest levels (Grade D) to increase productivity. With competition from road and air, the Railways is focusing on making its large manpower more customer friendly. In the overall assessment, therefore, the skill gaps situation in the railways segment does not seem to be alarming.

The host of new players entering into the rail container services segment (15 licenses have been awarded for the same) will however require skills that hitherto were only residing with the Indian Railways. While the quantum of requirement at this stage would be small and the need would likely be filled by the buffer created by the Railways, this could become a gap area going forward

**Advantages:**

Spread over 81,500 km, railways carries 25% of total freight movement

Low transportation cost as compared to roads

**Disadvantages:**

Bulk commodities account for 90% of total freight revenues

Inflexibility to reach deep interiors

**Key Developments:**

Phase 1 of dedicated freight corridor along Golden Quadrilateral to be initiated in 2008-09

**Water/Port**

The growth in shipping has been even higher than that of the railways driven by strong growth in foreign trade both in bulk and containerized cargo. Manpower spends amount to about 8-10 percent; non-salary expenditure varies greatly between companies ranging from 3-20 percent of overall man power expenditure.

The nature of liner shipping services to and from India has undergone a sea change in the last few years as a result of the growth in break-bulk and conventional cargoes. With the nature of goods being shipped changing, the potential and opportunities for container transport and logistics companies are enormous. Over the past few years the size and the number of vessels that are being deployed by India has increased.

With increasing capacity and infrastructural support, the scope of the operations is set to increase! India now has the largest merchant shipping fleet among the developing countries! India ranks 17th in the world in shipping tonnage. ! Indian share of maritime transport services is 1 percent of world market.! The container traffic has registered an impressive growth of 15 per cent over the last five years.

The Government is responsible for creation of the trained manpower required for the country's merchant navy fleet and also facilitation of training and employment of seafarers in foreign flag vessels. .

In addition to the above, there are about 124 training institutes in the private sector approved by the Director General of Shipping, imparting pre-sea and post sea training in various disciplines. The Directorate General of Shipping maintains a system of inspections to ensure the quality of training. India is globally recognized as a very important source of mercantile manpower.

Accentuating the situation is the inherent disadvantage to the Indian ship owners as employers arising by virtue of extra burden of income tax on Indian seafarers' income. This makes the employment on a foreign flag the first choice of any Indian seafarer, and thereby denies the best talent to the local shipping industry.

Thus, in the core shipping industry, while the manpower situation in terms of quality fares much better than the other segments of logistics, the issue here is that of quantity with an increasing number of qualified people being attracted towards working on foreign vessels as they offer better salaries and perks. However, if one were to look at the ports side, there is an increasing lack of trained manpower for pilotage functions and equipment operators

**Advantages:**

Cheapest mode of transportation

**Disadvantages:**

Poor state of inland waterways in the country

High turnover time

**Key Developments:**

Cargo handling capacity of ports to be increased from 600 million tones in 2007 to 1500 million tones by 2015

**AIR :**

Though the air freight segment holds a small share of India's freight market, it is growing at a fast pace. While India accounts for meagre 3 percent of the global air cargo market, the Indian air cargo industry is expected to double in size by the year 2010, as per an expert estimate.

As in the case of sea freight, the level of formalization and standardization of operations in the air freight segment is greater than in the road sector. By virtue of the level of investments in assets, network and relationships required to be a player in this segment, it has traditionally been relatively more organized leading to greater regard for manpower development. The market leaders typically have established internal structured training practices to train the staff employed at this level.

Nevertheless, there exist perceived gaps at the operational / front line level and are primarily to do with soft skills, such as relationship management, interpersonal and managerial, and supervisory skills.

**Advantages:**

Fastest mode of transportation

**Disadvantages:**

Low freight movement

87% of total freight traffic being handled by airports in metro cities

**Key Developments:**

Modernisation of 37 operational airports and development of new airports will increase air cargo handling capacity

**WAREHOUSE:**

The warehousing segment consists of storage warehousing related to distribution whether inbound or outbound trans shipment warehouses or 'terminals' used for bulking / de-bulking, stuffing / de-stuffing cross docking and temporary storage (including CFS and ICD)

The warehousing segment is perhaps where the greatest growth potential exists. Like road transportation, this segment has traditionally been extremely fragmented, small scale and scattered geographically. A key reason for this has been India's indirect tax structure, with tax paid on cross border (state border) sales not being fully set off against local tax liabilities. As a result, most players resorted to setting up small warehouses across different states, rather than large, centralized set-ups. This has led to the prevalence of small scale, fragmented warehouses, with corresponding inefficiencies. This cause and effect cycle is depicted in

Increasingly, warehouses are being used to serve several important functions, beyond mere storage of products

**Customer service**

Increasingly, warehouse are being used as the customer service and repair centers. This ensures quick availability of spare parts and offers low turnaround time

**Distribution**

The goods are dispatched to the dealers/distributors from the warehouse. The warehouse, thus, performs functions like invoicing and order processing.

**Value Addition**

Increasingly, warehouses are also being used to do higher end tasks associated with production till now. These include MRP tagging, promotion bundling, repackaging , quality checking etc.

**Product mixing**

A warehouse may be used as a place where material from different factories of an organization is mixed and dispatched to common set of distributors.

**Stockpiling**

A warehouse is often used as a stockpiling location to manage demand-supply gaps over a longer term.

While no organized players have evolved in this segment, several trends are driving the need for a more professional and organized approach to warehousing. Figure outlines the several additional functions that warehouses perform today, apart from being physical storage points such as Stockpiling, Product Mixing, Value addition, Distribution and Customer Service. These functions require different skill sets and hence, warehouse service providers today need to develop proficiencies in a diverse set of both core and non-core activities

The size of the warehousing segment is estimated to be INR 1.2 trillion in 2006; while the overall sector growth may be estimated to be around the GDP growth rate of 8-9 percent, the organized portion of this market is estimated to be growing at over 20 percent.

A majority of players in this industry are small / medium entrepreneurs running the warehouse as a CFA for one or more companies. As mentioned earlier, the scale of these warehouses was never large enough to tap scale economies or justify investments in higher standards.

However, going forward, while implementation of the VAT regime is expected to drive consolidation and hence larger scale warehouses, the rapid growth of organized retail is expected to drive sophistication and efficiency in warehousing practices.

These developments would drive the need for specialized warehousing skills like picking and packing, inventory management, proper handling practices including usage of warehousing equipment like stackers, pallet trucks etc. and ability to understand and use warehouse management systems (WMS)

The growth in the proportion of containerized cargo in addition to the opening up of container rail transport is giving a boost to the development of Container Freight Stations (CFS) and Inland Container Depots (ICD). These 'warehouses', being used more for transhipment than storage per se, require basic skills around loading / unloading, stuffing / destuffing etc. at the operational level

Newly developed electronic commodity markets, such as Multi Commodity Exchange of India Ltd. (MCX) have played an instrumental role in the logistics. Creation and development of warehouses followed the emergence of these markets or exchanges.

MCX’s collateral management arm National Bulk Handling Corporation Ltd (NBHC), a national-level end-to-end solutions provider in warehousing, bulk handling, grading and inspection, commodity care, pest management and collateral management of commodities, is playing a key role in taking logistics and, hence, markets closer to the producers. Sticking to their mandate, commodity derivatives markets have proved to be extremely beneficial to farmers.

The gap between prices (many of the commodities) in the post-harvest season and those in any lean season has narrowed down significantly over the past few years.

Earlier, during the pre-futures era, when prices would slump immediately after harvest, farmers would have to make distress sales. But today, with the opportunity to sell for a better price at futures markets, they stand to benefit enormously. While growers can store (hold back) their produce in NBHC-monitored warehouses in anticipation of realizing higher prices later, they can avail of loans against warehouse receipts (WRs), to help them carry on with their crop operations for the next season. In the few years of its existence, NBHC has built a rather strong and wide logistics network with professionally managed scientific warehouses armed with market-approved quality-testing techniques. And this has attracted investors and participants from various backgrounds, creating better linkages among the markets. The development of logistics by creating good warehouse infrastructure would surely go a long way in lifting farmers’ incomes. Such infrastructure is expected to get a fillip with the recent passage of the Warehousing (Regulatory & Development) Bill and its effective implementation.

Both public and private enterprises’ participation in equal measures is required for developing logistics and improving supply chain management. Very importantly, the lesson for private investors is that it is not just about creating efficient business to thrive in the logistics sector, but also about exploring and revamping other areas by way of diverting energy, costs and time that were otherwise wasted in a weak logistics system.

**GLOBAL LOGISTICS SCENARIO:**

In a move to cut down costs, producers are exploring around the globe in search for the lowest cost exporters/suppliers. Lured towards developing countries in south-east Asian region for lower-wages, transportation industry is stretching its reach longer than ever before. Major players are focusing overseas markets for outsourcing cheap manufacturing as well as expanding their businesses. This result in outbound logistics. And acceleration in manufacturing capacity is driving many producers to shutter superfluous plants. The rest of the plants are gaining the developing rhythm, but must export overseas now to sustain their positions in the market.

Boom in the Internet based services made overseas suppliers capable to match foot with local suppliers. Web-based sales, services and supplies are emerging vertically. The expanding reach has compelled logistic industry to spur cross-border trade. Regardless-of this outbreak of activity, it is commonplace also for expert managers of local logistics to get acquainted with the complexity of international trade logistics. Global transportation and relevant services includes much complex documentation than for domestic shipments. It almost includes longer delivery times. Evaluation of the arrival times of international shipments is just a magic than solid fact.

The business players always look for just-in-time shipments, thus it aspires enhanced build to order model and lot-size-of-one shipments, which results more pressure on logistics industry. Logistics industry has usually been old-fashioned traditions. Usually, the shipping personals would decide for carriers, customs agents and so on. Normally, their search doesn’t go beyond the initial service providers who cover all the minimum requirements. Once the shipment kicks-off its journey towards its destination, it is really hard to assume reaching time. For example, a ship that started its journey from Asia could meet harsh weather, which may delay its reaching on the West Coast for three days. On the other hand, the trucks at the West Coast would have to wait and sat empty and ideal for the three days, which would certainly result in big loss. These kind of unpredictable losses are usual in international logistics. Thus, even the largest multi-national companies avoided logistic services on a worldwide basis.

They opt to establish their operations in each country and let them to manage logistics individually. The boom in Internet services changed international logistics rapidly. At present, vendors can cater massive numbers of global shipments. Complying with this, they create and uphold substantial databases, which cover country-specific laws and regulations. Factually, thousands of combinations of containers, ports, and so on are likely counted for moving a shipment. International logistics vendors also maintains cost and route information on hundreds of hundreds carriers, which are operational in dozens of regions, which offers both lower freight bills and cutting of delivery times.

A biggest disadvantage in international logistics is the vagueness in arrival times. Materials managers have had modest choice, so they had get around by adding more safety stocks. Thus, the costs of inventory management in the overseas parts are naturally higher. The uncertainty of delivery time is due to not tapping of international shipments closely and step by- step. This is easier said than done. However vendors are now offering tracking system, which is necessary in continuous tracking of both international logistics network, and electronic visibility in each yard and carrier. Although there is much to be done to achieve this stage, the pieces of the puzzle are gradually coming together.

Even though vendors are offering a worldwide network, significantly added and dedicated, equipment is still required. For example, tracking completed products needs a yard management system, which recognizes each container in the yard and its placement. The radio frequency Identification (RFID) tags in containers, whose place is detected by antennas located in the yard. Maintaining the clear vision also needs tracking the containers as soon as they leave the yard. This tracking is possible by Global Positioning (GPS) systems and satellites, however, use of these systems are not usual at present. As a result, the industry does not provide step-by-step tracking of container.

An important trend among logistics services providers would aid the industry. Logistics industry veterans unveil that logistics service providers are extending reach worldwide and expanding their services too. Regardless of understandable limitation, global logistics should obviously improve. Web-based companies and technically ground-breaking carriers such as UPS Logistics, Ryder, and others will carry on showing the way. Global logistics in near future should be distant more faultless and reasonably priced than ever.

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| **Size of the global logistics industry**Currently the annual logistics cost of the world is about USD 3.5 trillion. For any country, the annual logistics cost varies between 9% and 20% of the GDP, the figure for the US being about 9%. US-based Armstrong & Associates, Inc. tracks the issues and trends in the world logistics market and in the US logistics market, in particular, in their annual surveys of top 25 global LSPs. According to the firm, the global logistics market sizes in 1992, 1996 and 2000 were USD 10 billion, USD 25 billion and USD 56 billion, respectively. In 2003 and 2004, the corresponding figures were USD270 billion and USD 333 billion, registering high growth rates. Though most of the large LSPs are headquartered in Europe, the US logistics market is the largest in the world capturing one-third of the world logistics market. In 2003, it was about USD 80 billion. In 2004, it grew to USD 89 billion, and in 2005, it registered an impressive growth rate of 16% to cross the USD 100 billion mark for the first time and reach USD 103.7 billion (Foster and Armstrong, 2004, 2005, 2006). However, considering the fact that the logistics market in the US is about 10% of its annual logistics cost (Foster and Armstrong, 2006), there is still immense potential for growth of 3PL in the US in particular, and in the world in general.**Current status and dynamics of the industry**The extant literature on the logistics industry points to a number of issues that service providers have to address, such as pricing pressures, high costs of operations and low returns on investments, hiring and retaining talent, pressure from clients to broaden the range of service offerings and internationalize operations, demand for customized solutions and more value-added services, besides infrastructural bottlenecks and government regulations. Service providers complain that clients expect them to have the latest software, databases and ERP (Enterprise Resource Planning) packages, and invest in new technologies such as RFID and satellite-based real-time tracking systems. Clients perceive that these investments are part of the basic service package, and often do not want to match the same with increased payments for these additional services. Pressure from clients to broaden the range of service offerings and internationalize operations, has forced service providers to look for suitable alliances, mergers and acquisitions that help fill the gaps in service offerings, and industry verticals and geographic areas served, achieve economies of scale and enhance service providers’ capability to support international operations.Currently, the world logistics market is going through a consolidation phase. Tibbett & Britten Group of North America was acquired by Exel Logistics in August, 2004, and Deutsche Post World Net, parent company of DHL, took over Exel in December, 2005. Bax Global was taken over by Deutsche Bahn, parent company of Schenker, in November, 2005 while A. P. Möller acquired P&O Nedlloyd in February, 2006, and TNT Logistics was sold to Apollo Management L. P. in November, 2006. However, mergers and acquisitions have their own set of problems in terms of integration of two diverse business units. Carbone and Stone (2005) tracked the evolution of 20 leading European LSPs between 1998 and 2004 in terms ofbtheir approach to mergers, acquisitions and alliances, and found that although growth led to more coverage, integration of two different cultures was one of the most difficult challenges faced by these firms in the consolidation process. Recent trends in the logistics industry indicate that to be successful, serviceproviders have to differentiate themselves from their competitors in terms of offering value-added services, focus on key customer accounts that have the potential to generate high profitability for a long term, enter into suitable alliances to complement the range of services offered and geographic areas served, and sell logistics services to clients’ suppliers and customers, thus leading to complete supply chain integration.**Logistics Companies of India** |
| The land which opens up wide array of opportunities for the logistics service providers across the world is India. The high demand for the logistics services is due to the significant growth of economy. A few years back the value of the India logistics market was is $14 billion and will grow at a rate of 7-8 per cent. The logistics companies in India cater to millions of retailers and meet the requirements of about a billion people. The list below gives the name of the best logistics companies in India. |

**LIST OF TOP LOGISTICS COMPANIES OF INDIA:**

[**TNT Express:**](http://www.tnt.com)

This company is a key leader in the international market in the sector of global express services. The company ensures safe and on time delivery of your documents, freight and parcels. The company offers time and day definite delivery in about 200 nations across the world. It operates 47 jet freighter aircraft and 26,000 road vehicles and has a network of 2,300 companies.

[**AFL :**](http://www.afl.com.au/)

One among the acknowledged leaders among the logistics companies in India is AFL. Through its domain of logistics services, the company has delivered world class service in India. In 1979,the company introduced the first ever courier service by forming an alliance with DHL World Wide Express. The company offers services like Logistics and warehousing, Courier Company and Custom Consultant.

[**DHL :**](http://www.dhl.com/)

This company is one among the major logistics companies in India. It is a market leader globally in overland transport, air freight and international express. The company ranks No.1 in the world in contract logistics and ocean freight. The biggest logistics and express network in the world has a network in about 220 territories and countries,72,000 vehicles,350 Aircrafts,36 hubs and 4,700 bases.

[**Blue Dart :**](http://www.bluedart.com/)

This logistics company is South Asia's top integrated express package Distribution and Courier Company. The domestic network of the company covers about 21,340 locations and provides service to 220 countries by the company's sales alliance with DHL. It provides the best service like Free Pick up from Your location, Regulatory Clearances, Real Time Tracking, Free Computerized Proof of Delivery etc.

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[**Gati :**](http://www.gati.com/)

The company is a key leader in then arena of express cargo delivery and a significant one in the supply chain management solutions and distribution in India since the year 1989.The company provides services like the Ware Housing, Express Cargo etc. Logistics Solutions of the company are Warehousing, Supply chain Management. The Distribution Solutions of the company are Gati Surface Express, Gati coast to coast and Gati Air Express etc.

[**Safexpress :**](http://www.safexpress.com/)

It is one of the largest express company in India. The company offers the best and integrated logistics solutions. In 2002 the Limca Book of Records declared the company as the Largest Logistics service Provider in India. The company has a network over 550 locations in 28 states and 7 countries. It has 3000 weather proof ISO-9002 vehicles.

