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CHALLENGES FACED IN IMPORT EXPORT IN AIR CARGO

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Abstract: Air cargo is a vital component of international trade and logistics, serving as the fastest mode of transporting goods across countries and continents. It plays a crucial role in facilitating the movement of high-value, perishable, and **time-sensitive** commodities, such as electronics, pharmaceuticals, fashion items, and emergency relief supplies. The growing demand for global connectivity and **just-in-time inventory systems** has further emphasized the importance of efficient air cargo services. However, the industry is confronted with a variety of operational, regulatory, and infrastructural challenges that hinder its full potential. These include rising fuel and operational costs, stringent customs and security regulations, capacity limitations, inadequate airport infrastructure, and delays due to documentation and clearance procedures. Moreover, the sector is under pressure to adapt to technological innovations, ensure compliance with **international trade** norms, and meet the increasing expectations of speed, reliability, and transparency. This study delves into the core challenges faced in the import and export of goods through air cargo, analysing their impact on global trade efficiency and supply chain performance. It also seeks to identify potential strategies and policy interventions that can streamline processes, reduce delays, and enhance the competitiveness of **air freight logistics**. Understanding these challenges is essential for stakeholders—including freight forwarders, customs authorities, exporters, importers, and logistics providers—to develop effective solutions and contribute to the overall growth and sustainability of the air cargo industry.

Keywords: time sensitive, just-in-time, international trade, air freight logistics

I. INTRODUCTION

Air cargo is a vital segment of the global logistics and transportation industry, specializing in the movement of goods by air. It plays a key role in international trade by providing the fastest method of transporting goods across countries and continents. Unlike sea or land transport, air cargo is particularly suited for time-sensitive, high-value, or perishable items such as medical supplies, electronics, fresh food, and luxury goods. The air cargo industry includes a range of stakeholders such as cargo airlines, freight forwarders, airport ground handlers, customs officials, and logistics providers, all collaborating to ensure efficient and secure delivery. Over the years, the growth of globalization, advancements in aviation technology, and the rise of e-commerce have significantly boosted the demand for air cargo services. Despite challenges like high costs, regulatory compliance, and environmental concerns, air cargo remains an indispensable mode of transportation for businesses aiming to meet rapid delivery expectations and sustain global supply chains. Air cargo refers to the transportation of goods and freight by aircraft. It is a crucial component of international trade and logistics, enabling the rapid movement of high-value or time-sensitive goods across long distances. Air cargo services are used for a wide range of products including electronics, pharmaceuticals, perishable goods, and industrial parts. With the growth of global markets and e-commerce, air cargo has become essential in maintaining supply chain efficiency and meeting consumer demand. The sector includes major players such as airlines, freight forwarders, and customs agents, all working together to ensure safe and timely delivery.

II. STATEMENT OF THE PROBLEM

The import-export air cargo sector, while essential to global trade, is burdened by several operational and regulatory challenges that impact its efficiency and growth. One of the primary issues is the high cost associated with air freight, making it less accessible for small and medium-sized enterprises (SMEs). Inconsistent customs regulations, documentation delays, and varying trade policies between countries often result in shipment hold-ups and increased transit times. Moreover, limited cargo space, especially in passenger aircraft, and inadequate infrastructure at some international airports restrict cargo handling capacity. Security concerns, risk of cargo damage, and compliance with international safety standards further complicate air cargo operations.

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These problems collectively hinder the smooth functioning of the global supply chain, causing inefficiencies in the timely and cost-effective movement of goods across borders.

III. REVIEW OF LITERATURE

I Harrison & Hoek (2020) discuss how complex customs procedures and trade restrictions delay shipments and increase costs for exporters and importers.
II IATA (2021) emphasizes the need for harmonized global trade regulations to simplify customs clearance and reduce non-tariff barriers.
III Bachman & Zaun (2019) analyze the role of security measure such as cargo screening and electronic documentation in ensuring with international trade laws.
IV. Bowen & Larrson (2019) highlight that fuel price volatility significantly impacts air freight rate, making cost management a major challenge for airlines and shippers.
V. Rodrigue (2021) points out that airport congestion, lack of modern cargo terminals, and inefficient ground handling operations slow down air freight process.
VI. Gupta & Kumar (2021) analyze how artificial intelligence (AI) and predictive analytics can optimize air cargo scheduling & reduce inefficiencies.

IV. OBJECTIVES

1. To understand the role of air cargo in facilitating international import and export activities.
2. To analyze the operational processes and logistics involved in air cargo transportation.
3. To identify key challenges faced by the import-export air cargo sector, such as costs, regulations, and infrastructure limitations.
4. To evaluate the impact of air cargo on global supply chains and economic development.
5. To suggest improvements and strategies for enhancing the efficiency, reliability, and sustainability of air cargo services in international trade.

