Exploring Strategies for Revitalizing Air Cargo Sector in The Sultanate of Oman: The Impact of Stakeholder Alignment and Inter-sectoral Collaboration on the Development of Oman's Air Cargo Sector.

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Declaration

I, Sumaiya Al Nabhani, hereby declare that this thesis, titled "Exploring Strategies for Revitalizing the Air Cargo Sector in the Sultanate of Oman: The Impact of Stakeholder Alignment and Inter-sectoral Collaboration in the Development of Oman's Air Cargo Sector" and the work presented herein, is entirely my own original work unless otherwise indicated. I affirm that I have not submitted this work, in part or in whole, for any other degree or qualification.

I acknowledge and attribute all sources used in this thesis, including ideas, data, images, and text. Any contributions from others, including research participants, have been appropriately acknowledged and credited. I declare that the research presented in this thesis adheres to ethical guidelines and institutional standards.

I also acknowledge the guidance, assistance, and support received from my supervisors, Prof. Jillian MacBryde and Dr. Aylin Ates, as well as the faculty and staff of the Hunter Centre for Entrepreneurship, Strathclyde Business School, and the University of Strathclyde. I also extend my gratitude to other individuals, organizations, or institutions that contributed to the completion of this work.

To ensure clarity and coherence in the presentation of the findings, AI tools were used solely for proofreading and language refinement. These tools were employed to correct grammar, improve sentence structure, and enhance readability, without contributing to the generation of ideas or the intellectual content of the thesis.

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Abstract

The air cargo sector is a critical driver of global trade and economic development, particularly for countries like Oman aiming to diversify their economies under frameworks such as Oman Vision 2040. This research investigates methods to revitalize air cargo sector in the Sultanate of Oman through the evaluation of stakeholder alignment and inter-sectoral collaboration. The research combines quantitative cargo volume trend analysis from 2018 to 2023 with survey data from 86 industry professionals and qualitative insights obtained through 15 in-depth interviews. The study incorporates benchmarking data from Amsterdam Schiphol Airport, Dubai Airports and Singapore Airports to provides additional context and comparative insights.

The research identifies critical challenges. The challenges facing the industry include stakeholder misalignment as well as insufficient inter-sectoral collaboration and regulatory inefficiencies and infrastructure gaps especially in cold chain logistics and regional competition. The sector has shown resistance to adopting modern digital technologies which restricts operational efficiency and transparency. The research proposes multiple strategic initiatives to handle existing challenges and maximize current opportunities through the creation of a National Logistics Council, infrastructure investments, digital transformation implementation and regulatory process optimization. The research identifies three essential enablers which include shared governance frameworks together with stakeholder incentives and digital integration to overcome collaboration barriers and boost sectoral efficiency.

The research adds to stakeholder theory through its demonstration of how alignment and collaboration functions in industries involving multiple stakeholders. The research provides actionable recommendations to policymakers and industry leaders about how to use enablers to overcome barriers which will improve Oman's air cargo market competitiveness. Research should investigate how these strategies scale up and what long-term effects digital transformation and governance frameworks have on industries involving multiple stakeholders.

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List of Abbreviations

ABBREVIATION	FULL TERM
AEO	Authorised Economic Operator
AI	Artificial Intelligence
ALPS	Airport Logistics Park of Singapore
BRI	Belt and Road Initiative
CAA	Civil Aviation Authority
CAC	Changi Airfreight Centre
CDM	Collaborative Decision-Making
COVID-19	Coronavirus Disease
CSR	Corporate Social Responsibility
DXB	Dubai International Airport
GCC	Gulf Cooperation Council
GDP [1]	Gross Domestic Product [1] / Good Distribution Practice [2]
ICT	Information and Communication Technology
IOT	Internet of Things
IATA	International Air Transport Association
KPI(S)	Key Performance Indicator(s)
MCT	Muscat International Airport
OIA	Oman Investment Authority
PPP(S)	Public-Private Partnership(s)
R&D	Research and Development
RQ1, RQ2, RQ3	Research Question 1, 2 and 3
SAF	Sustainable Aviation Fuel
SATS	SATS Ltd (formerly Singapore Airport Terminal Services)
SDG(S) / UN SDGS	Sustainable Development Goal(s) / United Nations Sustainable Development Goals
SLA(S)	Service Level Agreement(s)
TEU(S)	Twenty-foot Equivalent Unit(s)
UAE	United Arab Emirates
UAV(S)	Unmanned Aerial Vehicle(s)
UK	United Kingdom
USA	United States of America
VISION 2040	Oman Vision 2040

Chapter 1: Introduction

Chapter 1 sets the foundation for the study by introducing the strategic importance of the global air cargo sector and its relevance to Oman's Vision 2040, a national policy framework aimed at achieving sustainable economic diversification and social development by 2040. It begins by contextualizing air cargo as a critical enabler of international trade, responsible for transporting high-value, time-sensitive goods. The chapter highlights the sector's vital role in supporting global health logistics, e-commerce expansion, and trade resilience, particularly during crises such as the COVID-19 pandemic.