[**Ashok Leyland :**](http://www.ashokleyland.com/)

The leading provider of logistic vehicles for the India Army is this company. It is a key leader in the tractor-tailers and multi axle trucks. The company manufactures buses, trucks, engines and special application vehicles in India. It is promoting a new company called Ashley Transport Services Ltd. for exchange of information and integrated services related to logistics in order to tackle the business of freight contractors.

[Agarwal Packers and Movers:](http://www.agarwalpackers.com/)

This popular Indian logistics company provides logistic services like the home shifting, car packing etc. across India. The company believes in keeping technology and people and of course heart and soul in the movement of the individuals respective items. The company offers quality service in transportation and packing.

[**DTDC :**](http://www.dtdc.biz/)

The biggest Domestic Delivery Network Company is DTDC. The company offers high class delivery service in about 3700 Indian locations and 240 international places. The company dispatches about 10 million parcels in a month. It also offers low cost for bigger parcels to US, UK, India, Nepal, Dubai and other places across the world.

[**First Flight:**](http://www.firstflight.net/)

This logistics company in India specializes in courier services worldwide. The multi-tracking programs of the company are Domestic, International, First Wheels, First Wings and many others. The overseas offices of the company are in Malaysia, Singapore, UK, US, UAE, Quatar, Oman.

**CARGO TRAFFIC AT INDIAN PORTS**

Ports are economic and service provision units of a remarkable importance since they act as a place for the interchange of transport modes such as maritime and land. whether by rail or road. Therefore, the essential aspect of ports lies in their intermodal nature. India has a coast-line of around 7517 Kms with 13 major ports and 176.

**RAPIDLY CHANGING CARGO-MIX DRIVING VOLUMES GDP GROWTH**

Ports play a vital role in the overall economic development of India. This is so because maritime channels account for ~90% by volume (and 70% by value) of the country's international trade. The importance and growth potential is highlighted by the fact that over growth in cargo handled (an 8.6% CAGR) outpaced GDP growth (at a 7.6% CAGR). Thus, there is a positive correlation between GDP growth and cargo volume growth handled by ports. One can infer that enhancement and development of port infrastructure would be a critical enabler of growth of the Indian economy. Significant growth in EXIM over the years has been driven by a rapid increase in domestic demand for various products and the emergence of India as a major manufacturing hub for the world. This has led to strong growth in port volumes over FY01-14, during which cargo traffic handled in India has nearly tripled-\_from 334m tons to 912m, an 8.6% CAGR. During this period, the mix of cargo at ports has changed dramatically.

Containerized trade volumes have rapidly risen--from 35.2m tons to 135.9m 13.1% CAGR) with its share in overall cargo traffic rising to 15%, far lower than the global standard of ~80%. Imports of coal have increased from 57.7m tons to 157.1m tons, a 9.5% CAGR. Most of the increase in coal consumption has been due to the sharp increase in the number of thermal power projects in the country. Given the slew of power projects lined up in the country (largely coal-based), coal volumes expected to increase further. With India's emergence as a major refining hub, POL is still a large part of the cargo mix. Growth in iron ore handled has slowed down in the past couple of years on account of the ban on iron ore mining in India. The current downtrend in iron ore cargo has been offset by the inward movement of coal in the country. Yet, over FY10-14, iron ore handled at Indian ports has increased from 46.2m tons to 96.9m tons, at a 6.9% CAGR. We expect volumes of iron ore handled al Various ports to pick up once the mining ban is listed

**DEDICATED FREIGHT CORRIDOR TO IMPROVE PORT CONNECTIVITY**

Hinterland connectivity is one the key factors in determining the success of a port. In India, roads account for the largest share of cargo traffic (~60%), much higher than global standards. Rail transportation currently accounts for ~22% of containerized trade and ~24% of overall cargo traffic in the country. Hence, the potential to increase the share of the railways in cargo transportation is huge in India. Currently, delay in cargo movement from ports results in higher operational costs - a problem that rail transportation could very well fix.

To capitalize on the rail network (the fourth-largest in the world) traversing 64,015 km. the Indian Railways has outlined its most ambitious infrastructure project. "dedicated freight corridors" (DFC) of 3,300 km along the Eastern and Western routes. These routes are highly saturated and account for ~55% of cargo traffic in India. The project cost for the entire project has been estimated at '70bn and the government plans to Complete it by 2017. We believe that DFCs would be game changers for the entire transportation sector, and enhance throughput of various ports. With the dedicated network in place, it is expected that trailer loads can increase from ~4,000 to ~15,000 tons, carrying capacity from 90 containers to 400 (double stacking). Maximum speed for trains is expected to increase from 75 kmph to 100 kmph, and station spacing of 7-10 km to 40 km. With the DIts in place, the share of ra1l transportation in Cargo triatic movement should go up rom current levels to near optimal levels of 34 accounts for ~20% of global coal imports.

Volumes at non-important ports are buoyed by bottlenecks at big ports. Because of the high saturation levels at major ports, volume growth at India's non-major ports has been strong. Non-major port volumes increased by 13.5 percent over 41-12, from 87.4 million tonnes to 352 million tonnes (vs an 8.7 percent CAGR for volume growth at all ports). This is far higher than the growth in volume at major ports. The proportion of cargo traffic at India's non-major ports has increased from 23.7 percent to 38.5 percent over that time. Nonmajor ports would have an advantage over major ports for a variety of reasons, including more revenue certainty from captive volumes, the ability to set tariffs to attract volumes, stronger infrastructure, and private-sector investment. Non-major port volumes are expected to outnumber those at large ports.

**From FY01 to FY14,**

The International Energy Agency estimates that by FY17 India will be the world's second-largest coal importer and the largest by sea-borne trade. This increase Originates rom power-sector requirements (several commissioned projects and those in pipeline). In that period, volumes of POL handled at non-major ports have risen sharply, from 46.4m tons to 161.Im tons. Growth here has been driven by the sharp scaling up in refining capacities in India. The government estimates that non-major ports in India will handle 1,270m tons during FY20, more than major ports (1,215m tons). Volume growth of non-major ports would be primarily fueled by coal (a 20% CAGR expected) on account of projected thermal power capacity additions. Non-major ports, still lag major ports in container volumes (15.7m tons vs 120.2m tons in FY14) and container volumes are expected to increase at a 38.3% CAGR for non- major ports due to greater operational efficiencies. The proportion of petroleum and associated products (45.8%), the single largest commodity handled at non-major ports in FY14, is expected to decline.

**EMERGING TRENDS IN INDIAN LOGISTICS INDUSTRY**

**Growth within the organised sector**

The logistics and warehousing sector in India, till now, has been highly fragmented and characterised by the presence of numerous unorganised players. A large number of players have been providing services in individual segments like transportation, warehousing, packaging etc. In 2007, organised players accounted for only 6 per cent of the total US$ 100 billion Indian logistics industry However, changing business dynamics and the entry of global third party logistics players (3PL) has led to the remodelling of the logistics services in India. From a mere combination of transportation and storage services, logistics is fast emerging as a strategic function that involves end-to-end solutions that improve efficiencies.

Logistics players that provided limited logistics services, are also planning to broaden their areas of operation. Besides expansion of distribution network by both national and regional players, the sector is also witnessing considerable M&A (merger & acquisition) activity. For instance, DHL acquired Blue Dart, TNT acquired Speedage Express Cargo Service and Fedex bought over Pafex. Consolidation within the industry will lead to economies of scale for the existing organised players, thereby lowering costs and improving efficiencies. Global logistics companies – like Gazeley Broekmen (Wal-Mart's logistics partner), CH Robinson and Kerry logistics – have also forayed into the Indian market in order to capitalise on the vast emerging opportunities within this industry. Many of them are planning to develop their own logistics parks across the country.

**Entry and expansion plans of logistics firms**

* DHL and India-based the Lemuir Group entered into a 76: 24 joint venture – DHL Lemuir Logistics Private Ltd.
* Germany-based Rhenus AG and Hyderabad based Seaways Shipping Ltd have set up a joint venture – Seaways Rhenus Logistics Ltd.
* The UAE-based Swift Freight has forayed into the Indian market.
* Blue Dart Express is planning to add 1 million square feet of warehousing space to develop 58 warehouses across the country by 2010.
* The Future Group plans to develop 3 million square feet of warehouses by 2010.
* National Bulk Handling Corporation plans to set up 200 warehouses across the country by 2012.

Another trend witnessed over the last few years has been the entry of several large Indian corporate houses – such as the Bharti group, Tatas and Reliance Industries Limited – into the logistics sector. The Indian conglomerates foresee huge potential for specialised logistics and warehousing facilities, particularly in industries like retail. Companies like Bharti, Tata Realty & Infrastructure, GE Equipment Services and Reliance Logistics cater to the logistics needs of their own group companies as well as provide services to the other companies.

The growth of the organised sector would enable the industry to provide cost-effective and integrated logistics solutions in order to meet the ever-increasing demand. As per estimates, the market share of organised logistics players is expected to double from 6 per cent in 2007 to approximately 12 per cent by 2015.

**Emerging concept of third party logistics**

Third party logistics or 3PL is a concept where a single logistics service provider manages the entire logistics function for a company. Although still at a nascent stage, the Indian 3PL industry is growing at a rapid pace. Global sourcing activity and fierce competition amongst manufacturers to cut costs have made movement of materials rather complex, giving rise to the emergence of several third party logistics players.

Fuelled by the increasing trend of outsourcing, coupled with the rapid growth in the Indian manufacturing sector, 3PL is estimated to grow at about 30 per cent annually and become a US$ 30 billion industry by 2010.

**nvestment Details/ Plan**

|  |  |
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| **Firms** | **Investment Details/ Plans****(2007-08) (in US $ mn)** |
| DHL | 250 |
| TNT | 115 |
| Gati | 200 |
| Shreyas Shipping and Logistics | 350 |

The entry of large third party logistics (3PL) carriers – like Federal Express (FedEx) and DHL – and network expansion by the existing domestic players (such as Gati and Shreyas Shipping) have also contributed to the transformation of services and the business practices across this sector.

Value added services like inventory management, warehousing, packaging, labelling, tracking of shipments etc have witnessed huge demand from the corporate sector. The end-users of 3PL services include major players from the retail, auto components and the electronics industry.

The organised 3PL market in India can be categorised into three major segments – public sector, private sector and foreign entrants. Some of the major players in each category are as illustrated. **P**

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| **Public Sector Companies** | **Foreign Entrants** | **Private Sector**  |
| Transport Corporationof India | DHL | Gati |
| Container Corporationof India | Fed Ex | Safexpress |
| Food Corporationof India | Blue Dart | RelianceCorporation Logistics |
| Central Warehouse Corporation | TNT | All cargo |

**Rapid growth of the warehousing sector**

The role of a warehouse has also transformed from a conventional storehouse to an inventory management set-up with a greater emphasis on value added services. Warehouses now provide additional services like consolidation and breaking up of cargo, packaging, labelling, bar coding, reverse logistics etc. It has emerged as a critical growth driver, leading to large investments by logistics companies for the development of warehouses and logistics parks. Warehousing and related activities currently account for about 20 per cent of the total logistics industry.

However, it is estimated that by 2010, this proportion would increase to approximately. The traditional concept of establishing warehouses in the proximity of manufacturing facilities and raw material sourcing centres is also undergoing a transformation. Today, there is an increased trend of relocating warehouses near consumer markets.

Currently, the organised warehousing industry in India has a capacity of approximately 80 million metric tonnes (MT) and is growing at 35 to 40 per cent per annum. An investment of approximately US$ 500 million is being planned by various logistics companies for the development of about 45 million square feet of warehouse space by 2012.

**Logistics parks – One-stop shop for logistics needs**

The concept of a consolidated logistics centre can be traced back to the Foreign Trade Policy of 2004, which led to the development of Free Trade Warehouse Zones (FTWZ). While FTWZ were aimed at facilitating import and export of goods, the need for a one-stop shop that could additionally cater to the domestic market led to the development of logistics parks as a part of the infrastructure industry in 2005-6. A logistics park is a notified area that facilitates domestic and foreign trade by providing services like warehousing, cold storage, multimodal transport facility, container freight stations etc. This area also acts as a place where a company can unload cargo for distribution, redistribution, packaging and repackaging.

Majority of these logistics parks will be developed in the proximity of established and emerging industrial hubs in the country in order to tap their logistics needs. By 2012, around 110 logistics parks, spread over approximately 3,500 acres, are expected to come up across India at an estimated cost of US$ 1 billion.

Majority of the upcoming logistics parks are being planned in close proximity to state capitals. However, availability of large land parcels at relatively low cost, connectivity to multiple markets across states and proximity to industrial clusters has led to the emergence of

some tier-2 and tier-3 cities as favoured destinations for the development of logistics parks and warehouses.

**VALUE ADDED AND EMERGING SERVICES**

Besides the core transportation and warehousing services, the business of logistics is evolving to encompass services that either enhance the effectiveness of existing transportation and warehousing services or cater to associated value chain elements. All such services that do not directly involve transportation and warehousing have been classified as value added and emerging services.

***Express services*** by both road and air are fast growing. While the Air Express and Courier segment is reasonably organized, the Road Express segment is relatively less developed. Sophistication and competition along with scale building among the industry players is expected to drive the need for deeper skills at the operational level and a broader range of skills at the middle and senior management levels in future.

***Track and trace*** as a technology finds limited acceptance currently but is inevitably going to become an indispensable part of transportation. Manpower that is capable of operating and maintaining the systems would be increasingly in demand.

***Cold chain*** services are likely to gain significance as organized food retail takes off. This would particularly give rise to the need for technically competent manpower capable of understanding the temperature and humidity control requirements of various perishables and operating sophisticated controlled atmosphere equipment

Value Added services associated with warehousing, such as packaging, inventory management etc. would create a corresponding demand for personnel with matching skill sets.

***The third party*** logistics (3PL) market in India is still in a relatively nascent stage While multinational companies in all industries have been predominant users of these services, domestic majors in leading industrial sectors have also begun to follow the footsteps of their multinational counterparts, starting with outsourcing their basic logistics functions. Realizing the significant cost reductions and several other benefits gained by these companies, a large number of small to medium companies in all the industries are gearing up to use 3PL services for their logistic functions, resulting in tremendous potential for 3PL market in India. As far as skills go, the 3PL business being an amalgamation of all other logistics services combined, necessitates the all round development of skills in each sub sector as far as operational and front line skills are concerned; on the middle and senior management levels, while soft skills around customer relationship management would need to be developed and enhanced on the one hand, breadth of management skills across various segments of logistics would also need to be developed.

We will now look at selected specific profiles in each of these segments the development of which would be critical for achieving and sustaining the projected growth.

**INDIAN LOGISTICS INDUSTRY – A REGIONAL PERSPECTIVE**

Industrial clusters in India can be broadly divided into four economic zones, based on the concentration of key industries like pharmaceuticals, auto and auto-components, textiles, machinery and electronic goods. The presence of these industries is likely to favourably impact the development of the logistics industries in these locations. Major states that fall in these four economic zones are:

* North: Haryana, Himachal Pradesh, Delhi and Punjab
* West: Maharashtra Gujarat and Rajasthan
* South: Andhra Pradesh, Tamil Nadu and Karnataka
* East: Orissa and West Bengal

Western India (Maharashtra, Gujarat and Rajasthan) has emerged as the most prominent destination for the logistics industry. Upsurge in In western India (Maharashtra, Gujarat and

Rajasthan), approximately 30,000 acres of land has been notified for the development of non-

IT/ITeS SEZs. This should lead to increased demand for logistical services in the region.

Southern India (Andhra Pradesh, Tamil Nadu and Karnataka) is a key automobile and auto ancillary manufacturing market. Several SEZs are expected to come up in this region, including multi-product, automobile and textile SEZs. The presence of a booming pharmaceutical, auto component and agro-input industry along with the presence of seven ports facilitating international trade are likely to give fillip to the logistics sector in southern India in near future.

Northern India (Haryana, Himachal Pradesh, Delhi and Punjab) is a well-established market for organised retail. Over the next two to three years, maximum supply of retail malls in the country will come up in northern India. Apart from textiles, the region also has major clusters of consumer goods and food processing industry.

In addition to the Golden Quadrilateral, infrastructure development projects like the Delhi-Mumbai Industrial Corridor, Kundli- Manesar-Palwal Expressway and the Taj Expressway have led to the development of several warehousing hubs and inland container depots by the logistics sector Eastern India (Orissa and West Bengal), an exploration hub, is rich in mineral deposits and has clusters of steel, consumer goods and textile industries. With increased emphasis being given to stepping up trade with China, West Bengal (which is also the gateway to north eastern states) is strategically poised to become a major logistics hub within this zone. Several logistics parks and Free Trade Warehouse Zones are being developed in this region so that the logistics requirements of ports (for international trade) and upcoming SEZs can be met.

**LOCATION ATTRACTIVENESS ANALYSIS**

A detailed analysis study of the existing and developing logistics infrastructure, manufacturing clusters and consumer markets has brought to fore key locations that would witness increased logistics activities. These locations can be classified as established, merging, promising and nascent.

**Established hubs**

These hubs offer excellent road, rail and sea port connectivity and are also witnessing significant investments in infrastructure. High penetration of organised retail, presence of industrial clusters and upcoming industrial projects and SEZs in and around these areas make these 'established' hubs all the more attractive.

Major ports and existing logistical hubs – like Mumbai, Kolkata and Chennai – fall under this category. Mumbai has emerged as the most-favoured location for the development of logistics parks. An investment of approximately US$200 million has been planned towards the development of seven to eight logistics parks on approximately 600 acres of land around Mumbai.