V. RESEARCH METHODOLOGY

The research methodology for this study is designed to explore the challenges faced in import export in air cargo. It outlines the systematic approach taken to gather, analyze, and interpret data to answer the research questions.

The study will adopt a **descriptive research design** to systematically describe the types of amendments affecting freight forwarders, the operational and financial challenges they face, their adaptability in response to these amendments, and their strategies to mitigate these issues. The research will also evaluate the impact of amendments on client relationships and contractual obligations. **Probability sampling** is a method of selecting a sample from a population in such a way that **every unit in the population has a known and non-zero chance of being selected**. This technique ensures that the sample is representative of the entire population, which enhances the **accuracy, objectivity, and generalizability** of the study findings.

DATA COLLECTION :
Data collection methods refer to the techniques used to gather information or data for research purposes. These methods are essential in research as they ensure that the data gathered is accurate, reliable, and relevant to the study. Data collection can be categorized into **primary** and **secondary** methods. Primary data collection involves obtaining fresh data directly from the source through tools like surveys, interviews, observations, and experiments. These methods allow researchers to tailor questions or observations to the specific needs of the study and gather original, first hand information. On the other hand, secondary data collection involves gathering existing data from sources like published studies, government reports, databases, and historical records. This type of data provides a broader context and background, helping researchers to build upon existing knowledge. Both primary and secondary data collection methods are crucial in answering research questions, testing hypotheses, or gaining insights into specific problems. Choosing the right method depends on the research objectives, the type of data needed (qualitative or quantitative), and the available resources.

SAMPLING TECHNIQUE :
sampling technique refers to the method used to select a subset of individuals, items, or data points from a larger population for the purpose of conducting research. Since it is often impractical or impossible to collect data from an

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entire population, sampling allows researchers to study a representative portion of that population, making inferences or conclusions that can be generalized to the whole.

DATA ANALYSIS TOOLS:

Data analysis tools are software applications or platforms used to process, analyze, and interpret data to uncover meaningful insights, patterns, and trends. These tools help researchers, analysts, and businesses to make data-driven decisions by organizing and visualizing data, performing statistical analysis, and generating reports.

The right tool depends on several factors:

- **Complexity of Analysis:** For advanced statistical modeling or machine learning, tools like **R**, **Python**, or **SAS** may be required. For basic analysis or smaller datasets, **Excel** or **SPSS** might suffice.
- **Data Size and Type:** Large datasets or real-time data often require more robust tools like **Tableau**, **Power BI**, or **Google Analytics**.
- **User Expertise:** Some tools are more user-friendly (**Excel**, **Tableau**, **Power BI**), while others require advanced programming skills (**R**, **Python**, **MATLAB**).

Together, these statistical tools enhanced the credibility of the study by allowing meaningful comparisons, identifying significant relationships, and supporting evidence-based conclusions regarding the causes and consequences of documentation amendments in international logistics.

VI. SIGNIFICANCE OF STUDY

Air cargo enables the swift and efficient movement of goods across international borders, promoting global trade. It is particularly essential for high-value, time-sensitive, or perishable goods. It contributes significantly to the economy by supporting industries such as manufacturing, retail, pharmaceuticals, and agriculture. It creates job opportunities within the air transportation sector and related industries like logistics and customs.

Air cargo is one of the fastest modes of transportation, crucial for industries that rely on just-in-time inventory and need goods delivered quickly to maintain production schedules or meet consumer demand. Air freight is a key component of the global supply chain, connecting various industries and markets. Its role in timely deliveries ensures the smooth flow of goods and services worldwide. The air cargo sector is often at the forefront of adopting new technologies, such as automation, tracking systems, and advanced cargo handling techniques, improving efficiency, security, and transparency in global logistics.

FINDINGS

The descriptive statistics for the various aspects of air cargo operations reveal moderate levels of satisfaction and significant variability in experiences. On the topic of delays in air cargo shipments, the mean score of 2.360 suggests that delays are experienced fairly frequently, with a moderate spread in responses indicating differing experiences among respondents. The reliability of air freight transit times is generally perceived positively, with a mean of 1.960, and minimal variation in responses (standard deviation of 0.9345), indicating that most respondents view transit times as reliable. However, customs issues are still a concern, with a mean of 2.520, highlighting that such issues are common, but their frequency varies among individuals. In terms of understanding international compliance requirements, the mean of 2.120 suggests a moderate level of confidence, although the variation in responses shows differing levels of familiarity with the regulations.

