**CHAPTER-I**

**INTRODUCTION**

* 1. **INTRODUCTION**

In the modern era of global trade and commerce, the efficient movement of cargo plays a critical role in sustaining economies and meeting consumer demands. Over the years, the integration of Information Technology (IT) has revolutionized the cargo movement industry, streamlining processes, enhancing transparency, and optimizing operations. From managing inventory to tracking shipments in real-time, IT solutions have become indispensable for businesses involved in cargo movement.

This paper explores the implementation of Information Technology in cargo movement, highlighting its significance, benefits, challenges, and future prospects. By examining various IT applications and their impact on different stages of the cargo supply chain, this study aims to provide insights into how technology is reshaping the logistics landscape and driving operational excellence.

Akbar express cargo company is a leading provider of innovative Information Technology solutions tailored specifically for the cargo movement industry. With a dedicated team of experienced professionals and a commitment to excellence, we specialize in delivering cutting-edge IT systems and services that optimize logistics operations, enhance visibility, and drive efficiency across the entire supply chain.

At the core of our business philosophy is a deep understanding of the challenges faced by companies involved in cargo movement. Whether it's managing inventory, optimizing transportation routes, or ensuring real-time tracking of shipments, we recognize the complexities of modern logistics and strive to provide comprehensive IT solutions that address these challenges effectively.

Small business looking to streamline your logistics operations or a large enterprise seeking to optimize your supply chain, our company is your trusted partner for all your Information Technology needs in cargo movement. With our expertise, experience, and dedication, we empower businesses to thrive in today's dynamic and competitive market landscape.

The implementation of Information Technology has become indispensable for the efficient and effective movement of cargo in today's globalized economy. By leveraging IT solutions such as inventory management systems, transportation management systems, and tracking technologies, businesses can optimize operations, reduce costs, and enhance customer satisfaction. However, challenges such as data security, integration complexity, and infrastructure limitations need to be addressed to realize the full potential of IT in cargo movement. Looking ahead, emerging technologies like AI, blockchain, IoT, and autonomous vehicles are poised to further revolutionize the logistics industry, offering new opportunities for innovation and growth.

* 1. **AREA CHOSEN FOR STUDY**

This area is conducted at Akbar express cargo, Calicut airport

* + 1. **INDUSTRY PROFILE**

**Air Cargo Market Overview**

The Air Cargo Market is the sector of the economy concerned with the design, manufacture, marketing, and sale of Air Cargo products or services. It includes a range of companies that develop, promote, and market these products in order to satisfy consumer demand. The size, scope, and dynamics of the market are determined by a number of variables, including as customer preferences, technology improvements, and the regulatory environment. The "Air Cargo Market" offers a platform for businesses to compete and innovate by providing solutions that address a wide range of customer needs. It plays a vital role in the overall economy and makes a substantial contribution to growth and development.

Discover the boundless possibilities with Air Cargo Market! As a pioneering force in the industry, we redefine excellence through unmatched products and services. Our customer-driven approach and relentless pursuit of innovation have catapulted us to the forefront. Join our network of satisfied clients and experience the transformative power of Air Cargo Market, where growth knows no bounds. Elevate your business to new heights with us today!

In the coming years, the global Air Cargo Market is set to experience steady growth, driven by a combination of continuous technological advancements, growing environmental awareness, and the rising need for streamlined operations. To seize the evolving market opportunities, industry players are anticipated to concentrate on product innovation, strategic collaborations, and geographical expansion.

The research study includes profiles of leading companies operating in the Air Cargo Market:

This Air Cargo Market report reveals several key market methods that may assist businesses in leveraging their position in the market and diversifying their product range. It is an effective market report instrument for conquering certain business setbacks. This sort of innovative market research provides useful data in a timely manner. It also conducts data-driven research studies to provide insights into elements of market growth. The bulk of the key insights in this study are based on in-depth information gleaned from primary and secondary data collection data.

When considering suggestions to enhance the efficiency and effectiveness of air cargo operations, leveraging advanced technologies and best practices is essential. Here are some focused suggestions aimed at improving air cargo services, potentially for a hypothetical or real company like Akbar Express Cargo:

1. Digital Transformation

**Digital Freight Matching:** Utilize digital platforms that match cargo loads with available aircraft capacities, reducing empty load flights and optimizing freight logistics.

**E-Air Waybill (e-AWB):** Fully adopt electronic air waybills to streamline documentation, reduce paper waste, and enhance data accuracy and accessibility.

2. Advanced Tracking and Visibility

**Real-time Tracking Systems:** Implement systems that provide real-time tracking of shipments from origin to destination, giving both the logistics team and customers up-to-the-minute information.

**Use of IoT Sensors:** Deploy IoT sensors for temperature-sensitive or high-value shipments, allowing continuous monitoring of conditions inside cargo holds.

3. Automation and Robotics

**Automated Loading Systems:** Invest in automated loading and unloading systems which can decrease turnaround times and reduce physical strain on workers.

**Robots for Sorting and Handling:** Employ robots for sorting and handling cargo, which can increase processing speed and reduce errors.

4. Improved Safety and Security

**Advanced Scanning Technologies:** Utilize X-ray machines and other advanced scanning technologies to ensure cargo integrity and enhance security measures.

**Tamper-proof Seals and Locks:** Apply smart seals and locks that notify carriers and customers of unauthorized access, enhancing cargo security.

5. Efficient Space Management

**Container Optimization Software:** Use software solutions that assist in optimal container stuffing and palletizing, maximizing space usage and minimizing damage risks.

**Dynamic Space Allocation:** Implement dynamic space allocation tools that adapt to varying cargo sizes and weights, improving the efficiency of aircraft loading.

6. Sustainability Practices

**Fuel-efficient Aircraft:** Encourage the use of or invest in more fuel-efficient aircraft to reduce carbon emissions and operational costs.

**Sustainable Packaging:** Promote or mandate the use of recycled materials for packaging to decrease the environmental impact.

7. Enhanced Customer Interaction

**Customer Portal Improvements:** Upgrade customer portals to offer detailed insights into shipment statuses, billing, and historical data.

**Mobile Apps:** Develop or improve mobile apps that provide notifications and the ability to manage shipments on the go, enhancing customer convenience.

8. Data Analytics and AI

**Predictive Analytics:** Employ predictive analytics to forecast demand, optimize flight schedules and manage cargo space allocation proactively.

**AI-driven Optimization:** Utilize artificial intelligence to enhance decision-making processes, route planning, and to predict maintenance issues before they occur.

9. Compliance and Regulation Technology

**Automated Compliance Checks:** Use automated systems to ensure that all shipments comply with international regulations and standards without manual checks.

**Blockchain for Documentation:** Explore the use of blockchain technology to create an immutable ledger of shipment data, enhancing transparency and security.

10. Employee Training and Support

**Skills Development:** Continuously train staff on the latest air cargo handling techniques, technology use, and customer service practices.

**Tech Support Teams:** Establish dedicated tech support teams to assist with the implementation and troubleshooting of new technologies.

Implementing these suggestions can significantly enhance the efficiency, security, and customer satisfaction of an air cargo service like Akbar Express Cargo. Continuous improvement and adaptation to technological advancements will be key to maintaining competitiveness in the rapidly evolving air freight industry.

**Definition**

Air cargo is any commodity transported in an aircraft. It’s shipped through a passenger aircraft, cargo aircraft, or combi aircraft. Air cargo cost depends on the commodity's actual weight or volumetric weight. However, the larger the commodity, the less per kilo. For example, if you pay $2 per kilo to transport a package of 50 kilos, you will pay $1.75 to transport a commodity of 120 kilos.

**Air Cargo Market by Type**

The Global Air Cargo Market can be segmented based on various factors to gain a comprehensive understanding of its dynamics and opportunities. The segmentation allows for a more targeted analysis of specific market segments, helpin**g businesses make informed decisions and tailor their strategies accordingly.**

Air Cargo refers to the shipments, products, or any other item carried through an aircraft. The Air Cargo Industry has been crucial to the economy besides for the people. It has reduced the gap between people, across the globe, by carrying and delivering shipments in minimal time especially during the recent pandemic.

**Background of the Air Cargo Industry**

For years, the global air cargo market has served a multitude of concerns surrounding the transportation of goods and consignments and with the rise of global air cargo demand, the complexities increased in the sector. From lack or loss of documents to delay in processing and incorrect data entry, the Air Cargo domain has been striving to prevent maximum revenue leakages.

**Scope and Growth of Air Cargo Industry**

Over the years, digitisation has played a crucial role in the growth of the global Air Cargo Industry. With the advancement in technology, the transportation operation got smoother and instant. Air Cargo is considered to be a reliable and faster mode of transportation.

The disregarded Air Cargo industry showcased its further importance recently by transporting vaccines, medical and safety kits, worldwide. Also, with the surge in global E-Commerce, Air Cargo has been concluded to be the prime preference for Door-to-Door operations. The scope of growth of the Air Cargo Industry has increased in manifolds with the assistance of technology.

**Role of Cargoflash in digitalising Air Cargo**

Cargoflash’s vision is of a paperless Air Cargo industry with minimal human interference for error-free results. The next-generation ‘nGen’ cloud-based solutions make the process efficient by increasing revenue and avoiding errors. To know more about solutions provided by Cargoflash, visit here.

**The Players in the Air Cargo Industry**

Air cargo shipments begin with the shipper. This can be an individual or a major manufacturer with an item to ship. Shippers have the option of taking a product directly to a carrier or alternatively using a third-party logistics provider (usually a freight forwarder) to find the best shipping options and to ensure that all the arrangements are made.

There are several shipping channels. Air cargo carriers provide differing service based on customer demands. The primary distribution channels for air freight and mail include:

**Integrated express carriers:** These carriers include FedEx, UPS, and DHL, which operate with a very tight shipping window to their Midwest distribution hub (FedEx in Memphis, UPS in Louisville, and DHL in Cincinnati). They operate a large fleet of scheduled aircraft, trucks, and couriers for door-to-door service. Typically, integrated express companies provide next-day and deferred time-definite delivery of documents and small packages (two to 70 pounds).

**All-cargo freighter airlines:** A carrier that generally operates scheduled wide-body and/or containerized cargo aircraft from one major airport to another. All-cargo carriers include Atlas Air Cargo, Kalitta, Evergreen, Cargolux, and Polar Air Cargo.

**Commercial passenger airlines**: Scheduled passenger airlines use space in the belly of aircraft to move cargo from airport to airport. The air cargo services provided by passenger carriers can vary in terms of scope and size depending on the airline and the aircraft available. Carriers that offer air cargo service in the belly of passenger aircraft include Delta, United, American, and Southwest.

**Freight forwarders:** An intermediary that arranges the best means of transport for goods, typically by accepting small packages from shippers and consolidating them into container loads. These loads are then transferred to the non-integrated carrier or passenger airlines to deliver to an agent or subsidiary at the destination airport. Forwarders include Panalpina and Expeditors. Integrated express carrier DHL is also a major forwarder and UPS and FedEx have been strengthening their freight forwarding divisions in recent years and including more and more shipments of heavy freight and bulk shipments.

**Regional air cargo carriers:** These carriers operate between market stations and smaller or more remote cargo markets, typically in support of a larger integrated express cargo operator such as FedEx, UPS, or DHL. South Aero and Mountain Air Cargo are examples of contracted ‘feeder’ airlines to both UPS and FedEx. Feeder flights often transport cargo from a smaller market and feed cargo to an awaiting cargo jet bound for the carrier’s hub. Regional feeder aircraft may also fly directly to a hub. Ameriflight is a regional cargo carrier not affiliated with any larger airline, providing custom and time-critical charter flights moving air freight from point to point.

**Consolidators:** A company that combines shipments to a common destination. By combining the shipments, the cost per pound can be reduced, and a savings can be passed along to everyone in the shipping chain. Domestic shipments are typically off-loaded at the destination airport and are picked up by, or delivered to the consignee by truck.

For international shipments, there are several unique players:

**Customs officials:** Federal officials who inspect shipments in the destination country.

**Customs broker (or importer**): A company that works with government agencies to clear the goods for entry into the country. Because international shipping can be a detailed and cumbersome process, the shippers and forwarders typically work with a customs broker.

**Consignee:** The buyer that receives the shipment after it is cleared to enter the country. On occasion, the shipment may be moved to a container freight station for basic handling and customs inspection. Subsequently the shipments are broken down for individual consignees and delivered by truck.

**Technological advancements in air cargo**

In the air cargo industry revolution, it’s essential to spot the technological advancements that have played an important role in this transformation. These advancements have not only enhanced the efficiency of cargo transportation but have also contributed significantly to the reduction of costs, improved delivery times, and heightened the industry’s ability to meet customer expectations.

**1. Digitalization and automation**

The most impacted change that technology has brought to the air cargo industry is the digitization of operations. Manual processes, which were once prone to human error and time-consuming, have now given way to automated systems.

From booking cargo space to tracking shipments in real-time, digital platforms have revolutionized the way the industry functions. This transition has led to faster processing, reduced errors, and enhanced overall operational efficiency.

**2. Real-time tracking and monitoring**

These systems provide shippers and consignees with the ability to track their cargo’s journey from origin to destination. They offer a level of transparency and accountability that was unimaginable just a few decades ago.

This real-time visibility allows for swift decision-making, improved security, and a substantial reduction in the risk of cargo loss or damage.

**3. Cargo Robotics and Automation**

Warehouses and cargo handling facilities are increasingly turning to robotics to streamline their operations. Autonomous cargo vehicles, robotic arms, and automated sorting systems are revolutionizing the handling of cargo shipments.

These technologies not only expedite the cargo handling process but also improve safety, particularly for time-sensitive cargo.

**4. Block chain technology**

Blockchain technology is being explored as a means to enhance the security and transparency of air cargo transactions.

It can provide an immutable ledger of all cargo-related activities, including bookings, payments, and customs clearance. Blockchain’s potential to reduce fraud, improve trust, and simplify cross-border transactions has the industry intrigued.

**5. Green technologies and sustainability**

The air cargo industry is also making strides in sustainability through technological advancements. Fuel-efficient aircraft, improved route optimization, and the reduction of carbon emissions are becoming increasingly critical.

The development of alternative fuels and the integration of eco-friendly practices are contributing to a more environmentally responsible air cargo sector.

**The Future of Air Cargo: Trends and Innovations**

The Air Cargo Industry, over the past two years, has reshaped massively. Due to the pandemic outbreak, the industry faced a downfall, later shifting to the transportation of vaccines and perishable goods. Over the years, the Air Cargo Industry has evolved, and its importance has increased manifold. The effect of COVID-19 also led to the industry's transformation into digital modes. The Air Cargo ecosystem promises to grow in diverse ways and become environmentally conscious in the upcoming years. In the vast expanse of the global economy, the skies above are not merely a canvas of clouds and sunlight; they are the conduits of commerce, connecting continents and catalyzing the exchange of goods. At the heart of this aerial ballet is air cargo, a dynamic force propelling the world's supply chains with unmatched speed and efficiency. As we stand on the precipice of a new era, the future of air cargo beckons with promise and innovation, reshaping the very fabric of logistics.

Air cargo has long been the linchpin of international trade, transcending borders and time zones to deliver goods with unparalleled swiftness. Today, as we venture into the next chapter of transportation evolution, the landscape is adorned with transformative air cargo trends and ground-breaking innovations that are poised to redefine the way we perceive and utilize air cargo services.

**I. Air Cargo Trends: Navigating the Skies of Change**

* **Sustainable Aviation**

One of the key trends in the future of air cargo is a shift towards sustainability, a commitment to greener skies and a more environmentally conscious approach to logistics. According to the International Air Transport Association (IATA), the aviation industry aims to reduce its net carbon emissions to half of 2005 levels by 2050. Sustainable aviation fuels, powered by bioenergy and advanced technologies, are expected to play a pivotal role in achieving this ambitious target.

* **Digitization and Data-driven Logistics**

The integration of digital technologies is revolutionizing air cargo operations. From real-time tracking systems to advanced analytics, digitization enhances visibility and transparency in the supply chain. Automated processes, powered by artificial intelligence, optimize route planning, cargo handling, and inventory management. The result is a more efficient and responsive air cargo ecosystem.

* **E-commerce Boom**

As the digital revolution permeates every aspect of our lives, the e-commerce boom emerges as a beacon guiding the trajectory of air cargo. The rise of online shopping has propelled air cargo into a new realm of demand, where swift and reliable deliveries are not just a luxury but an expectation. According to Statista, the global e-commerce market is expected to grow to $8.1 trillion by 2026, with air cargo providers becoming indispensable partners in meeting the ever-growing consumer expectations.

**II. Innovations in Air Freight: Paving the Way for Tomorrow's Cargo**

* **Drone Technology**

Above the clouds, a fleet of unmanned aerial vehicles (UAVs) or drones is emerging as a revolutionary force in air cargo trends. These agile carriers transcend traditional infrastructure, promising faster and more flexible delivery options, especially in remote or hard-to-reach areas. According to a forecast by MarketandMarkets, the global drone logistics and transportation market is projected to reach $16.1 billion by 2030, ushering in an era where drones are not just a technological marvel but a pragmatic solution to last-mile deliveries and intra-city transport challenges.

* **Autonomous Cargo Aircraft**

In the aeronautical realm of innovation, autonomous cargo aircraft take center stage. Advancements in autonomous technology are paving the way for pilotless flights, reducing human error and increasing operational efficiency. The autonomous aircraft market is projected to witness exponential growth, with estimates suggesting a leap from $3.6 billion in 2018 to $23.7 billion by 2030, as reported by MarketsandMarkets. The prospect of cargo aircraft navigating the skies sans pilots heralds a new era in air freight logistics.

* **Smart Cargo Containers**

Down on the ground, within the steel confines of shipping containers, the Internet of Things (IoT) is orchestrating a symphony of data. Smart cargo containers, equipped with sensors and real-time monitoring capabilities, provide an unprecedented level of insight into the conditions and locations of goods during transit. According to the Insight Partners, the global smart container market is expected to reach $11.7 million by 2027, offering a transformative leap in cargo safety, reducing risks, and enhancing overall supply chain visibility.

**III. Future of Air Logistics: Navigating Challenges and Opportunities**

* **Infrastructure Upgrades**

To meet the demands of a growing air cargo industry, airports and logistics hubs are undergoing significant upgrades. Expanded runways, improved cargo handling facilities, and state-of-the-art storage systems are becoming essential to handle the increasing volume of air freight. Investing in modern infrastructure is crucial for maintaining the efficiency and competitiveness of air logistics.

* **Regulatory Changes**

In the complex dance of air logistics, regulatory changes play a crucial role. As the industry embraces innovations, governments and aviation authorities are shaping the rules of engagement. According to a report by PwC, the global air cargo industry is expected to face increased regulatory scrutiny, especially regarding safety and environmental standards. Striking the delicate balance between innovation and compliance is imperative for the seamless integration of new technologies and the sustained safety of air cargo operations.

