Chapter – 2
LOGISTICS MANAGEMENT AND AIR TRANSPORT-AN OVERVIEW

The concept logistics and its management is not new; there are enough reasons and proofs to believe that it has been with us in different forms since the dawn of known civilization. However, logistics as a business concept evolved as late as the 1950s, before which period it was conceived primarily as a military strategy and expressed in martial terminology. Now logistics is an integral part of the business economic system, is a major global economic activity and plays a key role in the well-being of national economy.

Logistics as a formal business management discipline has undergone a lot of modifications in the few decades of its existence. From Industrial Revolution to about 1930, companies mainly emphasized manufacturing techniques and production because demand was assured. The period from 1930s to 1950s, the focus moved on to product promotion and distribution. After 1950s, companies had to closely attend to consumer wants and needs, and recognize customer service as one of the most important non-price competitive factors. Since 1990s the business scenario has fundamentally changed due to factors and agencies such as globalization, free market economy and competitive spirit which have together ensured the customer gets the right materials, at the right time, at the right point and in the right condition at the lowest cost. Business logistics plays a vital role in providing cheapest customer services. Hence Companies are increasingly coming to realize logistics and supply chain management as vital to contemporary corporate success. That efficient
management of logistics is a prerequisite for survival in an aggressively competitive market has also burned itself deeply in management thinking of the day. In short, logistics has attained the status of a key business component, gradually but unmistakably shedding its military air.

2.1.1 Origin of Logistics

The term *logistics* comes from the Greek *logos* (λόγος), meaning “speech, reason, ratio, rationality, language, phrase”, and more specifically from the Greek word *logistikos* (λογιστική), and Latin word ‘Logisticus’ which means science of computing and calculating. Its original use was to describe the science of movement, supply and maintenance of military forces in the field. Later on it was used to describe the management of materials flow through an organization, from raw materials through to finished goods.

2.1.2 Development of Logistics Management

Logistics is concerned with getting products and services where they are needed. As already mentioned it was originally a military activity and developed in the context of military activities in the late 18th and early 19th centuries and it launched from the military logistics of World War II. During Second World War, many substantial developments occurred in areas such as science, technology, strategies and supply chain management. After the war, sustained development has been achieved in the area of logistics only. Over the period of time logistics has gained many names, such as business logistics, physical distribution, materials logistics management, materials management, logistics of distribution, marketing logistics, inbound logistics and outbound logistics.
Before the 1950s, it was preoccupied with the procurement, maintenance, and transportation of military facilities, materiel, and personnel; but it is now seen as an integral part of the modern production process. The main background of its development is the recession of America in the 1950s which caused industrial houses to place importance on goods circulations.

The successive stages of Evolution of logistics and supply chain management, the central characteristics of each stage, and the drivers of change are shown in the Figure below:

<table>
<thead>
<tr>
<th>Dormant Years &amp; Development Years</th>
<th>Years</th>
<th>Take-off Years</th>
<th>Logistics Alliance 3rd Party</th>
<th>Logistics Globalization</th>
<th>Logistics</th>
<th>21st Century</th>
</tr>
</thead>
</table>

**Figure 2.1 Historical Developments of Logistics**

Before the 1950s, logistics was more or less dormant since production was the main part of the managers concerned. In the 1950s and 1960s the military was the only organization to use the term logistics. During this period there was a tendency to apply new ideas of administration to business. In mid of 1960s organizations began to look at the principles of military logistics as a way to improve distribution network. From the 1970s onwards, more and more applications and researches of logistics appeared. This stage is regarded as distribution management and the chief characteristics are coordination among functions and focuses on reducing inventory and distribution cost. The drivers of change from 1970s to 1980s are reengineering of
organizational cost structures. In the 70s, the emphasis was on improved productivity, cost reduction and long-term contracts, while value-added services such as packaging, labelling, systems support and inventory management were on offer in the 80s. The characteristics of stage 1980s are coordination among functions international to organizations and achieve system wide objectives. Another stage of evolution of logistics is from 1980s to 1990s. By 1980s and 1990s, business logistics developed as an important area for corporate strategy of achieving competitive advantage. The drivers of change are increased competition and globalization. The chief characteristics of this stage are coordination among several firms to provide superior customer service at reduced costs.

2.1.3 Definitions of Logistics Management

Logistics is a general concept, which has different definitions for different industries. Logistics is simply defined as the art of managing the flow of goods, products, services, information and people from one place to another. It encompasses a harmonization of various professional activities like planning, controlling, managing, directing, coordinating, forecasting, warehousing and transportation.

The most basic definition of logistics comes from the Webster’s Dictionary (1963) which define logistics as: The procurement, maintenance, and transportation of military material, facilities, and personnel.”

Christopher (1998) defines logistics as “the process of strategically managing the procurement, movement and storage of materials, parts and finished
inventory and related information flow through the organization and its marketing channels”.

Philip Kotler (2001)\(^6\) defines logistics as “planning, implementing and controlling the physical flows of materials and final goods from point of origin to point of use to meet customer’s need at a profit”.

According to Bowesox and Closs (2002)\(^7\), logistics involves “A single minded logic to guide process of planning, allocating and controlling financial and human resources committed to physical distribution manufacturing, support and purchasing operations”.

Bowesox et al., (2006)\(^8\), opine that “Logistics refers to the responsibility to design and administer systems to control movement and geographical positioning of raw materials, work in progress, and finished inventories at the lowest total cost”.