The introduction also frames the research problem, emphasizing that Oman, despite its strategic geographic location and infrastructure investments, lags regional competitors in cargo throughput and stakeholder coordination. The sector faces operational inefficiencies, regulatory barriers, and underutilization due to fragmented collaboration among key actors.

Drawing from stakeholder theory, the chapter establishes the theoretical lens through which the research is conducted. The theory underscores the importance of aligning diverse stakeholder interests to enhance operational efficiency and long-term sustainability. The chapter explains how the application of this theory can offer insights into governance, collaboration, and strategic alignment challenges within Oman's air cargo ecosystem.

The significance of the study is also outlined in terms of its contributions to theory, policy, and practice. It proposes a stakeholder-focused approach to improve efficiency, competitiveness, and alignment with Oman Vision 2040's economic diversification goals.

Finally, Chapter 1 concludes by presenting the thesis objectives and research questions. These guide the study's investigation into challenges, stakeholder alignment, inter-sectoral collaboration, and strategies for improving Oman's position in the global air cargo sector. The chapter also previews the structure of the thesis, providing a roadmap for the chapters that follow.

Strategic Importance of the Global Air Cargo Sector

As a practitioner in the aviation and air cargo sector for around 8 years now, I have observed numerous challenges that hinder the sector's growth and efficiency. One of the critical challenges that I intend to focus on in this research, as a Doctor of Business Administration (DBA) researcher, is the limited collaboration and alignment within the air logistic sector and its interrelated industries. This issue is pivotal because the air cargo sector does not operate in isolation; it is basically linked with various stakeholders whose coordinated efforts are essential for operational success. Drawing from stakeholder theory, this research aims to explore how improved alignment and collaboration among stakeholders can enhance the development and resilience of the air cargo sector. The global air cargo sector plays a pivotal role in facilitating international trade, contributing significantly to economic development by enabling the rapid and secure transportation of high-value, time-sensitive goods. Despite accounting for only 1% of global trade by volume, the sector's value share exceeds 35%, reflecting its importance in industries such as pharmaceuticals, electronics, and luxury goods (IATA, 2023). This disproportionate value-to-volume ratio underscores the strategic role of air cargo in supporting sectors where speed, reliability, and security are critical for maintaining competitiveness. For example, the pharmaceutical industry relies heavily on temperature-controlled air freight solutions to ensure the safe transport of vaccines and other medical supplies, demonstrating the sector's essential role in global health logistics (Investment Opportunities in Temperature-Controlled Logistics (TCL), 2023).

Stakeholder theory, which emphasizes the importance of aligning stakeholder interests and fostering collaboration, provides a valuable framework for understanding the dynamics within the global air cargo sector (Freeman, 1984). The sector's efficiency and adaptability depend on the interplay between diverse stakeholders, including governments, private sector operators, and regulators, whose coordinated efforts are essential to addressing operational challenges and achieving strategic goals.

The sector has also been instrumental in driving globalization, with advancements in trade liberalization and the proliferation of free trade agreements expanding international commerce. The rise of e-commerce platforms, such as Amazon and Alibaba, has further revolutionized air

cargo operations by increasing demand for fast and reliable delivery services. In 2022, e-commerce shipments accounted for approximately 22% of all global air cargo volumes, driven by consumer expectations for rapid delivery and technological advancements in logistics optimization (Boeing, 2023). The growing reliance on air cargo for e-commerce reflects its ability to meet the speed and efficiency demands of businesses and consumers alike, further solidifying its integral role in modern global trade (Florido-Benítez, 2023).

Technological innovation has further enhanced the strategic importance of the air cargo sector. Innovations such as blockchain-enabled supply chain visibility, automated sorting systems, and real-time tracking have transformed operations, offering greater transparency, efficiency, and responsiveness (Gavalas et al., 2022). These technologies allow stakeholders to monitor cargo movement, optimize routing, and minimize delays, ultimately enhancing customer satisfaction. However, the uneven adoption of these technologies globally highlights the need for sustained investments and collaboration among stakeholders to close gaps in technological capabilities.

The air cargo sector also serves as a critical enabler of resilience in global trade, helping mitigate supply chain disruptions caused by natural disasters, pandemics, or geopolitical tensions. For example, the COVID-19 pandemic underscored the sector's adaptability, as airlines swiftly repurposed passenger aircraft for cargo operations to meet the unprecedented demand for medical supplies and e-commerce goods (Sun et al., 2022). This capacity for resilience ensures the continuity of critical trade flows even during times of crisis.