* **Global Supply Chain Resilience**

The resilience of supply chains became a focal point during the crucible of the COVID-19 pandemic. In response to this awakening, the air cargo industry is adapting to fortify global supply chains. The future of air logistics involves diversification of routes, advanced risk management strategies, and increased collaboration among global partners, creating a robust and adaptable framework for unforeseen challenges.

**Air Cargo Innovations: Pioneering the Next Frontier**

* **Hyperloop for Cargo**

As we look beyond traditional air transportation trends, the concept of hyperloop technology emerges as a beacon of innovation in cargo logistics. According to a study by Virgin Hyperloop, hyperloop systems have the potential to reduce cargo transport costs by 20% and offer transit times four times faster than traditional modes of transportation. This visionary innovation has the capacity to revolutionize long-distance cargo transport, heralding an era where delivery times and costs are dramatically reduced.

* **Blockchain for Supply Chain Transparency**

Blockchain technology is finding applications in air cargo for enhancing supply chain transparency and security. By providing an immutable and decentralized ledger, blockchain ensures the integrity of data related to cargo movements, reducing the risk of fraud and errors. This innovation improves trust among stakeholders and facilitates smoother transactions in the air cargo ecosystem.

* **3D Printing in Air Cargo**

The integration of 3D printing introduces a transformative approach to manufacturing and logistics in the air cargo innovations industry. With the ability to produce spare parts on-demand, air cargo providers can mitigate inventory costs and respond rapidly to maintenance needs. This innovation minimizes downtime, enhances sustainability, and elevates the overall efficiency of air cargo operations.

The future of air cargo trends is not merely a projection of technological advancements; it is a narrative of evolution, adaptation, and responsibility. From the trends of sustainable aviation and digitization to the innovations in air freight to drone technology and autonomous cargo aircraft, the air cargo industry is charting a new course. As logistics strategies evolve to embrace the challenges and opportunities on the horizon, the skies above remain open—a canvas awaiting the brushstrokes of a new era in air cargo, defined by speed, efficiency, and environmental responsibility.

**Advantages and Disadvantages of Air Cargo**

**Advantages of Air Cargo**

**1. Wide Spread Reach**

The biggest advantage of air cargo is its wide reach all over the globe. Every country has an airport, thereby enabling the general public to send cargo and parcels to anywhere in the world. The other cargo route such as roads and ships have their limitations when it comes to the route, air cargo has no such hurdles, as the transportation route is free from any obstruction.

**2. Time**

If you have a package that needs to reach a place before a certain day or time, then look no more, air cargo is the way to go. You can send a package from one end of the globe to the other and the package will reach its destination in two to three days, unlike road and sea routes which will take months with multiple loading and unloading.

**3. Reliable**

Air cargo is the most reliable form of cargo service in two ways. Firstly, you don’t have to worry about someone stealing your cargo during the transit process and the second way is that air cargo is never delayed if it is delayed it is only by a couple of hours and not days and weeks like road and ship so that you can relax because your cargo will reach the final destination on time. Air cargo also provides accurate tracking, so that you can see where your cargo is at any given time, the service provider will give a tracking number once you have handed over your parcel to them.

**4. The Best Transport Method For Perishable Items**

For all the products that have a short shelf life like beverages, food materials, fish, and other items, air cargo is the best as you can transport them in a small windows frame. Transporting perishable items in the ship and via road have their set of risks like being delayed can cause the start degrading marking a loss to the manufacturer.

**Disadvantages of Air Cargo**

**1. Cost**

Out of all three cargo services, the air cargo is the one that will cost you more, but when taking in the advantages the price of the air cargo is justified. Your cargo will always be on time, it is reliable and no one is going to tamper with your products during the transit process. Even if we compare the distance, the air cargo will be more expensive on any given day.

**2. Limitation Are There**

Not all items can be sent via air cargo, there are set dimension for size and weight, as the space on planes are not as wide as, on ships, there is also a weight limit, going beyond the weight limit is dangerous as it can cause the plane to lose its lift during flight and cause a crash. Certain liquids that cannot handle high pressure and altitude cannot be shipped via air and have to make use of the road or sea route.

**3. Impact of Weather**

The only thing that can delay an air cargo service is the weather. If mother nature is in a bad mood, most of the flights will be canceled before take-off and if the weather condition gets worse during in flight, the cargo flight will have to make an emergency landing in the nearest airport and halt till the weather clears up.

**4. Huge Investment**

Air cargo requires huge investment because you need to have your fleet of planes or even leasing a cargo plane will require you to shell out a huge amount of money. Not only that there should be proper maintenance from time to time, permits and licenses will also cost you a bit and the pilots should be experienced and they must undergo routine scrutiny and must be updated with the latest software updates when it comes to the onboard flight system.

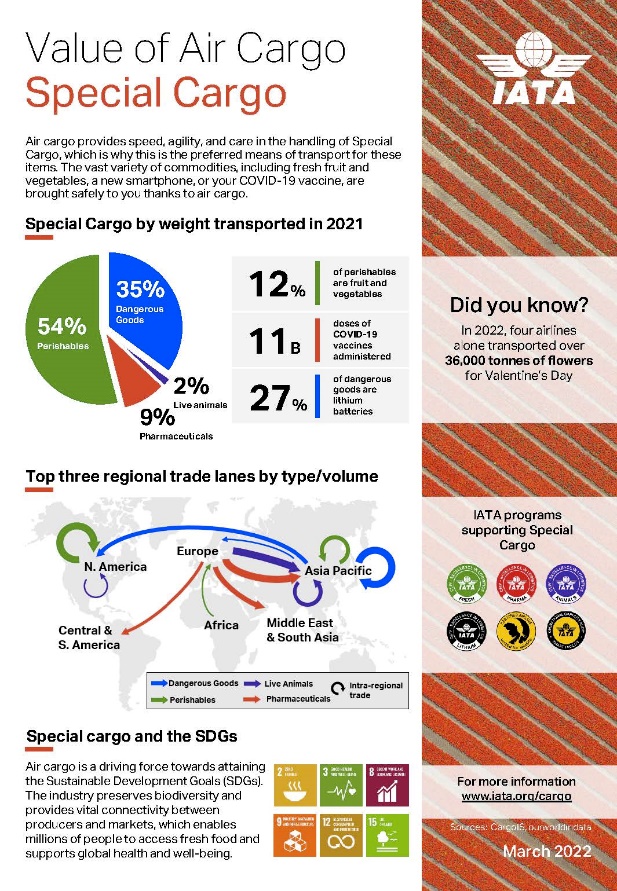
If you have a cargo that needs to reach a specific destination before a certain time or are you a manufacturer and exporter of perishable goods? Whoever you are, if you said yes, the air cargo is the way to go. Consult a trusted air cargo service provider who has a wide range of fleet and global presence to make sure that your cargo will reach the destination on time.

**Value of Air Cargo**

​Air cargo is a trade facilitator that contributes to global economic development and creates millions of jobs. The global economy depends on the ability to deliver high-quality products at competitive prices to consumers worldwide. Air cargo transports over US $6 trillion worth of goods, accounting for approximately 35% of world trade by value.

IATA launched the “Value of Air Cargo” campaign to raise awareness of the importance of air cargo to commerce, economies, and the global community. Throughout the year we will publish fact sheets on the commodities transported.





**Air cargo industry worldwide - statistics & facts**

The transportation industry co-evolved with both socio-economic and technological changes. The introduction of airplanes in the 1900s systematically affected how we make business and transport goods. Although many people only associate aviation with passenger transportation, the global air cargo industry increasingly became a powerhouse for global economic relations especially in the age of rising e-commerce. Even though the market size of the cargo airline fluctuated around 110 billion U.S. dollars during the last years, in a long-run analysis the strong growth in the cargo airline industry becomes obvious. Between 2004 and 2021, worldwide revenue generated in the cargo aviation industry more than doubled, reaching a peak at 175 billion U.S. dollars in 2021. However, global airfreight traffic only increased by roughly 62 percent during the same period.

* **Firms in the air cargo industry**

In addition to well-functioning markets with a multitude of cargo firms, cargo airports are the necessary nodes in the global air freight transportation industry providing crucial infrastructure for air cargo firms. Since 2014, Hong Kong (HKG), Memphis (MEM), and Shanghai (PVG) were the largest cargo airports by freight volume. In 2020, FedEx, UPS, and Qatar Airways were the leading three airlines for international and domestic air cargo in terms of freight tonne-kilometers. In less than a decade, Emirates Group’s air cargo volume increased by 70 percent, reaching over 2.6 million metric tons of cargo carried. Some firms have a more dynamic market strategy with large expansions. For instance, Qatar Airways increased the amount of cargo carried to over 2.7 billion metric tons.

* **Outlook of the air cargo industry in the aftermath of COVID-19**

The growth of global trade and economic relations triggered indirectly a positive expansion of the air cargo industry until 2020. However, the persistence and magnitude of the coronavirus shock make countries and industries rethink industrial policy designs. To shift towards localized industrial production is one of the tendencies , especially in the aftermath of COVID-19. Consequently, industries can strive to become somewhat self-sufficient, thus, reducing the need for more transportation including air cargo. Most importantly, the coronavirus outbreak hits the international air freight forwarding market through a persistent health shock that drags the global economy into a deep recession. This is because industrial production remained at a historically low-level globally throughout 2020. In a severe impact scenario, the global air freight forwarding market is expected to contract by 7.7 percent in 2020 compared with 2019. Moreover, the restrictions on passenger aviation impacted the share of freighter capacity in the air cargo segment. As of August 2020, approximately 78 percent of the air cargo capacity was supplied by a freighter (a cargo aircraft), which is a sharp change from the balance of 50-50 between belly freight and freighter air cargo prior to the coronavirus pandemic.

**Air Cargo Industry in India**

India’s air cargo industry is undergoing a remarkable transformation, driven by speed, regulatory reforms, digitization, and infrastructure development. The sector is poised to play a central role in shaping India’s express delivery industry, fueled by the surging demand for swift deliveries, the expanding B2B and B2C landscape, and the need to efficiently transport high-value and temperature-sensitive goods.

With regulatory reforms and infrastructure development initiatives like the New Logistics Policy （NLP） and PM Gati Shakti leading the way, India is poised to become a global air logistics powerhouse, offering businesses efficient and cost-effective solutions while contributing to a sustainable future.

* **Fastest Growing Air Cargo Sector**

India boasts one of the world’s fastest-growing express delivery sectors, with air transport playing a substantial role. In 2022, it handled 2.2 million Tonnes of air cargo, projected to reach 10 million Tonnes by 2031. The Indian air freight market is expected to reach $13.08 billion by the end of 2023, with forecasted growth to $17.22 billion by 2028, boasting a 5.65% CAGR.

To meet the growing demand, TCI Express, a key express delivery player, has expanded its air cargo capabilities with 73 air gateways and 3000 air pickup points domestically, and international operations in over 208 countries to keep up with India’s growth.

* **B2B Segment Powering Growth**

The B2B segment is a significant growth catalyst for India’s express delivery industry, contributing approximately 60% of its revenue in the fiscal year 2016-17. Simultaneously, air transport constituted 45% of the express delivery volume and 29% of revenue during that period. With a thriving SME/MSME sector, efficient B2B logistics play a pivotal role in India’s economic landscape.

Recognising this potential, TCI Express, the fastest-growing B2B express delivery firm, derives 95% of its revenue from the B2B segment, catering to industries such as manufacturing, textiles, electronics, automobiles, and pharmaceuticals.

* **High-Value & Temperature-Sensitive Cargo**

The air cargo sector has recently witnessed a surge in transporting high-value goods, pharmaceuticals, and temperature-sensitive items, emphasising the crucial role of air cargo services in ensuring secure and efficient deliveries. With the Indian pharmaceutical industry valued at approximately $50 billion and expected to achieve a remarkable 10.7% CAGR by 2030, growing from $65 billion in 2024 to $130 billion, there exists substantial growth potential in air cargo.

TCI Express, with its asset-light approach, maintains a competitive edge as it continues to address the escalating demand for temperature-sensitive air cargo, encompassing pharma products, frozen blood plasma and vaccines, through its Air Express service.

* **Regulatory Reforms & Infrastructure Development**

The Indian government is driving essential regulatory reforms through the PM Gati Shakti Master Plan and the New Logistics Policy （NLP） to establish a global standard air logistics ecosystem. PM Gati Shakti national master plan focuses on infrastructure development, pivotal in modernising transportation networks. Under the UDAN initiative, the government aims to create 220 operational airports, heliports, and water aerodromes by 2024-25. This includes developing 109 new aviation facilities, encompassing 51 existing airstrips,18 greenfield airports,12 water aerodromes, and 28 heliports.

Additionally, 40 air cargo ports and 30 airports have been equipped with cold storage facilities to enhance export capabilities. This initiative anticipates enhancing the infrastructure landscape, including airports and air freight stations, to boost air cargo efficiency by reducing dwell times, increasing productivity, and ultimately cutting logistical costs.

**Types of Air Cargo**

With a solid understanding of the importance of air cargo and its role in the supply chain, let’s explore the nine distinct types of air cargo. We will also delve into their unique features and uses in various industries.

* **General Cargo**

As the backbone of the air freight service industry, general cargo is a versatile and vital category. It covers a wide range of goods and products. This cargo can handle anything to do with electronics, clothing, machinery parts, medical supplies, and more. General cargo encompasses items that do not require specific handling or storage conditions during transportation.

Manufacturers, retailers, and businesses across numerous sectors depend on general cargo air freight services to transport their goods quickly and efficiently.

While specific restrictions and regulations may apply depending on the nature of the items, general cargo is typically more straightforward in terms of packaging and handling requirements. This category allows for streamlined operations, contributing to its substantial air cargo market share.

* **Special Cargo**

Special cargo refers to goods that have unique requirements for handling, storage, or transportation. This category covers a diverse range of items, such as fine art, pharmaceuticals, sensitive equipment, or even live stage props for entertainment events.

The unique nature of these goods necessitates specialized care and attention, often involving additional security measures, temperature controls, or custom-designed containers.

Companies whose cargo includes museums and galleries, pharmaceutical companies, and event organizers rely on special cargo services to transport their valuable and delicate items safely and securely.

Air cargo providers offering special cargo services are well-equipped to handle the stringent regulations and standards associated with these goods. This ensures compliance and minimizes risks during transportation.

* **Live Animals**

This type of cargo transports our furry, feathered, or four-legged friends through the skies. The specialized sector handles various creatures, from pets and farm animals to rare species destined for zoos and conservation centers. This way, they all receive the utmost care during their journey.

The live animal air cargo sector is essential in fostering connections across the globe and providing a reliable, humane way to transport the planet’s diverse inhabitants. Pet owners, breeders, farmers, and wildlife conservationists in the United States entrust live air freight with more than 2 million animals annually.

To guarantee the welfare and safety of every living passenger, air cargo providers follow strict guidelines laid out by the International Air Transport Association (IATA) in Live Animal Regulations.

* **Dangerous or Hazardous Cargo**

The hazardous cargo category includes goods that pose a potential health, safety, or property risk during transportation. These items require special attention and handling to ensure the safety of air cargo personnel and cargo aircraft.

Air freight shipping of such items is subject to stringent oversight. The IATA provides the Dangerous Goods Regulations (DGR), the global standards for transporting hazardous materials by air. These types of cargo fall into nine categories, each with its own set of regulations stipulating packaging, labeling, documentation requirements, and guidelines for handling and storage:

* Explosives
* Flammable Gasses
* Flammable Liquids
* Flammable Solids
* Oxidizing
* Toxic and Infectious
* Radioactive
* Corrosives

Miscellaneous, such as cargo requiring an elevated temperature, magnetized materials, and microorganisms.

Businesses that deal with chemicals, pharmaceuticals, and other industries requiring hazardous materials are the primary users of dangerous cargo air freight service.

* **High-Value Or Fragile Cargo**

The high-value or fragile cargo category consists of items with significant monetary value or that are prone to damage during transportation. Businesses and individuals shipping goods such as:

* Fine art
* Luxury goods
* High-end electronics
* Delicate musical instruments
* Precious gems or metals

All these require specialized handling and strong security measures to ensure their safe and secure transit.

Air cargo services provide these enhanced security measures, such as surveillance, secure storage facilities, and in some cases, a dedicated cargo escort. They also employ specialized packaging materials and handling techniques. This protects fragile items from damage during transport.

High-value or fragile cargo makes up a smaller portion of total air cargo transport than general cargo. Therefore it remains an essential service for numerous industries and clients seeking secure and reliable transportation for their valuable or delicate items.

* **Perishable Cargo**

When it comes to perishable cargo, time is of the essence. Because they have a limited shelf life, these goods require specialized air cargo transport. It is essential for perishable cargo to reach its destination quickly and in the best possible condition. Fresh fruits, flowers, meats, seafood, and even temperature-sensitive pharmaceuticals are delicate items that fall under this category.

Perishable Cargo Regulations are in place to ensure the safe transportation of perishable cargo. Guidelines cover everything from proper packaging and temperature control to transit times.

Although perishable cargo is a smaller slice of the air cargo shipping pie, it’s essential for industries that rely on the prompt and efficient transportation of goods with a limited lifespan. For example, Africa’s burgeoning floriculture industry relies on specialized air cargo services to ensure the quality of its products.

* **Temperature Controlled Cargo**

Temperature-controlled cargo is a game-changer for businesses that rely on precise temperature conditions during transportation. This specialized category is designed to maintain a consistent environment for goods sensitive to temperature fluctuations. The goal is that the goods arrive at their destination in perfect condition.

Industries that deal with temperature-sensitive goods, such as pharmaceuticals, chemicals, and food processing, rely heavily on temperature-controlled air freight services. These services employ advanced temperature-controlled containers and monitoring systems to maintain a consistent climate throughout the journey. By doing so, the cargo is protected from potential damage.

The IATA Temperature Control Regulations provide guidelines for packaging, temperature management, and handling procedures.

* **Mail Cargo**

The mail cargo segment plays a pivotal role in the worldwide postal and parcel delivery network. It guarantees the prompt delivery of letters, documents, and packages to their intended destinations. Air freight handles approximately 328 billion letters and 7.4 billion packages annually, making mail cargo the most significant percentage of air shipment loads.

This air cargo category comprises personal correspondence and e-commerce purchases as well as essential business paperwork and small parcels, all requiring efficient transportation to bridge the global gap between people and businesses.

Users of mail cargo air freight services primarily include postal authorities, online retailers, and courier firms. These services collaborate closely with customs agencies to ensure compliance with international shipping regulations, which cover restrictions on specific items, weight constraints, and proper documentation.

* **Human Remains, Tissue, and Organ Cargo**

Air transport is mission-critical in the delicate realm of human remains, tissue, and organ cargo. This category deals with transporting human remains for repatriation or funeral purposes. It also ships life-saving tissues and organs for transplants. Given the sensitive nature of these items, it is of the utmost importance that they are transported securely, respectfully, and efficiently.