The Council of Logistics Management (CLM), now the Council of Supply Chain Management Professionals (2009)\(^9\), defines logistics as ‘that part of the supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet consumers’ requirements”.

2.1.4 Types of Logistics

On the basis of services performed by logisticians, logistics can be classified as follows:
A. Classification on the basis of flow of materials:

On the basis of the flow of materials, logistics are classified into two ways:

i) **Inbound Logistics**: It is the management of materials from suppliers and vendors into production process or storage facilities.

ii) **Outbound Logistics**: It is the process related to the storage and movement of the final product and related information flows from the end of the production process to the end users. Waste disposal plans which are major threats to the industrial sector in all economies are also included in this type of logistics.

B. Classification based on activities involved in the process:

On the basis of activities involved in the process, logistics are classified into the following ways:

i) **Procurement Logistics**

Procurement is the process of identifying and obtaining goods and services. It covers all activities from identifying potential suppliers through to delivery from suppliers to the users or beneficiaries. It includes activities such as market research, make- or- buy decisions, supplier management, ordering and order controlling.

ii) **Production Logistics**

It connects procurement with distribution logistics. The purpose of this is to ensure that each machine and work station is being fed with the right product in the
right quantity and quality at the right point of time. Its main function is to use available production capacities in producing the products needed in distribution logistics.

iii) Distribution Logistics

It includes a broad range of activities concerned with efficient movement of finished goods from the end of the production line to the customers. Logistics activities in the distribution logistics consists of order processing, warehousing, transportation and other related activities. It is important because the time, place and quantity of production differ with the time, place and quantity of consumption.

iv) Disposal Logistics

The main functions of disposal logistics are to reduce logistics costs and enhance services related to the disposal of waste produced during the operation of a business.

v) Reverse Logistics

Reverse logistics process includes activities that return materials to an organization or to vendors from buyers or it is the process of moving goods from their place of use back to their place of manufacturer for re-processing, refilling, repair and recycling or waste disposal. Royers et al (1998) define reverse logistics as “the process of planning, implementing and controlling the efficient, cost effective flow of raw materials, work in progress, finished goods and related information from
the point of consumption to the point of origin for the purpose of recapturing value or proper disposal.”

vi) Green Logistics

Green logistics describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of the forward and reverse flow.

C. Third Party Logistics (3PL): In order to keep the cost of logistics activities under control, firms appoint an outside agency to perform their logistics functions. This is called Third Party Logistics.

D. Forth Party Logistics (4PL): Complete outsourcing of all activities such as manufacturing and logistics functions including selection of Third Party Service Provider are called forth party logistics.

2.1.5 Objectives of Logistics Management

The overall objectives of logistics management are to achieve a target level of customer service at the lowest possible total cost. Stock and Lambert(2001)\textsuperscript{11} state that the overall objective of logistics management is to minimize the total costs given the customer service objective where total costs include transportation costs, warehousing costs, order processing cost, information costs, lot quantity costs and inventory carrying costs. An effective system of logistics contributes immensely to the achievement of the business and marketing objectives of a firm. It creates time and place utilities in the product and thereby helps in maximizing satisfaction to
consumers. It helps the company bring down the cost of carrying inventory, material handling, transportation and other related activities of distribution. The general objectives of logistics can be summarized as reduction of costs, reduction of capital and service improvement.

2.1.5 Importance of Logistics Management

According to Davis and Drumm (1999)\textsuperscript{12}, logistics management has gained importance due to the following factors:

- Advances in technological changes
- Significant opportunities presented by e-commerce potential
- Development of the systems approach and total costs analysis concept
- Recognition of the role of logistics in a company’s customer service program
- Profit leverage resulting from increased logistics efficiency
- General Economic conditions since the 1950s
- Recognition of the role of logistics in creating competitive advantage in the market place, particularly in the face of domestic and foreign competitors
- Customer requirements for value-added services continuing to drive costs up
- Increasing interest in third party providers that handle all or part of a company’s logistics functions
- Customer service activates continues to be centralized and consolidated
- Increased focus on computer technology and distribution software
- Globalization
2.1.6 Scope of Logistics Management

The scope of logistics ranges from the management of material procurement and manufacturing to the delivery of finished products to its ultimate customers/consumers. The following are the main scope of logistics 13

- Customer Service
- Traffic and Transportation
- Warehousing and Storage
- Plant and warehouse site selection
- Inventory Management
- Order processing
- Logistics Communication
- Procurement
- Material Handling
- Packaging
- Demand forecasting
- Parts and service support
- Salvage and scrap disposal
- Return goods handling

In addition to the above logistics activities, freight forwarding and customs clearance are the key activities of most companies.

2.1.7 Elements of Logistics Management

Logistics is a process of movement of goods across the supply chain of a company. However, this process consists of various functions that have to be
properly managed to bring effectiveness and efficiency to supply chain of the organizations. The core elements of Logistics management called wings of logistics are:

- Order Processing
- Inventory Control
- Warehousing
- Transportation
- Material handling and storage
- Logistical Packaging
- Information

2.1.8 Logistics Management Process

Logistics is viewed as the competent which links an enterprise with its consumers and suppliers. Information from and about customers’ flows through the enterprise in the form of sales activity, forecast and orders. This information is thus translated into manufacturing and purchasing plans. As product and materials are procured, value addition takes place along with the inventory flow that ultimately results in transfer of ownership of finished products to customers. So the process of logistics can be viewed in terms of two inter-related efforts, inventory flow and information flow. This is termed as integrated logistics. The integrated logistics concept is shown in the following figure\textsuperscript{14};
2.1.9 Logistics Management in International Trade

Logistics Management in international trade means management of logistics activities in international trade. It is the art of managing international flow of goods and services. Globalization and liberalization of trade policy has brought about many changes in the business environment and companies are forced to think and act globally to survive in this globalized environment. So to remain competitive in the world market, international firms have begun to implement various strategies and considered logistics as one of the key strategies. Logistics is changing the face of international trade by providing workable systems geared up to fulfilling global needs by supplying goods to the right destination in the right quantity, at right time.