Despite its benefits, the air cargo sector must contend with significant challenges, including high operating costs, environmental pressures, and infrastructure constraints. Sustainability concerns, in particular, have drawn increasing attention from policymakers and consumers, with initiatives such as sustainable aviation fuels (SAF) and carbon offset programs gaining momentum (Amicarelli et al., 2021). Addressing these challenges requires innovative solutions and stronger alignment between stakeholders to ensure the sector remains a vital component of global trade and economic growth (Bartle et al., 2021; Serfontein & Govender, 2021).

Challenges Facing the Global Air Cargo Sector

The global air cargo sector faces numerous challenges that threaten its operational efficiency, sustainability, and ability to meet growing market demands. Among these, geopolitical instability significantly disrupts established trade routes, increases operational risks, and raises costs. For example, the Russia-Ukraine conflict in 2022 forced air cargo operators to reroute shipments, resulting in longer transit times and higher fuel expenses for shipments between Europe and Asia (Caldara et al., 2022). Such geopolitical tensions underscore the need for diversified routes, resilient supply chain strategies, and improved risk management frameworks to navigate uncertainty effectively.

Environmental concerns also present substantial challenges for the sector. With increasing regulatory pressure to reduce greenhouse gas emissions, airlines and logistics providers must adopt sustainable practices such as energy-efficient technologies, sustainable aviation fuels (SAF), and carbon offset programs. These measures, while essential for mitigating climate change, require significant financial investments and collaborative innovation across the industry. For instance, the development and deployment of SAF have progressed, but widespread adoption is limited by production costs and scalability challenges (Amicarelli et al., 2021). Stakeholder alignment is critical to advancing these initiatives effectively and ensuring industry-wide compliance with evolving sustainability standards.

The COVID-19 pandemic further exposed the vulnerabilities and adaptability of the air cargo sector. While passenger aviation experienced a sharp decline, the demand for air freight surged due to the need for transporting medical supplies, e-commerce goods, and other essential items. Airlines adapted by repurposing passenger aircraft for cargo-only operations, demonstrating the sector's capacity for crisis response (Sun et al., 2022). However, the pandemic also revealed inefficiencies in stakeholder coordination and a lack of contingency planning, emphasizing the importance of fostering greater collaboration to ensure long-term sustainability. The pandemic accelerated the adoption of digital tools such as electronic airway bills (e-AWB), which streamlined operations and reduced physical contact, highlighting the role of technology in building resilience (IATA, 2022).

Operational inefficiencies and rising costs remain persistent challenges. High fuel prices, fluctuating labor costs, and infrastructure constraints limit the sector's profitability and scalability.

For instance, underinvestment in cold chain logistics and digital technologies in some regions restricts air cargo operators' ability to meet customer demands for transparency, real-time tracking, and efficient handling of perishable goods (Gavalas et al., 2022). Moreover, the fragmented adoption of technologies like blockchain and the Internet of Things (IoT) restricts the potential for end-to-end supply chain visibility, further hindering operational efficiency.

Geopolitical risks, such as trade wars and regional conflicts, also exacerbate challenges by disrupting trade routes and creating uncertainty in market dynamics. These risks necessitate proactive scenario planning and diversification of routes to maintain operational continuity. For instance, regional instability in Asia-Pacific and the Middle East has prompted airlines to explore alternative corridors, increasing operational costs and complexity (Serfontein & Govender, 2021).

Addressing these challenges requires a multifaceted approach that integrates technological innovation, regulatory reform, and stakeholder collaboration. Industry players must invest in advanced logistics technologies, streamline regulatory frameworks, and build partnerships across sectors to enhance operational resilience and sustainability. By fostering a collaborative ecosystem, the air cargo sector can navigate these challenges effectively and continue to play a critical role in global trade and economic growth (Bartle et al., 2021; Baxter & Wild, 2021).

A stakeholder-focused approach is crucial for addressing these challenges effectively. Stakeholder theory highlights how aligning interests and managing relationships among key actors can enhance the sector's capacity to overcome disruptions, adopt sustainable practices, and leverage technological advancements (Mitchell, Agle & Wood, 1997). This research builds on these principles to identify actionable strategies in the context of Oman that foster alignment and resilience within the global air cargo industry.

Oman Vision 2040: A Blueprint for Economic Diversification

Oman Vision 2040 serves as the nation's comprehensive roadmap for achieving sustainable development and economic diversification. The vision aims to transition the country away from its dependence on oil revenues by prioritizing non-oil sectors such as logistics, manufacturing, agriculture, and tourism. Among these, the logistics sector, including air cargo, is highlighted as a cornerstone of economic transformation, providing the infrastructure and connectivity necessary for international trade and export-driven growth (Oman Vision 2040, 2020).