The primary users of this specialized air cargo service include funeral homes, medical institutions, and organ transplant organizations. These services adhere to strict regulations and guidelines to ensure the ethical and safe transport of human remains, tissues, and organs. Relevant authorities, such as the World Health Organization (WHO) and IATA, provide comprehensive guidelines regarding the packaging, documentation, and handling procedures required for this type of cargo.

Organ procurement organizations (OPOs) are also working with cargo and passenger airlines to implement the UNOS Organ Tracking System. This collaboration improves the in-flight tracking system for donated organs in transit. As of December 2022, they have successfully tracked 7,000 organ shipments while providing up-to-the-minute information from loading to landing.

**Chances of growth for Air Cargo in India**

The Air Cargo market in India has experienced huge development over the past few years and the changes are evident in terms of technology and awareness about the industry. The shipments, varying in sizes and volumes, are transported to different parts of the world from India. The Air Cargo industry in India is currently considered as one of the most competitive and growing markets in the Air Cargo sector. It has become one of the most promising markets and international organisations have decided to take a part in the ongoing journey. Moreover, witnessing the air cargo growth in the market, various Indian airlines decided to shift towards cargo transportation to make revenue and sustain in the market.

As reported in 2016, India substituted China as the emerging market with maximum potential to grow and increase revenue. It happened for the first time in the history of seven years that a country other than China was observed with the most potential and reflected a strong growth of the economy. Ever since the opportunities for Air Cargo in India as an emerging market has been manifold.

One of the reasons for Air Cargo in India being considered with the potential to increase growth and revenue leads to a transformation in infrastructure, networks and work structure. The advancement of technology led to making the long tedious process efficient, swift and provided error-free results. According to the experts, another reason for India being a developing market would be the lower cost incurred during a setup as compared to other developed countries. This indeed led other developed countries in investing in the Indian Air Cargo market. The trend also resulted in the economic development of India as well as improved relationships with other countries. The industries are also optimising the demand, supplies and productions required as an emerging market. The growth has been stable and hence increased opportunities for the Indian Air Cargo market.

In recent times, domestic consumption gathered heat and led to the internal development of the country. The Asian consumers’ market is becoming inclined towards buying the products manufactured, developed and shipped through Asian exporters. This resulted in lower taxes, the introduction of new programs and easier access to loans in setting up organisations. The traditional mode of cargo transportation is withering away with time and is being replaced by modern, technologically advanced methods.

The rapidly increasing demand and supply have led Air Cargo India to develop systems that require minimum or no human interference, ensuring the proper safety of documents and a smooth handling process. The Air Cargo professionals get updates about the emerging trends in the market. This has spread knowledge about the boost and the revenue that could be made through the Indian Air Cargo Industry.

Technology plays an essential part in the development of Air Cargo in India and has managed to pave its way from managing revenue to setting up warehouses’ rules and regulations. The chances of errors or mistakes have been reduced to an immense level focusing more on customer-oriented operations and relations. This way, India has made its name in the global scenario as the emerging industry in Air Cargo.

**Logistics**

Logistics refers to the movement of goods from Point A to Point B, which entails two functions: transportation and warehousing. The overall supply chain is a network of businesses and organizations working in a sequence of processes, including logistics, to produce and distribute goods.

Logistics is the collection of processes involved in moving goods internally or from buyer to seller. Logistics managers oversee and control the many complexities involved in that process; in fact, there are a number of certifications (opens in a new tab) for these professionals. Success depends on attention to many details: Routes need to be determined based on expediency, regulatory environments and avoiding obstacles ranging from road repairs to wars and adverse weather conditions. Shipping provider and packaging options must be carefully considered, with costs weighed against factors from weight to recyclability. Fully loaded costs may include factors outside of transportation, such as those that ensure customer satisfaction and the availability of suitable warehousing. If a shipment of dairy products arrives spoiled because refrigeration failed, that’s on the logistics team.

Fortunately, logistics management software helps businesses make the very best routing and shipping decisions, contain costs, protect investments and track the movement of goods. Such software can often also automate processes, such as choosing shippers according to rate fluctuations or contracts, printing shipping labels, automatically entering transactions in ledgers and on the balance sheet, ordering shipper pickups, recording receipts and receipt signatures and helping with inventory control and other functions.

Business logistics refers to the entire set of processes involved in moving goods, whether from a supplier to a business or from a business to a customer. The key concept here is managing these processes as a unified system. For example, online retailers that successfully drop ship products direct to customers from hundreds or thousands of small suppliers have advanced business logistics practices. A logistics management system underpins that effort and includes inbound and outbound transportation management, warehouse management, fleet management, order processing, inventory control, supply and demand forecasting, and managing third-party logistics (3PL) service providers.

**Importance of Logistics**

Logistics centers on the movement of goods, but its effects extend much further. In business, success in logistics translates to increased efficiencies, lower costs, higher production rates, better inventory control, smarter use of warehouse space, increased customer and supplier satisfaction, and an improved customer experience.

Each of these factors can significantly move the needle on a company’s success. Note that logistics also extends to managing returns to extract the most revenue from these goods.

**The Role of Logistics**

The very essence of a business is to exchange goods or services for money or trade. Logistics is the path those goods and services take to complete the transactions. Sometimes goods are moved in bulk, such as raw goods to a manufacturer. And sometimes goods are moved as individual disbursements, one customer at a time.

No matter the particulars, logistics is the physical fulfillment of a transaction and as such is the life of the business. Where there is no movement of goods or services, there are no transactions—and no profits.

There are seven pillars of effective logistics:

* **Material sourcing:**

Material sourcing involves more than finding the lowest-cost supplier for a raw material used in manufacturing. Logistics includes calculating and managing contributing factors and costs, such as backorder delays, competitor priority rankings and lockouts, add-on services costs, extraneous fees, increased shipment costs due to distance or regulatory environments, and warehousing costs. Finding the right source for any given material requires a good understanding and management of all contributing factors. This process is called strategic sourcing, and logistics plays an important role in that planning.

* **Transportation:**

At the core of logistics is the act of physically transporting goods from Point A to Point B. First, a company needs to select the best mode of shipment—air or land, for example—and the best carrier based on cost, speed and distance, including optimizing routes that require multiple carriers. In the case of global shipments, the shipper needs to be up to speed on customs, tariffs, compliance and any relevant regulations. Transport managers need to document and track shipments, manage billing and report on performance using dashboards and analytics.

* **Order fulfillment:**

To complete a transaction, items must be “picked” from the warehouse per the customer order, properly packaged and labeled and then shipped to the customer. Collectively, these processes comprise order fulfillment and are the heart of the logistics sequence in customer distribution.

* **Warehousing:**

Both short- and long-term storage are common parts of logistic planning. But warehouse management systems also enable logistical planning. For example, logistics planners must consider warehouse space availability and special requirements such as cold storage, docking facilities and proximity to modes of transportation such as rail lines or shipyards.

Further, organization within the warehouses is part of logistic planning. Typically, goods that move frequently or are scheduled for transport soon are placed at the front of the warehouse. Lower-demand items are stored toward the rear. Perishable goods are often rotated so the oldest items are shipped out first. Items that are often bundled are usually stored beside one another, and so on.

* **Demand forecasting:**

Logistics relies heavily on inventory demand forecasting to ensure that a business never runs short on core or high-demand products or materials—and never ties up capital unnecessarily in warehoused goods with sluggish sales, either.

* **Inventory management:**

By using inventory management techniques to plan ahead for increased demand in seasonal or trending products, companies can keep profits higher and make inventory turns faster, meaning the ratio of how many times you sell and replace inventory in a set period. Conversely, by noting slowing inventory turns on other products, a company can better determine when to offer discount pricing or other incentives to free capital to reinvest in goods that are in higher demand.

Further, retail sales often differ store to store, region to region and country to country. Good inventory management enables the business to decide to ship products that are performing poorly in one store or region to another rather than take a loss via discount pricing to be rid of the stock. Logistics is key to moving inventory where it is likely to get the best price.

* **Supply chain management:**

Logistics is an important link in the supply chain as it facilitates the movement of goods from suppliers to manufacturers and then to sellers or distributors and eventually to buyers.

A supply chain is essentially a series of transactions. If logistics fails, the supply chain fails and transactions grind to a halt. A prime example: bare shelves in grocery store dairy aisles even as farmers dumped milk as supply chains broke during the pandemic.

**Logistics vs Supply Chain Management**

Logistics deals with the movement of goods from a single company’s perspective, meaning the movement of materials and goods one company receives and manages internally as well as when it moves those goods to a customer. A supply chain is a network of businesses involved sequentially in the production or distribution of goods or services. In short, logistics is generally a one company issue while the supply chain is a multi-company issue.

While logistics may be coordinated throughout part of or even the entirety of the supply chain, each segment is the responsibility of one entity until it hands off the material or product to another entity in the supply chain.

**Logistics Components**

In its most basic form, logistic components are:

* Intake from suppliers and material handling;
* Labeling, packaging into smaller units, organization and warehousing;
* Inventory management for production or distribution;
* Demand planning;
* Order fulfillment; and
* Transport.

Typically, a logistics management system includes inbound and outbound transportation management, warehouse management, fleet management, order processing, inventory control, supply and demand forecasting, and management of third-party logistics service providers.

**Benefits of Logistics Management**

Given that the movement of goods is what drives cash flow, it stands to reason that managing that movement—logistics management—is a core business concern. Indeed, logistics management impacts a company’s bottom line for better or worse. It’s best not to leave that impact to chance.

The following are six major benefits of effective logistics management.

* **Visibility:**

Logistics management affords greater visibility into the supply chain. This enables businesses to better control costs, tease out efficiencies, spot supply chain problems, conduct demand planning and gain insights into opportunities.

* **Reduced overhead:**

Logistics management enables companies to reduce overhead in areas from cutting shipping costs to shrinking how much warehouse space they need by proactively controlling inventory levels.

* **Improved customer experience:**

An excellent customer experience (CX) is the driving factor behind repeat sales. By delivering orders accurately and quickly, you improve the customer experience which in turn increase brand loyalty and future sales.

* **Preventing loss:**

Logistics management helps prevent loss in several ways. One is by a true inventory accounting, so your company knows exactly how much stock it has on hand at any given time. Companies can also track movement and current location so stock won’t be misplaced or diverted without notice. In addition, by ensuring optimal storage and transport conditions, such as temperature and moisture management, solid logistics prevents spoilage and damage.

* **Support expansion:**

Demand forecasting supports expansion by realistically calculating inventory needs and ordering, transporting and stocking accordingly. Further, logistics management best practices help companies scale to fulfill more customer orders on time.

* **Competitive edge:**

Delivering orders correctly and on time is a foundational element in the customer experience—and good CX is key to repeat orders as well as solid brand reputation and net promotor scores, which in turn help a company acquire new buyers. Logistics management helps a company consistently deliver, or over deliver, on promises and sharpen its competitive edge.

**7 Rs of Logistics**

The Chartered Institute of Logistics and Transport (opens in a new tab), an international organization for supply chain, logistics and transport professionals, defines the seven Rs of logistics as “getting the right product, in the right quantity, in the right condition, at the right place, at the right time, to the right customer, at the right price.”

And in truth, that is the goal of logistics management.

* **Right product:**

Job #1 is delivering the product that was ordered according to specifications: color, size, brand, quantity. But also consider an automated maintenance plan where manufacturers use IoT data to send a “just-in-time” replacement part, or something else that the customer may have not specified but needs. The point is to get buyers the products that are right for them or their situations.

* **Right quantity:**

Say an item can be purchased as either a single unit or in packs of 12, which are also considered a unit. On a larger scale, a manufacturer may sell parts in a box containing a few products or as a pallet of multiple boxes. Getting quantity right demands clarity in how inventory is listed as well as proper picking and packing.

* **Right condition:**

New, used or refurbished, customers expect a product to function properly and otherwise be useable. Products should therefore be inspected for flaws and damage prior to shipping. And, return shipping processes should be simple and convenient for customers.

* **Right place:**

Tracking to ensure receipt and that shipped items were delivered to the right address are essential parts of logistics management. A package that is never received and must be replaced costs a company twice—and damages the customer relationship.

* **Right time:**

Often, from the customer’s perspective, timing is everything. Whether it’s a consumer ordering a birthday or holiday gift or a manufacturer that needs a raw material to meet its schedules, late arrivals may cost the customer or be returned as no longer needed.

* **Right customer:**

Order mix-ups, address errors and other mishaps communicate a lack of respect for the customer and inattention to detail. An ERP system that automates outbound logistics can minimize errors and maximize a company’s supply chain execution.

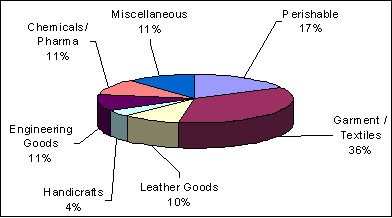
* **Right price:**

It’s important that your pricing be competitive for the geographic area and the industry to turn your inventory regularly and at a good margin. It is also imperative to adjust pricing—up or down—according to demand. To succeed here, companies need continuous insights into profitability ratios and unit margins.

**Air cargo opportunities**

1. Air cargo opportunities

Air cargo comprises goods with high-value, high-time dependency, or perishable cargo. Growing at 6% pa, the world airlifted cargo accounted for 2% of international trade by volume and 30% by value in 2006-07. Its growth has traditionally exhibited strong correlation with world GDP growth. Boeing forecasts that 60 million tonnes of cargo will be transported by air in the year 2017.



### Exhibit: Share of air lifted export commodities in India in 2006-07

Source: AAI/Air India and CRISIL Analysis.

Perishable include seafood, fruits & vegetables, cut flowers, eggs etc Miscellaneous includes hazardous Chemicals, Pharmaceuticals, Unaccompanied baggage, Tea, Mica, Dangerous goods etc.

Major destinations for India’s perishable goods are Gulf countries (66% of total perishables) and UK (12%). Mumbai and Delhi are major cargo center of India accounting for 57% of air cargo export and 54% of India’s air cargo import. This is owing to well developed infrastructure and vicinity of industrial activities around these two metros. Mumbai is leading in export of perishable product export with 49% market share.

It can be noticed that Gujarat has strong industrial presence in major air cargo categories. Gujarat’s share of national output is 30%, 16% and 6% in chemical and pharma, textiles, apparel and engineering goods respectively. Currently Gujarat’s airports handle 2% of India’s air cargo of 2007-08 as seen below. Ahmedabad is the leading air cargo center accounting for 83% of state’s air cargo traffic in 2007-08. Cargo traffic of Ahmedabad airport comprised 44% domestic and 56% international cargo (2006-07).

Exhibit: Air cargo traffic at Gujarat's airports (tonnes)

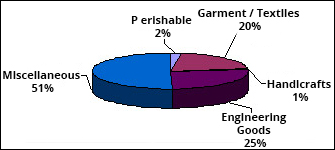
|  |  |  |  |
| --- | --- | --- | --- |
| **Airport** | **2005-06** | **2006-07** | **2007-08** |
| Ahmedabad | 16878 | 20211 | 23576 |
| Vadodara | 3435 | 3422 | 3377 |
| Rajkot | 825 | 872 | 812 |
| India’s total | 1403977 | 1553465 | 1713656 |
| Gujarat’s share | 2% | 2% | 2% |

Source: AAI and CRISIL Analysis

Ahmedabad is also the leading airport handling 67% of Gujarat’s domestic air cargo traffic. This is followed by Vadodara (26%) and Rajkot (7%) Rajkot airport. In last three years, the growth of air cargo at Ahmedabad Airport was 16.6% as against 10.5% of national air cargo industry growth .

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### Exhibit: Share of air lifted export commodities at Ahmedabad airport in 2006-07



Source : AAI

In this perspective, Gujarat’s strength in chemical, textiles and horticulture can be leveraged by augmenting air cargo export from the state. Air cargo by definition is extremely time sensitive and/or high value cargo and it is possible to find export orders if facilities for quick transport are available.

Gujarat also has a potential in perishable goods due to considerable emphasis on the development of horticultural crops. The major fruits crops grown in Gujarat are banana, mango, citrus and chikoo. Major vegetables grown in Gujarat are onion, potato, brinjal, tomato, okra and cucurbits. The productivity of fruit crops and vegetable are estimated at 18.18 MT/ha, 16.56 MT/ha which is higher than the national average The State also produces spices such as cumin, fennel, and garlic and enjoys a virtual monopoly in seed spices. Area under flowers like Rose, Lily and Marigold is increasing. Various aromatic plants like pacholi & pamaroza is cultivated in the southern part of the State. There is a scattered cultivation of medicinal plant like allovera, sena, gugal in the State.

Gujarat also has 12 co-operative milk plants with combine milk handling capacity of 70.10 lakh litres per day, 11 private dairy plants and 12991 co-operative dairy societies. South Gujarat region is leading producer of flowers and fruits and central Gujarat region is leading producer of milk and flowers. Thus the production of perishable industries products in central and southern regions can further be strengthened through provision of adequate air cargo lifting facilities at Ahmedabad and Surat.

Given the large presence of chemicals and pharmaceuticals in the air lifted cargo, it could be extremely beneficial to locate an air cargo hub around Bharuch / Dahej area. PCPIR could host a large air cargo complex along with proposed MRO facility.

**LOGISTICS – GLOBAL VIEW**

Global Logistics Industry includes all activities of the supply chain such as transportation, customer service, inventory management, the flow of information, and order processing. Other activities of the supply chain are warehousing, material handling, purchasing, packaging, information dissemination, and maintenance among others. The Logistics market in terms of revenue was valued at US$ 8185.46 billion in 2015 and is expected to reach US$15522.02 billion by 2023, growing at a CAGR of 7.5% from 2015 to 2024. The market in terms of volume was valued at 54.69 billion tons in 2015 and is expected to reach 92.10 billion tons by 2024 growing at a CAGR of 6% from 2016 to 2024.1.

The Global Logistics Industry in 2017 is equally subject to global geopolitical machinations but that apart countless disruptions threaten to tip the balance of global trade as we knew it. These could be stated as follows: -

* Robotics, automation, 3 D /4 D printing will offset low-cost manufacturing advantages.
* Rampant protectionism favors localisation and also sustainability.
* Digitisation and demand-driven logistics are pushing supply chains closer to demand.
* Middle-class growth in developing markets is altering supply-demand dynamics.
* Global E-Commerce will challenge traditional borders and boundaries.

Thus there are countless locations with compelling value propositions. Whether it is a pureplay distribution facility, the manufacturing center of excellence, transshipment port, regional E-Commerce hub, or new market to sell in/ source from, retailers and manufacturers have no shortage of options. On top of that if we consider global volatility and hypersensitivity to supply chain exceptions then what emerges is that supply chain modeling, simulation and optimization are fast becoming core competencies.