International trade logistics include those activities that are inherent to the movement of goods and paper work from one country to another, those activities that constitute the basis of or exports and imports activities and operations. The definition given by the Council of Supply Chain Management Professionals (CSMP) can be logically modified to define international logistics by including the elements of the
international environment. International Logistics is the process of planning, implementing, and controlling the flow and storage of goods, services and related information from a point of origin to a point of consumption located in a different country\textsuperscript{16}.

2.1.10 Elements of Logistics in International Trade

Elements of logistics in International and Domestic trade are same but differ in Four D’s such as Distance, Documentation, and Diversity in culture and Demand of customers. This explain why logistics cost in international trade is higher than domestic trade. International trade logistics consists of various functions that have to be properly managed to deliver the product more efficiently and effectively to customers located in different countries. It includes the range of services and processes that are involved in moving goods from the country to another: customs and administrative procedures, organization and management international shipment operations, tracking and tracing and the quality of transport and information technology infrastructure. The core elements of logistics in international trade are:

- Freight Transportation
- Freight Forwarding
- Warehousing
- Packaging
- Customs Clearance
- Inventory Management
- Order Processing
• **Freight Transportation**

The key element of freight logistics is transportation. Transportation activity refers to managing the movement of products and includes activities such as selecting the method of shipment (air, rail, water, pipeline, or road, or a combination thereof), choosing the specific route also known as routing, complying with various local, provincial and national transportation regulations and being aware of both domestic and international shipping requirements. A good transport system in logistics activities could provide better logistics efficiency, reduce operation cost, and promote service quality because around one third to two third of the logistics costs are spent on transportation.

• **Freight Forwarding**

Freight forwarding is a crucial element in logistics and it facilitates smooth traffic from one point to another. Freight forwarding activity can be described as a group of specific functions, tasks, operations, skills and regulations that enable efficacious shipping, delivery and transit of material goods by any means of transport and any transportation route in conventional, combined and multi-modal transport. A Freight Forwarder is a cargo intermediary who takes up the transport of goods on behalf of his customer, without himself assuming the role of a carrier. He is known by different names, eg: clearing agent, customs broker, shipping and forwarding agent in different countries. Freight forwarders have been called travel agents for freight.
A person who performs the function of freight forwarding is called Freight Forwarder. A Freight Forwarder is a cargo intermediary who takes up the transport of goods on behalf of his customer, without assuming the role of a carrier himself. Forwarders do not own transport vehicle and they deal with various countries and agents. Forwarders take profits from charging customer service fees. The price that forwarder pays for shipping space from the carrier is lower than the price of which that forwarder sells to the shipper, so that they make profit from the price differences. The freight forwarder is paid a fee by the shipper and often receives an additional percentage of the freight charges from the carrier.

- **Warehousing**
  Warehouse is part of the logistics chain which is referred to get goods from place where they arise to where they are required in the right quality, time and costs. It plays a crucial role in the smooth functioning of logistics operation which ultimately supports the whole supply chain. It creates time utility by bringing the time gap between production and the consumption of goods. It refers to the systematic storing of goods with the goal of making them available on demand. The important function of warehousing includes handling, stock piling, documentation, product mixing, consolidation, fumigation, customs clearance inspection and verification etc.

- **Packaging**
  In logistics perspective packaging serves two purposes. Firstly it must protect product from damage while it is being stored or transported. Secondly it helps to
easier to store and move product by reducing handling and therefore material handling costs.

- **Customs Clearance**
  This is also another important element of international trade logistics. The efficiency of logistics services in international trade may be judged on the basis of speed and timeliness of clearance of cargo. Speedy and efficient customs clearance push up the competitiveness in international trade.

- **Inventory management**
  The Inventory is the greatest element in the overall supply chain of a firm. A good system of inventory management is essential to keep enough inventory stocks to need customers requirements with lowest carrying cost. It helps to strike a balance between the customer service for not losing market opportunity and the cost of meet the same. A sound inventory management policy is based on five aspects of selective deployment: customer segmentation, product requirements, and transport integration, time based requirements and competitive performance\(^{18}\).

- **Order Processing**
  It is an important part of logistics operations. The purchase order placed by a buyer to a supplier is an important legal document pertaining to the transactions between the two parties. Order processing includes the systems used by an organization to receive orders from customers, check on the status of orders and communicate with customers regarding orders as well as actually filling the order and making it available to the customer. Part of the order processing system therefore
is the checking of inventory status, customer credit, invoicing and accounts receivable\textsuperscript{19}.