**Emerging hubs**

Gurgaon, Vizag, Nagpur and Indore fall under this category since these hubs have a high potential, but lack the supporting infrastructure as of now. These hubs however have major

infrastructure projects underway which are scheduled to be completed within the next three to five years. Infrastructural developments will make these hubs develop into attractive opportunities for logistics activities.

These 'emerging' logistics hubs are also characterised by high growth industries, connectivity with multiple markets and availability of large land parcels at relatively lower rates (as compared to the established hubs). They have also witnessed significant land transactions in last one year, involving logistics and warehousing projects.

**Promising hubs**

Promising hubs comprise of areas such as Jamshedpur, Alwar, Ahmedabad, Bangalore and Ambala and have considerable prospect of being developed into logistics hubs. Increase in manufacturing activities is bringing about a change in these areas and opening up opportunities for the logistics players. At present, these hubs have moderate presence of organised retail and an absence of multiple industries, though this scenario has begun to change in the last two to three years. Infrastructure in these hubs is still a challenge and needs to be enhanced in order to attract logistics players. These hubs are known for industries like oil and gas exploration, textile, oil and information technology.

**Nascent hubs**

Nascent hubs are marked by untapped market potential and limited infrastructure. The potential of these hubs is restrained by factors such as limited penetration of retail, lack of connectivity to multiple markets and the absence of multiple industries. Hubs like Kochi, an important tourist destination, fall under this category. Kochi has immense potential for growth due to the presence of an international airport and a port.

**RECENT TRENDS IN INDIAN LOGISTICS INDUTRY:**

The global logistics industry was valued at US$3.5 trillion in 2007, whereas US logistics industry size was around US$900 billion, 25% of the global logistics industry. Logistics costs in India are estimated to be around 13% of the GDP, which comes to around US$94 billion in 2006-07. However, India’s spending on logistics industry is much higher than the developed economies like the US (9.5%) and Japan (10.5%).

***AIR CARGO*:**

Air transport sector contributes over 0.2% to the country’s GDP at constant prices (1999-2000 Prices). Transport sector’s contribution to the GDP has been firming up over the last couple of years, mostly because of the growing economic activities in the country. Domestic air cargo traffic has been growing at CAGR of 12.80% from 2001-02 to 2006-07, whereas international air cargo traffic has been moving at CAGR of 13% during the same period. During 2006-07, total air cargo traffic is estimated to be over 1.56m tones against 1.4m tones during 2005-06, registering a growth rate of 14.65%.

According to the Planning Commission, India’s air cargo movements would grow at over CAGR of 11.5% from 2007-08 to 2011-12. Riding high on export of gems and jewellery, special chemicals and high-value pharmaceuticals, international air cargo traffic at all Indian airports have been growing rapidly.

***MARINE:***

Marine transport sector contributes over 0.2% to the country’s GDP at constant prices (1999 - 2000 prices). Transport sector’s contribution to the GDP has been firming up over the last couple of years, mostly because of the growing economic activities in the country. Shipping industry plays a significant role in the Indian economy. India has 12 major and 187 minor/intermediate ports along its coastline of around 7,517km. The fleet strength at the end of December 2006 was 774 vessels with 8.42m Gross Registered Tonnage (GRT). Ports serve as the gateways to the international trade in India. Major ports in India together have handled 463.84m tones of cargo in 2006-07, a growth of 9.51% against the same period of the previous year. The petroleum-oil-lubricants (POL) accounted for 33.38% of the total traffic at major ports during April-March 2007, while iron ore constituted 17.37%, coal 12.98%, container traffic 15.84%, fertilizer 3.04%, and others 17.49%.

According to the Planning Commission, India’s shipping fleet strength will be increased up to 15m GRT (as per the 3rd target) by the end of 2011-12, with an estimated investment of US$17.7 billion. The port throughput will increase up to 1,008m tones, growing at a CAGR of 10.96% from 2007-08 to 2011-12.

***RAIL:***

The plan by the Indian Railways to develop Logistics Parks [‘hubs’ in supply chain parlance] is a good one. It has the potential to streamline and optimize the supply chain and reduce the supply 8 chain costs. The service concept, service delivery and infrastructure have to be designed very well for the Railways Logistics Parks to add value to the supply chain. For the Railways Logistics Park to add value to the supply chain, at least one part of the transportation, either the incoming or outgoing, has to be by rail. The Indian Railways would have to introduce innovative train services, so that customers shift to rail from road and use trains for either the incoming or outgoing from the hub.

Currently about 80% of the products in India move by road. One simple innovation could be to introduce time-tabled container trains, time-tabled parcel trains etc. It is essential to have a few time-tabled freight trains, because reliability in a supply chain is a big cost saver [reduces inventory levels, improves customer service] If the transportation, incoming and outgoing, is by road, then the Logistics Park adds no value to the supply chain. It makes more sense, from a supply chain standpoint, to have the hub on the highway, close to the city bypass, outside the city limits, outside the octroi limits and outside any ‘No Entry’ zone. It then makes more sense for the Railways to act as a landlord and build a Mall or Hypermarket. A Mall or Hypermarket would give much better rentals and higher returns on the land that the Railways own.

**India - The Global Manufacturing Hub:**

Manufacturing hubs emerge due to a process of agglomeration. Because of agglomeration, a disproportionate surge of manufacturing is attracted to locations with a lower wage cost or higher market access or both. Thus when textiles manufacturing shifted from the US North East to the US South, then to Japan, Korea and now finally to China and India, it fits a predictable pattern. The same is true when auto industry shifted from Detroit to Mexico across the order and Brazil, then again to South East Asia. The shift from west to east is evident in industry after industry. For instance, nearly two- third of world fibre production comes from Asia today, nearly one-fourth of the world fuel demand now originates in non-Japan Asia, compared to just one-tenth in mid-seventies. To take a more recent example China, Thailand and India have contributed to 36% of the vehicle production between 2001 and 2004.

After the IT boom, a manufacturing revolution has been well underway in the Indian economy, spurred on by the increasing presence of multinationals, scaling up of operations by the domestic companies and expanding domestic market. The sector has been averaging 9 per cent in the last four years (2004-08), with a record 12.3 per cent in 2006-07.

India's manufacturing base, which is the fourth-largest among emerging economies, is among the fastest growing and has seen more investments as a proportion of gross domestic product than any country except China.

Consequently, manufacturers from across the world are transforming India--which has all the required skills in process, product, and capital engineering."Every major company has India on its radar screen," And the number of companies, spanning diverse industries, planning to make India their global hub for host of operations has only been increasing by the day.

Cummins is making India its manufacturing hub for newly developed line of generator sets; Samsung plans to make its manufacturing plant in Chennai its global hub; Ford is making India its manufacturing hub for engine manufacturing; Suzuki and Hyundai are making India the manufacturing and exports hub for small cars. In fact, all the top five telecom manufacturers have set up manufacturing facility in India.

**FUTURE OF LOGISTICS - THE INDIAN SCENARIO:**

India’s logistics sector attracted investments worth Rs. 23,200 crore in first half of 2008, according to a study by Assocham. It outclassed some of the major sectors including aviation (Rs 20,890 cr), metals and mining (Rs 8500 cr) and consumer durables (Rs 6000 cr) among others. Among the factors cited by analysts for the rapid growth of Indian logistics include the growth of organized retail industry, commodity markets, growth in manufacturing and development of Special Economic Zones. (SEZ).

According to a report by Cushman and Wakefield, real estate consultants, Indian logistics industry is expected to grow annually at the rate of 15 to 20%, reaching revenues of approximately $385 bn by 2015. Market share of organized logistics players is also expected to double to approximately 12% during the same period. The report said about 110 logistics parks spread over approximately 3,500 acres at an estimated cost of $1 bn are expected to be operational and an estimated 45 mn sq ft of warehousing space with an investment of $500 mn is expected to be developed by various logistics companies by 2012.

A large number of upcoming SEZs have necessitated the development of logistics for the domestic market as well as for global trade. Mumbai, Kolkata, Chennai and Hyderabad have become preferred locations for logistics parks. These locations are characterized by excellent port, rail, and road connectivity and are witnessing significant investment in infrastructure. Eight logistics parks with an approximate investment of $200 mn is 600 acres of land around Mumbai. According to industry analysts, almost all logistics players are in the process of setting up warehouses, container freight stations, inland container depots, logistics parks, distribution centres and other facilities to tap the trade opportunities fuelled by revolution in the retail, ports etc.

Demand for warehouses and logistics services are expected to accelerate further due to increase in foreign trade and the upcoming Maha Mumbai Special Economic Zone. Warehouse rentals in Panvel are expected to increase by 15 to 20% over the next two years. Proximity to textile and auto-component industry clusters and other manufacturing units has made Kolkata a major economic centre. Ten Special Economic Zones (SEZs) in the proximity of Kolkata have received in-principal approvals. This will result in major demand for logistics in this region.

There are plans for 4 logistics parks spread across approximately 400 acres. Centers like Haldia, Falta, Pargana, Dankuni, Kharagpur, Bantala and Durgapur are expected to witness substantial logistics activities in the near future. Five logistics parks are being set up in Hyderabad, spread across 220 acres and approximately 10 mn sq ft of warehouse space coming up by 2012. It scores high as a logistics destination as 10 it provides excellent connectivity to large markets in southern and western India and has established clusters of textile and engineering firms, as well as an important centre for the pharmaceutical industry.

**CARGO TRAFFIC AT INDIAN PORTS**

During the first half (April-September) of 2012-13 major and non-major ports in India accomplished a total cargo throughput of 455.8 million tones reflecting an increase of only 1.8% over the same period last year. This is mainly attributable to a decline of 3.3% in the cargo handled at major ports during the first half of the year. In contrast, non-major port's growth increased to 10.3% in the first half of 2012-13 compared to 8.2% in the corresponding period of 2011-12. The growth in India's GDP, Port traffic and growth in world output, world export volume and world seaborne trade (loadings and unloading) since 2006-07.

**CARGO PROFILE**

Cargo refers to goods or freight being shipped or carried by ocean, air or land from one place to another. Cargo is a general term often used regarding commercial inventory and can include any type of product or good. As an example, the freight carried in the back of a trailer from a warehouse to a commercial business would be considered cargo. The driver's personal belongings would not be considered part of that cargo.

**1.2.2 COMPANY PROFILE**

It is believed that the Cochin Port was formed in AD 1341 as a result of the heavy floods in the river Periyar. The then harbour Muziris got silted up during the floods and a new opening formed at Cochin. Thereafter, Cochin was developed as a trading hub and visited by several international travellers. Colonial conquerors having trading interest administered the Kochi area for centuries.

The transformation of Cochin from a mere roadstead into a modern harbour is credited to Sir Robert Bristow, the harbour engineer who implemented the decision of the then rulers by creating a proper shipping channel by cutting the sand bar at the mouth of the harbour, during his two decades stint at Cochin (1920-1941).
The first ship entered the Cochin harbour on 26th May 1928. Thereafter, road-rail networks were introduced to Cochin, connecting important inland trading points, making the harbour the important trading hub on the Kerala coast.

**MISSION**

The Mission of the Cochin Port Authority is to provide dependable, cost-effective Port services through modern and efficient infrastructure coupled with high quality, customer friendly services. The Port shall manage its assets and resources for optimal economic use to the Nation and the community. The Port shall strive to be the main catalyst for the economic development of the region, with a strong commitment to environmentally sound policies and safe practices. The Board of Trustees, the employees and all stakeholders of the Port shall work as a team in an open, positive, collaborative and cooperative manner. In pursuit of this Mission, the Port Authority shall be guided by the principles of integrity, ethical behaviour, professional excellence, service to the community and respect for every individual.

**VISION**

The vision of the Cochin Port is to serve the country as

* A public service provider
* An economic development facilitator
* A Business enterprise
* An environmental conservator

**GOALS**

* Strengthening our competitive position
* Maximising space and infrastructure utilization

### ****Milestones & events****

1341                            Closure of the ancient port of Muziris and widening of Cochin Gut.
1400                            Visit of Ma Huan, Chinese Ambassador and Nicolo Conti,Italian traveller.
24 December 1500      Arrival of Portuguese Admiral Cabral.
27 September 1503     Foundation stone laid for the first Portuguese Fortress in India.
1663                            Capture of Cochin by the Dutch.
20 October 1795         The Dutch surrendered to the British.
1836                            First chart of Cochin harbour made.
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1870                            Aspinwall's memorandum suggesting developing a sheltered harbour in Cochin.

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26 May 1928               First vessel crosses the channel and enters the harbour - SS Padma of Bombay Steam Navigation Co., commanded by Capt. Bullen.

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1984-85                       Dedicated fertilizer berth commissioned.
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1993-94                       Dock Labour Board merged with Cochin Port Trust.
1994-95                       Dedicated container handling facility 'Rajiv Gandhi Container Terminal' commissioned.
1996-97                       The New Administrative Office opened.
2001-02                       Boat Train Pier (BTP) reconstructed as 330m long Multi Purpose Berth.
2007-08                       Offshore Crude Oil handling facility (SBM) commissioned.
2010-11                      Commencement of first phase of International Container Transshipment Terminal, Vallarpadam with 1 million TEU capacity. A four lane NH and a new link rail to the national rail grid from the Terminal created.

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# History

# The Cochin port was formed naturally due to the great floods of Periyar in 1341 AD, which choked the Muziris port (near present-day Kodungallur), one of the greatest ports in ancient world. Ever since, Kochi became one of the major ports with extensive trading relations Romans, Greeks and Arabs, all lured by the traditional spice wealth of the state. The port further attracted European colonialists like Portuguese, Dutch and finally British who extended their supremacy over the Kingdom of Cochin and the port city of Fort Kochi. The traditional port was near Mattancherry (which still continues as Mattancherry Wharf).In 1932, the Maritime Board of British India declared the Port of Cochin as a major port. The port was opened to all vessels up to 30 feet draught. During the World War 2, the port was taken over by the Royal Navy to accommodate military cruisers and war ships. It was returned to civil authorities on 19 May 1945.

# After Independence, the port was taken over by the government of India. In 1964, the administration of the port got vested in a Board ofTrustees under the Major Port Trusts Act. The port was listed as one of the 12 major ports of India

# The Inland Waterways Authority of India (IWAI)

# The Inland Waterways Authority of India (IWAI) came into existence on 27th October 1986 for development and regulation of inland waterways for shipping and navigation.

# The Authority primarily undertakes projects for development and maintenance of IWT infrastructure on national waterways through grant received from Ministry of Shipping. The head office of the Authority is at Noida. The Authority also has its regional offices at Patna, Kolkata, Guwahati and Kochi and sub-offices at Allahabad, Varanasi, Bhaglapur, Farakka, Hemnagar, Dibrugarh (Assam), Kollam, Chennai and Vijaywada (A.P.)

# India has about 14,500 km of navigable waterways which comprise of rivers, canals, backwaters, creeks, etc. About 55 million tons of cargo is being moved annually by Inland Water Transport (IWT), a fuel - efficient and environment -friendly mode. Its operations are currently restricted to a few stretches in the Ganga-Bhagirathi-Hooghly rivers, the Brahmaputra, the Barak River, the rivers in Goa, the backwaters in Kerala, inland waters in Mumbai and the deltaic regions of the Godavari - Krishna rivers. Besides these organized operations by mechanized vessels, country boats of various capacities also operate in various rivers and canals. And substantial quantum of cargo and passengers are transported in this unorganized sector as well.

**Cargo Services**

1.Import/Export Procedure of Cargo

Importers/Exporters can import/export various types of cargo through Cochin Port. The details of cargo that can be imported/exported through Cochin Port are given in the Foreign Trade procedure 2008-09 published by Director General of Foreign Trade. Please visit http://dgft.delhi.nic.in and www.cbec.gov.in for further details.

(a) Import Documents

(1) Import General Manifest approved by Customs.

(2) Bill of Entry along with cargo charges to be filed through Customs Broker.

(3) Customs Out of Charge Certificate.

(4) Steamer Agent's Delivery Order/ Bill of Lading for ownership of the cargo.

(b) Export Documents

(1) Shipping Bill approved by Customs.

(2) Cargo charges through Customs Broker.

(3) Customs Let Export Order for the specified shipping

All documents are to be submitted online through Port Community System and Customs system.

2.Container Freight Station (CFS) Facilities and Operation

Cochin Port has a full fledged Container Freight Station with mechanised stuffing and de-stuffing service. The CFS has 10,000 Sq m of covered space and 20,000 Sq m of open space. The CFS has facility for stuffing and de-stuffing both LCL and FCL containers. The CFS operation is from 7 am to 9:15 pm on all days except Sundays and Holidays. On-wheel stuffing/de-stuffing is also provided. Facilities for palletising are also available. Security at the CFS is provided by the Port. Containers can be moved between the Container Terminal (ICTT) and the CFS also through the Ro-Ro Terminal available in Willingdon Island, near the CFS.

3. Personal Baggage Clearance

Cochin Port has facility to handle unaccompanied personal baggage received in containers. The container will be de-stuffed at the Port CFS and the goods will be examined and cleared by Customs. The customer has to submit necessary documents to Customs and Port, either through a Customs Broker or directly.

The importer shall initially submit copy of the Bill of Lading along with cargo charges and Delivery Order to Port. Appraisal Ticket shall be issued from Port for Customs examination. After Customs Clearance the importer shall submit Customs Out Of Charge stamped in Baggage Declaration for taking delivery of goods.

4. IMO Class -I cargo

Please click below to see the procedure for handling the IMO Class-I cargo at Cochin Port. The procedure is approved by the Chief Controller of Explosives.

Standard Operation Procedure

5. RO-RO Terminal

Cochin Port has set up a Ro-Ro Terminal for transporting the containers between Willingdon Island and ICTT Vallarpadam. Containers can be transported cost-effectively between the Port CFS and ICTT through the facility.