**LOGISTICS – INDIAN PERSPECTIVE**

" The Indian logistics sector is valued at USD$ 354 billion, contributing 18.4 % of the country’s GDP. With the easing of FDI norms, the proposed implementation of GST, increasing globalization, growth of e-commerce, positive changes in the regulatory policies, and government initiatives such as “Sagarmala”, “Make in India”, “Gati Shakthi” the sector is expected to touch $450 billion by 2026-2027. In the World Bank’s Logistics performance ranking 2016, India’s ranks 38 in 2023-2024. Out of this USD 150 billion logistics cost, almost 99% is accounted for by the unorganized sector (such as owners of less than 5 trucks, affiliated to a broker or a transport company, small warehouse operators, customs brokers, freight forwarders, etc.), and slightly more than 1%, i.e. approximately USD 1.5 billion, is contributed by the organized sector. However, the industry is growing at a fast pace and if India can bring down its logistics cost from 14% to 9% of the GDP (level in the US), savings to the tune of USD 50 billion will be realized at the current GDP level, making Indian goods more competitive in the global market. Moreover, growth in the logistics sector would imply improved service delivery and customer satisfaction leading to the growth of export of Indian goods and potential for the creation of job opportunities."

**DEMAND-SUPPLY GAP OF SKILLED MANPOWER IN LOGISTICS SECTOR**

* Logistics Sector employs about 22 million as of 2016. Of 22 million 42.14 % are employed in passenger roadways segment, 38% in road fright while remaining are in passenger railways, freight forwarding, warehousing, packaging, and other services.
* As per the National Sample Survey, the distribution of employees is mainly in Mumbai, Kolkata, Hyderabad, and Ahmedabad Districts whereas emerging clusters include Bangalore, Surat, and Indore.
* There has been no formal training in the country to address the skill gap in the logistics sector.
* Thrust on infrastructure projects such as the dedicated Freight & Industrial Corridors like DMIC, expansion of Port Terminals, and construction of greenfield Port projects under Sagarmala project and Bharatmala project will create fresh employment opportunities.
* Increasing income levels and rapid growth in organized retail, e-commerce, QSR, etc. will create new opportunities for the youth.
* With 100 percent FDI through automatic route permitted, and the implementation of GST FMCG is expected to grow at over 12 percent CAGR during 2010- 2020

**SCOPE FOR SKILL DEVELOPMENT IN THE LOGISTICS SECTOR**

It is estimated that the total workforce will increase from the current 22 million to over 31 million by the year 2022. That means this sector alone will generate additional requirements of over 9 million people across all the modals-roads, railways, ports, and aviation. Government and associated stakeholders including sector skill councils, training institutions, and logistic firms will need to ramp up their training capacity to cater to the growing training needs of the sector. It will also involve various efforts such as:-

* Creation of Kaushal Kendras for every sub-sector addressing the demand
* Engage with the Logistic Companies to invest in skill development as their CSR activity
* Review and update the existing QP/NOS as per the sector requirement.
* Synthesise the various training programs and educational courses and align them to the job roles in the logistics sector that would allow for career progression and lateral mobility
* Bring in transnational equivalence of the QP/NOS which would permit placement of LSC certified candidates abroad

**OVERVIEW OF LOGISTICS INDUSTRY IN INDIA**

The logistics industry in India is growing rapidly, with the country’s economy expanding at a rapid pace. The sector is expected to grow at a compound annual growth rate (CAGR) of 15.5% between FY2019 and FY2024, according to various market research.

The sector employs around 22 million people and is expected to create another 1.2 million jobs by 2025.

The government’s focus on infrastructure development, FDI reform, and the implementation of the Goods and Services Tax (GST) are some of the key drivers of growth in the sector. The government’s initiatives such as Make in India and Digital India are also expected to boost the growth of the logistics industry in the country.

**TYPES OF LOGISTICS SERVICES**

There are many different types of logistics services available in India. Here is a brief overview of some of the most popular services:

* Transportation Logistics: This type of logistics service helps companies to move their goods from one place to another. This can be done via land, sea, or air.
* Warehousing Logistics: This type of service helps companies to store their goods in a safe and secure location.
* Distribution Logistics: This type of service helps companies to distribute their goods to various locations.
* Supply Chain Management: This type of service helps companies to manage their supply chains effectively.
* Project Logistics: This type of service helps companies to plan and execute logistics for specific projects.

**COMMON LOGISTIC FUNCTIONS**

There are many common logistics functions that are performed within the logistics industry in India. These functions include transportation, warehousing, and distribution. Each of these functions play a vital role in ensuring that goods and materials are moved effectively and efficiently from one location to another.

Transportation is responsible for physically moving goods and materials from one location to another. This can be done via various means of transportation, such as trucks, trains, planes, and ships. Transportation must be carefully planned in order to ensure that goods arrive at their destination safely and on time.

Warehousing is responsible for storing goods and materials until they are needed. Warehouses must be large enough to accommodate the volume of goods that they will be receiving, and they must be equipped with the proper storage facilities and equipment. Distribution is responsible for delivering goods and materials to the customers or end-users. This can be done via various means of distribution, such as retail stores, wholesalers, or online retailers.

**BRIEF HISTORY OF LOGISTICS INDUSTRY IN INDIA**

The logistics industry in India has a long and rich history, dating back to ancient times. The first recorded use of logistics in India was in the military campaigns of Alexander the Great, who used elephants to transport supplies and troops across the country. In the centuries that followed, logistics became an integral part of Indian society, with many different types of businesses and organizations using it to move goods and services around the country.

Today, the logistics industry in India is booming, thanks to the country’s rapidly growing economy. This growth is being driven by a number of factors, including the increasing demand for e-commerce and online shopping, the expansion of the retail sector, and the government’s infrastructure development initiatives.

With its vast population and large geographical size, India presents a unique challenge for logistics companies. But as the country’s economy continues to grow, so too will the demand for efficient and reliable logistics services.

**CROSS BORDER LOGISTICS TRADE IN INDIA**

As India continues to open up its economy, businesses are increasingly looking to expand their operations beyond its borders. This has created a huge demand for logistics services that can facilitate cross-border trade.

There are a number of factors that make India an attractive destination for businesses looking to set up shop. Firstly, the country has a large and growing population that provides a vast potential market for products and services. Secondly, India’s infrastructure is improving rapidly, making it easier to move goods around the country. Finally, the Indian government is becoming increasingly business-friendly, providing tax breaks and other incentives to encourage investment.

All of these factors are coming together to make the logistics industry in India one of the most exciting and fastest-growing in the world. If you’re thinking of starting a business in this sector, now is the time to get on board.

**FUTURE TRENDS IN LOGISTICS INDUSTRY IN INDIA**

* Increasing use of technology: The use of technology is increasing in all aspects of businesses and this is also true for the logistics industry. Technology is being used to streamline operations, track shipments, and improve communication between different stakeholders.
* Increased focus on supply chain management: With businesses becoming increasingly globalized, there is a need to have efficient supply chain management systems in place. This has led to an increased focus on supply chain management within the logistics industry.
* Growing e-commerce sector: The e-commerce sector is one of the fastest growing sectors in India and this is having a positive impact on the logistics industry. The growth of e-commerce is leading to an increased demand for efficient last-mile delivery services.

**KEY TRENDS IN THE LOGISTICS INDUSTRY**

* The rise of e-commerce: E-commerce is booming in India, and this is having a major impact on the logistics industry. Online shopping is growing at an incredible rate, and this is leading to a huge increase in demand for logistics services.
* The growth of online grocery shopping: Along with e-commerce, online grocery shopping is also growing rapidly in India. This is another area where logistics companies are seeing a big increase in demand for their services.
* The rise of last-mile delivery: Last-mile delivery is becoming increasingly important in the logistics industry, as companies strive to get orders delivered to customers as quickly and efficiently as possible.
* The growth of express delivery: Express delivery is another area where the logistics industry is seeing strong growth. With customers expecting ever-faster delivery times, logistics companies are working hard to meet this demand.
* The rise of reverse logistics: Reverse logistics is also becoming increasingly important, as more and more companies focus on ensuring that returns are handled efficiently.

India’s logistics industry is expected to grow at a compound annual growth rate (CAGR) of 10.5% between FY18 and FY22, according to various reports. The growing e-commerce sector, along with the government’s initiatives such as Make in India and Digital India, are some of the major factors driving the growth of the logistics industry in India. Visit Vakilsearch for legal assistances.

**AIRPORT INDUSTRY**

Air transport is the most recent mode of transport. It is the gift of 20th century to the world. The two world wars gave a great impetus to the development of air transport in almost all the countries of the world. The peculiar characteristic of air transport is that is does not need a specific surface track for its operations.

Air transport is an aircraft design for transporting passengers and freight from one location to another in the air using airplanes, jets, rockets, helicopters and drones. Each of these type of air transport has a unique way of achieving speed and the sustainability of it voyage, however there are other types of air transport which may or may not be used for conveying goods, but could be used for recreational purposes.

 It has no physical barriers as in the case of other mode of transport. Political boundaries are also immaterial although it has to observe the requirements of the International Law. The supreme advantage of air transport lies in its quickness.

It is the fastest mode of transport. But the cost of its operation is very high and thus it is suitable for only rich passengers, mails and light and costly cargo. However, in advanced countries like USA, Germany etc. it offers a tough competition to the railways.

**CHARACTERISTICS**

**1. Unbroken journey**

      Air transport provides unbroken journey over land and sea. It is the fastest and quickest means of transport.

**2. Rapidity**

     Air transport had the highest speed among all the modes of transport.

**3. Expensive**

Air transport is the most expensive means of transport. There is huge investment in purchasing aero planes and constructing of aerodromes.

**4. Special preparations**

    Air transport requires special preparations like wheelers links, meteorological stations, flood lights, searchlights etc.

**ADVANTAGES**

**1)  High Speed**

It is the fastest mode of transport and therefore suitable for carriage of goods over a long distance. It requires less time.

**2) Quick Service**

Air transport provides comfortable, efficient and quick transport services. It is regarded as best mode of transport for transporting perishable goods.

**3)  No Infrastructure Investment**

Air transport does not give emphasis on construction of tracks like railways. As no capital investment in surface track is needed, it is a less costly mode of transport.

**4) Easy Access**

Air transport is regarded as the only means of transport in those areas which are not easily accessible to other modes of transport. It is therefore accessible to all areas regardless the obstruction of land.

**5) No Physical Barrier**

Air transport is free from physical barriers because it follows the shortest and direct routes where seas, mountains and forests do not obstruct.

**6) Natural Route**

Aircrafts travels to any place without any natural obstacles or barriers because the custom formalities are compiled very quickly. It avoids delay in obtaining clearance.

**7) National Defense**

It plays a significant role in the national defense of the country because modern wars are conducted with the help of aero planes. Airways has a upper hand a destroying the enemy in a short period.

**DISADVANTAGES**

**1) Risky**

Air transport is the riskiest form of transport because a minor accident may put a substantial loss to the goods, passengers and the crew. The chances of accidents are greater in comparison to other modes of transport.

**2) Very Costly**

Air transport is considered costlier as compare to other mode of transport. The operating cost of aero-planes is higher and it involves a great deal of expenditure on the construction of aerodromes and aircraft. Because of this reason the fare of air transport are high that common people can’t afford it.

**3) Small Carrying Capacity**

The aircrafts have small carrying capacity and therefore these are not suitable for carrying bulky and cheaper goods. The load capacity cannot be increased as it is found in case of rails.

**4) Unreliable**

Air transport is unreliable as it depends of the weather forecast. Normally if the weather is not certain the flight may got delayed.

**5) Huge Investment**

Air transport requires huge investment for construction and maintenance of aerodromes. It also requires trained, experienced and skilled personnel which involves a substantial investment.

**6) Not Connected to Every Place**

Another limitation of air transportation is that it is available in cities only and if one wants to go to a remote place or interior places than one has to use either road transportation or rail transportation. Hence it is not connected to every place which poses serious limitation as far as movement of people or goods are concerned.

**TYPES OF AIR TRANSPORT**

1. Commercial airplanes

2. Helicopters

3. Private planes

4. Blimps

5. Gliders

6. Hang gliders

7. Zeppelin

8. Parachute

**1) Commercial airplane**

These are the common ways in which people travel through the air, the commercial planes provide a fast means of transportation compared to other modes of transport such as road transport, rail transport and water transport. Airplanes are capable of carrying hundreds of people from on location to another at a time; the seating is sometimes divided into two or four classes. For instance, most domestic flights usually have two classes which are: First Class and Economy Class. While international flights may have up to four classes such as First Class, Club Class, Business Class, Premium Economy and Economy Class.

**2) Helicopters**

Helicopters are another fast means of air transport; these move people through the air. Helicopters when compared with commercial airplanes are much more limited when it comes to passenger’s space and can only transport a few people at a time, whereas some commercial airplanes can transport hundreds of people at a time.

**3) Private planes**

Private planes are made to provide transportation service for a single person or at most five (5) people at a time. Private planes range from the smallest Cessna to luxury jets such as the Citation CJ1, which carries up to five people in leather-seated comfort. These planes provide comfort and privacy during the trip and these could travel from one location to another for a business purpose or for pleasure.

**4) Blimps**

Blimps and hot air balloons are used to transport people for recreational purposes. They cover a limited area that enables tourists to see a location on a larger scope than if they tried to view the area from the ground. Blimps used to be a form of commercial transport but are no longer used for that.

**5) Glider**

A glider, which is also called sailplane, is a type of glider aircraft used in the sport of gliding or for recreational activity. Sailplanes are aerodynamically streamlined and are capable of gaining altitude when flown in rising air. Some modern gliders are made of analuminium, alloy or composite frame covered with synthetic sailcloth which forms the wings.

**6) Rocket**

A rocket is any vehicle that uses a rocket engine; it includes a missile, spacecraft, aircraft or other vehicle. Rockets have been used at least since the 13th century for small-scale military applications and recreational displays. Rockets work more in space than in the atmosphere, the engines work by action and reaction of pushing the rockets forward simply by expelling their exhaust in the opposite direction at high speed, and can therefore work in the vacuum of space.

**7) Zeppelin**

A Zeppelin was a type of rigid airship named after the German Count Ferdinand von Zeppelin; it consists of a cigar-shaped, trussed, and covered frame supported by internal gas cells. Count Ferdinand von Zeppelin designed Zeppelin in the early 20th century. Zeppelins almost look like blimps but they differ by two points: Zeppelins have a metal skeleton with a rigid covering, and they use hydrogen gas to float. These two elements made zeppelins larger when compared to blimps.

**8) Parachute**

This is a cloth canopy that is filled with air and allows a person, package or a heavy object attached to it to descend slowly when dropped from an aircraft, or which is released from the rear of an aircraft on landing to act as a brake. Back then, the military developed parachuting technology as a way of saving aircrews from emergencies aboard balloons and aircraft in flight, and later as a way of delivering soldiers to the battlefield. Nowadays, parachuting is performed as a recreational activity and as a competitive sport in various places.

**DEVELOPMENT OF AIR TRANSPORT**

Air transport is the newest means of transport; this means of transport was introduced in 1903 but developed into full means of transporting people and freights in the 1930s. The greatest of air transportation started after the Second World War (WW11). This means of transportation can be used for both domestic and international flights.

Of all transport development of the 20th century, those in air transport have been the most striking ones. Who would have thought that when the Wright brothers made their historic flight in 1903, that aircraft would become one of the most important means of passengers transport within just three generations? Improvements have indeed been rapid: jet engines

replaced propellers, radar was introduced, the size of aircraft has grown to jumbo proportions; supersonic speeds have been achieved and vertical take-off is now possible.

Today, across the world, air transport is used extensively both for passengers and freight. Broadly, there are two types of services: Those operating for particular purposes on and ad hoc basis and those operating on regular schedules. Into the first category, you will have the flights. (For example, those for tourist in summer and for mineral deposits between inaccessible mines and industrial regions), however, into the latter category would come those services run by British airways and the other world airlines. Increasingly, the routes of both types radiate from the developed regions and especially from the great capital cities and industrial centers of the world. Whenever possible they mark the shortest distance between places and thus use the Great Circle routes to economize both time and fuel. Many cities including London, New york, Cairo and Bangkok possess major international airports and many others are developing their own international airport facilities. In low areas, where there is difficult terrain, air transport provides the only communication possible and assumes a correspondingly greater significance.

**MINISTRY OF CIVIL AVIATION**

The Civil Aviation Ministry is located at Rajiv Gandhi Bhavan at the Safdarjung Airport in New Delhi. The Ministry of Civil Aviation is responsible for formulation of national policies and programs for the development and regulation of the Civil Aviation sector in the country. It is responsible for the administration of the Aircraft Act, 1934, Aircraft Rules, 1937 and various other legislations pertaining to the aviation sector in the country. This Ministry exercises administrative control over attached and autonomous organizations like the Directorate General of Civil Aviation, Bureau of Civil Aviation Security and Indira Gandhi Rashtriya Udan Academy and affiliated Public Sector Undertakings like National Aviation Company of India Limited, Airports Authority of India and Pawan Hans Helicopters Limited. The Commission of Railway Safety, which is responsible for safety in rail travel and operations in terms of the provisions of the Railways Act, 1989 also comes under the administrative control of this Ministry.

**DIRECTORATE GENERAL OF CIVIL AVIATION DGCA**

The Directorate General of Civil Aviation (DGCA) is the regulatory body in the field of Civil Aviation, primarily dealing with safety issues. It is responsible for regulation of air transport services to/from/within India and for enforcement of civil air regulations, air safety, and airworthiness standards. The DGCA also co-ordinates all regulatory functions with the International Civil Aviation Organization (ICAO).

Private operators were allowed to provide air transport services. However, no foreign airline could directly or indirectly hold equity in a domestic airline company. By 1995, several private airlines had ventured into the aviation business and accounted for more than 10 percent of the domestic air traffic. Today, Indian aviation industry is dominated by private airlines and these include low cost carriers, who have made air travel affordable. The Government nationalized nine airline companies vide the Air Corporations Act, 1953. These government-owned airlines dominated Indian aviation industry till the mid-1990s. In April 1990, the Government adopted open-sky policy and allowed air taxi- operators to operate flights from any airport, both on a charter and a non- charter basis and to decide their own flight schedules, cargo and passenger fares. As part of its open sky policy in 1994, the Indian Government ended the monopoly of IA and AI in the air transport services. Private operators were allowed to provide air transport services. However, no foreign airline could directly or indirectly hold equity in a domestic airline company. By 1995, several private airlines had ventured into the aviation business and accounted for more than 10 percent of the domestic air traffic. Today, Indian aviation industry is dominated by private airlines and these include low cost carriers, who have made air travel affordable.

**Registration of civil aircraft**

Formulation of standards of airworthiness for civil aircraft registered in India and grant of certificates of airworthiness to such aircraft

Licensing of pilots, aircraft maintenance engineers and flight engineers, and conducting examinations and checks for that purpose

**Licensing of air traffic controllers**

Certification of aerodromes and CNS/ATM facilities

Granting of Air Operator's Certificates to Indian carriers and regulation of air transport services operating to/from/within/over India by Indian and foreign operators, including clearance of scheduled and non-scheduled flights of such operators;

Conducting investigation into accidents/incidents and taking accident prevention measures including formulation of implementation of Safety Aviation Management programs.