### 2.1.11 Logistics Costs

Logistics costs are normally referred to as cost components related to distribution cost and cost for warehouse. In other words, the expenses involved in logistics activities are called logistics cost. The logistics cost elements consist of the following:

1. **Procurement Cost**
2. **Inventory Cost**
3. **Warehousing Cost**
4. **Material Handling Cost**
5. **Packaging Cost**
6. **Transportation Cost**
7. **Distribution Channel Cost**
8. **Customer Service Cost**
9. **Communication and Information Processing Cost**

Logistics costs are an important factor that affects the competitiveness of nations and firms. To determine the efficiency of the logistics system, total logistics costs need to be measured in relation to Gross Domestic Product (GDP), which is widely accepted as the barometer to gauge the rate of growth in the economy. In the developed world, logistics costs on average account for 10-15 per cent of the final cost of the finished production. On the basis of studies conducted in the United States, these costs include transportation costs which amount to 7-9 per cent of the...
cost of final product, warehousing cost in the range of 1-2 per cent and inventory cost which are 3-5 per cent of final product cost. But in the developing world, logistics costs are higher than that of developed world because of greater inefficiencies in logistics system. It is estimated that these costs are in the range of 15-25 per cent of the final cost of the product.

India’s logistics costs mainly consist of cost of transportation, warehousing, packaging and losses, inventory and order processing and administration. Around 40 per cent of the India’s logistics costs are incurred for transportation followed by warehousing and packaging (26 per cent), Inventory (24 per cent) and Order Processing and Administration (10 per cent).

2.2 Air Transport

It is the gift of twentieth century to the world and is the most modern, the quickest and the latest addition to the modes of transport. It is the fastest mode of transport for long-distance passengers and high-value light goods. As far as the world trade is concerned, it is still dominated by sea transport because air transport is very expensive and is also unsuitable for carrying heavy, bulky goods. However, transportation of high value light goods and perishable goods is increasingly being carried out by air transport. Air transport is mainly used for international transport and in emergency rather than in normal times. With an increasing globalized economy, countries and companies are exporting and importing all kinds of goods from everywhere in the world. So the importance of air transport increases and plays
a very significant role in countries economic growth. Both passenger and freight are the two backbones of air transport.\textsuperscript{21}

![Figure 2.3 Backbone of Air Transport](image)

2.2.1 Air transport scenario in India

One of the fastest growing aviation industries in the world is Indian aviation industry. Owing to globalization and liberalization, India’s aviation industry has witnessed a revolution with the revocation of the monopoly of government owned airlines and emergence of a new generation of low cost airlines. Air transport has contributed to the rapid growth of India’s international trade in recent decades by offering a reliable and faster mode of transport services to move products and personnel services. It indicates that air transport is going to play an important role in the country’s future economic development.

Growth in the passenger and cargo traffic in India requires significant investments in terms of construction of new airports, expansion and modernization of existing airports, improvement in connecting infrastructure and better air space management.
2.2.2 Airports in India

Airports, as nuclei of economic activity, assume a significant role in the national economy. The airport infrastructure plays a decisive role in shaping a nation’s competitiveness and the inflow of foreign investment. It is also significant in the country’s booming economic growth. In India airports are managed by the Airport Authority of India. The Airport Authority of India is the government authority that was formed on 1st April 1995 by merging the International Airport Authority of India and the National Airports Authority with a view to accelerating the integrated development, expansion and modernization of the operation, terminal and cargo facilities at the airports in the country confirming to international standards.

2.2.3 Classification of Airports in India

India has jumped to 9th position in world’s aviation market from 12th in 2006. Presently India has 454 airports and airstrips, of which 125 are owned by the Airport Authority of India in which 11 are International airports, 86 are Domestic airports and 28 are Civil Enclaves\(^2\). Airports in India are classified in the following ways

a) International Airports:

An international airport is an airport that can accommodate international flights. They are typically equipped with customs and immigration facilities. Such airports are usually larger, and often feature longer runways and facilities to accommodate the larger aircraft commonly used for international travel and available for scheduled international operations by Indian and foreign carriers. These are
Chennai, HAL Bangalore, Calcutta, Ahmadabad, Goa, Trivandrum, Calicut, Jaipure, Srinagar, Nagpur and Amritsar.

b) Domestic Airports:

Domestic airport is an airport which handles only domestic flights or flights within the same country. Domestic airports do not have customs and immigration facilities and are therefore incapable of handling flights to or from a foreign airport.

c) Joint Venture International Airports

There are joint venture international airports and available for operations by India and foreign airlines. These are Mumbai, Delhi, Cochin, Bangalore and Hyderabad

d) Customs Airports with limited international operations;

These have customs and immigration facilities for limited international operation by national carriers and for foreign tourists and cargo charter flights.

e) Model Airports

These are domestic airports which have a minimum runway length of 7500 feet and adequate terminal capacity to handle Airbus 320 type aircraft. These can cater for a limited international traffic also, if required. These include Bhubaneswar, Gawahati, Nagpur, Vadodara, Imphal and Indore.
2.2.4 Air Cargo Logistics

Air cargo has been one of the fastest growing sector in the world economy for the last four decades and plays a vital role in the economic development of a nation. Air cargo logistics means using aircraft and warehousing services for the transport of goods quickly from point of origin to point of consumption for satisfying the requirements of customers. Air cargo is used mostly for shipping goods that are highly valuable, time-sensitive and perishable. Globally, more than one third of the value of goods traded internationally is transported by air and therefore air cargo industry is considered as a barometer of global economic health. It is the fastest mode of transport and offers benefits of secure handling, speed and geographical and temporal flexibility. But it is relatively expensive. One kilogram costs average six times than ocean container freight. That high cost is compensated by reduced inventory and warehousing costs.

2.2.5 Air Cargo Logistics Process

Air cargo logistics process is a time-definite endeavour that requires the coordination of multiple parties, namely shippers, freight forwarders, carriers, customs, warehousing agents, ground handlers and consignees. The processes of moving cargo from its origin to destination are given below:-
From the above picture it is clear that the following parties are involved in air cargo supply chain and all are crucial to the efficiency of the air cargo process.