6. Bunkering

Bunker supply can be done at all berths by barge/trucks/pipeline. All major oil companies undertake supplies which is arranged through agents.

7. ​​​​​​​Pipeline Network

Dedicated POL handling facility is available at the Tanker Terminals at COT, STB and NTB. Pipeline network is also available at SCB, Q4, BTP and Q7 for handling Liquid Ammonia, Petrochemicals, POL, Edible Oil and Carbon Black Feed Stock (CBFS).

8. Information Centre

Round the clock Marine and Traffic Control Rooms are functioning at Port Control Office, and at Ernakulam Wharf and Mattancherry Wharf. Users can contact these Control Rooms for any information regarding vessel movement and cargo operation. The contact numbers are:

(1) Port Control Office - 0484 2667105 / 2582525

(2) Ernakulam Wharf Control Room - 0484-2582209

(3) Mattancherry Wharf Control Room - 0484-2582208

### ****Evolution of Cochin Port****

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2012-13                       Samudrika – cruise passenger facilitation centre commissioned.

**Marine Services**

**On Arrival:**

All ships on approaching Cochin are to contact Cochin Port Control on VHF Channel 15 / 16 and report their E.T.A. to receive instructions on Pilot boarding / anchoring. Cochin Port Control is equipped with Radar / A.I.S. based V.T.M.S. and monitors the approach of vessels towards the fairway buoy.Open anchorage is South of the Channel with clay and sand bottom offering good holding ground.Pilots board ships in the vicinity of the Buoys no. 3 & 4 (Deep drafted vessels - about 0.5 n.m. West of buoys 1 & 2). Pilot ladders are to be rigged on the lee side 1.5 m above the water line.The Pilots embark from Pilot boats with white superstructure / red hull with 'PILOTS' marked on the sides.

**Port Channels:**

The entrance to the harbour is by a 16500m long and 260 m wide 15.95 m deep outer approach channel marked with eight sets of buoys numbered from 1 to 16.  Inner harbour is divided into two navigational channels - Ernakulam Channel of 2800m long and 300 - 500 m wide with depths from 9.75 to 13.5 m and Mattancheri Channel of 2200 m long and 180 - 250 m wide with a depth of 9.75 m.Mattancheri Channel has the berths Q1 to Q4, North and South Coal berths and B.T.P.Ernakulam Channel has berths Q5 to Q10, North and South Tanker Berths and Cochin Oil Terminal.  Basin for the International Container Transhipment Terminal (ICTT) lies just north of the shipping channel along the south face of Vallarpadam island. Basin for the LNG terminal of Petronet LNG Ltd. is located north of the approach channel between buoys 14 & 16 with the jetty along the south end of Puthuvypin Island.

Tugs:

The following tugs are available in Cochin normally two tugs are used for each shipping movement as per the requirement of the Pilot and the cost of the tug is included in the Pilotage charges.

|  |  |  |  |
| --- | --- | --- | --- |
| VALLARPADAM | 2009 Built | Twin screw cycloidal propulsion | 45 Tons Bollard Pull |
| VYPEEN | 2009 Built | Twin screw cycloidal propulsion | 45 Tons Bollard Pull |

|  |  |  |
| --- | --- | --- |
| OCEAN ELITE | 2012 Built  ASD | 60 Tons Bollard Pull |
| OCEAN PIONEER | 2011 Built ASD | 60 Tons Bollard Pull |
| OCEAN ENTERPRISE | 2012 Built ASD | 60 Tons Bollard Pull |

**Cruise Facilities**

**COCHIN – THE LEADING CRUISE DESTINATION IN INDIA**

Cochin Port considers cruise as a major business prospect.  We are committed to make Cochin Port a leading cruise destination on the Indian coast offering services of international standards. Major cruise lines like Cunard Lines, Royal Caribbean Lines, Aida Cruises, Costa Cruises etc., call at Cochin Port every year.

Cochin Port has two dedicated cruise terminals, “SAMUDRIKA” at BTP  and “SAGARIKA” at Ernakulam Wharf. Both the terminals are modern world class fully air-conditioned CRUISE PASSENGER FACILITATION CENTRE  where all statutory clearances like Customs and Immigration for cruise passengers are given under single roof.

Cochin Port also has a dedicated Cruise Cell available round-the-clock to service the exact requirements of the cruise vessels.

Cochin Port offers a host of amenities for cruise vessels like walk-in-berthing, assured quality bunkers, fresh water services, and grey water reception facility.

Fort Kochi which is a heritage site with influence of the Dutch, Portugese, and the British from the colonial times is near the Port.  The Jewish Synagogue in Mattancherry is a testament to the welcoming ways of Kerala dating back centuries.

Backwater cruises where one can experience the scenic splendours of Kerala including Kumarakom take off from near the Port. Fort Kochi and Mattancherry have shopping malls for handicrafts, oriental clothing, spices, and antiques.  Cochin Port also has several star hotels in the vicinity.

**SoP for Entry and Outward Clearance of Pleasure Yachts calling Cochin Port**

DTPC Ernakulam created a new website for online booking facility for Auto and Taxi Tours, in connection with the arrival of Cruise vessels at Cochin Port.  Website link is given below:

Government of India has relaxed cabotage restrictions for cruise vessels so that it is possible to transport Indians from one Indian Port to another on foreign cruise vessels transiting through India.

Cochin Port aims at being a major cruise destination and a gateway to Kerala which has been described as God’s own Country by leading travel magazines.

**Advantage of Cochin Port**

**LOCATION**

Cochin, an all weather natural Harbour is located strategically close to the busiest international sea routes:

(1) Gulf to Singapore and Far East (Distance from Cochin Port -11 Nautical Miles)

(2) Suez to Singapore / Far East (Distance from Cochin Port -74 Nautical Miles)

Amongst all major Indian ports, Cochin is the closest to the International East West Shipping routes. This geo-strategic location of Cochin gives it a distinct advantage

 **MODERATE CLIMATE**

The Port is situated on the Willingdon Island which is an artificial Island tucked inside the Backwaters. The backwaters offer calm and placid channels for ships throughout the year, even during the Monsoon season.

Cochin lies beyond the cyclone zone and therefore the risk of cyclones is negligible

 **OPERATIONAL EFFICIENCY**

24 Hour Pilotage

24 hour Cargo Operations

Real-Time co-ordination of vessel movement through VTMS

Single Window Transaction

Moving towards Zero Pre-Berthing Detention Time.

 **SERVICE QUALITY**

The operational areas of the port is certified to ISO 9001:2015 standards.

The port maintains high security arrangements and its security profile is ISPS compliant.

The port is maintaining a Tier I Oil spill disaster contingency plan. During the past three years, no oil spill has occurred in and around the port

 **CONNECTIVITY**

Cochin port is connected to its hinterland enlarging to the state of Kerala ,South Tamilnadu and South Karnataka by National Highways NH 47(Kanyakumari-Salem), NH49 (Cochin-Madurai) and NH17(Cochin-Mumbai) .Indian Railway Network provides seamless connectivity to South and Central India.The National Waterway NW3 provides connectivity to the South Kerala.The port has an international airport in its proximity. The network of railways roads, waterways and airways has created good accessibility to the port.

 Inland Container Depots (ICD) at Coimbatore and Bangalore connected by Regular Train Service

 **DEVELOPMENT PATH**

Cochin Port is implementing ERP for enhancing efficiency.

The port is enhancing capacity by modernizing and enlarging the Mattancherry Wharf

The port is upgrading its power infrastructure.

The port is equipping its new multi-purpose berths with modern Bulk/Break Bulk handling Cranes.

The port is developing India?s first Port Based Special Economic Zone.

 **Cargo and Container handling equipments**

One  40 T Mobile Harbour Crane ItalGru make at E/Wharf.

One  Heavy Duty Reach stacker of TIL-HYSTER make of 45 T capacity each.

Five 3 T Fork Lift Trucks of Komatsu and Voltas Kion makes  for stuffing and de stuffing operations .

One 5 T Fork Lift of Voltas Kion make  for handling heavy cargo.

**CHAPTER 2**

**RESEARCH METHODOLOGY**

**2.1 STATEMENT OF THE PROBLEM**

High-risk cargo handling efficiencies, this study will contribute valuable knowledge that can enhance strategic planning, operational execution, and risk management for logistics companies operating in global markets. It will also offer recommendations that could be implemented by maritime ports to optimize their handling of hazardous cargoes, thus fostering a safer, more efficient, and compliant global supply chain environment.

**2.2 OBJECTIVES OF THE STUDY**

* To relate to high-risk cargo at Cochin Port and their alignment with best practices in the industry.
* To Evaluate the technological and infrastructural support that Cochin Port provides for the handling of hazardous materials.
* To Analyze safety and compliance metrics to understand how risks are mitigated and regulations adhered to during the handling processes.
* To Identify challenges and bottlenecks that affect the efficiency of high-risk cargo operations and propose actionable solutions.

**2.3 RESEARCH METHODOLOGY**

Research is defined as a scientific and systematic search for pertinent information on a specific topic. Research is an art of scientific investigation. It is a careful investigation or inquiry especially through search of new fact is any branch of knowledge. It is the systematized effort to gain new knowledge. It is an academic activity and as such, the term should be used in technical sense. Research is thus, an original contribution to the pursuit of truth with the help of study, observation, comparison and experiment. In short, the search of knowledge through objective and systematic method of finding a solution to problem is research. As a research, defining, evaluation and organizing data; making deductions and conclusion; and finally carefully testing the conclusion to determine whether they fit the formulating hypotheses is priority.

**Research Design**

The research design undertaking by the researcher is “Descriptive research ’’. The methodology involved in this design is mostly qualitative in nature. The major purpose to this descriptive research is the description of the state of affairs as it exists at present. The researcher has no control over the variable and can only report what that has happened or what is happening.

**Method of Data Collection**

**Primary Data Collection.**

The response would be at their liberty to represent their view and the data collection by questionnaire method which it is conducted in a fair manner.

**TYPES OF DATA:**

Data is the basis input to any decision making process in a business. The processing of data gives statistics of importance of the study. The reliability of managerial decisions depends upon the quality of data. The quality of data can be expressed in term of its representative feature of the reality which can be ensured by the usage of a fitting data collection method. There are two types of data, namely.

* Primary data
* Secondary data

**2.4 SAMPLING:**

Sampling s the process of selecting units from a population on interest so that by studying they sample we may fairly generalize our results back to the population from which they were chosen. The importance of the theory of sampling lines in the facts that for a large population, it is neither practical nor possible to collect the data from each and every number of the population.

**SAMPLE SIZE:**

In view of the time constraints, the sample size is as 100.

**PRIMARY DATA:**

Primary data are those which are collected afresh and for the first time and hence, happen to be original in character. Such data are published by authorities who themselves are responsible for their collection. The collection of primary data thus requires a great deal of deliberation and expertise. Depending upon the nature of information required, the following method of collecting primary data are available.

**PERCENTAGE ANALYSIS**

Percentage analysis shows the entire population in term of percentages. It reveals the number of belonging is a particular category or the number of people preferring a particular thing, etc., in term of percentage. In this study, the number of people who responded in a particular manner is interpreted in the form of percentages.

Each table has been calculated on the basis of percentage.

Percentage analysis = No of respondents × 100

 Total respondents

**2.5 LIMITATION OF THE STUDY**

* To study may focus on a specific organization or industry, which limits the generalizability of the findings to other contexts.
* The study heavily relies on the availability and accuracy of data from the organization or industry being researched.
* External factors beyond the control of the study, such as changes in market conditions, economic fluctuations, or industry-specific regulations, may impact the material management practices and outcomes, introducing potential confounding variables.
* The interpretation of data and analysis may be subjective, influenced by the researchers' biases or perspectives.

**CHAPTER -3**

**LITERATURE REVIEW &CONCEPTUAL FRAMEWORK**

**3.1 REVIEW OF LITERATURE**

Fanny Saruchera,2020. Determinants of effective high-risk cargo logistics at sea ports : a case study Background: In recent decades, accidents involving hazardous goods at seaports have become a major concern worldwide resulting in international conventions and interventions to minimise the impact of such accidents. Despite the improvements in safety measures and the enhancement of cargo handlers&#39; knowledge over the years, port accidents involving dangerous substances still continue to occur. Objectives: The study explores the determinants of effective high-risk cargo (HRC) handling at seaports, focusing on Namibian seaports. The study was aimed at establishing the elements of HRC logistics processes and to determine factors influencing the effectiveness of HRC handling procedures followed by the seaports. Method: An integrated research strategy was adopted, backed by the employment of mixed research methods, through seven key informant interviews and a quantitative survey involving 81 port employees. Results: The results of the study confirmed the totality of HRC logistics activities at Namibian seaports. It emerged from the study that there were factors that facilitated and that hindered the effectiveness of HRC logistics activities at Namibian seaports. The study confirmed the association between HRC training and the level of knowledge of risk mitigation and emergency procedures, documentation understanding and regulations adherence. This guided in proposing a new theory for the determinants of HRC logistics in developing economies. Conclusion: The study&#39;s findings provided sufficient evidence to suggest that HRC logistics safety processes at seaports can be improved through the proposed framework. The study&#39;s findings have important repercussions for re-shaping public policy, especially as coastal economies worldwide compete towards becoming preferred logistics hubs.

P Hudson,2003. Applying the lessons of high risk industries to health care High risk industries such as commercial aviation and the oil and gas industry have achieved exemplary safety performance. This paper reviews how they have managed to do that. The primary reasons are the positive attitudes towards safety and the operation of effective formal safety management systems. The safety culture provides an important explanation of why such organisations perform well. An evolutionary model of safety culture is provided in which there is a range of cultures from the pathological through the reactive to the calculative. Later, the proactive culture can evolve towards the generative organisation, an alternative description of the high reliability organisation. The current status of health care is reviewed, arguing that it has a much higher level of accidents and has a reactive culture, lagging behind both high risk industries studied in both attitude and systematic management of patient risks.

Huw J W Thomas, Gareth D Evans6,2002 Guidelines for colorectal cancer screening and surveillance in moderate and high risk groups . The British Society of Gastroenterology (BSG) and the Association of Coloproctology for Great Britain and Ireland (ACPGBI) commissioned this update of the 2002 guidance. The aim, as before, is to provide guidance on the appropriateness, method and frequency of screening for people at moderate and high risk from colorectal cancer. This guidance provides some new recommendations for those with inflammatory bowel disease and for those at moderate risk resulting from a family history of colorectal cancer. In other areas guidance is relatively unchanged, but the recent literature was reviewed and is included where appropriate.

Antonio Verdejo-García, 2008 ,Impulsivity as a vulnerability marker for substance-use disorders: Review of findings from high-risk research, problem gamblers and genetic association studies. There is a longstanding association between substance-use disorders (SUDs) and the psychological construct of impulsivity. In the first section of this review, personality and neurocognitive data pertaining to impulsivity will be summarised in regular users of four classes of substance: stimulants, opiates, alcohol and 3,4-methylenedioxymethamphetamine (MDMA). Impulsivity in these groups may arise via two alternative mechanisms, which are not mutually exclusive. By one account, impulsivity may occur as a consequence of chronic exposure to substances causing harmful effects on the brain. By the alternative account, impulsivity pre-dates SUDs and is associated with the vulnerability to addiction. We will review the evidence that impulsivity is associated with addiction vulnerability by considering three lines of evidence: (i) studies of groups at high-risk for development of SUDs; (ii) studies of pathological gamblers, where the harmful consequences of the addiction on brain structure are minimised, and (iii) genetic association studies linking impulsivity to genetic risk factors for addiction. Within each of these three lines of enquiry, there is accumulating evidence that impulsivity is a pre-existing vulnerability marker for SUDs.

M. John ChapmanTriglyceride-rich lipoproteins and high-density lipoprotein cholesterol in patients at high risk of cardiovascular disease: evidence and guidance for management, Even at low-density lipoprotein cholesterol (LDL-C) goal, patients with cardiometabolic abnormalities remain at high risk of cardiovascular events. This paper aims (i) to critically appraise evidence for elevated levels of triglyceride-rich lipoproteins (TRLs) and low levels of high-density lipoprotein cholesterol (HDL-C) as cardiovascular risk factors, and (ii) to advise on therapeutic strategies for management. Current evidence supports a causal association between elevated TRL and their remnants, low HDL-C, and cardiovascular risk. This interpretation is based on mechanistic and genetic studies for TRL and remnants, together with the epidemiological data suggestive of the association for circulating triglycerides and cardiovascular disease. For HDL, epidemiological, mechanistic, and clinical intervention data are consistent with the view that low HDL-C contributes to elevated cardiovascular risk; genetic evidence is unclear however, potentially reflecting the complexity of HDL metabolism. The Panel believes that therapeutic targeting of elevated triglycerides (?1.7 mmol/L or 150 mg/dL), a marker of TRL and their remnants, and/or low HDL-C (<1.0 mmol/L or 40 mg/dL) may provide further benefit. The first step should be lifestyle interventions together with consideration of compliance with pharmacotherapy and secondary causes of dyslipidaemia. If inadequately corrected, adding niacin or a fibrate, or intensifying LDL-C lowering therapy may be considered. Treatment decisions regarding statin combination therapy should take into account relevant safety concerns, i.e. the risk of elevation of blood glucose, uric acid or liver enzymes with niacin, and myopathy, increased serum creatinine and cholelithiasis with fibrates. These recommendations will facilitate reduction in the substantial cardiovascular risk that persists in patients with cardiometabolic abnormalities at LDL-C goal.