Carrying out amendments to the Aircraft Act, the Aircraft Rules and the Civil Aviation Requirements for complying with the amendments to ICAO Annexes, and initiating proposals for amendment to any other Act or for passing a new Act in order to give effect to an international Convention or amendment to an existing Convention;

Coordination at national level for flexi-use of air space by civil and military air traffic agencies and interaction with ICAO for provision of more air routes for civil use through Indian air space;

Keeping a check on aircraft noise and engine emissions in accordance with ICAO Annex 16 and collaborating with the environmental authorities in this matter, if required;

Promoting indigenous design and manufacture of aircraft and aircraft components by acting as a catalytic agent;

Approving training programmes of operators for carriage of dangerous goods, issuing authorizations for carriage of dangerous goods, etc.

**BUREAU OF CIVIL AVIATION SECURITY – BCAS**

The Bureau of Civil Aviation Security (BCAS) was initially set up as a Cell in the DGCA in January 1978 on the recommendation of the Pande Committee. The BCAS was reorganized into an independent department under the Ministry of Civil Aviation on 1st April 1987. The main responsibilities of BCAS include laying down standards and measures with respect to security of civil flights at international and domestic airports in India. BCAS Head quarter is located at "A" Wing, I-III floor, Janpath Bhavan, Janpath, New Delhi-110001. It has got four Regional Offices located at International airports i.e. Delhi, Mumbai, Kolkata and Chennai.

Laying down Aviation Security Standards in accordance with Annex 17 to Chicago Convention of ICAO for airport operators, airlines operators, and their security agencies responsible for implementing AVSEC measures

Monitoring the implementation of security rules and regulations and carrying out survey of security needs.

Ensure that the persons implementing security controls are appropriately trained and possess all competencies required to perform their duties.

Planning and coordination of Aviation security matters.

Surprise/Dummy checks to test professional efficiency and alertness of security staff.

Mock exercise to test efficacy of Contingency Plans and operational preparedness of the various agencies.

**COMMISSION OF RAILWAY SAFETY – CRS**

The Commission of Railway Safety (CRS) , working under the administrative control of the Ministry of Civil Aviation of the Government of India, deals with matters pertaining to safety of rail travel and train operation and is charged with certain statutory functions as laid down in the Railways Act (1989), which are of an inspectorial, investigatory & advisory nature. The Commission functions according to certain rules viz. statutory investigation into accidents rules framed under the Railways Act and executive instructions issued from time to time. The most important duties of the Commission is to ensure that any new Railway line to be opened for passenger traffic should conform to the standards and specifications prescribed by the Ministry of Railways and the new line is safe in all respects for carrying of passenger traffic. This is also applicable to other works such as gauge conversion, doubling of lines and electrification of existing lines. Commission also conducts statutory inquiry into serious train accidents occurring on the Indian Railways and makes recommendations for improving safety on the Railways in India.

**NATIONAL AVIATION COMPANY OF INDIA LIMITED**

Air India Ltd. was incorporated under the Companies Act 1956 on 30 March 2007 and is owned by the Government of India. The Company was created to facilitate the merger of the two main state-owned airlines in India: Air India, with its subsidiary Air-India Express and Indian Airlines, together with its subsidiary Alliance Air. The other companies under NACIL are;

Hotel Corporation of India Limited

Air India Air Transport Services Limited

Air India Engineering Services Limited

Air India Charters Limited

IAL Airport Services Limited

Airline Allied Services Limited

Vayudoot Limited

**PAWAN HANS HELICOPTERS LTD. – PHHL**

The Pawan Hans Helicopters Ltd. (PHHL) is one of the leading helicopter companies in India and is known for its reliable helicopter operations. Its objective is to provide helicopter support services to the Oil Sector for its off-shore exploration operations, services in remote and hilly areas as well as charter services for promotion of travel and tourism. The Registered Office of the Company is located at New Delhi and its Regional offices are at Mumbai and New Delhi. PHHL is the first ISO 9001: 2000 certified Aviation Company in India. Pawan Hans has played a vital role in the growth story of the Helicopter Industry in India.

**AIRPORTS AUTHORITY OF INDIA.**

The Airports Authority of India or AAI under the Ministry of Civil Aviation is responsible for creating, upgrading, maintaining and managing civil aviation infrastructure in India. It provides Air Traffic Management (ATM) services over Indian airspace and adjoining oceanic areas. . It also manages 125 airports including 21 International airports, 8 custom airports, 77 domestic airports and 19 civil enclaves at Military Airfields.

**CALICUT INTERNATIONAL AIRPORT**

One of the busiest airports in India, the Calicut International Airport, also called Karipur Airport serves the cities of Kozhikode and Malappuram in Kerala. Calicut is an ideal place to visit in India and hence, many people from different parts of the world explore this place to experience its natural charm and scenic beauty. That is why the airport became international in 2006 by garnering the attention of many.

Calicut International Airport (IATA: CCJ, ICAO: VOCL), also known as Karipur Airport, is an international airport serving the cities of Kozhikode and Malappuram in Kerala, India. It is located in Karipur, about 28 km (17 mi) from Kozhikode and 25 km (16 mi) from Malappuram. The airport serves as an operating base for Air India Express. It was the twelfth-busiest airport in India in terms of overall passenger traffic.[4] It is the third-busiest airport in Kerala after Kochi and Thiruvananthapuram. It was given international airport status on 2 February 2006.

Get an insight of the Calicut International Airport:

Starting with terminals, there has been a recent installation of 5 conveyor belts at the arrival terminal. Calicut International Airport has 2 terminals, i.e., Domestic Terminal and International Terminal.

Domestic Terminal: It is designed for the local and regional flights within the country. This terminal hosts about 80 to 90 flights in a week and is being categorized as the main hub of Air India. This terminal operates a number of airlines such as; Air India, Air India Express, IndiGo, Jet Airways, SpiceJet, and some others with two passenger entry and exit gates.

**International Terminal:** This terminal specifically hosts the international flights worldwide mainly for the gulf region. At peak hours, the terminal handles around 250 passengers and serves them with all the basic amenities like shops, lounge and restaurants, etc.

**Facilities Provided By The Calicut International Airport:**

**Information Desk:** Information desks especially at the busiest airports are really helpful. Calicut Airport has it at the Domestic Arrivals Hall.

**ATMs :** The availability of ATMs / cash machines are there at the Domestic Departures and International Arrivals.

**Banking:**Vijaya Bank kiosks at the International Departures and Arrivals will help you for accessing any banking service you want.

**Currency Exchange:**NL Forex gives you the facility of currency exchange and is located at the International Departures and Arrivals.

**Lounge:** The lounge called Al Hind Malabar Palace Executive, is at International Terminal and is open 24 hours.

**Hotels:**

Many hotels are there surrounding the Calicut International Airport.

|  |  |  |
| --- | --- | --- |
| **S.No.** | **HOTELS** | **DISTANCE** |
| 1. | Park Residency | 9.8 km from Calicut Airport |
| 2. | Hotel Calicut Gate | 10.4 km from Calicut Airport |
| 3. | Pulikkal Tourist Home | 200m from Calicut Airport |
| 4. | Punna Residency | 200m from Calicut Airport |
| 5. | Redbell Residency | 0.5 km from Calicut Airport |
| 6. | OYO 6210 Pookodans International Hotels | 1.8 km from Calicut Airport |
| 7. | The Raviz Calicut | 22.2 km from Calicut Airport |
| 8. | Paradise Tourist Home Kondotti | 0.4 km from Calicut Airport |
| 9. | Metro Tourist Home | 18.1 km from Calicut Airport |
| 10. | NC Gardens & Beach Resort | 12.5 km from Calicut Airport |

**Duty-Free Shops:** The Flemingo Duty-Free shops at the areas of International Departures and Arrivals, give passengers an opportunity to shop a variety of souvenirs and local crafts present throughout the airport.

**Food And Drinks:** A variety of options are available there at business hours for passengers at both the terminals (land-side and air-side).

**Family Services:**The Child Care Room at the airport will help the passengers traveling with kids. It is available free of cost.

**Disabled Services:** The wheelchair service is present at the airport, but it is recommended that passengers with reduced mobility must coordinate with their respective airlines.

**Luggage Wrapping:** One can access this service at the International Departures Hall (land-side).

**Meditation Halls And Prayer Rooms:**At the airport, meditation halls and prayers rooms are also available free of cost to the passengers.

**Transportation:** KSRTC buses are there for the passengers which link the airport with places like Kasargod, Kozhikode, etc. Also, prepaid taxis are readily available. Metered taxis as well as auto-rickshaws can be hired from outside the airport.

**Parking:** The airport offers passengers both, short-term and long-term parking options by supporting more than 800 cars. The drop & go, pay-less parking, free baggage, and a free shuttle ride to the airport, are the services provided by the airport.

**History**

**Early years**

The airport was inaugurated on 13 April 1988. In 1977, the airport was sanctioned due to long periods of struggle under the leadership of the late freedom fighter, K. P. Kesava Menon. In the 1990s, Gulf Malayalis played an important role in the development of the airport - they collected funds for the purpose when the Union Government claimed it did not have any. This led to the inception of the Malabar International Airport Development Society, which helped raise funds for the airport's development. Consequently, major developments of facilities, such as an extension of the runway from 6,000 feet to 9,000 feet to facilitate the operation of large aircraft, were carried out with loans from the Housing and Urban Development Corporation (HUDCO). It received the status of an international airport on 2 February 2006, which led to more development in its infrastructure, for handling the operation of international flights from its terminal. It is the 12th-busiest airport in India in terms of its passenger traffic and 11th-busiest in cargo handling.

**Wide-body aircraft restrictions**

Since 1 May 2015, the Airports Authority of India (AAI) imposed restrictions on the operation of wide-body aircraft such as Boeing 777 and 747 for a period of six months for runway recarpeting, which had been long overdue at this airport. As a result, Emirates, Saudia and two Air India Boeing 747 flight operations had to move temporarily to Cochin International Airport during this time. The airport authorities had expressed doubt about getting permission to operate wide-bodied aircraft from the airport, even after the completion of the recarpeting, for the runway in the airport is not large enough for the operation of jumbo aircraft. AAI had earlier instructed that all airports using widebody aircraft must have 240 m of Runway End Safety Area (RESA) in each direction, whereas that of Calicut Airport must have 90 m. The airport director K Janardhanan said the short runway was a major hurdle in operating wide-bodied aircraft from the tabletop runway and the runway length should be extended from the current 2,850 m to 3,150 m to operate wide-bodied aircraft, he added. The major hurdle in extending the runway is the delay in acquiring the land which requires a total of 156 hectares (385 acres) of land for extending the runway and associated facilities. The state government has been finding the task difficult, for it requires relocation of 1,500 families living around the airport.[11] As of 10 June 2016, not much action has been taken for land acquisition to help increase the runway length.[The AAI decided to get a runway safety area to avoid the aircraft overrunning the end of the table-top runway. On 7 August 2020, wide-body aircraft have been banned from flying to CCJ after the crash of IX 1344, which overran the table-top runway. As of November 2020, the airport does not have the recommended Runway safety area or Engineered Materials Arresting System installed. The land acquisition procedures for runway development are progressing as of July 2022.

**Reinstatement of wide-body aircraft operations**

As advocated by various Malayali associations like KMCC, MCC and MDF and others, Gulf Malayalis, political parties, Kerala State Government and MPs from Malabar region, on 9 August 2018, DGCA gave approval for resuming wide-body aircraft (Code E category) operations from Calicut International Airport. In the beginning, Saudia has been given permission to start nonstop flights to Jeddah and Riyadh using Boeing 777-200LR and Airbus A330-300.After three and a half years, the wide-body aircraft (Airbus 330-300) of Saudi Arabian Airlines from Jeddah landed at Calicut International Airport at 11:04 (IST) on 5 December 2018. It flew back to Jeddah on the same day at 13:19 (IST). Saudia has also resumed its services to Riyadh from Calicut in December 2018.[26] On 5 July 2019, Saudi Arabian Airlines flew with the Boeing 777-300ER and Airbus A330-300 to CCJ. DGCA gave approval for wide-body aircraft operations of Air India from Calicut International Airport using Boeing 747-400, Boeing 777-200LR, Boeing 777-300ER, and Boeing 787-8 Dreamliner.Emirates also secured approval from DGCA to operate Boeing 777-200LR and 777-300ER from Calicut.Air India already resumed its service with Boeing 747-400 Jumbo aircraft and with Boeing 777-300 ER aircraft.

On 7 August 2020, Air India Express Flight 1344, a COVID-19 repatriation flight on the Dubai-Kozhikode route, overran the tabletop runway upon landing in bad weather and crashed into the runway slope, killing 21 passengers. As a result, no wide-body aircraft has permission to fly to Kozhikode Airport, and as of 7 July 2022, runway renovation is in progress.

**History**

The Government of India constituted the International Airports Authority of India (IAAI) in 1972 to manage the nation’s international airports while the National Airport Authority (NAA) was constituted in 1986 to look after domestic airports. The organization were merged in April 1, 1995 by an Act of Parliament, namely, the Airports Authority of India Act, 1994 and have been constituted as a Statutory Body and was named as Airport Authority of India (AAI). This new organization was to be responsible for creating, upgrading, maintaining and managing civil aviation infrastructure both on the ground and air space in the country.

**Functions**

Airport Authority of India (AAI) came into existence on 1st April 1995. AAI has been constituted as a Statutory Authority under the Airport Authority of India Act, 1994. It has been created by merging the erstwhile International Airports Authority of India & National Airports Authority with view to accelerate the integrated development, expansion and modernization of the air traffic services, passenger terminals, operational areas and cargo facilities at the airports in the country.

The Airports Authority of India or AAI under the Ministry of Civil Aviation is responsible for creating, upgrading, maintaining and managing civil aviation infrastructure in India. It provides Air Traffic Management (ATM) services over Indian airspace and adjoining oceanic areas. It also manages 125 airports including 21 International airports, 8 custom airports, 77 domestic airports and 19 civil enclaves at Military Airfields.

**The main functions of the Authority are as under:**

* Control and management of the Indian air space (excluding special user air space) extending beyond the territorial limits of the country as accepted by ICAO.
* Provision of communication, Navigational and Surveillance aids
* Expansion and strengthening of operational areas viz Runways, Aprons, Taxiways etc. and provision of ground based landing and movement control aids for aircrafts & vehicular traffic in operational area.
* Design, development, operation and maintenance of passenger terminals.
* Development and management of cargo terminals at international and domestic airports.
* Provision of passenger facilities and information systems in the passenger terminals.

AAI owns and maintains 125 airports comprising 69 operational airports, 25 Civil Enclaves, i.e. Civil Air Terminals at defense controlled airports where AAI handles civil flight operations and 31 non-operational airports. In addition, AAI provides Air Navigation Services (ANS) at all civil airports in the country. AAI manages the designated Indian air space measuring 2.8 million square nautical miles which includes land area measuring 1.05 million square nautical miles and oceanic air space measuring 1.75 million square nautical miles. Air Navigation Services are also provided by the AAI at joint venture airports (e g . Delhi, Mumbai, Nagpur), Greenfield airports (e g. Bangalore, Shamshabad, Cochin, Durgapur) State Government airports (e g. Lengpui, Diu and Andal) and private airports (e g. Mundra, Nanded) as per the terms and conditions of CNS/ATM agreement agreed between AAI and the airport operator concerned.

The Airports at Ahmedabad, Amritsar, Calicut, Guwahati, Jaipur, Trivandrum, Kolkata & Chennai, which today established as International Airports, are open to operations even by Foreign International Airlines. Besides, the International flights, National Carriers operate from Coimbatore, Tiruchirappalli, Varanasi, and Gaya Airports. Not only this, the Tourist Charters also now touch Agra, Coimbatore, Jaipur, Lucknow, Patna Airports etc.

AAI has entered into a Joint Venture at Mumbai, Delhi, Hyderabad, Bangalore and Nagpur Airports to upgrade these Airports and emulate the world standards. All major air-routes over Indian landmass are Radar covered (29 Radar installations at 11 locations) along with VOR/DVOR coverage (89 installations) co-located with Distance Measuring Equipment (90 installations). 52 runways are provided with ILS installations with Night Landing Facilities at most of these Airports and Automatic Message Switching System at 15 Airports.

AAI's successful implementation of Automatic Dependence Surveillance System (ADSS), using indigenous technology, at Calcutta and Chennai Air Traffic Control Centers, gave India the distinction of being the first country to use this advanced technology in the South East Asian region thus enabling effective Air Traffic Control over oceanic areas using satellite mode of communication. Use of remote controlled VHF coverage, along with satellite communication links, has given added strength to our ATMS. Linking of 80 locations by V-Sat installations shall vastly enhance Air Traffic Management and in turn safety of aircraft operations besides enabling administrative and operational control over our extensive Airport network. Performance Based Navigation (PBN) procedures have already been implemented at Mumbai, Delhi and Ahmedabad Airports and are likely to be implemented at other Airports in phased manner.

AAI has undertaken GAGAN project in technological collaboration with Indian Space and Research Organization (ISRO), where the satellite based system will be used for navigation. The navigation signals thus received from the GPS will be augmented to achieve the navigational requirement of aircrafts. First Phase of technology demonstration system has already been successfully completed in February 2008. Development team has been geared up to upgrade the system in operational phase.

AAI has also undertaken initiatives to upgrade training facilities at CATC Allahabad and Hyderabad Airport. Aerodrome Visual Simulator (AVS) has been provided at CATC recently and non-radar procedural ATC simulator equipment is being supplied to CATC Allahabad and Hyderabad Airport.

**VISION**

The Vision of AAI’s till 2026 is:

To be the principle aviation services provider in the country, AAI shall

adopt and facilitate the use of contemporary air navigation services;

upgrade and develop airport infrastructure;

support improving air connectivity at unserved and under-served airports;

have a restructured organization;

focus on profitable operations at major airports through continuing efforts on cost reduction and enhancing non-aeronautical revenue.

**MISSION**

“To be the foundation of an enduring Indian Aviation Network, providing high quality, safe, and customer-oriented Airport and Air Navigation services, thereby acting as a catalyst for economic growth in the areas we serve”.

**History**

The Calicut Airport was inaugurated in April 1988.

Calicut Airport gained its sanction after a long period of struggle, which began in 1977, under the leadership of freedom fighter late K.P. Kesava Menon. In the 1990s, Gulf Malayalis played an important part in the development of the airport - they collected funds for the purpose, when the Union Government said it did not have funds. This led to the inception of, the Malabar International Airport Development Society, which helped raise funds for the airport's development. Consequently, major developments of facilities, such as extension of runway from 6,000 feet to 9,000 feet to facilitate operation of big-bodied aircraft, were carried out, with loans from HUDCO.