**a) Shipper/Consignor:** The person or firm who requests the service in transporting the cargo through air.

**b) Freight Forwarders:** Freight Forwarders are air cargo agents they typically purchase transport capacity from carriers in bulk and sell it to their shipper. They are also called Third Party Logistics (3PL) service providers.

**c) Carrier:** The firm which provides the service of air delivery of cargo from the origin airport to the destination airport. There are two type of carrier: all cargo carrier and combination carrier. Carrier that is exclusively for freight is...
called all cargo carriers and the carrier that carries both passenger and cargo that is stored in the bellies of aircraft is called combination carrier.

d) **Ground Handlers**: An agent at an airport that physically handles the cargo.

e) **Consignee**: The receiving party that the goods are sent.

### 2.2.6 Process of International Air Cargo Transportation flow

International air cargo transportation is not only a system of transporting cargo using air carrier, but it also needs to handle the issue before and after shipping, and lot of works are to be done. The basic exports process takes the following steps and structure. 1) The shipper sends request to the forwarder and the forwarder arranges transportations for the shipper 2) The freight forwarder books cargo space in the carrier 3) When the exportation is permitted, the customs broker does customs clearance. In case of clearing and forwarding agents, both cargo spaces booking and customs clearance done by this agents. 4) the shipper moves cargo to the airport waiting for loading. In case of import cargo the process is 1) when airlines moves cargo to the destination country and unloads the cargo. 2) Customs broker does customs declaration, and move cargo to consignee when import is permitted.

### 2.2.7 Air Cargo Traffic in India

The air cargo industry came of age only during the late 1980s in India. The ‘Air Cargo Open Sky Policy’ adopted in 1990 and abolishment of regulatory regime over cargo rates for major export commodities made tremendous increase in air cargo growth across India. Air freight traffic constituted less than 2 per cent of all
tions. However, it represents over one third of the aggregate value of all international trade.

The major drivers for the air cargo growth are the entry of low cost airlines, strong economic growth, increased Foreign Direct Investment, increased cargo movement, strong business growth and supporting government policies. Increasing globalization, establishment of manufacturing facilities and India’s growing might in the Information Technology (IT) space have contributed to the boom in the country’s economy. This has resulted in an increased aggregate demand from India, driving the air cargo services market. In 1978, the total volume of international exports and imports cargo was 45,000 tons, which has grown to one million tons at present. This highlights the fast growth of air cargo industry in India. One of the main reasons for the rapid growth in air cargo in recent years is the unique competitive advantages that can be gained by shipping by air rather than by ground. The growth rate of cargo in the last 5 years has been 10.5 per cent for international cargo and 25.1 per cent for domestic cargo. The overall growth has been 15.3 per cent. According to IATA, air cargo represents about 10 per cent of the airline industry’s revenues.

2.2.8 The Indian Air Cargo Traffic Performance

Air cargo traffic performance in India from 2001-02 to 2010-11 are shown in the following table:-
Table 2.1

Trends of Air Cargo Traffic in India (Figures in ‘000 MT)

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic</th>
<th>International</th>
<th>Total</th>
<th>% Growth Domestic</th>
<th>% Growth International</th>
<th>% Growth Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>294.050</td>
<td>560.226</td>
<td>854.276</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002-03</td>
<td>333.220</td>
<td>646.237</td>
<td>979.457</td>
<td>13.32</td>
<td>15.35</td>
<td>14.65</td>
</tr>
<tr>
<td>2003-04</td>
<td>375.436</td>
<td>693.223</td>
<td>1068.659</td>
<td>12.67</td>
<td>7.27</td>
<td>9.11</td>
</tr>
<tr>
<td>2004-05</td>
<td>456.662</td>
<td>823.608</td>
<td>1280.270</td>
<td>21.64</td>
<td>18.81</td>
<td>19.8</td>
</tr>
<tr>
<td>2005-06</td>
<td>483.790</td>
<td>920.150</td>
<td>1403.940</td>
<td>5.94</td>
<td>11.72</td>
<td>9.66</td>
</tr>
<tr>
<td>2007-08</td>
<td>568.230</td>
<td>1146.750</td>
<td>1714.980</td>
<td>7.29</td>
<td>12.29</td>
<td>10.58</td>
</tr>
<tr>
<td>2008-09</td>
<td>552.640</td>
<td>1149.360</td>
<td>1702.000</td>
<td>(-)2.74</td>
<td>0.23</td>
<td>(-)0.76</td>
</tr>
<tr>
<td>2009-10</td>
<td>686.100</td>
<td>1271.000</td>
<td>1957.100</td>
<td>24.15</td>
<td>10.58</td>
<td>14.99</td>
</tr>
<tr>
<td>2010-11</td>
<td>852.000</td>
<td>1496.000</td>
<td>2348.000</td>
<td>24.18</td>
<td>17.7</td>
<td>19.98</td>
</tr>
<tr>
<td>CAGR (%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12.55</td>
<td>11.53</td>
<td>11.89</td>
</tr>
</tbody>
</table>

Source: www.aai.aero/traffic_news

Table 2.1 reveals that the air cargo traffic performance in India shows an upward trend during the period 2001-02 to 2010-11 except a slight decline in the year 2008-09 for domestic and total cargo traffic. This may be due to financial meltdown. Total cargo handled at the Indian airports has grown in the last ten years at a CAGR of 11.89 per cent during 2001-02 to 2010-11. Domestic cargo handled has grown in the same period at a CAGR of 12.55 per cent. Similarly, the international cargo handled at India airports has grown in the same period at CAGR of 11.53 per cent.
2.2.9 Air Transport Scenario in Kerala