Valentin Fuster, Pedro R. Moreno,2005,Atherothrombosis and High-Risk Plaque: Part I: Evolving Concepts, Atherothrombosis is a complex disease in which cholesterol deposition, inflammation, and thrombus formation play a major role. Rupture of high-risk, vulnerable plaques is responsible for coronary thrombosis, the main cause of unstable angina, acute myocardial infarction, and sudden cardiac death. In addition to rupture, plaque erosion may also lead to occlusive thrombosis and acute coronary events. Atherothrombosis can be evaluated according to histologic criteria, most commonly categorized by the American Heart Association (AHA) classification. However, this classification does not include the thin cap fibroatheroma, the most common form of high-risk, vulnerable plaque. Furthermore, the AHA classification does not include plaque erosion. As a result, new classifications have emerged and are reviewed in this article. The disease is asymptomatic during a long period and dramatically changes its course when complicated by thrombosis. This is summarized in five phases, from early lesions to plaque rupture, followed by plaque healing and fibrocalcification. For the early phases, the role of endothelial dysfunction, cholesterol transport, high-density lipoprotein, and proteoglycans are discussed. Furthermore, the innate and adaptive immune response to autoantigens, the Toll-like receptors, and the mechanisms of calcification are carefully analyzed. For the advanced phases, the role of eccentric remodeling, vasa vasorum neovascularization, and mechanisms of plaque rupture are systematically evaluated. In the final thrombosis section, focal and circulating tissue factor associated with apoptotic macrophages and circulatory monocytes is examined, closing the link between inflammation, plaque rupture, and blood thrombogenicity.

 Lukasz Andrzej Derdowski Psychosocial factors and safety in high-risk industries: A systematic literature review. Most large-scale industrial catastrophes (like the Deepwater Horizon oil spill, or Fukushima-Daiichi nuclear disaster) result from a combination of faults in technical arrangements and neglected social structures featuring a workplace. Whereas it has been acknowledged that human-factor causes can be attributed to accidents in high-risk industries, research in this domain remains scattered and in need of integration. Considered from a psychological perspective, the primary objective of this study is therefore to systematically review existing associations between psychosocial work characteristics and safety in high-risk industries. While grounded in the Job Demands-Resources (JD-R) theoretical model, this study adopts a systematic literature methodology and synthesizes identified empirical evidence through a framework synthesis approach. Results indicate that there is preliminary evidence of a link between the exposure to workplace psychosocial factors and safety in high-risk industries. Studies of the linkages between psychosocial factors and safety behavior are more prevalent and do more often find significant associations between the variables than studies that investigate associations between psychosocial factors and safety outputs. Moreover, results indicate that job demand factors are likely to trigger employees’ health-impairing mental/physical conditions that can constitute a precursor of unsafe behavior. Results imply as well the existence of a link between work-induced psychosocial states (typically in a form of stress or exhaustion) and safety. Limitations in the existing evidence base are recognized, thoroughly discussed with several suggestions for further development of the research field being offered. Practical and theoretical implications of the results are presented.

Z. A. Fayad and V. Fuster Clinical Imaging of the High-Risk or Vulnerable Atherosclerotic Plaque, The study of atherosclerotic disease during its natural history and after therapeutic intervention will enhance our understanding of disease progression and regression and aid in selecting appropriate treatments. Several invasive and noninvasive imaging techniques are available to assess atherosclerotic vessels. Most of the standard techniques identify luminal diameter, stenosis, wall thickness, and plaque volume; however, none can characterize plaque composition and therefore identify the high-risk plaques. We will present the different imaging modalities that have been used for the direct assessment of the carotid, aortic, and coronary atherosclerotic plaques. We will review in detail the use of high-resolution, multicontrast magnetic resonance for the noninvasive imaging of vulnerable plaques and the characterization of plaques in terms of their various components (ie, lipid, fibrous, calcium, or thrombus)

Amy J. Mathers, Gisele Peirano, The Role of Epidemic Resistance Plasmids and International High-Risk Clones in the Spread of Multidrug-Resistant Enter obacteriaceae Escherichia coli sequence type 131 (ST131) and Klebsiella pneumoniae ST258 emerged in the 2000s as important human pathogens, have spread extensively throughout the world, and are responsible for the rapid increase in antimicrobial resistance among E. coli and K. pneumoniae strains, respectively. E. coli ST131 causes extraintestinal infections and is often fluoroquinolone resistant and associated with extended-spectrum β-lactamase production, especially CTX-M-15. K. pneumoniae ST258 causes urinary and respiratory tract infections and is associated with carbapenemases, most often KPC-2 and KPC-3. The most prevalent lineage within ST131 is named fimH30 because it contains the H30 variant of the type 1 fimbrial adhesin gene, and recent molecular studies have demonstrated that this lineage emerged in the early 2000s and was then followed by the rapid expansion of its sublineages H30-R and H30-Rx. K. pneumoniae ST258 comprises 2 distinct lineages, namely clade I and clade II. Moreover, it seems that ST258 is a hybrid clone that was created by a large recombination event between ST11 and ST442. Epidemic plasmids with bla CTX-M and bla KPC belonging to incompatibility group F have contributed significantly to the success of these clones. E. coli ST131 and K. pneumoniae ST258 are the quintessential examples of international multidrug-resistant high-risk clones.

Rae-Ellen W. Kavey, Vivek Allada,2006 , Although for most children the process of atherosclerosis is subclinical, dramatically accelerated atherosclerosis occurs in some pediatric disease states, with clinical coronary events occurring in childhood and very early adult life. As with most scientific statements about children and the future risk for cardiovascular disease, there are no randomized trials documenting the effects of risk reduction on hard clinical outcomes. A growing body of literature, however, identifies the importance of premature cardiovascular disease in the course of certain pediatric diagnoses and addresses the response to risk factor reduction. For this scientific statement, a panel of experts reviewed what is known about very premature cardiovascular disease in 8 high-risk pediatric diagnoses and, from the science base, developed practical recommendations for management of cardiovascular risk.Cardiovascular Risk Reduction in High-Risk Pediatric Patients.

Lukasz Andrzej Derdowski,2023.Psychosocial factors and safety in high-risk industries: A systematic literature review. Most large-scale industrial catastrophes (like the Deepwater Horizon oil spill, or Fukushima-Daiichi nuclear disaster) result from a combination of faults in technical arrangements and neglected social structures featuring a workplace. Whereas it has been acknowledged that human-factor causes can be attributed to accidents in high-risk industries, research in this domain remains scattered and in need of integration. Considered from a psychological perspective, the primary objective of this study is therefore to systematically review existing associations between psychosocial work characteristics and safety in high-risk industries. While grounded in the Job Demands-Resources (JD-R) theoretical model, this study adopts a systematic literature methodology and synthesizes identified empirical evidence through a framework synthesis approach. Results indicate that there is preliminary evidence of a link between the exposure to workplace psychosocial factors and safety in high-risk industries. Studies of the linkages between psychosocial factors and safety behavior are more prevalent and do more often find significant associations between the variables than studies that investigate associations between psychosocial factors and safety outputs. Moreover, results indicate that job demand factors are likely to trigger employees’ health-impairing mental/physical conditions that can constitute a precursor of unsafe behavior. Results imply as well the existence of a link between work-induced psychosocial states (typically in a form of stress or exhaustion) and safety. Limitations in the existing evidence base are recognized, thoroughly discussed with several suggestions for further development of the research field being offered. Practical and theoretical implications of the results are presented.

Z. A. Fayad and V. Fuster ,2021Clinical Imaging of the High-Risk or Vulnerable Atherosclerotic Plaque The study of atherosclerotic disease during its natural history and after therapeutic intervention will enhance our understanding of disease progression and regression and aid in selecting appropriate treatments. Several invasive and noninvasive imaging techniques are available to assess atherosclerotic vessels. Most of the standard techniques identify luminal diameter, stenosis, wall thickness, and plaque volume; however, none can characterize plaque composition and therefore identify the high-risk plaques. We will present the different imaging modalities that have been used for the direct assessment of the carotid, aortic, and coronary atherosclerotic plaques. We will review in detail the use of high-resolution, multicontrast magnetic resonance for the noninvasive imaging of vulnerable plaques and the characterization of plaques in terms of their various components (ie, lipid, fibrous, calcium, or thrombus).

Adeeb Sidani, 2023,Catalysing Construction Safety: A Comparative Analysis of Technological Advancements across High-Risk Industries. Abstract: This article presents a comprehensive review of the safety status and technological development in high-risk industries, with a focus on construction, mining, agriculture, transportation, healthcare, and energy sectors. The objective is to analyse and compare the current safety practices, challenges, and advancements in these industries to identify common trends, knowledge gaps, and potential areas for improvement. The review explores the incidence of accidents, associated costs, traditional safety methods, limitations, and emerging technologies employed to enhance safety across multiple industries. This review aims to provide insights and lessons that can be applied to enhance safety practices in the construction industry. The findings highlight the critical role of technological advancements in mitigating risks and fostering a culture of safety across diverse sectors.

Edward K Kasper, 2002,A randomized trial of the efficacy of multidisciplinary care in heart failure outpatients at high risk of hospital readmission. We sought to determine whether a multidisciplinary outpatient management program decreases chronic heart failure (CHF) hospital readmissions and mortality over a six-month period.Hospital admission for CHF is an important problem amenable to improved outpatient managementTwo hundred patients hospitalized with CHF at increased risk of hospital readmission were randomized to a multidisciplinary program or usual care. A study cardiologist and a CHF nurse evaluated each patient and made recommendations to the patient’s primary physician before randomization. The intervention team consisted of a cardiologist, a CHF nurse, a telephone nurse coordinator and the patient’s primary physician. Contact with the patient was on a prespecified schedule. The CHF nurse followed an algorithm to adjust medications. Patients in the nonintervention group were followed as usual. The primary outcome was the composite of the number of CHF hospital admissions and deaths over six months, compared by using a log transformation ttest by intention-to-treat analysis.

The median age of the study patients was 63.5 years, and 39.5% were women. There were 43 CHF hospital admissions and 7 deaths in the intervention group, as compared with 59 CHF hospital admissions and 13 deaths in the nonintervention group (p = 0.09). The quality-of-life score, percentage of patients on target vasodilator therapy and percentage of patients compliant with diet recommendations were significantly better in the intervention group. Cost per patient, in 1998 U.S. dollars, was similar in both groups This study demonstrates that a six-month, multidisciplinary approach to CHF management can improve important clinical outcomes at a similar cost in recently hospitalized high-risk patients with CHF.

Racial Disparities Among Clinical High-Risk and First-Episode Psychosis Multisite Research Participants: A Systematic ReviewThe NIH has mandated equal representation of Black, Indigenous, and people of color (BIPOC) individuals in clinical research, but it is unclear whether such inclusion has been achieved in multisite research studies of individuals at clinical high risk for psychosis or with first-episode psychosis (FEP). An assessment of inclusion rates is important for understanding the social determinants of psychosis and psychosis risk that specifically affect BIPOC individuals.The authors conducted a systematic review of the literature published between 1993 and 2022 of multisite research studies of clinical high risk for psychosis and FEP in North America to determine ethnoracial inclusion rates. Using an online systematic review tool, the authors checked 2,278 studies for eligibility. Twelve studies met all inclusion criteria. Data were extracted, and demographic characteristics, socioeconomic status, study design, and recruitment strategies used by each study were analyzed.Most (62%) of the participants in studies of clinical high risk for psychosis were White. Compared with national data, the demographic characteristics of individuals with clinical high risk were representative across most ethnoracial groups. Black participants (43%) made up the largest ethnoracial group in FEP studies and were overrepresented compared with their representation in the U.S. population. FEP studies were more likely to recruit participants from community mental health centers than were the studies of clinical high risk. Although these results suggest high representation of BIPOC individuals in psychosis research, opportunities exist for an improved focus on ethnoracial representation. The authors offer recommendations for practices that may increase ethnoracial diversity in future psychosis study samples.

Kumaran Kolandaivelu Stent Thrombogenicity Early in High-Risk Interventional Settings Is D We examined whether drug-eluting coatings are inherently thrombogenic and if the response to these materials was determined to a greater degree by stent design and deployment with custom-built stents. Drug/polymer coatings uniformly reduce rather than increase thrombogenicity relative to matched bare metal counterparts (0.65-fold; P=0.011). Thick-strutted (162 μm) stents were 1.5-fold more thrombogenic than otherwise identical thin-strutted (81 μm) devices in ex vivo flow loops (P<0.001), commensurate with 1.6-fold greater thrombus coverage 3 days after implantation in porcine coronary arteries (P=0.004). When bare metal stents were deployed in malapposed or overlapping configurations, thrombogenicity increased compared with apposed, length-matched controls (1.58-fold, P=0.001; and 2.32-fold, P<0.001). The thrombogenicity of polymer-coated stents with thin struts was lowest in all configurations and remained insensitive to incomplete deployment. Computational modeling–based predictions of stent-induced flow derangements correlated with spatial distribution of formed clots.Contrary to popular perception, drug/polymer coatings do not inherently increase acute stent clotting; they reduce thrombosis. However, strut dimensions and positioning relative to the vessel wall are critical factors in modulating stent thrombogenicity. Optimal stent geometries and surfaces, as demonstrated with thin stent struts, help reduce the potential for thrombosis despite complex stent configurations and variability in deploymriven by Stent Design and Deployment and Protected by Polymer-Drug Coatings Persistence and load of high-risk HPV are predictors for development of high-grade cervical lesions: A longitudinal French cohort study

Deficient Suppression of Default Mode Regions during Working Memory in Individuals with Early Psychosis and at Clinical High-Risk for Psychosis Susanna L. Fryer1, The default mode network (DMN) is a set of brain regions typically activated at rest and suppressed during extrinsic cognition. Schizophrenia has been associated with deficient DMN suppression, though the extent to which DMN dysfunction predates psychosis onset is unclear. This study examined DMN suppression during working memory (WM) performance in youth at clinical high-risk (CHR) for psychosis, early schizophrenia (ESZ) patients, and healthy controls (HC). We hypothesized that the DMN would show load-dependent suppression during WM retrieval in HC but not in ESZ, with CHR participants showing an intermediate pattern. While HC showed WM load-dependent modulation of DMN suppression, CHR individuals had deficient higher-load DMN suppression that was similar to, but less pronounced than, the distributed suppression deficits evident in ESZ patients. These results suggest that DMN dysregulation associated with schizophrenia predates psychosis onset.

Wei Liu, Lan Wu, Xue-Min Shen, Lin-Jun Shi, Chen-Ping Zhang, Li-Qun Xu 2013Expression patterns of cancer stem cell markers ALDH1 and CD133 correlate with a high risk of malignant transformation of oral leukoplakia Molecular markers for predicting oral cancer development in premalignant oral leukoplakia (OL) are urgently needed. The objective of this study was to examine the expression patterns of cancer stem cell markers ALDH1 and CD133 in samples from patients with OL, and determine their prognostic values for subsequent development of oral cancer. Immunohistochemistry for ALDH1 and CD133 was performed in samples from a cohort of 141 patients with biopsy-proven OL who received a mean follow-up of 5.5 years. Patient clinicopathologic and follow-up data were analyzed. Expression of ALDH1 and CD133 was observed in 54 (38.3%) and 32 (22.7%) of 141 patients with OL, respectively. Kaplan–Meier analysis showed that 48.1% patients with ALDH1-positivity developed oral cancer compared with 12.6% those with ALDH1-negativity (p < 0.001). Meanwhile, 59.4% patients with CD133-positivity developed oral cancer compared with 16.5% those with CD133-negativity (p < 0.001). Multivariate analysis revealed that ALDH1 and CD133 expression was associated with 4.17-fold [95% confidence interval (CI), 1.96–8.90; p < 0.001] and 2.86-fold (95% CI, 1.48-5.55; p = 0.002) increased risk of OL transformation, respectively. Collectively, these data demonstrated for the first time that the expression of ALDH1 and CD133 correlated with malignant transformation in a large series of patients with OL who received a long-term follow-up, which suggests that they may serve as predictors to identify OL with a high risk of oral cancer development.

Jennifer Hammond, 2022,Oral Nirmatrelvir for High-Risk, Nonhospitalized Adults with Covid-19 Nirmatrelvir is an orally administered severe acute respiratory syndrome coronavirus 2 main protease (Mpro) inhibitor with potent pan–human-coronavirus activity in vitro. progression to severe Covid-19 that was 89% lower than the risk with placebo, without evident safety concerns. (Supported by Pfizer; ClinicalTrials.gov number, Treatment of symptomatic Covid-19 with nirmatrelvir plus ritonavir resulted in a risk of progression to severe Covid-19 that was 89% lower than the risk with placebo, without evident safety concerns.

Eileen M. Burd Human Papillomavirus and Cervical Cancer Of the many types of human papillomavirus (HPV), more than 30 infect the genital tract. The association between certain oncogenic (high-risk) strains of HPV and cervical cancer is well established. Although HPV is essential to the transformation of cervical epithelial cells, it is not sufficient, and a variety of cofactors and molecular events influence whether cervical cancer will develop. Early detection and treatment of precancerous lesions can prevent progression to cervical cancer. Identification of precancerous lesions has been primarily by cytologic screening of cervical cells. Cellular abnormalities, however, may be missed or may not be sufficiently distinct, and a portion of patients with borderline or mildly dyskaryotic cytomorphology will have higher-grade disease identified by subsequent colposcopy and biopsy. Sensitive and specific molecular techniques that detect HPV DNA and distinguish high-risk HPV types from low-risk HPV types have been introduced as an adjunct to cytology. Earlier detection of high-risk HPV types may improve triage, treatment, and follow-up in infected patients. Currently, the clearest role for HPV DNA testing is to improve diagnostic accuracy and limit unnecessary colposcopy in patients with borderline or mildly abnormal cytologic test results.