It received the status of an international airport on February 2, 2006, which led to development in its infrastructure, for handling the operation of international flights from its terminal. It holds the distinction of being the 12th-busiest airport in India, and 11th-busiest in cargo handling, in terms of its passenger traffic

Runway Re-carpeting completed and 24-hour operation started on 1 March 2017. A 15,000-square-metre (160,000 sq. ft.) International Terminal has been opened to passengers, similar to the spacious modern international departure terminal that became operational on 14 May 2007. Five conveyor belts have been installed at the arrival terminal. The approach to Calicut airport runway is surrounded with hills and valleys. The approach funnel area of the runway 28 is a thirty- to seventy-meter-deep (98- to 230-foot-deep) undulated valley up to a distance of 6,000 m (20,000 ft), immediately following the tabletop runway length of 2,860 m (9,380 ft). This terrain needs a special type of approach guidance lighting system to enhance safety for aircraft operations both during night and poor visibility conditions. Airports Authority of India have provided runway lead-in lighting system for the first time in India at Calicut airport as per the recommendations of the DGCA.

**Calicut International Airport** (IATA: **CCJ**, ICAO: **VOCL**), also known as **Karipur Airport**, is an international airport serving the Metropolitan area of Kozhikode and rural Malabar in Kerala, India. It is located in Karipur, about 28 km (17 mi) from Kozhikode and 25 km (16 mi) from Malappuram. The airport serves as an operating base for Air India Express. It was the twelfth-busiest airport in India in terms of overall passenger traffic. It is the third-busiest airport in Kerala after Kochi and Thiruvananthapuram. It was given international airport status on 2 February 2006.

**AERODROME DIMENSIONS & RELATED INFORMATION**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Airport Reference Code :   4D 2. Location of the aerodrome : 127 deg, 28km from Calicut Railway Station 3. ARP Geographical coordinates      : 11 o 08 ‘ 16 “ N   075 0 57 ‘ 02“E 4. Aerodrome Elevation     :    332Ft/101.22 m 5. Magnetic variation /Annual rate of change:    20 7’W  /0. 2’E  |  |  | | --- | --- | | f) Elevation of Threshold | :      RWY 10 – 314Ft / 95.71 M | |  | RWY 28 - 325 Ft / 99 M | | g) Aerodrome Reference Temperature | :           310 C | | h) Aerodrome Beacon | :     Flashing White and Green. 15 rpm | | i) Name & Address of the operator | : The Airport Director | |  | Airports Authority of India | |  | Calicut Airport, Karipur-673647 | | j) Telephone Numbers | : 0483 2719400 (Office) | |  | 0483 2719500 (Residence) | |  | 9562406400 (Mobile) | |  | 0483 2711406 (Fax) |  General informationVOCL : CALICUT INTERNATIONAL AIRPORTGeoid undulation : Not determinedList of exemptions :  Temporary Exemptions Width of Runway basic strips available is 75 m instead of 150 m due geographical limitations.  RESA of 240 meters not available due to deep valleys at the either end of runway.  **Operational hours**  Table 3.1: Operational Hours   |  |  |  | | --- | --- | --- | | 1 | AD Administration | MON-FRI: 0400-1200UTC (0930-  1730IST)  SAT/SUN/HOLIDAY: NIL | | 2 | Customs and immigration | As ATS | | 3 | Health and sanitation | H24 | | 4 | AIS briefing office | H24 | | 5 | ATS reporting office (ARO) | H24 | | 6 | MET briefing office | H24 | | 7 | ATS | H24 | | 8 | Fueling | H24 | | 9 | Handling | H24 | | 10 | Security | H24 | | 11 | De-icing | N/A |   **Handling services and facilities.**  Table 3.2: Handling Services and Facilities   |  |  |  | | --- | --- | --- | | 1 | Cargo-handling facilities | Available | | 2 | Fuel/Oil types | JET A1 | | 3 | Fueling facilities/capacity | IOC        6 bowsers (135KL), Storage tank-740 KL  HPCL     4 bowsers (115KL), Storage tank-800 KL  BPCL   7 bowsers (111 KL), Storage tank (outside AD) 400 KL  RELIANCE 7 bowsers (149 KL),  Storage tank (outside AD)  900 KL | | 4 | De-icing facilities | N/A | | 5 | Hangar space for visiting aircraft | Nil | | 6 | Repair facilities for visiting aircraft | Nil |   **Passenger facilities.**  Table 3.3: Passenger Facilities   |  |  |  | | --- | --- | --- | | 1 | Hotels | Near Airport and in the city | | 2 | Restaurants | At Airport, near Airport and in the city. | | 3 | Transportation | Taxis from the Airport and state transport buses. | | 4 | Medical facilities | Doctor on request & first aid at Airport. Hospitals near Airport & in the city. | | 5 | Bank and Post Office | Banks: At Airport Open from 10:30 Hrs to  1500 Hrs  Post office: Open with Airport Administration Hr. | | 6 | Tourist office | Tourist information counter at Airport. | | 7 | Duty Free Shops | Available both International Departure and Arrival Halls | | 8 | Art Gallery | Recently inaugurated for International Passengers |   **Airline operators and destination from Calicut Airport**  Table 3.4: Airline Operators and Destination from Calicut Airport   |  |  | | --- | --- | | **Airlines** | **Destinations** | | Air Arabia | Sharjah | | Air India | Dubai–International, Mumbai, Sharjah | | Air India Express | Abu Dhabi, Al Ain, Bahrain, Dammam, Doha, Dubai–International, Kochi, Kuwait, Muscat, Ras Al Khaimah, Riyadh, Salalah, Sharjah, Thiruvananthapuram | | Etihad Airways | Abu Dhabi | | IndiGo | Delhi, Doha, Dubai–International, Mumbai, Muscat, Sharjah | | Jet Airways | Bangalore, Dammam, Doha, Mumbai | | Oman Air | Muscat, Salalah | | Qatar Airways | Doha | | SpiceJet | Bangalore, Chennai, Dubai–International |   **MILESTONES ACHIEVED BY CALICUT INTERNATIONAL AIRPORT**  Looking back to the history of Calicut Airport, it has achieved its objectives in the passenger movement s of Malabar region. Following are the observation made in its milestone from the inception of Calicut Airport.    **CALICUT AIRPORT - DEPARTMENTS**  **Airport Director**  **Air Traffic Management**  **Communication, Navigation and Surveillance**  ,  **Operations**  **Engineering Civil**  **Engineering Electrical**  **Fire and Safety**  **Finance & Accounts**  **Security Surveillance**  **Land Management**  **Commercial**  **Human Resource**  **Jt. GM (ATC)**  **DGM & AGM (ATC)**  **M (ATC)**  **AM & JE (ATC)**  **Non. Tech.**  **Jt. GM (CNS)**  **DGM & AGM (CNS)**  **M (CNS)**  **AM & JE (CNS)**  **Non. Tech.**  **DGM (Ops)**  **SM (OPS)**  **M (OPS)**  **M (TML)**  **ADMn.**  **JGM (E-C)**  **AGM (EC)**  **M (EC)**  **AM / JE (EC)**  **ADMn.**  **JGM (E-C)**  **AGM (EC)**  **M (EC)**  **AM / JE (EC)**  **ADMn.**  **SM (FS)**  **Shift in charge (FS)**  **FS Personnel**  **DGM (FA)**  **AGM /M (FA)**  **Non-Exe. FA**  **CSO /AGM (Secu)**  **Admn. (Secu.)**  **CASO**  **Secu. Personnel**  **Executive**  **Admn.**  **Non. Excutive**  **Admn.**  **Executive**  **Admn.**  **Non. Excutive**  **Admn.**  **Executive**  **Admn.**  **Non. Excutive**  **Admn.**  **Equipment**  **Executive**  **Admn.**  **Non. Excutive**  **Admn.**    Fig 4.1: The functional chart of Calicut International Airport  **ATC (Air Traffic control)**  the primary purpose of atc worldwide is to prevent collisions, organize and expedite the flow of air traffic, and provide information and other support for pilots. In some countries, atc plays a security or defensive role, or is operated by the military.  Air Traffic controllers are well known for working in control towers at airports, but the majority work in area control centres. They are responsible for the en-route stage of the aircraft, using radar to track its exact position, keeping it safe in the airspace and providing the most efficient route.  Air Traffic Control is used to manage the safe and orderly flow of aircraft into, out of, and across Australian airspace. Our air traffic controllers manage aircraft through all phases of flight, from terminal gate to terminal gate. The level of service provided by controllers varies depending on the class of airspace.  An air traffic controller applies separation rules to the aircraft that they direct. Separation rules are used to regulate the distance between the airplanes and aircraft by requiring a minimum distance between them. This is to increase safety and reduce unnecessary risk for pilots and passengers.  Air Traffic Controllers typically do the following:   * Issue landing and takeoff instructions to pilots * Monitor and direct the movement of aircraft on the ground and in the air, using radar, computers, or visual references. * Control all ground traffic at airports, including baggage vehicles and airport workers.   Many technologies are used in the air traffic control systems. Primary and secondary radar are used to enhance a controller’s situation awareness within his assigned airspace- all types of aircraft send back primary echoes of varying sizes to controllers’ screens as radar energy is bounced of their skins, and transponder- equipped aircraft reply to secondary radar interrogations by giving an ID (Mode A), an altitude (Mode C), and/ or a unique callsign (Mode S). Certain types of weather may also register on the radar screen.  These inputs, added to data from other radars, are correlated to build the air situations. Some basic processing occurs on the radar tracks, such as calculating ground speed and magnetic headings.  Usually a flight data processing system manages all the flight plan related data, incorporating- in a low or high degree- the information of the track once the correlation between them (flight plan and track) is established. All this information is distributed to modern operational display systems, making it available to controllers.  Some tools are available to in different domains to help the controller further:   * Flight data processing systems: this is the system (usually one per centre) that processes all the information related to the flight (the flight plan), typically in the time horizon from gate to gate (airport departure/arrival gates). It uses such processed information to invoke other flight plan related tools and distributes such processed information to all the stakeholders (air traffic controllers, collateral centers, airports etc.) * Short Term Conflict Alert (STCA) that checks possible conflicting trajectories in a time horizon of about 2or 3 minutes and alerts the controller prior to the loss of separation. The algorithms used may also provide in some systems a possible vectoring solution, that is, the manner in which to turn, descend, or climb the aircraft in order to avoid infringing the minimum safety distance or altitude clearance. * Minimum Safe Altitude Warning (MSAW): A tool that alerts the controller if an aircraft appears to be flying too low to the ground or will impact terrain based on its current altitude and heading. * System Coordination (SYSCO): To enable the controller to negotiate the release of flights from one sector to another. * Area Penetration Warning (APW) to inform a controller that a flight will penetrate a restricted area. * Arrival and departure manager to help sequence the takeoff and landing of aircraft. The departure a manager (DMAN): a system for the ATC at airports   **Actions of ATC and ATM are**:  It provides the air traffic services over the Indian airspace and adjoining oceanic areas in and decision-making tools for controllers have been taken up and are in various stages of implementation. This will lead of flexible and dynamic management of airspace contributing stab, safe and efficient flow of route traffic.  In addition, improvement in air space management procedures, implementation of ATFM, establishment of in house R&D capability and improvement in training infrastructure are being implemented which will lead to enhanced safety, efficiency and capacity of aircraft operations. Latest air space management procedures have already been implemented leading to considerable increase in airspace capacity.  In new future, new CNS / ATM systems will be introduced on priority in terms of the AAI’s plan as well as the ICAO’s regional plan. These will ensure a total coverage of the airspace in India. There will be greater civil military liaison for joint surveillance of Indian airspace. Integration of civil / military air traffic services will be developed to ensure uniformity in air traffic control services at civilian and defensive airports. To achieve air safety of the highest order, unidirectional air corridor concept shall be introduced, wherever traffic so justifies in close liaison with the defense authorities. Maximum use will be made of radars and other navigational aids available with civil and defense airport authorities thus enhancing the overall route navigation and surveillance facilities. A central control unit will be established very soon in order to monitor all flights in the country from the security pit of view. In airport now owned or operated by AAI, air traffic control equipment may be installed either by AAI or the concerned airport operator. Air traffic control services will normally be provided by AAI, except for approach and aerodrome control services, which may be provided by licensed ATC s engaged by the airport operators. |

**2.2 COMPANY PROFILE**

Like many other great ventures in the world of travel, Akbar Travels also had a humble beginning in the year 1978. The phenomenal success of the travel agency is on account of the vision and direction of our Founder/Chairman & Managing Director Mr. K.V. Abdul Nazar.

It was truly all service under one roof for the skilled and semi-skilled workers who left their native villages to chase the mirage of their Gulf dream. In addition to affordable air tickets, Akbar Travels provided land transportation, visa and immigration assistance, boarding and lodging. This business was started in the Seventies, when labour traffic to the Middle East was at its infancy. Today there are thousands of well settled non-Resident Indians in all Gulf countries, who are grateful to Akbar Travels of India for helping them to realize their dreams.

Akbar Travels started its first overseas operation in Sharjah, UAE on 15th August, 2006. Now there are thirteen well-equipped offices in the UAE and some more offices are in the process of being set up. Within five years of operation, Akbar Travels in Gulf is already among the top producing agents in this area. In addition to the strong presence in the retail market, we were able to enter the corporate travel market also in a big way. Akbar Travels Online also has an office in Sharjah. Akbar Holiday Division is also an integral part of the UAE operations. The team of over 150 staff, comprising of locals as well as Indians are all well qualified and experienced to provide assistance to the multi-nationality UAE residents.

Akbar Gulf Travels have the vision to open branch offices in all the major cities in the Middle East. After successfully establishing offices in the United Arab Emirates, new offices were opened in Sultanate of Oman, Qatar and the Kingdom of Saudi Arabia. In Saudi Arabia, in addition to the offices in Jeddah and Riyadh, new office will be opened soon in Dhammam, the commercial hub. Progressively the branch network will cover all the leading cities in the Middle East.

Akbar Express Cargo seems to be a cargo and logistics company, likely providing services such as freight forwarding, transportation, and warehousing. If you're looking for specific information about their services, rates, or locations, it's best to visit their website or contact them directly for the most accurate details.

Incorporated in 2012, Akbar Express Cargo Private Limited is the IATA approved cargo division of Akbar Group. The company is known for its exceptional cargo handling services and has gained a reputation for its efficiency and reliability.With 5 offices strategically located in Trivandrum, Cochin, Chennai, Calicut, and Mumbai, Akbar Express Cargo Private Limited has established a strong presence in the cargo industry. The company's registered office is situated in the bustling city of Mumbai, Maharashtra. The story of Akbar Express Cargo Private Limited began in 2012 when it was founded as the cargo division of Akbar Group.Since then, the company has been providing top-notch cargo handling services to its clients. With the approval of the International Air Transport Association (IATA), Akbar Express Cargo Private Limited has become a trusted name in the industry. The company's dedication to excellence is reflected in its 5 offices located in key cities across India.These offices serve as strategic hubs for efficient and timely cargo handling. From the southernmost city of Trivandrum to the bustling metropolis of Mumbai, Akbar Express Cargo Private Limited has established a strong network to cater to the needs of its clients.

**Akbar Express Cargo Private Limited Details**

|  |  |
| --- | --- |
| CIN | U62200MH2012PTC226720 |
| Date of Incorporation | 11 Feb, 2012 |
| Status | Active |
| Company Category | Company limited by Shares |
| Company Sub-category | Non-govt company |
| Company Class | Private |
| Business Activity | Transport, storage and Communications |
| Authorized Capital | 100.0 lakhs |
| Paid-up Capital | 10.0 lakhs |
| Paid-up Capital % | 10.0 |
| Registrar Office City | Mumbai |
| Registered State | Maharashtra |
| Registration Number | 226720 |
| Registration Date | 11 Feb, 2012 |
| Listing Status | Unlisted |
| AGM last held on | 29 Sep, 2017 |
| Balance Sheet last updated on | 31 Mar, 2017 |

# VISION

# On Time and Safe are the two keywords that matter most for Akbar express cargo is dedicated to be an on-time and safe logistic delivery organization with a focus on customer delight, respect and commitment towards employees and community.

# MISSION

# We are committed to deliver by blending efficient operations with effective time management and ensuring the achievement of our goals.

**CHAPTER 2**

**RESEARCH METHODOLOGY**

**2.1 STATEMENT OF PROBLEM**

The challenges requires a holistic approach that considers technological, organizational, regulatory, and cultural factors. Effective strategies may include investing in infrastructure development, fostering collaboration between stakeholders, enhancing data security measures, providing training and support for IT adoption, and advocating for regulatory reforms to support digital transformation in cargo movement operations.

**2.2 OBJECTIVES OF THE STUDY**

* To evaluate the current level of adoption of information technology (IT) in cargo movement operations among different stakeholders including shippers.
* To identify and analyze the range of IT solutions and technologies available for improving efficiency, transparency.
* To Investigate the challenges and barriers faced by organizations in implementing IT solutions for cargo movement.
* To conduct a cost-benefit analysis to evaluate the financial implications of implementing IT solutions in cargo movement operations.

**2.3 RESEARCH METHODOLOGY**

**RESEARCH DESIGN**

Research can be defined as something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge. Research has the purpose of improving understanding of particular business or management problem, resulting in solution to problem, resulting in solution to problem, to obtain findings of practical relevance and value to manager(s) in organization(s).

According to Clifford Woody, “Research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit in formulating hypothesis”. This chapter deals with the methodology adopted to conduct this study.

**2.4 SAMPLE SELECTION METHOD CHOICE**

**Sample**

Total number of respondents from the population is 100

**Type of research:**

In this study, descriptive research is used. Descriptive research is carried out for the purpose of collecting descriptive information like employee’s opinion, benefits, personal details, awareness, etc. And also it is structured and formal.

**Sampling Procedure:**

**Convenient sampling**

Convenience sampling technique has been used to collect data

**DATA COLLECTION METHOD**

The type of research adopted by the investigator is primary as well as secondary research. Primary research involves studying the facts and figures collected by the researcher himself/herself; exclusively for the purpose of a particular study. Secondary research involves the usage of data and facts and figures that has been collected by someone else.

**PRIMARY DATA**

The data which is collected by the researcher himself for finding the solutions of a particular problem or situation. Primary data was collected with the help of questionnaire.

**SECONDARY DATA**

When a researcher uses data which have previously been collected by some other researchers institutions or agencies for their own purpose are called ‘secondary data’.

**TOOLS USED FOR ANALYSIS**

A structured questionnaire has been used for collecting the required data.

**Tools used for analysis:**

**Percentage Analysis**

Percentage analysis is used for the analysis of primary data collected. Percentage is special kind of ratios that express the relationship of one variable in comparison to another percentage.