The state of Kerala is well-connected by airways. The state has three international airports at Trivandrum, Calicut and Cochin handling both international and domestic flights and all are located at strategic locations in the state. Out of the three international airports, Trivandrum and Calicut airports are owned by Government of India and that at Cochin airport is owned by Government of Kerala with Public Private Participation. In Kerala all the three airports predominantly handle perishable cargo like fruits, vegetables, flowers and seafood. But the air cargo industry in Kerala is still in a gestation period. Cochin airport has the maximum capacity on offer and thereby attracts majority of cargo followed by Trivandrum and then Calicut.

2.2.9.1 Trivandrum International Airport

Trivandrum International airport is the oldest and the foremost of the three international airports in Kerala and also the first international airport outside the four metros in India. It is one of the major airports in South India. It is located at a distance of 4 Kilometers (approximately) from downtown Trivandrum. This airport is located close to the Shankumugham beach. It was established as a part of the flying club, in the year 1932. Its International operations were launched by Air India to Middle Eastern cities like Dubai, Abu Dhabi, Doha, Kuwait city, Bahrain and Dhahran, during the latter half of the 1970s and early 1980s. It became an International airport after its upgrade in 1991. With this Trivandrum Airport became the first international airport in India to be located outside metropolitans’ cities. Now
it has daily flights to many international cities like Kuwait, Dubai, Singapore, Male, Colombo, Sharjah, Muscat, Bahrain Doha, Dammam, Jeddah, Kuala Lampur and Abu Dhabi. The airport is a convenient connecting point to neighbouring SAARC nations like Sri Lanka and the Maldives as well as Middle East and South East Asian Countries. It plays a major role in the world aviation map, connecting and controlling about nine international Air Routes and provides approach control service to eight major and minor aerodromes. There are two separate terminals for handling international traffic and domestic traffic, with a total area of 9000m² covering ground and first floor. The international Terminal has a peak hours passenger capacity of 800 and domestics terminal 500 for both arrival and departure passengers put together.

The New Terminal Building (NITB) was inaugurated by Dr. Manmohan Singh, the Hon’ble Prime Minister of India, on 12th February 2011. International flights from Trivandrum airports stand shifted to new Airport Terminal with effect from first March 2011. Customs friendly services provided by the companies at Trivandrum airport at competitive rates is one of the major attractions for importers and exporters to opt for Trivandrum airport for the business purpose. Trivandrum Air cargo Terminal is the major centre for exports of perishables from South India. It has also obtained quality certification from the Bureau of Indian Standards as per: ISO 9001-2000 standards, as early in the year 2003. It is the first its kind in India to receive the ISO 9001-2000 certification. The AAI has agreed to give its backing for a Multimodal Hub at this airport.
Air India, Air India Express, Indian Airlines, Jet Airways, Kingfisher Airlines, and Paramount airways are the domestic airlines and Air Arabia, Air India, Air India Express, Emirates, Etihad Airways, Gulf Air, Indian Airlines, Jet Airways, Maldivian, Monarch Airlines, Oman Air, Qatar Airways, Silk Air, Sri Lankan Airlines, Thomas Cook Airlines, Thomson Airways, and Saudi Airlines are the international airlines currently operating from Trivandrum airport. Middle East continues to be the major destination of international flights.

A) Items of Cargo handled in the Airport

a) Export cargo handled:

The export cargo mainly consists of perishable and general cargo. Perishable cargo includes fresh vegetables, fruits, fish and meat, flowers, etc. The major share of exports of perishable cargo is vegetables. General cargo mainly includes commercial cargo viz. engineering products, textiles, items such as ready-made garments etc. Besides this only negligible quantities of valuable and courier cargo are also exported from Trivandrum airport.

b) Import Cargo handled:-

The import cargo mainly consists of two categories of cargo such as Unaccompanied Baggage (UB) or Personal effect and Commercial cargo. UB includes electronic equipment like computer and television and household appliances like washing machine, refrigerator and air conditioner brought by the majority of the Gulf returnees. Almost 95 per cent of the import consignment at this airport is UB. Commercial cargo includes electronic spares and other equipments imported by BPL
and other IT companies based in Kerala, especially at Techno Park, Trivandrum, and also machines and spares imported by ISRO, major hospitals and other industrial units. Besides this only negligible quantities of valuable and courier cargo are also imported in Trivandrum airport.