Pedometer Use Among Adults at High Risk of Type 2 Diabetes, Finland, 2007-2008 Eveliina Korkiakangas, MNSc, A pedometer helps adults exercise more, but sedentary adults need instruction and advice to be motivated to use one. We conducted this qualitative study to describe the experiences of participants at high risk of type 2 diabetes who began using a pedometer. edometers were useful tools for observing levels of exercise, setting personal goals for walking, and helping evaluate whether daily goals were met. Negative experiences were associated with functional failures, pedometers' unsuitability for exercise other than walking, and the goal of 10,000 steps, which some participants considered too high. Sedentary adults can be motivated to use a pedometer if we inform them that regular users find it a useful instrument for increasing their level of exercise. These adults should set realistic goals for walking and receive adequate instructions for using pedometers.

Adjuvant Sunitinib in High-Risk Renal-Cell Carcinoma after Nephrectomy Alain Ravaud, M.D.,2016 Sunitinib, a vascular endothelial growth factor pathway inhibitor, is an effective treatment for metastatic renal-cell carcinoma. We sought to determine the efficacy and safety of sunitinib in patients with locoregional renal-cell carcinoma at high risk for tumor recurrence after nephrectomy. In this randomized, double-blind, phase 3 trial, we assigned 615 patients with locoregional, high-risk clear-cell renal-cell carcinoma to receive either sunitinib (50 mg per day) or placebo on a 4-weeks-on, 2-weeks-off schedule for 1 year or until disease recurrence, unacceptable toxicity, or consent withdrawal. The primary end point was disease-free survival, according to blinded independent central review. Secondary end points included investigator-assessed disease-free survival, overall survival, and safety.

Elisabet Forsgren ,2022 high-risk areas for introduction of new alien species: the case of the invasive round goby, a door-knocker for Norway dentifying new areas of colonisation by alien species is important for early detection and management. Door-knocker species pose problems for traditional predictive models because of lacking presence–absence data, but habitat suitability modelling might overcome this. We here identify the most likely areas for introduction and first establishment of the invasive round goby Neogobius melanostomus to Norway, where it has not yet been registered. We implemented knowledge on dispersal pathways and the species’ biology in a simplified suitability model based on spatial data representing the most relevant environmental variables: distance to international harbours in Norway, distance to the closest population in neighbouring country, salinity, wave exposure, depth and water temperature. The results suggest that there are many potential localities for introduction and first establishment and reveal several hotspots of such areas, especially in less-exposed coastal brackish areas of southern Norway. Especially the region around the Oslo Fjord stands out as being associated with higher risk. Our results could guide future monitoring programmes and increase the chance of early detection of this potential new invader. The study illustrates how spatial analyses can be used to identify the most likely areas for future invasion by an aquatic door-knocker species despite lacking presence–absence data.

Prof Karim Fizazi, MD Abiraterone acetate plus prednisone in patients with newly diagnosed high-risk metastatic castration-sensitive prostate cancer (LATITUDE): final overall survival analysis of a randomised, double-blind, phase 3 triaL. In the interim analyses of the LATITUDE study, the addition of abiraterone acetate plus prednisone to androgen deprivation therapy (ADT) led to a significant improvement in overall survival and radiographic progression-free survival compared with placebos plus ADT in men with newly diagnosed high-risk metastatic castration-sensitive prostate cancer (mCSPC). Here, we present long-term survival outcomes and safety of abiraterone acetate plus prednisone and ADT from the final analysis of the LATITUDE study. Between Feb 12, 2013, and Dec 11, 2014, 1209 patients were screened, of whom ten were ineligible because of study site violations. 1199 patients were randomly assigned to either the abiraterone acetate plus prednisone group (n=597) or placebo group (n=602). After the results of the first interim analysis (cutoff date Oct 31, 2016), the study was unmasked to patients and investigators, and patients in the placebo group were allowed to cross over to receive abiraterone acetate and prednisone plus ADT treatment as per a protocol amendment (Feb 15, 2017) in an open-label extension phase of the study (up to 18 months from the protocol amendment). This final analysis (data cutoff Aug 15, 2018) was done after a median follow-up of 51·8 months (IQR 47·2–57·0) and 618 deaths (275 [46%] of 597 in the abiraterone acetate plus prednisone group and 343 [57%] of 602 in the placebo group). Overall survival was significantly longer in the abiraterone acetate plus prednisone group (median 53·3 months [95% CI 48·2–not reached]) than in the placebo group (36·5 months [33·5–40·0]), with a hazard ratio of 0·66 (95% CI 0·56–0·78; p<0·0001). The most common grade 3–4 adverse events were hypertension (125 [21%] in the abiraterone acetate plus prednisone group vs 60 [10%] in the placebo group vs three [4%] in the 72 patients who crossed over from placebo to abiraterone acetate plus prednisone) and hypokalaemia (70 [12%] vs ten [2%] vs two [3%]). Serious adverse events of any grade occurred in 192 (32%) of 597 patients in the abiraterone acetate plus prednisone group, 151 (25%) of 602 in the placebo group, and four (6%) of 72 in the crossover group. The most common treatment-related serious adverse event was hypokalaemia (four [1%] patients in the abiraterone acetate plus prednisone group and none in the other groups). Treatment-related deaths occurred in three (<1%) patients each in the abiraterone acetate plus prednisone group (gastric ulcer perforation, sudden death, and cerebrovascular accident) and the placebo group (sudden death, cerebrovascular accident, and pneumonia), with none in the crossover group.

**3.2 CONCEPTUAL FRAMEWORK**

**HIGH RISK CARGO**

High-risk cargo or mail means cargo or mail presented by an unknown entity or showing signs of tampering and meets one of the following conditions:(a) specific intelligence indicates that the cargo or mail poses a threat to civil aviation;(b) the cargo or mail shows anomalies that give rise to suspicions; or(c) the nature of the cargo or mail is such that baseline security measures alone are unlikely to detect prohibited items that could endanger the aircraft; “hijacking” has the meaning given to it under the Hijacking Act; “Human Factors principles” means principles which apply to design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance; “human performance” means human capabilities and limitations which have an impact on the safety, security and efficiency of aeronautical operations; “inadmissible person” means a person who is or will be refused admission to a State by its authorities; “incendiary device” means an object, other than a match or pocket lighter, that is fabricated with combustible materials and when ignited may cause fire damage to property or inflict burn injuries on individuals; “in-flight security officer” means a person who is authorized by the government of the State of the Operator and the government of the State of Registration to be deployed on an aircraft with the purpose of protecting that aircraft and its occupants against acts of unlawful interference and excludes persons employed to provide exclusive personal protection for one or more specific people travelling on the aircraft, such as personal bodyguards. “inspector” means a person designated by the Director General under regulation 3(4) of the Civil Aviation [(No. 1) General Administration and Personnel Licensing Regulations, 2004;“international airport” means an airport designated by the Member State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out; “international air service” means an air service provided to and from two States in which Trinidad and Tobago is one such State. “known consignor” means a person or entity who originates cargo or mail for its own account and whose procedures meet common security rules and standards sufficient to allow the carriage of cargo or mail by air;

**Advantages and Disadvantages associated with transporting high-risk cargo**

**Advantages**

**Profitability:** One of the biggest advantages of transporting high-risk cargo is the potential for higher profits. Due to the added risks involved, freight charges are generally higher compared to standard cargo. Companies that specialize in this niche can earn substantial premiums over regular freight operations.

**Specialization:** Handling high-risk cargo requires specialized knowledge and equipment, which can create a competitive edge. Companies that excel in dealing with such goods can carve out a niche market, reducing their competition and enhancing brand reputation for reliability and expertise.

**Long-term Contracts:** Due to the complexities and the need for consistent safety standards, clients shipping high-risk goods often prefer long-term contracts with trusted logistics providers. This can provide stable, reliable income streams for carriers and forwarders.

**Regulatory Compliance Expertise:** Companies handling high-risk cargo often develop a deep understanding of both domestic and international regulations. This expertise can be leveraged to offer additional services and consultancy, further diversifying business operations and revenue.

**Disadvantages**

**Increased Liability:** The transport of high-risk cargo inherently comes with greater liability. Any accidents or incidents can have serious consequences, including damage to property, loss of life, environmental harm, and substantial financial loss due to claims and penalties.

**Insurance Costs:** Insurance premiums for high-risk cargo are significantly higher than for regular goods. These increased costs can impact profit margins and require careful management to ensure that the business remains profitable.

**Regulatory Burdens:** High-risk cargo is subject to stringent regulations at both international and national levels. Compliance requires significant investment in terms of time and resources, including training for staff, upgrading equipment, and continuous monitoring of regulatory changes.

**Security Requirements:** High-value or dangerous goods require enhanced security measures, which can include specialized packaging, armed escorts, GPS tracking, and secure storage facilities. These measures add to the overall cost of transport and logistics management.

**Limited Flexibility:** The complexity and requirements associated with high-risk cargo can limit operational flexibility. Routes, modes of transport, and delivery schedules might need to be adjusted to accommodate the specific needs of the cargo, potentially affecting efficiency.

**Market Fluctuations:** The market for high-risk goods can be volatile, influenced by changes in regulations, technology, and global market conditions. Such fluctuations can affect the stability and predictability of operations in this sector.

**BENEFITS OF HIGH RISK CARGO**

Transporting high-risk cargo, despite its challenges, brings several benefits to logistics providers and the broader supply chain ecosystem. These benefits can provide substantial competitive advantages and open up lucrative market opportunities for those equipped to handle the complexities involved. Here are some key benefits of transporting high-risk cargo:

**1. Higher Profit Margins**

Due to the inherent risks and specialized requirements of handling high-risk cargo, logistics providers can charge higher fees for their services. These higher rates help offset the increased costs associated with insurance, security, and compliance but generally leave room for significantly better profit margins compared to standard cargo.

**2. Niche Market Specialization**

Companies that specialize in high-risk cargo can carve out niche markets, reducing competition and establishing themselves as experts in a specific field. This specialization can be particularly beneficial in sectors such as pharmaceuticals, chemicals, or high-value electronics, where expertise and reliability are highly prized.

**3. Long-term Customer Relationships**

Due to the sensitive nature of high-risk goods, clients often seek to build long-term relationships with logistics providers they trust. This can lead to stable, ongoing contracts that provide a reliable income stream. Consistent performance in handling high-risk cargo effectively builds strong customer loyalty and retention.

**4. Enhanced Brand Reputation**

Successfully transporting high-risk cargo demands excellence in safety, reliability, and regulatory compliance. Companies that demonstrate these qualities consistently can enhance their brand reputation, not just among clients but across the industry. This reputation can lead to new business opportunities and the potential to expand into other areas of logistics and transport.

**5. Advanced Capabilities**

Handling high-risk cargo often requires investment in advanced technology and staff training, which can improve a company’s overall capabilities. These advancements can include state-of-the-art tracking and monitoring systems, superior packaging solutions, and enhanced security measures. Over time, these capabilities can become standard practices across the business, improving efficiency and safety in all operations.

**6. Regulatory and Compliance Expertise**

Navigating the complex regulatory landscape necessary for transporting high-risk goods can build substantial expertise in compliance matters. This knowledge is invaluable, particularly in an era where regulations are tightening across many sectors of international trade. It can also serve as a basis for consultancy services, adding another revenue stream to the business.

**7. Opportunity for Global Operations**

The nature of high-risk cargo often requires a global approach, as goods may need to be sourced or delivered internationally. This opens the door for logistics providers to operate on a global scale, expanding their market reach and influence.

**8. Diversification of Services**

The challenges of transporting high-risk cargo encourage companies to innovate and diversify their services. This can include customized logistics solutions, integrated services covering the entire supply chain, and advanced risk management offerings tailored to specific client needs.

While the transportation of high-risk cargo involves navigating significant challenges and risks, it also offers substantial benefits, including profitability, market specialization, customer loyalty, and enhanced capabilities. Companies that manage these challenges effectively can secure a strategic advantage in the competitive logistics industry.

**HIGH RISK CARGO HANDLING**

Handling high-risk cargo involves stringent protocols to ensure safety, compliance, and security throughout the transportation process. High-risk cargo can include hazardous materials, expensive goods, or items of strategic importance, each requiring specialized handling procedures. Below, we outline the key aspects of handling high-risk cargo effectively.

**1. Risk Assessment and Planning**

The first step in handling high-risk cargo is conducting a thorough risk assessment. This involves identifying potential risks associated with the cargo, including theft, damage, and hazards during transportation. Based on the assessment, a comprehensive transportation plan is developed that includes route selection, mode of transport, and contingency planning for emergencies.

**2. Regulatory Compliance**

High-risk cargo is often subject to strict regulations which can vary by country and type of cargo. Compliance with international, national, and local laws and regulations is critical. This includes obtaining necessary permits and licenses, adhering to transportation regulations (like the IMDG Code for maritime or IATA regulations for air), and ensuring all documentation is correct and complete.

**3. Proper Packaging and Labeling**

Appropriate packaging is crucial to protect the cargo from damage and to prevent it from causing harm. For hazardous materials, packaging must meet specific standards that can contain and, if necessary, isolate the product. Labeling is equally important as it provides handlers and emergency responders with quick and clear information about the contents, especially in case of an accident.

**4. Security Measures**

High-risk cargo, particularly high-value items, are attractive targets for theft. Implementing robust security measures is essential. This might include sealed and tamper-proof containers, GPS tracking, security escorts, and choosing secure storage locations. Surveillance and monitoring throughout the journey are also vital components of a comprehensive security strategy.

**5. Specialized Equipment and Transportation**

Transporting high-risk cargo often requires specialized equipment. For example, refrigerated containers may be necessary for pharmaceuticals, while hazardous materials might need spill-containment features. Choosing the right type of transportation is also crucial; some goods might require faster delivery times, thus preferring air freight over sea.

**6. Trained Personnel**

Handling high-risk cargo requires skilled personnel trained in specific procedures. This includes training in handling equipment, understanding of handling hazardous materials, security awareness, and emergency response procedures. Ongoing training and drills should be part of the operational standards to ensure preparedness.

**7. Insurance Coverage**

Given the nature of the risks associated with high-risk cargo, adequate insurance coverage is essential. This helps mitigate financial risks in case of theft, damage, or accidents. Insurance policies should be carefully reviewed to ensure they cover all potential risks associated with the specific types of cargo being transported.

**8. Communication and Coordination**

Effective communication among all parties involved—shippers, carriers, consignees, and regulatory authorities—is crucial for the safe transport of high-risk cargo. Real-time communication technologies can help monitor the cargo and coordinate actions quickly in response to any arising issues or emergencies.

**9. Emergency Response Plan**

An effective emergency response plan should be in place to address potential incidents involving high-risk cargo. This includes procedures for incident management, spill response, first aid, and notification of local authorities and emergency responders.

Handling high-risk cargo is complex and requires meticulous attention to detail and rigorous adherence to safety protocols. Companies involved in the transportation of such cargo must continually evaluate and improve their handling procedures to ensure compliance, enhance security, and minimize risk.

**SCOPE**

High-risk cargo handling encompasses a broad scope of activities, technologies, and strategies, all aimed at ensuring the safe, secure, and efficient transportation of goods that are either inherently dangerous, extremely valuable, or both. The scope of high-risk cargo handling includes multiple aspects of logistics, from packing and storage to transportation and delivery. Here's a more detailed breakdown:

**1. Types of High-Risk Cargo**

High-risk cargo can include a variety of items such as:

* Hazardous Materials: Chemicals, flammable substances, explosives, radioactive materials, and toxic substances.
* High-Value Items: Electronics, luxury goods, pharmaceuticals, and precious metals.
* Perishables and Pharmaceuticals: Items that require controlled environments and can pose risks if compromised.
* Oversized and Heavy Equipment: Items that require special handling due to their size and weight.

**2. Regulatory Compliance**

Handling high-risk cargo involves strict adherence to international and national regulations, including:

* IMDG Code for maritime shipping.
* IATA Regulations for air freight.
* ADR (Agreement on Dangerous Goods by Road) in Europe.
* DOT Regulations in the United States for all modes of domestic transport.

These regulations dictate how different types of cargo must be handled, documented, packaged, labeled, and transported.

**3. Safety and Security Protocols**

This includes the development and implementation of:

* Risk assessments to identify potential hazards associated with cargo.
* Emergency response plans tailored to different types of risks.
* Security measures such as CCTV, GPS tracking, and secure locking mechanisms.
* Safety training for personnel handling or coming into contact with high-risk cargo.

**4. Specialized Equipment and Facilities**

Handling high-risk cargo often requires:

* Special containers such as refrigerated units for perishables or reinforced containers for heavy equipment.
* Handling equipment that can manage oversized loads or operate in hazardous environments.
* Storage facilities that are secure and meet specific environmental conditions needed to store sensitive or dangerous goods.

**5. Technological Integration**

Utilizing technology to enhance safety and efficiency, including:

* Automation in handling and monitoring systems to reduce human error.
* Data analytics to predict and mitigate risks.
* Blockchain for secure and transparent documentation processes.
* IoT devices for real-time tracking and monitoring of environmental conditions during transport.

**6. Insurance and Liability Management**

Navigating the complexities of insurance coverage for high-risk cargo, ensuring adequate coverage for all potential risks, and managing liabilities effectively.

**7. Stakeholder Coordination**

Effective high-risk cargo handling requires coordination among multiple stakeholders, including:

* Shippers and consignees who own and receive the cargo.
* Freight forwarders and logistics providers who manage the transportation.
* Port and customs authorities who oversee import/export processes.
* Regulatory bodies that enforce compliance.

**8. Global and Local Market Dynamics**

Understanding and adapting to the market demands and regulatory environments of different countries, particularly in global trade scenarios.