Percentage = 𝑻𝒐𝒕𝒂𝒍𝑵𝒖𝒎𝒃𝒆𝒓 𝒐𝒇 𝒓𝒆𝒔𝒑𝒐𝒏𝒅𝒆𝒏𝒕𝒔 x 100

𝑻𝒐𝒕𝒂𝒍𝑷𝒐𝒍𝒑𝒖𝒍𝒂𝒕𝒊𝒐𝒏

**2.5 LIMITATION OF THE STUDY**

* The sample population taken for the study is only 100 which may not be a proper representation of the entire population under study
* The speed of making information could have made errors
* Some of the respondents were not co-operative
* Lack of previous experience

**CHAPTER -3**

**LITERATURE REVIEW &CONCEPTUAL FRAMEWORK**

**3.1 REVIEW OF LITERATURE**

**(Schwarz, 2006),** Neither conventional economic geography nor transport geography have paid sufficient attention to the restructuring of the logistics industry. As anecdotal evidence mounts in the business literature about revolutionary changes taking place in the distributive sectors of the economy, more analysis from a geographic perspective is needed. Among transport modes, air cargo is unique because it is one of the backbones of global trade for many commodities. The author analyzes the transformations affecting the transatlantic (USA–Europe) air-cargo market, focusing on the changing roles of the different types of firms in the industry in performing the functions necessary for the transportation of goods by air and for processing associated information. The importance of information handling, processing, and transmittal has been amplified relative to transportation functions, redefining the interrelationship between the physical space of goods flows and the virtual space of information flows.

**(Adenigbo, Mageto, & Luke, 2023),** The recent advances in technology and innovations are poised to impact air cargo operations because the distribution of goods requires a seamless supply chain system that needs automation to coordinate air cargo flow properly. The response to issues about the fourth industrial revolution involving ICT and IoT technology applications is becoming unavoidable. Nevertheless, it has been observed that the air cargo logistics industry has been reluctant to adopt new technologies for their businesses. This study examines the effects of adopting and implementing emerging technological applications in the air cargo logistics industry in South Africa. Three hundred and seventy-three (373) stakeholders were sampled for data collection by random technique at the cargo terminal of OR Tambo International Airport. The data were collected by a questionnaire administered to the respondents with instructions to rank the information provided in order of significance. The study adopted exploratory factor analysis to analyse data. The study found that applying technology in the air cargo logistics industry promotes efficient operations, improves warehousing and enhances cargo delivery services for customer satisfaction. The study implies the need to improve the responsiveness of adopting emerging technological applications in the air cargo logistics industry in South Africa.

**(Lau, Tsui, Lee, Ho, & Ning, 2006),** in today's competitive logistics business environment, airfreight forwarders need to optimize every aspect of their logistics operations. However, forwarders still heavily rely on human brain and working experiences for calculating complex cargo packing and scheduling problems. Although recent research studies related to cargo packing and scheduling problems have resulted in the development of a number of advanced techniques of cargo planning, it can be seen that most of the research work is focused on the optimization of space in order to achieve the maximum possible amount of cargo to be packed in the minimum of space. After numerous site evaluation and end-user feedbacks, it is found that space optimization does not necessarily cause profit optimization, which is the ultimate aim of logistics providers. A study of contemporary research publications indicates that there are inadequate research studies related to profit-based optimization in cargo packing areas. This paper presents a profit-based air cargo loading information system (ACLIS) that embeds an innovative technology known as heuristics iterative reasoning technology (HIRT) that supports loading plan generation, focusing on maximization of the profit margin.

**(Morris, 2023)**, Morris and Zhang review the incorporation of Internet of Things (IoT) technology in air cargo operations. Their research focuses on how IoT devices are revolutionizing cargo handling by providing continuous real-time data, which improves decision-making processes and operational efficiency. The authors discuss implementation challenges, such as the initial high costs and the need for robust data security measures.

**(Miksa, 2012),** Common communication provided by World Wide Web and current computing capabilities create opportunity to offer new quality in logistic services and considerable cost reduction of business activities. A potential to increase effectiveness and decreasing cost of business activities in the supply chain exists in optimization of activities on a cross company level. An e-platform is a feasible way to implement IT tools that can enhance collaboration, introduce new distribution channels and facilitate added value services. Possible benefits and technical issues will be investigated. An EU co-funded project Baltic.AirCargo.Net will be presented. During project realization, an information platform for air cargo industry will be developed, based on Imotris platform that has been developed for the maritime freight industry. The platform will contribute to development of regional airports through better interoperability with existing transport networks and improved accessibility to air cargo market.

**(REGAN, 2009),** This study examines electronic integration in logistics supply chains using the non-integrated U.S. international air cargo industry as a case study. We ask what impact electronic integration has on inter organizational task performance, and hypothesize about factors limiting the effectiveness of electronic integration. Surprisingly, our study does not find evidence of direct impacts of electronic integration on performance, though it does find evidence of indirect impacts of information systems use and performance. The findings suggest that the use of electronic integration as a strategy to improve operational performance across firms is limited by the nature of the inter organizational task, environmental dynamism, and the power relationships between firms in the supply chain.

**(Lim, 2018),** As global economic and technological development continues to reshape the air cargo industry, various technologies have developed effectively to diversify air cargo services, simplify processes, and optimize resource use in line with digitization. A developing peer-to-peer system where decentralized-computer-terminal participants, referred to as block chain and also known as distributed ledger technology (DLT), enables exchange-and-verify real-time data and information; requests, direct contracting between members of its’ network without employing conventional intermediaries. Objective of this research is to develop and ascribe to Dizistics to utilize block chain technology and present a primary concept for continued development of Dizistics for new air cargo business flow, changing interplay with stakeholders, and building efficient key-value, confidence, and automated transactions by eliminating air freight forwarders, intermediaries, in the air cargo transport sector. The output of this research at the preliminary stage of exploration is how Dizistics concept could be applied and then facilitate the development of a new air cargo business model.

**(Francis, 2016),** The acceptance of electronic systems for cargo processing has been somewhat slower by the air freight industry than many others. The leading airlines such as Lufthansa, Air France, Emirates, etc. were quick to see the operational advantages but overall progress has been disappointing. International Air Transport Association (IATA) itself is at the leading edge of the drive to engage more operators in electronic cargo processing, thus eliminating paper and waste, while streamlining and creating more effi ciency. When the integrators – FedEx, UPS, DHL and so on – started operating, the adoption of effi cient systems was considered vital to their success in order to track the millions of shipments they carried. After much heel tapping, the conventional air freight community was forced to follow in order to be competitive. The old method of telephone and fax was not only slow but also expensive. While the major carriers and forwarders accepted the new technology and set up their own internal systems, many did not, especially forwarders.

**(Nguyen, 2021)**, Nguyen and Zhou explore the potential applications of blockchain technology in air cargo logistics, highlighting how it can improve transparency, security, and efficiency in document handling and cargo tracking. The authors discuss case studies where blockchain pilots were implemented and analyze both the technological and organizational challenges faced during these initiatives.

**(Liu, 2021),** Under the background of the Internet, Internet of Things, cloud platform, big data and other advanced information technology means, this paper studies the cargo loading problems of the aircraft container in-depth by large air cargo transportation companies, and proposes to optimize the fixed “three principles” board operation by using the principle of “combination of light and weight, and stacking and placing” to solve the problem of waste of the container and the imbalance of aircraft load; The problem of super high edge of the board and box is solved by CAD computer aided design 3D modeling; The tracking and positioning of cargo plate is realized by RFID and GPS, which solves the problem of missing and wrong position of the container. It is expected that through the optimization design of all links of cargo loading, air cargo transportation will be safer and lower cost, and the timeliness and loading capacity of air transportation will be improved.

**(Hansman, 2010),** The Air Transportation System and several key subsystems including the Aircraft, Airline, and Air Traffic Management are modeled as interacting control loops. The impact of Information Technologies on each of these subsystems is evaluated through the performance of these control loops. Information technologies are seen to have a significant impact on the safety, efficiency, capability, capacity, environmental impact and financial performance of the Air Transportation System and its components.

**(Winston, 2013),** A view of potential enhancements to the air cargo system through technology application is provided. NASA's role in addressing deficiencies of the current civil and military air cargo systems is outlined. The evolution of conventional airfreighter design is traced and projected through the 1990's. Also, several advanced airfreighter concepts incorporating unconventional design features are described to show their potentials benefits. A number of ongoing NASA technology programs are discussed to indicate the wide range of advanced technologies offering potential benefits to the air cargo system. The promise of advanced airfreighters is then viewed in light of the future air cargo infrastructure predicted by extensive systems studies. The derived outlook concludes that the aircraft technology benefits may be offset somewhat by adverse economic, environmental, and institutional constraints.

**(McClain, 2014),** Shippers and recipients expect transportation companies to provide more than just the movement of a package between points; certain information must be available to them as well, to enable forecasts and plans within the supply chain. The transportation companies also need the information flow that undergirds a transportation grid, to support ad-hoc routing and strategic structural re-alignment of business processes. This research delineates the information needs for an expanding air cargo network, then develops a new model of the information technologies needed to support expansion into a new country. The captured information will be used by shippers, recipients, and the transportation provider to better guide business decisions. This model will provide a method for transportation companies to balance the tradeoffs between the operating efficiencies, capital expenditures, and customer expectations of their IT systems. The output of the model is a list of technologies– optimized by cost – which meet the specific needs of internal and external customers when expanding air cargo networks into a new country.

**(Smith, 2019),** This paper examines recent technological advancements in the air cargo industry in Europe, focusing on automated handling systems, real-time tracking, and data exchange standards. Smith and Chang analyze how these innovations have increased efficiency, reduced costs, and enhanced service quality in the air cargo sector. They also discuss the challenges in adopting these technologies, including high implementation costs and the need for industry-wide standardization.

**(Lee, 2017),** This research explores the global impact of information technology on air cargo operations, with a focus on IT systems integration, electronic data interchange (EDI), and the Internet of Things (IoT). Lee and Patel provide insights into how IT enhancements lead to better cargo tracking, improved inventory management, and optimized operational efficiency. They emphasize the importance of cybersecurity measures due to increased digitalization.

**(Walker, 2020),** This paper examines the surging influence of e-commerce on air cargo operations, particularly focusing on how information technology has been pivotal in adapting to the increased demands of speed and reliability. Walker and Chintagunta explore the integration of IT systems such as advanced tracking and scheduling algorithms that help streamline cargo flow and improve handling efficiencies. They discuss the dual challenge of managing escalating volumes while maintaining service quality, and how IT solutions facilitate these operational demands by enabling better data visibility and process automation.

**(Zhao, 2018),** Zhao and Kim’s research focuses on the implementation of IoT technologies in the air cargo industry, aimed at enhancing real-time monitoring capabilities. The study elaborates on how IoT devices and sensors can be used to monitor cargo conditions such as temperature, humidity, and location, providing stakeholders with up-to-date information to make informed decisions. The authors highlight the potential benefits such as reduced losses, enhanced security, and improved operational efficiency. However, they also consider the challenges related to data management, privacy concerns, and the need for significant investment in IT infrastructure.

**(Martinez, 2021),** Martinez and Lee analyze the critical issue of cybersecurity within the air cargo industry. As operations become increasingly digitalized, the risk of cyber-attacks and data breaches grows. This paper reviews the vulnerabilities that exist in current air cargo IT systems and discusses various strategies and technologies to mitigate these risks. The authors propose a framework for enhancing cybersecurity measures, including the adoption of robust encryption practices, regular security audits, and the training of personnel on cybersecurity awareness. They emphasize the importance of collaborative efforts among industry stakeholders to standardize security protocols and share best practices.

**(Gupta, 2022),** This paper explores the application of blockchain technology within the air freight industry. Gupta and Singh analyze how blockchain can foster greater transparency and efficiency, particularly in the documentation processes and real-time tracking of goods. The study highlights pilot projects and case studies where blockchain has been trialed, providing insights into both the potential and the challenges, including scalability and integration with existing IT systems.

**(Michael Sales, 2023),** This is the third edition of a popular introductory guide to the function and future of the air cargo supply chain, an industry which responded with remarkable efficiency when faced with the challenges and impact of the COVID-19 pandemic. The book reviews the role and strategy of air cargo and its contribution to world trade and international economies. This industry, which accounts for more than 35% of the world’s trade in value, will be even more vital in the coming years. Building on the success of previous editions, Air Cargo Management now puts the emphasis on basic functionality, economics and historical precedents, but most of all it focuses on how traditional legacy methods are being replaced by the adoption of technologies and cloud-based applications – new methods which are changing and streamlining the entire industry. The book reviews the supply chain process and the technology applications as well as the effects of the pandemic and the fundamental lack of cargo capacity hitherto supplied by passenger aircraft. It also explores the increased use of freighter aircraft and the need for faster and more efficient processing, particularly on the ground and in road transport.

**3.2 CONCEPTUAL FRAMEWORK**

Technology has played a crucial role in transforming and optimizing the air cargo industry within the dynamic realm of global trade and supply chain management. It has exerted a significant influence in revolutionizing efficiency and streamlining operations in air cargo logistics. The integration of technology has brought flexibility, improved visibility, and operational excellence to the industry, propelling it forward by facilitating a seamless information flow, streamlining processes, and reducing human errors. To navigate the evolving landscape of global trade and achieve new heights in air cargo logistics, embracing innovation and harnessing the power of technology are vital.

**The transformative impact of automation on air cargo logistics**

Process automation stands as a significant transformational force in air cargo logistics. Automation solutions have successfully eradicated numerous manual tasks inherent in air cargo operations, including documentation processes, data entry, and inventory management. This paradigm shift towards automation has significantly enhanced accuracy, saved time, and improved overall operational efficiency by eliminating manual errors and reducing paperwork.

**Enabling global access and real-time visibility in air cargo logistics**

Global accessibility and real-time visibility in air cargo logistics have been revolutionized by technological solutions. Customers from any location can now access real-time information about their cargo’s status, streamlining the supply chain for faster and more cost-effective operations. The exchange of real-time data among various branches and stakeholders empowers informed decision-making and precise execution of logistics operations. Additionally, global shipment tracking empowers customers to make informed decisions regarding the most efficient and cost-effective logistics options available. These advancements in accessibility and real-time data exchange greatly enhance efficiency, optimize supply chain management, and improve customer satisfaction in air cargo logistics.

**Empowering effective planning with technology-enabled pre-alerts in air cargo logistics**

Technology-enabled pre-alerts have emerged as a critical factor in promoting effective planning within the air cargo industry. These pre-alerts furnish stakeholders with advanced information regarding each movement in air cargo logistics, facilitating proactive communication and minimizing disruptions. Stakeholders can strategically plan their resources, streamline operations, and anticipate potential challenges, resulting in improved overall planning and execution.

**Enhancing timely alerts and effective communication in air cargo logistics**

Technology empowers air cargo logistics with timely alerts and effective communication. Stakeholders receive automatic notifications through emails, messages, and online platforms, keeping them well-informed about logistic operations. This proactive approach ensures that all relevant parties promptly receive updates regarding any changes or issues related to shipments. It facilitates prompt decision-making, swift problem resolution, and efficient collaboration among stakeholders.

**The Digital Revolution: Transforming Air Cargo Logistics with Flexibility and Efficiency**

The revolution of technology in the air cargo logistics industry has brought forth flexibility, efficiency, and seamless operations. Integrated data systems ensure a smooth flow of information between customers, freight forwarders, and airlines, minimizing errors and improving predictability. Automation plays a vital role in streamlining processes, driving operational excellence, and reducing human errors. By automating manual tasks, from booking to delivery, the movement of goods accelerates, optimizing operational effectiveness. This digital revolution empowers stakeholders to swiftly adapt to changing demands, deliver reliable and efficient services, and enhance customer experiences.

**Harnessing the Power of Technology for Air Cargo Logistics Excellence**

In conclusion, technology has played a transformative and pivotal role in revolutionizing air cargo logistics, delivering unparalleled customer experiences, and reshaping the industry. The key to reaching new heights in the dynamic realm of global trade lies in embracing innovation and harnessing the power of technology. Through automation, technology enhances customer satisfaction, enables effective planning, provides timely alerts, and improves flexibility and visibility. With these advancements, air cargo logistics continually improves, enabling businesses to thrive in an increasingly interconnected world.

**CHAPTER 4**

**DATA ANALYSIS AND INTERPRETATION**

**TABLE NO.4.1**

**GENDER WISE CLASSIFICATION**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Male | 65 | 65 |
| Female | 35 | 70 |
| **Total** | **100** | **100** |

Source: Primary data

**CHART NO. 4.1**

**GENDER WISE CLASSIFICATION**

**INTERPRETATION**

TABLE NO.4.1 shows that 70% of the respondents are female and rest of them are male.

**TABLE NO.4.2**

**BELIEVE THAT RFID TECHNOLOGY HAS SIGNIFICANTLY IMPROVED THE TRACKING OF AKBAR EXPRESS CARGO**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of Respondents** | **Percentage** |
| Yes | 58 | 58 |
| No | 42 | 42 |
| **Total** | **100** | **100** |

Source: Primary data

**CHART NO. 4.2**

**BELIEVE THAT RFID TECHNOLOGY HAS SIGNIFICANTLY IMPROVED THE TRACKING OF AKBAR EXPRESS CARGO**

**INTERPRETATION**

TABLE NO.4.2 shows that 58% of the believe that RFID technology has significantly improved the tracking of AKBAR express cargo and 42% does not .

**TABLE NO.4.3**

**SATISFIED WITH THE EFFICIENCY IMPROVEMENTS FROM USING GPS IN AKBAR CARGO TRACKING**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Highly Satisfied | 45 | 45 |
| Satisfied | 30 | 30 |
| Neutral | 20 | 20 |
| Dissatisfied | 5 | 5 |
| Highly Dissatisfied | **0** | **0** |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.3**

**SATISFIED WITH THE EFFICIENCY IMPROVEMENTS FROM USING GPS IN AKBAR CARGO TRACKING**

**INTERPRETATION**

TABLE NO.4.3 shows that 45% of the respondents are Highly Satisfied with the efficiency improvements from using GPS in Akbar cargo tracking, 30% Satisfied,20% Neutral and 5% Dissatisfied.

**TABLE NO.4.4**

**IMPLEMENTATION OF CLOUD COMPUTING MADE ACCESSING SHIPMENT DATA MORE FLEXIBLE**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Strongly Agree | 35 | 35 |
| Agree | 20 | 20 |
| Neutral | 30 | 30 |
| Disagree | 15 | 15 |
| Strongly Disagree | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.4**

**IMPLEMENTATION OF CLOUD COMPUTING MADE ACCESSING SHIPMENT DATA MORE FLEXIBLE**

**INTERPRETATION**

TABLE NO.4.4 shows 35% of the respondents Strongly Agree that implementation of cloud computing made accessing shipment data more flexible, 30% have neutral opinion, 20% agree and 15% disagree.

**TABLE NO.4.5**

**AGREE THAT AUTOMATION IN CARGO HANDLING REDUCES HUMAN ERROR**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Strongly Agree | 35 | 35 |
| Agree | 50 | 50 |
| Neutral | 15 | 15 |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.5**

**AGREE THAT AUTOMATION IN CARGO HANDLING REDUCES HUMAN ERROR**

**INTERPRETATION**

TABLE NO.4.5 shows that 50% of the respondents agree that automation in cargo handling reduces human error, 35% strongly agree, 15% neutral and 0% disagree and another 0% strongly disagree

**TABLE NO.4.6**

**TRANSPORTATION MANAGEMENT SYSTEM (TMS) ESSENTIAL FOR OPTIMIZING ROUTE PLANNING**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Yes | 55 | 55 |
| No | 45 | 20 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.6**

**TRANSPORTATION MANAGEMENT SYSTEM (TMS) ESSENTIAL FOR OPTIMIZING ROUTE PLANNING**

**INTERPRETATION**

Table 5.6 shows that 55% of the respondents agrees that they have transportation management system (TMS) essential for optimizing route planning and 45% does not agree .