B) Warehouse Management in Trivandrum Airport

Trivandrum Air Cargo Terminal (TACT) is the first terminal in Kerala for imports and exports. Trivandrum Air cargo complex was started by Kerala State Industrial Enterprises (KSIE), and then later handed over to Airport Authority of India. Again it handed over to KSIE. So the cargo activities in Trivandrum Airport are carried out through KSIE. The exports operations from Trivandrum Airport commenced in 1979. A full fledged Trivandrum Air Cargo Terminal (TACT) was established by KSIE at Shangumugham from where full-fledged import/export activities commenced from July 1984 onwards. The warehouse in Trivandrum airport is a Bonded warehouse and is managed by KSIE and located within the Airport Premises in the restricted area. The warehouse is mainly for imports cargo because as far as exports are concerned around 98 per cent of the cargo is perishable item. The warehouse is in the area of 25000m² or 269097 sq. ft. It has a capacity to import 20400MT and Export 26400 MT per annum. The facilities and equipments in the warehouse includes mechanical handling, air conditioned storage, deep freeze storage, fresh meat inspection, de compression chamber, security for valuables, fumigation equipment, very large/heavy cargo handling equipment, trolley, web based cargo trucking system, weighbridge facility, cooling chamber for perishables, large go down to keep the export /import cargo forklift, conveyors, weighting
machine, X-ray machine for screening of both import and export along with strong
room and customs inspection general. Agricultural and Processed Food Products
Export Development Authority (APEDA) has established centre for perishable
cargo at Trivandrum airport. Automated storage and retrieval mechanism is used in
the airport for storing cargo in the warehouse. The charges levied in the airport
include terminal charges, demurrage charges, fork lift charges, charges for X-ray
machines, refrigerator/deep freezer charges, cooling chamber charges, handling
charges, charges for handling transhipment cargo, cold storage charges for exports
cargo and security charges. The customs clearance function in this airport is
performed by Central Excise and Customs Authority. The operating hours of
customs department is 24 hours a day except Sundays and holidays.

2.2.9.2 Calicut International Airport:

Calicut Airport which also called as Karipur International Airport is one of
the three international airports located in Kerala. It is located at Karippur in
Malappuram district, which is about 27 kms from Calicut, Kerala, India. The airport,
was sanctioned after a long period of struggle which began in 1977 under the
leadership of freedom fighter late K.P.Kesava Menon. It was commissioned on 13th
April 1988 on a Vishu (Malayalam New Year) by Airport Authority of India. Funds
were collected from Gulf Malayalys for its development in the 1990s when the
Union Government said it did not have funds. The Malabar International Airport
Development Society was established to help to raise the funds for the same. The
first flight was from Bombay, initially only four flights operated per week. The first
international flight to Sharjah started from this airport on 15th February 1992, placing
this airport on the international map and got the status of international airport on 2nd February 2006, thereby paving the way for the improvement of the infrastructure there for handling international flights. Today Calicut Airport is the Gateway to Malabar Region for the whole world. It is the third busiest airport in Kerala and 12th busiest airport in terms of passenger traffic and 11th in cargo handling. It has been declared the best among the 11 airports under the AAI. At present Calicut Airport has a total built up area of 7130 sq.mtrs. The airport have 2 passenger Terminals and one Cargo Terminal. Air India, Air India Express, Indian Airlines, Jet lite, and Kingfisher Airlines are the domestic airlines currently operating from this airport. Air Indi, Emirates, Saudi Airlines, Qatar Airways, Air Arabia, Oman Air, Jet lite, Etihad, Air India Express, Bahrain Air, Rak Air and Kingfisher Airlines are the international airlines currently operating from this airport. Middle East being the major destination of international flights.

A) Items of Cargo handled in the Airport

a) Exports cargo handled:

The exports cargo mainly consists of perishable and general cargo. Perishable includes fresh vegetables, fruits, food stuff, textile/ garments, printed materials, marine products, betel leaves and flowers etc. The major shares of exports of perishable cargo are vegetables. The fresh vegetables and fruits are collected from various markets and farms in Kerala and Tamilnadu by shipper and are being transported to the air cargo complex in packed conditions. The destinations are mainly to Middle East. General cargo mainly includes commercial cargo viz. engineering products, textiles, items such as ready-made garments etc. Besides this
small quantity of valuables and other cargo are also exported from this airport. The airport also planning to start courier cargo operations.

b) Import Cargo handled:-

The import cargo mainly consists of two categories of cargo ie Unaccompanied Baggage (UB) or Personal effect and Commercial cargo. Almost 98 per cent of the imports cargo at Calicut Airport consists of personal effects (UB). The balance 2 per cent constitutes garments and other items of commercial values and also negligible quantities of valuable cargo.

B) Warehouse Management in Calicut Airport

Warehouse in the Calicut Airport is managed by Kerala State Industrial Enterprises, a state government undertaking. It is a Bonded warehouse. It is situated in the restricted area and mainly used for storing imports cargo. The warehouse is in the area of 430,556 sq.ft. It has cargo capacity of 10000 tones. The area for import godown is 2960 sq.mt. and for exports it is 1000sq.mt. The warehouse have facilities such as X ray Screening Machine, Strong Room for Precious Cargo, Material Handling Equipment, Weigh Bridge Facilities ,Computer Network, Cooling Room Facilities for marine products, Fork Lift, Transhipment cargo holding area and Mechanical Handling Facilities. Automated storage and retrieval mechanism is used in the airport for storing cargo in the warehouse. The charges levied in the airport include terminal charges, demurrage charges, fork lift charges, charges for X-ray machines, handling charges and security charges. The customs clearance function is
performed by Central Excise and Customs Authority. The operating hours of customs department is 24 hours in a day except Sundays and holidays.