When it comes to documentation errors, respondents attributed responsibility with a mean of 2.400, indicating shared blame for such issues, but again with some differing opinions on accountability. Transparency in air cargo charges was moderately rated, with a mean of 2.600, pointing to an acceptable level of clarity, though opinions on this matter varied. Lastly, respondents indicated moderate satisfaction regarding value for the cost paid, with a mean of 2.360, but the standard deviation of 1.0360 reflects differing views on whether the cost is justified by the value received. Overall, while air cargo is generally viewed as efficient and reliable, there are notable concerns regarding delays, customs, documentation errors, and transparency of charges, with varying levels of confidence and satisfaction among the respondents.

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Descriptive Statistics

TABLE ANNOVA

	N	Minimum	Maximum	Mean	Std. Deviation
How often do you experience delays in air cargo shipments?	25	1.0	4.0	2.360	1.1860
How would you rate the reliability of air freight transit times?	25	1.0	4.0	1.960	.9345
What is the most common customs issue you face?	25	1.0	4.0	2.520	1.1590
Are you confident in your understanding of international compliance requirements?	25	1.0	4.0	2.120	.9713
Who is typically responsible for documentation errors?	25	1.0	4.0	2.400	1.1547
How transparent are the air cargo charges provided to you?	25	1.0	4.0	2.600	1.0801
Do you feel that you're getting value for the cost paid?	25	1.0	4.0	2.360	1.0360
Valid N (listwise)	25				

INTERPRETATION

Reliability of air freight transit times has the **lowest mean (1.96)**, indicating **concerns about consistency or performance**. **Transparency of air cargo charges** has the **highest mean (2.60)**, suggesting relatively **better clarity**, but still below a likely "satisfactory" level. Most variables have **means between 2.1 and 2.6**, showing **mixed to moderately negative experiences** across topics like **delays, customs issues, compliance understanding, and documentation errors**. **Standard deviations (0.93–1.18)** indicate **moderate variability** in opinions—responses were somewhat spread out, suggesting differing experiences among respondents.

What is the main cause of delays in your shipments?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Airline schedule charges	6	24.0	24.0	24.0
	Customs Clearance	8	32.0	32.0	56.0
	Documentation issues	6	24.0	24.0	80.0
	Handling errors	5	20.0	20.0	100.0
	Total	25	100.0	100.0	

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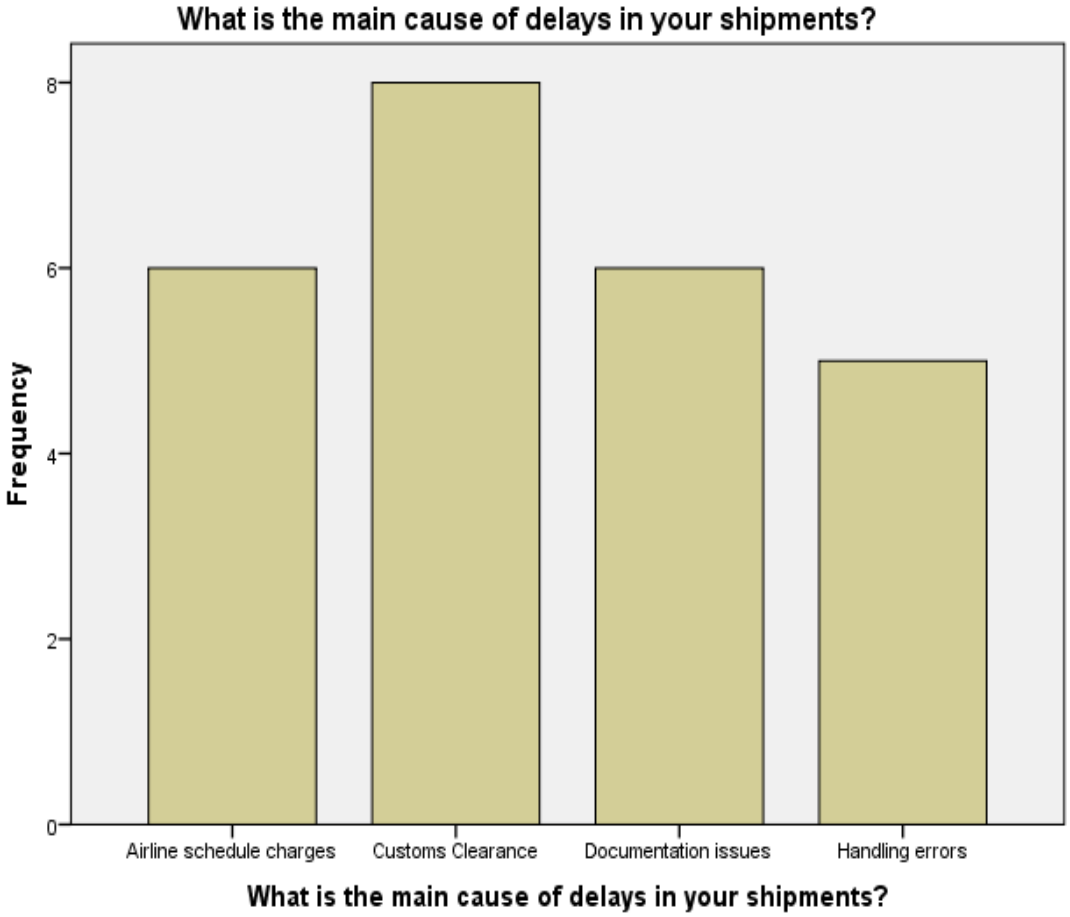