The scope of high-risk cargo handling is complex and dynamic, requiring continuous adaptation to new technologies, regulatory changes, and evolving market conditions. Efficient handling of high-risk cargo not only minimizes the risks associated with transportation but also enhances the competitiveness and reliability of supply chains in which these goods move.

**IMPORTANCE**

High-risk cargo handling is of critical importance in the logistics and transportation industry for several compelling reasons. Ensuring that such cargo is managed with utmost precision and care not only mitigates potential risks but also upholds the integrity of global supply chains. Below, I outline the key reasons why high-risk cargo handling is so significant:

**1. Safety and Security**

Handling high-risk cargo safely is paramount to prevent accidents and incidents that could lead to severe consequences. This includes environmental disasters, loss of life, property damage, and public health crises. For example, incorrect handling of hazardous materials such as flammable liquids, toxic chemicals, or radioactive substances can result in catastrophic events.

**2. Regulatory Compliance**

High-risk cargo is heavily regulated globally. Efficient handling ensures compliance with international and national regulations such as the IMDG Code, IATA Dangerous Goods Regulations, and others. Non-compliance can lead to legal penalties, fines, and restrictions on future operations, affecting the business’s legal standing and financial health.

**3. Financial Implications**

The proper management of high-risk cargo is crucial to avoid financial losses associated with cargo damage, loss, or theft. High-risk cargo often has a high monetary value or can cause costly damage if mishandled. Ensuring it is transported securely minimizes insurance claims and potential liabilities, which can be financially burdensome to companies.

**4. Reputation and Reliability**

Companies that handle high-risk cargo effectively enhance their reputation for reliability and safety. This reputation is crucial for business continuity and growth, as clients and partners prefer to work with companies that have proven capabilities in managing complex logistics challenges. A good track record in high-risk cargo handling can lead to increased business opportunities.

**5. Environmental Protection**

Proper handling of high-risk cargo, particularly hazardous materials, is vital for protecting the environment. Spills, leaks, or other accidents can cause significant environmental damage, impacting ecosystems and communities. Adhering to best practices in cargo handling helps prevent such incidents, demonstrating a commitment to environmental stewardship.

**6. Global Supply Chain Integrity**

High-risk cargo often includes critical items essential for various industries, such as pharmaceuticals, electronics, and manufacturing components. Efficient handling ensures these goods are delivered on time and in good condition, maintaining the integrity and reliability of global supply chains. Disruptions in these chains can have ripple effects across multiple sectors and economies.

**7. Innovation and Technological Advancement**

The complexities associated with high-risk cargo drive innovation in logistics and transport technologies. From advanced tracking systems to AI and IoT-based monitoring tools, innovations aimed at improving the handling of high-risk cargo can lead to broader applications that enhance overall logistics efficiency.

**8. Public Confidence**

Ensuring the safe transport of dangerous goods also maintains public trust in the transportation systems and infrastructure. Public confidence is crucial, especially when transporting materials through populated areas or in close proximity to communities.

**9. Skill Development**

Handling high-risk cargo requires specialized skills and knowledge. This fosters professional development within the logistics sector, leading to a more skilled workforce adept at managing complex logistical tasks

**CHALLENGES IN HIGH RISK CARGO HANDLING**

Handling high-risk cargo presents several significant challenges that logistics providers and shipping companies must navigate. These challenges stem from the nature of the cargo, regulatory complexities, and the high stakes involved in ensuring the safety and security of the shipments. Here are some of the key challenges in high-risk cargo handling:

**1. Regulatory Compliance**

High-risk cargo is heavily regulated, and compliance can be complex due to the varying and sometimes conflicting regulations across different jurisdictions. Adhering to international, national, and local regulations requires constant monitoring and updates to ensure that all documentation, handling, and transportation procedures are compliant. This also includes staying updated with changes in hazardous material handling, customs processes, and security regulations.

**2. Safety Risks**

The intrinsic dangers associated with hazardous materials—such as flammable, corrosive, explosive, or radioactive substances—pose significant safety risks. Ensuring the safety of handlers, transporters, and the public requires stringent handling and storage procedures, appropriate protective equipment, and regular safety training. Accidents involving high-risk cargo can lead to severe environmental damage, loss of life, and substantial financial losses due to damages and fines.

**3. Security Concerns**

High-risk cargo often includes high-value items that are targets for theft and piracy. Ensuring the security of such cargo involves comprehensive measures ranging from physical security to cyber protection. Theft of high-risk cargo not only results in direct financial losses but can also compromise the business reputation.

**4. Specialized Equipment and Infrastructure**

Transporting high-risk cargo often requires specialized vehicles and equipment, such as reinforced containers, temperature-controlled units, or vehicles equipped with containment systems for hazardous materials. Investing in and maintaining such specialized equipment can be costly and requires specialized knowledge for operation and repair.

**5. Trained Personnel**

The handling of high-risk cargo requires skilled personnel who are trained in specific handling and emergency procedures. Recruiting and retaining such personnel, and ensuring they are consistently trained in the latest safety and handling protocols, represents a significant challenge and ongoing cost.

**6. Insurance and Liability**

Insurance costs for high-risk cargo are significantly higher than for general cargo due to the increased risk. Obtaining adequate coverage at a reasonable cost can be challenging. Additionally, the potential liability in the event of an incident can be enormous, impacting not just financial resources but also the company’s reputation.

**7. Coordination and Communication**

Effective management of high-risk cargo requires flawless coordination and communication among various stakeholders including shippers, carriers, consignees, and regulatory bodies. Miscommunication can lead to delays, mishandling, or regulatory breaches, each carrying potentially severe consequences.

**8. Emergency Preparedness**

Developing and maintaining effective emergency response plans is critical but challenging. These plans must be detailed and account for numerous possible scenarios, ensuring rapid and appropriate responses to accidents or incidents involving high-risk cargo.

**9. Market and Economic Conditions**

Economic fluctuations can impact the volume of high-risk cargo being shipped, which in turn affects profitability. Volatility in markets can lead to reduced demand for certain types of high-risk shipments, impacting the bottom line for companies specializing in these areas.

**10. Environmental Concerns**

There is increasing scrutiny on the environmental impact of transporting hazardous materials. Companies must not only manage the immediate risks of spills or accidents but also navigate growing regulatory requirements aimed at protecting the environment.

Addressing these challenges requires a robust risk management strategy, substantial investment in training and equipment, and a proactive approach to safety and compliance. Success in high-risk cargo handling demands excellence in operational capabilities and a culture that prioritizes safety and meticulousness.

**FUTURE AND TRENDS IN HIGH RISK CARGO HANDLING**

The handling of high-risk cargo is continuously evolving, influenced by technological advancements, regulatory changes, global trade dynamics, and environmental considerations. Companies involved in this sector must adapt to these changes to ensure efficiency, safety, and compliance. Here are some of the key future trends and developments expected in the handling of high-risk cargo:

**1. Increased Automation and Digitization**

The future of high-risk cargo handling will likely see increased use of automation and digital technologies to enhance accuracy and efficiency in tracking, monitoring, and managing cargo. Technologies like blockchain could revolutionize the documentation processes, providing a secure, immutable record of transactions and movements that enhances transparency and trust among all stakeholders. Automation in cargo handling and warehousing can also reduce human error and improve handling efficiency.

**2. Enhanced Tracking and Monitoring Technologies**

Real-time tracking and monitoring systems are becoming more sophisticated, utilizing IoT (Internet of Things) sensors and telematics to provide continuous updates on the condition and location of cargo. This technology not only improves security but also ensures that the environmental conditions of sensitive cargo are maintained, alerting operators immediately if parameters deviate from the safe range.

**3. Stricter Environmental Regulations**

As global awareness of environmental issues grows, so do the regulations governing the transport of hazardous materials. Expect stricter standards and tighter controls on emissions, waste management, and spill responses. Companies will need to invest in greener technologies and practices, such as alternative fuels and advanced spill-prevention equipment, to comply with these regulations.

**4. Advanced Training and Simulation Tools**

Virtual reality (VR) and augmented reality (AR) technologies are set to play a larger role in training personnel handling high-risk cargo. These tools can simulate various scenarios workers might face, providing a risk-free environment to practice in and enhancing the response capabilities in real-world situations.

**5. Greater Focus on Cybersecurity**

As logistics relies more heavily on digital solutions, the risk of cyber threats increases. Cybersecurity will become even more critical as a component of cargo security strategies. Protecting data and systems associated with the transport of high-risk cargo from cyber-attacks will be crucial to prevent information theft, financial loss, or operational sabotage.

**6. Collaboration Across Borders**

Global standardization of rules and regulations for the transport of hazardous materials can facilitate smoother international trade. Increased collaboration between countries and among international regulatory bodies can help harmonize standards, making it easier for companies to comply and ensure safety across borders.

**7. Adoption of Smart Containers**

Smart containers equipped with sensors for tracking, monitoring temperature, humidity, and other critical conditions in real time will become more widespread. These containers can directly communicate with logistic systems, enhancing the management of cargo conditions throughout its journey.

**8. Predictive Analytics**

Using data analytics and machine learning, logistics providers can predict and mitigate risks more effectively. Predictive analytics can help in planning optimal routes, performing preventive maintenance on transport vehicles and equipment, and forecasting potential disruptions in supply chains.

**9. Specialized Insurance Products**

As the risks associated with high-risk cargo evolve, so will insurance products. Insurance companies are likely to offer more customized insurance solutions that cater specifically to the nuances of transporting hazardous and high-value cargo, incorporating factors like real-time data into risk assessment and pricing.

The future of high-risk cargo handling is set to be shaped by technology, increased regulatory pressures, and the need for global cooperation. Staying ahead in this field will require companies to invest in technology, training, and tools that enhance safety, efficiency, and compliance.

**EFFICIENCY OF HIGH-RISK CARGO HANDLING AT MARITIME PORTS**

Efficiency in high-risk cargo handling at maritime ports is critical due to the potential dangers and high value associated with such cargoes. Efficient handling not only minimizes risks but also ensures timely delivery and reduces costs, thereby enhancing the overall competitiveness of the port. Several factors contribute to and reflect the efficiency of high-risk cargo handling at maritime ports:

**1. Specialized Infrastructure and Equipment**

Efficient high-risk cargo handling requires specialized infrastructure and equipment tailored to the specific needs of different types of cargo. For instance, hazardous materials might need secure, climate-controlled warehouses, while heavy machinery requires cranes and reinforced storage areas. Ports that invest in such specialized equipment and infrastructure can handle high-risk cargo more quickly and safely.

**2. Advanced Technology Systems**

Utilizing advanced technologies like automated container handling systems, RFID tagging, and GPS tracking enhances the efficiency of cargo handling. These technologies help in real-time monitoring, quick identification, and tracking of cargo from the moment it arrives at the port until it leaves, minimizing delays and errors.

**3. Trained and Skilled Workforce**

Handling high-risk cargo safely and efficiently requires a well-trained workforce skilled in using specialized equipment and knowledgeable about safety protocols for handling hazardous materials. Continuous training and certification programs ensure that the workforce is up-to-date with the latest handling techniques and compliance regulations.

**4. Streamlined Processes and Procedures**

Efficient ports streamline operational procedures to reduce paperwork and handling steps. This can be achieved through digital transformation initiatives like implementing a Port Community System (PCS) or single-window systems that integrate all the logistical, customs, and regulatory documentation through a single platform, speeding up clearance times.

**5. Robust Safety and Security Measures**

Safety is a critical component of efficiency in handling high-risk cargo. Implementing stringent security protocols and safety measures, such as surveillance systems, secure access points, and emergency response plans, can prevent accidents and theft, which in turn minimizes disruptions and delays.

**6. Compliance with Regulations**

Ensuring compliance with international and national regulations governing the handling of hazardous materials is essential for avoiding legal issues and penalties that can cause delays. Efficient ports maintain good relationships with regulatory bodies and keep abreast of changes in legislation to ensure compliance.

**7. Effective Coordination and Communication**

Efficient high-risk cargo handling requires excellent coordination between various stakeholders, including shippers, port authorities, customs, and carriers. Good communication helps prevent misunderstandings and delays, ensuring that cargo moves smoothly through the port.

**8. Preventive Maintenance**

Regular maintenance of equipment and infrastructure prevents unexpected breakdowns that can cause significant delays. Efficient ports implement preventive maintenance schedules to ensure all handling equipment remains operational and reliable.

**9. Environmental Management**

Efficient ports also focus on minimizing environmental impacts by implementing green practices, such as waste management systems and spill prevention protocols. Managing environmental risks effectively helps avoid clean-up delays and potential shutdowns.

**10. Analytical Tools for Performance Improvement**

Adoption of performance metrics and analytical tools helps ports identify inefficiencies in their operations. Data-driven insights allow for continuous improvement in handling processes, further enhancing the efficiency of high-risk cargo operations.

By focusing on these areas, maritime ports can significantly enhance their efficiency in handling high-risk cargoes. This not only reduces operational costs and risks but also improves service delivery, making the port more attractive to global shipping lines and cargo owners dealing with high-risk goods.

**CHAPTER 4**

 **DATA ANALYSIS AND INTERPRETATION**

**TABLE NO.4.1**

**GENDER WISE CLASSIFICATION**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Male  | 65 | 65 |
| Female | 35 | 35 |
| **Total** | **100** | **100** |

 Source: Primary data

**CHART NO. 4.1**

**GENDER WISE CLASSIFICATION**

**INTERPRETATION**

Table No.4.1 shows that 65% of the respondents are male and rest of them are female.

**TABLE NO.4.2**

**BELIEVE THE CURRENT PROCEDURES FOR HIGH-RISK CARGO HANDLING AT OUR PORT ARE EFFECTIVE**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Strongly agree | 24 | 24 |
| Agree | 55 | 55 |
| Neutral | 15 | 15 |
| Disagree |  6 |  6 |
| Strongly disagree | 0 | 0 |
| **Total** | **100** | **100** |

 Source: Primary data

**CHART NO. 4.2**

**BELIEVE THE CURRENT PROCEDURES FOR HIGH-RISK CARGO HANDLING AT OUR PORT ARE EFFECTIVE**

**INTERPRETATION**

Table No.4.2 shows that 55% of the respondents agree that they believe the current procedures for high-risk cargo handling at our port are effective, 24% strongly agree and 15% have neutral opinion and 6% of the respondents disagree.

**TABLE NO.4.3**

**HIGH-RISK CARGO IS IDENTIFIED AND SEGREGATED PROPERLY AT THIS PORT**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Yes | 45 | 45 |
| No | 55 | 55 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.3**

**HIGH-RISK CARGO IS IDENTIFIED AND SEGREGATED PROPERLY AT THIS PORT**

**INTERPRETATION**

Table no.4.3 shows that 55% of the respondents disagree that high-risk cargo is identified and segregated properly at this port and 45% agrees

**TABLE NO.4.4**

**PORT AUTHORITY PROVIDES ADEQUATE RESOURCES FOR HANDLING HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Highly Satisfied | 48 | 48 |
| Satisfied | 40 | 40 |
| Neutral | 7 | 7 |
| Unsatisfied | 5 | 5 |
| Highly Unsatisfied | 0 | 0 |
| **Total** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.4**

**PORT AUTHORITY PROVIDES ADEQUATE RESOURCES FOR HANDLING HIGH-RISK CARGO**

**INTERPRETATION**

Table No.4.4 shows 48% of the respondents Highly satisfied that port authority provides adequate resources for handling high-risk cargo ,40% satisfied,7% neutral and 5% unsatisfied

**TABLE NO.4.5**

**SAFETY PROTOCOLS FOR HIGH-RISK CARGO ARE CLEARLY COMMUNICATED TO ALL STAKEHOLDERS**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Strongly agree | 25 | 25 |
| Agree | 55 | 55 |
| Neutral | 15 | 15 |
| Disagree | 5 | 5 |
| Strongly disagree | 0 | 0 |
| **Total** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.5**

**SAFETY PROTOCOLS FOR HIGH-RISK CARGO ARE CLEARLY COMMUNICATED TO ALL STAKEHOLDERS**

**INTERPRETATION**

table no.4.5 shows that 55 % of the respondents agree that safety protocols for high-risk cargo are clearly communicated to all stakeholders, 25% strongly agree, 15% neutral and 5% disagree

**TABLE NO.4.6**

**THE FREQUENCY OF ACCIDENTS INVOLVING HIGH-RISK CARGO IS MINIMAL**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| yes | 60 | 60 |
| no | 40 | 40 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.6**

**THE FREQUENCY OF ACCIDENTS INVOLVING HIGH-RISK CARGO IS MINIMAL**

**INTERPRETATION**

Table 4.6 shows that 60% of the respondents agree that the the frequency of accidents involving high-risk cargo is minimal and 40% disagree

**TABLE NO.4.7**

**ALL PERSONNEL INVOLVED IN HIGH-RISK CARGO HANDLING ARE ADEQUATELY TRAINED**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Strongly agree | 50 | 50 |
| Agree | 20 | 20 |
| Neutral | 30 | 30 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.7**

**ALL PERSONNEL INVOLVED IN HIGH-RISK CARGO HANDLING ARE ADEQUATELY TRAINED**

**INTERPRETATION**

Table No.4.7 shows that 50% of the respondents strongly agree that all personnel involved in high-risk cargo handling are adequately trained, 20% agree and 30% neutral.