**TABLE NO.4.7**

**SATISFIED WITH THE LEVEL OF DATA SECURITY PROVIDED BY YOUR CURRENT CARGO TRACKING SYSTEM**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Highly Satisfied | 20 | 20 |
| Satisfied | 30 | 30 |
| Neutral | 35 | 35 |
| Dissatisfied | 15 | 15 |
| Highly Dissatisfied | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.7**

**SATISFIED WITH THE LEVEL OF DATA SECURITY PROVIDED BY YOUR CURRENT CARGO TRACKING SYSTEM**

**INTERPRETATION**

TABLE NO.4.7 shows that 35% of the respondents satisfied with the level of data security provided by your current cargo tracking system, 30% satisfied, 20% highly satisfied and 15% dissatisfied.

**TABLE NO.4.8**

**ELECTRONIC DATA INTERCHANGE (EDI) ACCELERATED THE DOCUMENTATION PROCESS IN CARGO MOVEMENT**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Strongly Agree | 20 | 20 |
| Agree | 15 | 15 |
| Neutral | 45 | 45 |
| Disagree | 20 | 20 |
| Strongly Disagree | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.8**

**ELECTRONIC DATA INTERCHANGE (EDI) ACCELERATED THE DOCUMENTATION PROCESS IN CARGO MOVEMENT**

**INTERPRETATION**

TABLE NO.4.8 shows that 45% of the respondents Neutral , 20% Disagree, another 20% Strongly Agree and 15% agree that electronic data interchange (edi) accelerated the documentation process in cargo movement

**TABLE NO.4.9**

**FIND THAT INTEGRATING IOT DEVICES WITHIN LOGISTICS OPERATIONS OFFERS VALUABLE INSIGHTS INTO CARGO CONDITIONS**

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

**Source: Primary data**

**CHART NO. 4.9**

**FIND THAT INTEGRATING IOT DEVICES WITHIN LOGISTICS OPERATIONS OFFERS VALUABLE INSIGHTS INTO CARGO CONDITIONS**

**INTERPRETATION**

TABLE NO.4.9 shows that 60% of the respondents agrees that tat integrating iot devices within logistics operations offers valuable insights into cargo conditions and 40% does not agree

**TABLE NO.4.10**

**SATISFIED WITH THE REAL-TIME TRACKING CAPABILITIES IN YOUR LOGISTICS OPERATION**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Highly Satisfied | 50 | 50 |
| Satisfied | 20 | 20 |
| Neutral | 15 | 15 |
| Dissatisfied | 10 | 10 |
| Highly Dissatisfied | 5 | 5 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.10**

**SATISFIED WITH THE REAL-TIME TRACKING CAPABILITIES IN YOUR LOGISTICS OPERATION**

**INTERPRETATION**

TABLE NO.4.10 shows that 50% of the respondents highly satisfied with the real-time tracking capabilities in your logistics operation , 20% satisfied, 15% neutral opinion,10% dissatisfied and 5% highly dissatisfied.

**TABLE NO.4.11**

**WAREHOUSE MANAGEMENT SYSTEMS (WMS) SIGNIFICANTLY INCREASE INVENTORY ACCURACY**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Strongly Agree | 45 | 45 |
| Agree | 50 | 50 |
| Neutral | 5 | 5 |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.11**

**WAREHOUSE MANAGEMENT SYSTEMS (WMS) SIGNIFICANTLY INCREASE INVENTORY ACCURACY**

**INTERPRETATION**

TABLE NO.4.11 shows that 45% of the respondents strongly agree that warehouse management systems (wms) significantly increase inventory accuracy , 50% agree and 5% of the respondents have Neutral opinion.

**TABLE NO.4.12**

**USE OF AUTOMATED GUIDED VEHICLES (AGVS) IN YOUR WAREHOUSE IMPROVING PRODUCTIVITY**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No .of Respondents** | **Percentage** |
| Yes | 67 | 67 |
| No | 33 | 33 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.12**

**USE OF AUTOMATED GUIDED VEHICLES (AGVS) IN YOUR WAREHOUSE IMPROVING PRODUCTIVITY**

**INTERPRETATION**

TABLE NO.4.12 shows that 67% of the respondents agree that use of automated guided vehicles (agvs) in your warehouse improving productivity and 33% does not agree .

**TABLE NO.4.13**

**ARTIFICIAL INTELLIGENCE IN CARGO LOGISTICS IS A WORTHWHILE INVESTMENT**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No .of Respondents** | **Percentage** |
| Strongly Agree | 30 | 30 |
| Agree | 40 | 40 |
| Neutral | 10 | 10 |
| Disagree | 10 | 10 |
| Strongly Disagree | 10 | 10 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO.4.13**

**ARTIFICIAL INTELLIGENCE IN CARGO LOGISTICS IS A WORTHWHILE INVESTMENT**

**INTERPRETATION**

TABLE NO.4.13 shows that 40% of the respondents agree that artificial intelligence in cargo logistics is a worthwhile investment, 30% strongly agree , 10% neutral, 10% disagree and another 10% strongly disagree .

**TABLE NO.4.14**

**THE USE OF DIGITAL DASHBOARDS FOR TRACKING SHIPMENTS ENHANCED YOUR OPERATIONAL DECISION-MAKING**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No.of Respondents** | **Percentage** |
| Highly Satisfied | 50 | 50 |
| Satisfied | 20 | 20 |
| Neutral | 10 | 10 |
| Dissatisfied | 20 | 20 |
| Highly Dissatisfied | 0 | 0 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.14**

**THE USE OF DIGITAL DASHBOARDS FOR TRACKING SHIPMENTS ENHANCED YOUR OPERATIONAL DECISION-MAKING**

**INTERPRETATION**

TABLE NO.4.14 shows that 50% of the respondents highly satisfied with the use of digital dashboards for tracking shipments enhanced your operational decision-making .20% satisfied, 10% neutral and 20% dissatisfied

**TABLE NO.4.15**

**IS CYBER SECURITY A CRITICAL CONCERN WHEN IMPLEMENTING NEW IT SOLUTIONS IN CARGO MOVEMENT**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **No. of Respondents** | **Percentage** |
| Yes | 42 | 42 |
| No | 58 | 58 |
| **TOTAL** | **100** | **100** |

**Source: Primary data**

**CHART NO. 4.15**

**IS CYBER SECURITY A CRITICAL CONCERN WHEN IMPLEMENTING NEW IT SOLUTIONS IN CARGO MOVEMENT**

**INTERPRETATION**

Majority of the respondents 58% have no cyber security a critical concern when implementing new it solutions in cargo movement and 42% agrees to it that cyber security is a critical concern when implementing new it solutions in cargo movement

**TABLE NO.4.16**

**BELIEVE THAT THE WIDESPREAD USE OF WEARABLES IN LOGISTICS HAS IMPROVED WORKER SAFETY**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Strongly Agree | 55 | 55 |
| Agree | 25 | 25 |
| Neutral | 20 | 20 |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.16**

**BELIEVE THAT THE WIDESPREAD USE OF WEARABLES IN LOGISTICS HAS IMPROVED WORKER SAFETY**

**INTERPRETATION**

Majority 55% of the respondents strongly agree that the widespread use of wearable in logistics has improved worker safety ,25% agree, and 20% have neutral opinion.

**TABLE NO. 5.17**

**THE IMPLEMENTATION OF ADVANCED ANALYTICS LED TO BETTER RISK MANAGEMENT IN CARGO MOVEMENT**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Yes | 75 | 75 |
| No | 25 | 25 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.17**

**THE IMPLEMENTATION OF ADVANCED ANALYTICS LED TO BETTER RISK MANAGEMENT IN CARGO MOVEMENT**

**INTERPRETATION**

TABLE NO.4.17 shows that 75% of the respondents agree that the implementation of advanced analytics led to better risk management in cargo movement and 25% does not agree .

**TABLE NO. 5.18**

**SATISFIED WITH THE USE OF DRONES FOR QUICK AND EFFECTIVE INVENTORY CHECKS WITHIN LARGE WAREHOUSES**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Highly Satisfied | 35 | 35 |
| Satisfied | 40 | 40 |
| Neutral | 25 | 25 |
| Dissatisfied | 0 | 0 |
| Highly Dissatisfied | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.18**

**SATISFIED WITH THE USE OF DRONES FOR QUICK AND EFFECTIVE INVENTORY CHECKS WITHIN LARGE WAREHOUSES**

**INTERPRETATION**

TABLE NO.4.18 shows that 35% of the respondents are highly satisfied with the use of drones for quick and effective inventory checks within large warehouses,40% satisfied and 25% neutral

**TABLE NO. 5.19**

**AGREE THAT MACHINE LEARNING ALGORITHMS HAVE EFFECTIVELY PREDICTED CARGO DELIVERY TIMES**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Strongly Agree | 75 | 75 |
| Agree | 10 | 10 |
| Neutral | 15 | 15 |
| Disagree | 0 | 0 |
| Strongly Disagree | **0** | **0** |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.19**

**AGREE THAT MACHINE LEARNING ALGORITHMS HAVE EFFECTIVELY PREDICTED CARGO DELIVERY TIMES**

**INTERPRETATION**

TABLE NO.4.19 shows that 75% of the respondents strongly agree that machine learning algorithms have effectively predicted cargo delivery times and15% neutral and 10% agree

**TABLE NO. 5.20**

**DIGITAL TRANSFORMATION IN CARGO MOVEMENT LEADING TO A SIGNIFICANT REDUCTION IN ENVIRONMENTAL IMPACT**

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

Source: Primary Data

**CHART NO. 4.20**

**DIGITAL TRANSFORMATION IN CARGO MOVEMENT LEADING TO A SIGNIFICANT REDUCTION IN ENVIRONMENTAL IMPACT**

**INTERPRETATION**

TABLE NO.4.20 shows that 65% of the respondents agree that the digital transformation in cargo movement leading to a significant reduction in environmental impact and 35% of the respondents does not agree

**TABLE NO. 5.21**

**RECOMMEND THE ADOPTION OF BLOCK CHAIN TECHNOLOGY FOR ENHANCING TRANSPARENCY IN CARGO LOGISTICS**

|  |  |  |
| --- | --- | --- |
| **Category** | **No. of respondents** | **Percentage** |
| Strongly Agree | 35 | 35 |
| Agree | 20 | 20 |
| Neutral | 30 | 30 |
| Disagree | 15 | 15 |
| Strongly Disagree | 0 | 0 |
| **Total** | **100** | **100** |

Source: Primary Data

**CHART NO. 4.21**

**RECOMMEND THE ADOPTION OF BLOCK CHAIN TECHNOLOGY FOR ENHANCING TRANSPARENCY IN CARGO LOGISTICS**

**INTERPRETATION**

TABLE NO.4.21 shows that 35% of the respondents Strongly agree that they recommend the adoption of block chain technology for enhancing transparency in cargo logistics. 30% neutral, 20% agree and 15% disagree

**CHAPTER -5**

**FINDINGS, SUGGESTIONS AND CONCLUSION**

**5.1 FINDINGS**

**5.2 SUGGESTIONS**

**5.3 CONCLUSION**

**5.1 FINDINGS**

* 70% of the respondents are female
* 58% of the believe that rfid technology has significantly improved the tracking of akbar express cargo
* 45% of the respondents are highly satisfied with the efficiency improvements from using gps in akbar cargo tracking
* 35% of the respondents strongly agree that implementation of cloud computing made accessing shipment data more flexible
* 50% of the respondents agree that automation in cargo handling reduces human error
* 55% of the respondents agrees that they have transportation management system (tms) essential for optimizing route planning
* 35% of the respondents satisfied with the level of data security provided by your current cargo tracking system
* 45% of the respondents neutral that electronic data interchange (edi) accelerated the documentation process in cargo movement
* 60% of the respondents agrees that tat integrating iot devices within logistics operations offers valuable insights into cargo conditions
* 50% of the respondents highly satisfied with the real-time tracking capabilities in your logistics operation
* 50% agreed that warehouse management systems (wms) significantly increase inventory accuracy ,
* 67% of the respondents agree that use of automated guided vehicles (agvs) in your warehouse improving productivity
* 40% of the respondents agree that artificial intelligence in cargo logistics is a worthwhile investment
* 50% of the respondents highly satisfied with the use of digital dashboards for tracking shipments enhanced your operational decision-making
* 58% have no cyber security a critical concern when implementing new it solutions in cargo movement
* 55% of the respondents strongly agree that the widespread use of wearable in logistics has improved worker safety
* 75% of the respondents agree that the implementation of advanced analytics led to better risk management in cargo movement
* 40% satisfied with the use of drones for quick and effective inventory checks within large warehouses
* 75% of the respondents strongly agree that machine learning algorithms have effectively predicted cargo delivery times
* 65% of the respondents agree that the digital transformation in cargo movement leading to a significant reduction in environmental impact
* 35% of the respondents strongly agree that they recommend the adoption of block chain technology for enhancing transparency in cargo logistics.

**5.2 SUGGESTIONS**

* This enables real-time location tracking which not only helps in managing logistics but also enhances customer trust by providing them with real-time updates about their shipments.
* Utilize digital platforms that match cargo loads with available aircraft capacities, reducing empty load flights and optimizing freight logistics.
* Fully adopt electronic air waybills to streamline documentation, reduce paper waste, and enhance data accuracy and accessibility.
* Implement systems that provide real-time tracking of shipments from origin to destination, giving both the logistics team and customers up-to-the-minute information.
* Deploy IoT sensors for temperature-sensitive or high-value shipments, allowing continuous monitoring of conditions inside cargo holds.
* Invest in automated loading and unloading systems which can decrease turnaround times and reduce physical strain on workers.
* Employ robots for sorting and handling cargo, which can increase processing speed and reduce errors.

**5.3 CONCLUSION**

Air cargo industry stands at a pivotal juncture where integrating advanced technologies and embracing innovative logistical practices can significantly enhance operational efficiency, reduce environmental impact, and improve customer satisfaction. The suggestions provided underscore the importance of adopting a holistic approach to digital transformation, safety enhancements, and sustainability practices.

Air cargo companies like Akbar Express Cargo can position themselves as leaders in the logistics industry, offering efficient, secure, and customer-friendly services that meet the demands of the modern economy. The integration of technology and adoption of best practices in air cargo operations are not merely trends but necessary steps to ensuring future competitiveness and sustainability in the global market.

**REFERENCE/BIBLIOGRAPHY**

**BIBLIOGRAPHY**

**BOOKS:**

1. Coyle, J.J., Langley, C.J., Novack, R.A., & Gibson, B. (2016). Supply Chain Management: A Logistics Perspective (10th ed.). Cengage Learning.
2. Brewer, A.M., Button, K.J., & Hensher, D.A. (2001). Handbook of Logistics and Supply-Chain Management. Emerald Group Publishing.
3. Kumar, V., & Rahman, S. (2019). "Technology Adoption in the Logistics Industry: The Case of Blockchain and IoT." Procedia Manufacturing, 35, 1286-1291.

**WEBSITES**

* <https://www.akbargroup.in/akbarexpresscargo.html>
* https://www.scribd.com/document/132934043/Logistics-Insight-in-Export-and-Import-of-Air-Cargo

**ANNEXURE**

**QUESTIONNAIRE**

**A STUDY ON IMPLEMENTATION OF INFORMATION TECHNOLOGY IN CARGO MOVEMENT WITH AKBAR EXPRESS CARGO, CALICUT AIRPORT**

Name

Age

Gender

1. Do you believe that RFID technology has significantly improved the tracking of Akbar Express cargo?
2. Yes
3. No
4. Are you highly satisfied with the efficiency improvements from using GPS in Akbar cargo tracking?
5. Highly Satisfied
6. Satisfied
7. Neutral
8. Dissatisfied
9. Highly Dissatisfied
10. Has the implementation of cloud computing made accessing shipment data more flexible?
11. Strongly Agree
12. Agree
13. Neutral
14. Disagree
15. Strongly Disagree
16. Do you agree that automation in cargo handling reduces human error?
17. Strongly Agree
18. Agree
19. Neutral
20. Disagree
21. Strongly Disagree
22. Is a Transportation Management System (TMS) essential for optimizing route planning?
23. Yes
24. No
25. Are you satisfied with the level of data security provided by your current cargo tracking system?
26. Highly Satisfied
27. Satisfied
28. Neutral
29. Dissatisfied
30. Highly Dissatisfied
31. Has Electronic Data Interchange (EDI) accelerated the documentation process in cargo movement?
32. Strongly Agree
33. Agree
34. Neutral
35. Disagree
36. Strongly Disagree
37. Do you find that integrating IoT devices within logistics operations offers valuable insights into cargo conditions?
38. Yes
39. No
40. Are you highly satisfied with the real-time tracking capabilities in your logistics operation?
41. Highly Satisfied
42. Satisfied
43. Neutral
44. Dissatisfied
45. Highly Dissatisfied
46. Does using Warehouse Management Systems (WMS) significantly increase inventory accuracy?
47. Strongly Agree
48. Agree
49. Neutral
50. Disagree
51. Strongly Disagree
52. Is the use of automated guided vehicles (AGVs) in your warehouse improving productivity?
53. Yes
54. No
55. Do you feel that artificial intelligence in cargo logistics is a worthwhile investment?
56. Strongly Agree
57. Agree
58. Neutral
59. Disagree
60. Strongly Disagree
61. Has the use of digital dashboards for tracking shipments enhanced your operational decision-making?
62. Highly Satisfied
63. Satisfied
64. Neutral
65. Dissatisfied
66. Highly Dissatisfied
67. Is cyber security a critical concern when implementing new IT solutions in cargo movement?
68. Yes
69. No
70. Do you believe that the widespread use of wearables in logistics has improved worker safety?
71. Strongly Agree
72. Agree
73. Neutral
74. Disagree
75. Strongly Disagree
76. Has the implementation of advanced analytics led to better risk management in cargo movement?
77. Yes
78. No
79. Are you satisfied with the use of drones for quick and effective inventory checks within large warehouses?
80. Highly Satisfied
81. Satisfied
82. Neutral
83. Dissatisfied
84. Highly Dissatisfied
85. Do you agree that machine learning algorithms have effectively predicted cargo delivery times?
86. Strongly Agree
87. Agree
88. Neutral
89. Disagree
90. Strongly Disagree
91. Is the digital transformation in cargo movement leading to a significant reduction in environmental impact?
92. Yes
93. No
94. Would you recommend the adoption of block chain technology for enhancing transparency in cargo logistics?
95. Strongly Agree
96. Agree
97. Neutral
98. Disagree
99. Strongly Disagree