INTERPRETATION

The table shows that customs clearance is the leading cause of delays in air cargo shipments, with 32% of respondents identifying it as the primary issue. Airline schedule charges and documentation issues are also significant, each accounting for 24% of the delays. Handling errors contribute to 20% of the delays, making it the least common cause. Overall, customs clearance emerges as the most frequent problem, followed by airline scheduling and documentation issues, with handling errors being less of a concern.

VII. DISCUSSION

Air cargo plays a critical role in the global import and export industry, offering rapid and efficient transportation of goods across international borders. It is particularly important for high-value, time-sensitive, and perishable items, such as electronics, pharmaceuticals, and fresh produce. The speed of air transport ensures that businesses can meet tight deadlines, maintain just-in-time inventories, and respond quickly to market demands.

For imports, air cargo allows businesses to access products from all over the world in a matter of days, facilitating a smooth flow of goods into domestic markets. This is especially beneficial in industries that require the latest products or parts, where delays could disrupt production or sales cycles.

ANOVA can be used to assess whether there are significant differences in delay times across various shipment categories, such as by airline, region, or type of goods. By comparing satisfaction levels between different customer groups (e.g., importers vs. exporters or large vs. small businesses), ANOVA can identify factors that influence customer perceptions of air cargo services. **ANOVA** can help compare transportation costs for different routes or methods, identifying significant differences in costs between various air cargo service providers or shipping routes. By analyzing multiple factors affecting cargo performance (e.g., delivery times, cost, and handling errors), ANOVA helps optimize service quality and operational efficiency.

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VIII. CONCLUSION

In conclusion, air cargo plays a vital role in the global import and export industry by providing fast, efficient, and secure transportation for high-value, time-sensitive, and perishable goods. While it offers significant advantages in terms of speed and reliability, especially for industries that rely on just-in-time inventory and quick market response, it also comes with challenges such as high costs compared to other modes of transport and potential operational issues like delays, customs clearance problems, and handling errors.

Despite these challenges, air cargo remains an essential part of global trade, supporting economic growth and ensuring the seamless flow of goods across borders. As demand for rapid delivery continues to increase, on-going technological advancements and improvements in logistics are expected to enhance the efficiency and cost-effectiveness of air cargo services, making it an even more integral component of the global supply chain.

Air cargo plays a critical role in facilitating global trade by offering rapid transportation of goods across international borders. However, despite its advantages in speed, the sector faces on going challenges that affect its overall efficiency and customer satisfaction. The analysis reveals that issues such as unreliable transit times, frequent customs delays, documentation errors, and limited understanding of compliance requirements continue to hinder performance.

Moreover, a lack of transparency in pricing and concerns about the value received for costs paid further contribute to user dissatisfaction. To remain competitive and meet the growing demands of global trade, it is essential for air cargo stakeholders—including freight forwarders, customs authorities, and logistics providers—to adopt more streamlined, transparent, and technologically advanced processes. Addressing these challenges through targeted improvements will enhance reliability, build customer trust, and ensure that air cargo remains a preferred mode for time-sensitive international shipments.

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[2]. **MarketWatch – Cargo Giant Expeditors Sees China-to-U.S. Shipping 'Declining Significantly'** A report on the decline in shipping volumes from China to the U.S. due to unresolved tariff negotiations and shifting global trade dynamics.

[3]. **DHL Global Research (2022)** predicts that AI-driven logistics, drones, and autonomous cargo aircraft will revolutionize air freight in the next decade.

[4]. **Lu and Su (2020)** examined how digital tracking systems improve visibility and reduce delays. The rise of e-commerce, explored in IATA (2019) and other industry reports, has also drastically changed cargo demand patterns

[5]. **Hsiao et al (2010) and Zhang et al (2016)** delve into logistics performance and the factors influencing cargo throughput at airports. Efficiency studies often utilize Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) to measure airport performance. These works stress the importance of hub connectivity, cargo handling infrastructure, and ICT adoption