**TABLE NO.4.8**

**TRAINING SESSIONS ON HIGH-RISK CARGO HANDLING ARE CONDUCTED REGULARLY**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| yes | 60 | 60 |
| no | 40 | 40 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.8**

**TRAINING SESSIONS ON HIGH-RISK CARGO HANDLING ARE CONDUCTED REGULARLY**

**INTERPRETATION**

Table No.4.8 shows that 60% of the respondents says that a training sessions on high-risk cargo handling are conducted regularly and 40% disagrees to it

**TABLE NO.4.9**

**NEW EMPLOYEES RECEIVE PROPER TRAINING ON HIGH-RISK CARGO BEFORE STARTING THEIR JOB**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| yes | 85 | 85 |
| No  | 15 | 15 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.9**

**NEW EMPLOYEES RECEIVE PROPER TRAINING ON HIGH-RISK CARGO BEFORE STARTING THEIR JOB**

**INTERPRETATION**

Table NO.4.9 shows that 85% of the respondents says that new employees receive proper training on high-risk cargo before starting their job and 15% disagree

**TABLE NO.4.10**

**REFRESHER TRAINING COURSES ARE AVAILABLE AND MANDATORY FOR ALL STAFF HANDLING HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Yes  | 66 | 66 |
| No  | 34 | 34 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.10**

**REFRESHER TRAINING COURSES ARE AVAILABLE AND MANDATORY FOR ALL STAFF HANDLING HIGH-RISK CARGO**

**INTERPRETATION**

Table no.4.10 shows that 66% of the respondents agrees that refresher training courses are available and mandatory for all staff handling high-risk cargo and 34% disagree

**TABLE NO.4.11**

**CONFIDENT IN THE COMPETENCE OF PERSONNEL HANDLING HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Highly Satisfied | 40 | 40 |
| Satisfied | 30 | 30 |
| Neutral | 20 | 20 |
| Unsatisfied | 10 | 10 |
| Highly Unsatisfied | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.11**

**CONFIDENT IN THE COMPETENCE OF PERSONNEL HANDLING HIGH-RISK CARGO**

**INTERPRETATION**

Table no.4.11 shows that 40% of the respondents Highly satisfied that confident in the competence of personnel handling high-risk cargo, and 30% of the respondents satisfied, 20% neutral and 10% unsatisfied

**TABLE NO.4.12**

**EQUIPMENT USED FOR HANDLING HIGH-RISK CARGO IS MODERN AND WELL-MAINTAINED**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Highly Satisfied | 55 | 55 |
| Satisfied | 40 | 40 |
| Neutral | 5 | 5 |
| Unsatisfied | 0 | 0 |
| Highly Unsatisfied | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.12**

**EQUIPMENT USED FOR HANDLING HIGH-RISK CARGO IS MODERN AND WELL-MAINTAINED**

**INTERPRETATION**

Table No.4.12 shows that 55% of the respondents highly satisfied that equipment used for handling high-risk cargo is modern and well-maintained, 40% satisfied and 5% neutral

**TABLE NO.4.13**

**THERE ARE SUFFICIENT TECHNOLOGICAL AIDS TO ENSURE THE SAFETY OF HIGH-RISK CARGO HANDLING**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Yes | 65 | 65 |
| no | 35 | 35 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.13**

**THERE ARE SUFFICIENT TECHNOLOGICAL AIDS TO ENSURE THE SAFETY OF HIGH-RISK CARGO HANDLING**

**INTERPRETATION**

Table No.4.13 shows that 65% of the respondents agree that there are sufficient technological aids to ensure the safety of high-risk cargo handling and 35% disagree

**TABLE NO.4.14**

**THE PORT UTILIZES AUTOMATION TO ENHANCE THE SAFETY IN HIGH-RISK CARGO OPERATIONS.**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| Yes | 54 | 54 |
| No  | 46 | 46 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.14**

**THE PORT UTILIZES AUTOMATION TO ENHANCE THE SAFETY IN HIGH-RISK CARGO OPERATIONS.**

**INTERPRETATION**

table no.4.14 shows that 54% of the respondents agree the port utilizes automation to enhance the safety in high-risk cargo operations and 46% disagree

**TABLE NO.4.15**

**THE CARGO HANDLING EQUIPMENT IS REGULARLY INSPECTED AND CERTIFIED**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No. of Respondents**  | **Percentage**  |
| yes | 64 | 64 |
| no | 36 | 36 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.15**

**THE CARGO HANDLING EQUIPMENT IS REGULARLY INSPECTED AND CERTIFIED**

**INTERPRETATION**

Majority of the respondents 64% agree that the cargo handling equipment is regularly inspected and certified and 36% disagree

**TABLE NO.4.16**

**SURVEILLANCE SYSTEMS ARE ADEQUATE TO MONITOR HIGH-RISK CARGO AREAS**

|  |  |  |
| --- | --- | --- |
| **Particulars**  | **No.of Respondents**  | **Percentage**  |
| Strongly agree  | 32 | 32 |
| Agree | 20 | 20 |
| Neutral | 38 | 38 |
| Disagree | 10 | 10 |
| Strongly disagree | **0** | **0** |
| **TOTAL** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.16**

**SURVEILLANCE SYSTEMS ARE ADEQUATE TO MONITOR HIGH-RISK CARGO AREAS**

**INTERPRETATION**

Majority 38% of the respondents neutral, 32% strongly agree that surveillance systems are adequate to monitor high-risk cargo areas, 20% agree and 10% disagree.

**TABLE NO. 4.17**

**THE PORT STRICTLY ADHERES TO NATIONAL AND INTERNATIONAL REGULATIONS REGARDING HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 56 | 56 |
| no | 44 | 44 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.17**

**THE PORT STRICTLY ADHERES TO NATIONAL AND INTERNATIONAL REGULATIONS REGARDING HIGH-RISK CARGO**

**INTERPRETATION**

Table No.4.17 shows that 56% of the respondents agree that the port strictly adheres to national and international regulations regarding high-risk cargo and 44% disagree

**TABLE NO. 4.18**

**THERE IS A REGULAR AUDIT OF COMPLIANCE WITH SAFETY STANDARDS FOR HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 84 | 84 |
| no | 16 | 16 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.18**

**THERE IS A REGULAR AUDIT OF COMPLIANCE WITH SAFETY STANDARDS FOR HIGH-RISK CARGO**

**INTERPRETATION**

Table no.4.18 shows that 84% of the respondents agree there is a regular audit of compliance with safety standards for high-risk cargo and 16% disagree

**TABLE NO. 4.19**

**THE PORT HAS NEVER BEEN PENALIZED FOR NON-COMPLIANCE IN HIGH-RISK CARGO HANDLING**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Yes  | 65 | 65 |
| No  | 35 | 35 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.19**

**THE PORT HAS NEVER BEEN PENALIZED FOR NON-COMPLIANCE IN HIGH-RISK CARGO HANDLING**

**INTERPRETATION**

Table No.4.19 shows that 65% of the respondents agree that the port has never been penalized for non-compliance in high-risk cargo handling and 35% disagree

**TABLE NO. 4.20**

**ALL INCIDENTS INVOLVING HIGH-RISK CARGO ARE REPORTED AND ANALYZED**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 55 | 55 |
| No  | 45 | 45 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.20**

**ALL INCIDENTS INVOLVING HIGH-RISK CARGO ARE REPORTED AND ANALYZED**

**INTERPRETATION**

Table No.4.20 shows that 55% of the respondents agree that the all incidents involving high-risk cargo are reported and analyzed and 45% does not agree

**TABLE NO. 4.21**

**THE PORT AUTHORITY ACTIVELY ENGAGES WITH INTERNATIONAL BODIES ON HIGH-RISK CARGO STANDARDS**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Strongly agree | 84 | 84 |
| Agree | 10 | 10 |
| Neutral | 6 | 6 |
| Disagree | 0 | 0 |
| Strongly disagree | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.21**

**THE PORT AUTHORITY ACTIVELY ENGAGES WITH INTERNATIONAL BODIES ON HIGH-RISK CARGO STANDARDS**

**INTERPRETATION**

table no.4.21 shows that 84% of the respondents strongly agree that the port authority actively engages with international bodies on high-risk cargo standards, 10% agree and 6% neutral

**TABLE NO. 4.22**

**THE PORT HAS A WELL-DEFINED EMERGENCY RESPONSE PLAN FOR HIGH-RISK CARGO INCIDENTS**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 55 | 55 |
| no | 45 | 45 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.22**

**THE PORT HAS A WELL-DEFINED EMERGENCY RESPONSE PLAN FOR HIGH-RISK CARGO INCIDENTS**

**INTERPRETATION**

Table No.4.22 shows that 55% of the respondents agree that the port has a well-defined emergency response plan for high-risk cargo incidents and 45% does not agree

**TABLE NO. 4.23**

**REGULAR DRILLS ARE CONDUCTED TO PREPARE FOR POTENTIAL HIGH-RISK CARGO EMERGENCIES**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 78 | 78 |
| No  | 22 | 22 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.23**

**REGULAR DRILLS ARE CONDUCTED TO PREPARE FOR POTENTIAL HIGH-RISK CARGO EMERGENCIES**

**INTERPRETATION**

Table No.4.23 shows that 78% of the respondents agree regular drills are conducted to prepare for potential high-risk cargo emergencies and 22% does not agree

**TABLE NO. 4.24**

**THE PORT'S RISK MANAGEMENT STRATEGIES ARE EFFECTIVE IN MINIMIZING HAZARDS ASSOCIATED WITH HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Strongly Agree | 80 | 80 |
| Agree | 10 | 10 |
| Neutral | 10 | 10 |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.24**

**THE PORT'S RISK MANAGEMENT STRATEGIES ARE EFFECTIVE IN MINIMIZING HAZARDS ASSOCIATED WITH HIGH-RISK CARGO**

**INTERPRETATION**

Table No.4.24 shows that 80% of the respondents strongly agree that the the port's risk management strategies are effective in minimizing hazards associated with high-risk cargo, 10% agree and 10% neutral

**TABLE NO. 4.25**

**PORT HAS ADEQUATE INSURANCE COVERAGE FOR HIGH-RISK CARGO.**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| yes | 85 | 85 |
| no | 15 | 15 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.25**

**PORT HAS ADEQUATE INSURANCE COVERAGE FOR HIGH-RISK CARGO.**

**INTERPRETATION**

Table No.4.25 shows that 85% of the respondents agrees that port has adequate insurance coverage for high-risk cargo and 15% disagrees

**TABLE NO. 4.26**

**PREPARED TO HANDLE AN EMERGENCY INVOLVING HIGH-RISK CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Highly Satisfied | 15 | 15 |
| Satisfied | 20 | 20 |
| Neutral | 65 | 65 |
| Unsatisfied | 0 | 0 |
| Highly Unsatisfied | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.26**

**PREPARED TO HANDLE AN EMERGENCY INVOLVING HIGH-RISK CARGO**

**INTERPRETATION**

Table No.4.26 shows that 65% of the respondents are neural prepared to handle an emergency involving high-risk cargo, 20% satisfied and 15% highly satisfied

**CHAPTER 5**

 **FINDINGS, SUGGESTIONS AND CONCLUSION**

**5.1 FINDINGS**

**5.2 SUGGESTIONS**

**5.3 CONCLUSION**

**5.1 FINDINGS**

* 65% of the respondents are male
* 55% of the respondents agree that they believe the current procedures for high-risk cargo handling at our port are effective
* 55% of the respondents disagree that high-risk cargo is identified and segregated properly at this port
* 48% of the respondents Highly satisfied that port authority provides adequate resources for handling high-risk cargo
* 55 % of the respondents agree that safety protocols for high-risk cargo are clearly communicated to all stakeholders
* 60% of the respondents agree that the the frequency of accidents involving high-risk cargo is minimal
* 50% of the respondents strongly agree that all personnel involved in high-risk cargo handling are adequately trained
* 60% of the respondents says that a training sessions on high-risk cargo handling are conducted regularly
* 85% of the respondents says that new employees receive proper training on high-risk cargo before starting their job
* 66% of the respondents agrees that refresher training courses are available and mandatory for all staff handling high-risk cargo
* 40% of the respondents Highly satisfied that confident in the competence of personnel handling high-risk cargo
* 55% of the respondents highly satisfied that equipment used for handling high-risk cargo is modern and well-maintained
* 65% of the respondents agree that there are sufficient technological aids to ensure the safety of high-risk cargo handling
* 54% of the respondents agree the port utilizes automation to enhance the safety in high-risk cargo operations
* 64% agree that the cargo handling equipment is regularly inspected and certified
* 38% of the respondents neutral
* that surveillance systems are adequate to monitor high-risk cargo areas
* 56% of the respondents agree that the port strictly adheres to national and international regulations regarding high-risk cargo
* 84% of the respondents agree there is a regular audit of compliance with safety standards for high-risk cargo
* 65% of the respondents agree that the port has never been penalized for non-compliance in high-risk cargo handling
* 55% of the respondents agree that the all incidents involving high-risk cargo are reported
* 84% of the respondents strongly agree that the port authority actively engages with international bodies on high-risk cargo standards
* 55% of the respondents agree that the port has a well-defined emergency response plan for high-risk cargo incidents
* 78% of the respondents agree regular drills are conducted to prepare for potential high-risk cargo emergencies
* 80% of the respondents strongly agree that the the port's risk management strategies are effective in minimizing hazards associated with high-risk cargo
* 85% of the respondents agrees that port has adequate insurance coverage for high-risk cargo
* 65% of the respondents are neural prepared to handle an emergency involving high-risk cargo

**5.2 SUGGESTIONS**

* Conduct a comprehensive risk assessment to identify high-risk cargo types and potential vulnerabilities in the handling process.
* Evaluate existing procedures and protocols for handling high-risk cargo at maritime ports.
* Identify gaps and shortcomings in current practices that may contribute to vulnerabilities or increase the risk of security breaches.
* Research and benchmark best practices in high-risk cargo handling from reputable sources, such as international organizations, government agencies, and industry associations.
* Identify successful strategies and initiatives implemented in other ports to enhance security and mitigate risks.
* Collaborate to develop coordinated approaches and share information to enhance security measures.

**5.3 CONCLUSION**

The investigation into the efficiency of high-risk cargo handling at Cochin Port Authority has highlighted a commendable level of operational competence, underscored by the port's adherence to international safety standards and the implementation of modern technological solutions. Cochin Port's investment in specialized infrastructure and the continuous training of its workforce are central pillars that ensure the safe and efficient handling of high-risk cargoes. Moreover, the port's utilization of advanced tracking and monitoring systems, alongside robust safety protocols, contributes significantly to minimizing risks associated with the handling of hazardous materials. These measures not only enhance operational efficiency but also bolster the port’s reputation as a reliable hub in the maritime logistics network.

However, there is room for further enhancement, particularly in the areas of digital integration and inter-agency communication. The adoption of a more cohesive digital framework, such as a single-window system for all cargo documentation processes, could streamline operations and reduce turnaround times further. Additionally, fostering stronger coordination between the port authority, customs, and cargo handlers will ensure smoother transitions and fewer delays, driving improvements in overall efficiency. Addressing these areas will equip Cochin Port Authority to manage the increasing volume of high-risk cargo more adeptly, positioning it as a leader in maritime logistics not only in India but on an international scale.

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* [**https://www.clearias.com/ports-shipping-industry-india/**](https://www.clearias.com/ports-shipping-industry-india/)
* **https://www.cochin-logistics.com/**

**ANNEXURE**

**QUESTIONNAIRE**

Name

Age

Gender

1. I believe the current procedures for high-risk cargo handling at our port are effective.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. High-risk cargo is identified and segregated properly at this port.
* Yes
* No
1. The port authority provides adequate resources for handling high-risk cargo.
* Highly Satisfied
* Satisfied
* Neutral
* Unsatisfied
* Highly Unsatisfied
1. Safety protocols for high-risk cargo are clearly communicated to all stakeholders.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. The frequency of accidents involving high-risk cargo is minimal.
* Yes
* No
1. All personnel involved in high-risk cargo handling are adequately trained.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. Training sessions on high-risk cargo handling are conducted regularly.
* Yes
* No
1. New employees receive proper training on high-risk cargo before starting their job.
* Yes
* No
1. Refresher training courses are available and mandatory for all staff handling high-risk cargo.
* Yes
* No
1. I am confident in the competence of personnel handling high-risk cargo.
* Highly Satisfied
* Satisfied
* Neutral
* Unsatisfied
* Highly Unsatisfied
1. The equipment used for handling high-risk cargo is modern and well-maintained.
* Highly Satisfied
* Satisfied
* Neutral
* Unsatisfied
* Highly Unsatisfied
1. There are sufficient technological aids to ensure the safety of high-risk cargo handling.
* Yes
* No
1. The port utilizes automation to enhance the safety in high-risk cargo operations.
* Yes
* No
1. The cargo handling equipment is regularly inspected and certified.
* Yes
* No
1. Surveillance systems are adequate to monitor high-risk cargo areas.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. The port strictly adheres to national and international regulations regarding high-risk cargo.
* Yes
* No
1. There is a regular audit of compliance with safety standards for high-risk cargo.
* Yes
* No
1. The port has never been penalized for non-compliance in high-risk cargo handling.
* Yes
* No
1. All incidents involving high-risk cargo are reported and analyzed.
* Yes
* No
1. The port authority actively engages with international bodies on high-risk cargo standards.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. The port has a well-defined emergency response plan for high-risk cargo incidents.
* Yes
* No
1. Regular drills are conducted to prepare for potential high-risk cargo emergencies.
* Yes
* No
1. The port's risk management strategies are effective in minimizing hazards associated with high-risk cargo.
* Strongly Agree
* Agree
* Neutral
* Disagree
* Strongly Disagree
1. The port has adequate insurance coverage for high-risk cargo.
* Yes
* No
1. I feel prepared to handle an emergency involving high-risk cargo.
* Highly Satisfied
* Satisfied
* Neutral
* Unsatisfied
* Highly Unsatisfied