2.2.9.3 Cochin International Airport (CIAL)

Cochin International Airport is also known as Nedumbassery Airport. It is country’s youngest Airport and is the first Airport in which is constructed by private participation. It has been built in tune with the Government of India’s open sky policy to boost the aviation industry in the country as well as to meet expectation of the people. CIAL is located at Nedumbassery, Cochin, the airport is just 20 kms from Sea port, 15 kms from Cochin Economic Zone and 10 kms from industrial and commercial capital of Kerala, The Tirupur-Coimbatore cargo hub which is key cargo market for South India is only 225 kms from this Airport. It is located about 30kms from Kochi city. CIAL is the first Greenfield airport in India to be built under a Public Private participation (PPP). It is the second largest runway in India with a length of around 3400 m. It is the 4th busiest airports in India in number of international passenger, the other three being Mumbai, Delhi and Chennai. It is the fourth busiest airport in India in terms of international traffic, seventh busiest airport in terms of general traffic and also the busiest airport in Kerala in terms of domestic and international flight. It is one of the country’s youngest airports with modern facilities. With equity participation from the Government of Kerala, Industrialists, NRIs, Financial Institutions, Airport Service Providers and the Public, the Cochin International Airport Limited thus came into being as a model enterprise with the first International Airport in India outside the ambit of the Government of India, the first of its kind in the history of civil aviation in India.
The first aircraft by Air India commenced its international operation on 10th June 1999 to Damam. The Air India Jumbo Jet Boeing 747 touched down for the first time in Kerala on 21 June 1999. Domestic flight started on 01st July 1999. Cargo operation at CIAL commenced in October 1999. At that time Air India was the custodian of cargo operation. CIAL took over the cargo custodianship from Air India on December 2000. Air India, Air India Express, Go Air Indian Airlines, Indigo Airlines, Jet Airways, Jet Lite, Kingfisher Airlines, Paramount Airways, and Spice Jet are the domestic airlines currently operating from CIAL. Silk Air, Saudi Arabian Airlines, Qatar Airways, Oman Air, Kuwait Airways, Indian Airlines, Gulf Air, Etihad Airways, Emirates Airline, Bahrain Air, Air India Express, Air India, and Air Arabia are the International airlines currently operating from CIAL. Middle East being the major destination of international flights.

A. Items of Cargo handled in the Airport

   a) Export cargo handled:

   The export cargo mainly consists of Perishable, General Cargo, Valuables and Dangerous goods. Perishable includes fresh vegetables, fruits, fish and meat, flowers, chilled fish, betel leaves pineapple and sea food etc. The major share of export of perishable cargo is fruits and vegetables. General cargo mainly includes commercial cargo viz. engineering products, textiles, electronic equipments, courier bags, machineries, newspaper, magazines, dry fish, masala powder, ready-made garments etc. The valuables include foreign currency, gold jewellery, and silver. Dangerous goods include safety matches, dry ice and radioactive materials etc.
b) **Import Cargo handled:**

The import cargo mainly consists of two categories of cargo ie Unaccompanied Baggage(UB) or Personal effect and Commercial cargo. UB includes electronic equipments like computer, TV etc and items like washing machines, fridge, air conditions etc brought by majorities of the Gulf returns. Commercial cargo includes medical equipments, spare parts electronic items, industrial goods and ship spare parts. Besides this small quantity of valuables are also imported in this airport. Almost 50 per cent of total import cargo consists of Unaccompanied Baggage.

**B. Warehouse Management in Cochin International Airport**

The cargo warehouse at this airport is directly managed by CIAL. It is a Bonded warehouse and situated in the restricted area. It is well equipped to handle all types of exports and imports cargo to various countries with the help of various agents and airlines. Automated storage and retrieval mechanism is used in the airport for storing cargo in the warehouse. The charges levied in the airport include terminal charges, demurrage charges, fork lift charges, charges for X-ray machines, cold storage charges, strong room charges, break bulk charges, handling charges and security charges. The customs clearance function is performed by Customs Authority.

For cargo operation CIAL has a dedicated Cargo Village with total built up space of 1,00,000 sq.ft.in 50 acres of land. The cargo village is one of the largest facilities in the country with three complexes and it is helpful for the easy
transportation of goods to Vallarpadam and Cochin Port. The three complexes in the cargo village are

1. **Centre for Dry Cargo (CDC):** CDC having 50,000 sq.ft. facility with warehousing facility and air customs inspection facilities. A dedicated import unit is also commissioned.

2. **Centre for Perishable Cargo (CPC):** It is the largest dedicated cold storage centre for perishable goods in the country with around 25000 sq.ft. built up space, commissioned on February 2009 at a cost of 38crores, jointly by CIAL, Agriculture and Food Promotion Export Development Authority (APEDA) and Kerala Government. CPC have all modern infrastructure facilities and fully automated systems for ensuring export of farm fresh products to the worldwide markets. It has facilities like temperature and humidity control system required for different types of perishable cargo, including vegetables, fruits, flowers and non-vegetarian items. It has a total of capacity to handle 30,000 tons of cargo per year.

3. **Transhipment Cargo Complex:** A dedicated warehouse is allocated for the transhipment cargo. The imports as well as exports cargo from the customs warehouse in the catchments area as well as airports like Chennai and Bangalore, Coimbatore etc are handled and stored at this centre for export from CIAL. In addition a domestic cargo complex is also constructed.

4. **Domestic Cargo** CIAL has started handling domestic cargo from 1st February 2005, at the newly established domestic cargo terminal. CIAL have
a separate centre for domestic cargo with an area of 10,000sq.ft for the handling and storage of the Domestic cargo. CIAL is the sole service provider at this centre, and have separate strong room facilities for the valuable and vulnerable cargo, including a separate area for handling the dangerous goods. The customs clearance function is performed by Customs Authority. The operating hours of customs department is limited to 10am to 5pm except Sundays and holidays.

This chapter gives a vivid picture about trend of air cargo traffic in India and the airports operating in Kerala. Next chapters the researcher attempt to analyze the trend of air cargo traffic in Kerala and assess the logistics facilities in the airports in Kerala.
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