Within this framework, the air cargo sector plays a pivotal role in supporting economic diversification objectives. Oman's strategic geographic location, at the crossroads of major global trade routes, offers a unique opportunity to develop into a regional logistics hub. By capitalizing on this locational advantage, the nation can facilitate the rapid and secure movement of goods, enhance its integration into global supply chains, and attract foreign investment. For example, Muscat International Airport's state-of-the-art cargo terminal has an annual handling capacity of over 350,000 tons, equipped with cold chain logistics and automated sorting systems, enabling efficient processing of diverse cargo types (Oman Airports, 2023). Similarly, Salalah Airport's proximity to the Salalah Free Zone and Port of Salalah provides an opportunity for multimodal logistics capabilities, further strengthening Oman's position as a gateway for regional and international trade.

Key goals outlined in Vision 2040 include the development of advanced infrastructure, improvements in logistics efficiency, and the adoption of digital technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT). These technologies aim to streamline operations, improve supply chain transparency, and enhance overall efficiency (Rejeb, Keogh, & Treiblmaier, 2019). Investments in such innovations are critical for positioning Oman as a competitive player in the global air cargo landscape, enabling the nation to meet the increasing demands of international clients for real-time tracking, operational visibility, and secure transportation.

The implementation of Vision 2040 relies on addressing challenges such as regulatory inefficiencies, workforce development, and infrastructure gaps. For instance, Oman must

streamline customs clearance processes and align its regulatory frameworks with international standards to attract global logistics players. Workforce development initiatives, including training programs in logistics and supply chain management, are also crucial for ensuring that Oman has the skilled human capital necessary to manage advanced technologies and evolving market demands.

Moreover, investments in cold chain logistics, automated cargo systems, and integrated multimodal networks are identified as critical enablers for achieving the vision's targets (Oman Vision 2040, 2020). These advancements not only enhance Oman's air cargo sector but also support the growth of export-oriented industries such as agriculture, fisheries, and manufacturing. By leveraging its strategic location, modern infrastructure, and Vision 2040's comprehensive framework, Oman can transform its logistics sector into a globally competitive driver of economic growth.

Strategic Challenges Impacting Oman's Air Cargo Potential – The industrial problem

Despite Oman's strategic geographic location at the intersection of Asia, Europe, and Africa, its air cargo sector remains underutilized compared to regional peers. While significant investments have been made in infrastructure, such as the cargo terminals at Muscat International Airport and Salalah Airport,Oman's air freight volumes continue to lag those of major Gulf hubs. In 2019, Muscat International Airport handled approximately 235,000 tonnes of cargo, this figure is significantly smaller than Dubai International Airport's 2.5 million tonnes recorded in the same year. (Taderera, Al Balushi and Masengu, 2023).

A key barrier to growth is the absence of cohesive stakeholder alignment across airport authorities, customs, freight forwarders, and regulatory agencies. Research indicates that fragmented strategies and procedural inefficiencies, particularly in customs clearance, have deterred international logistics providers from expanding operations in Oman (World Bank, 2021). This misalignment not only increases transaction costs but also undermines Oman's appeal as a logistics hub.

Moreover, Oman's limited visibility on the global logistics stage has contributed to underperformance (World Bank, 2018). Unlike the UAE and Qatar, which have actively marketed their logistics offerings through global partnerships and promotional campaigns, Oman's branding

and international engagement remain modest (Oxford Business Group, 2023). This impacts its ability to attract foreign direct investment and secure strategic cargo alliances.

Technological adoption also lags leading cargo hubs such as Singapore and Amsterdam, where AI, blockchain, and IoT systems are increasingly standardized. While Oman has explored these technologies, their integration across public and private sector platforms remains inconsistent, limiting operational transparency and responsiveness (Rejeb, Keogh and Treiblmaier, 2019).

Addressing these gaps is essential for Oman to unlock the full potential of its air cargo sector. Enhancing stakeholder coordination through unified governance frameworks and fostering stronger public-private partnerships can reduce inefficiencies and streamline operations. Overcoming these challenges is not only critical for boosting the sector's performance but also for supporting the nation's broader economic diversification goals.

The Role of Stakeholder Collaboration in Achieving Oman Vision 2040

A key pillar of Vision 2040 is the emphasis on stakeholder collaboration to address the challenges facing Oman's air cargo sector. The vision acknowledges that coordinated efforts among government entities, private sector players, and industry associations are essential for realizing its ambitious objectives. Effective collaboration can streamline processes, resolve regulatory bottlenecks, and foster innovation, creating a cohesive and efficient logistics ecosystem (Ziadah, 2017). For example, alignment between customs authorities, airport operators, and freight forwarders can significantly reduce transit times, improve cargo tracking, and enhance customer satisfaction.

Stakeholder theory serves as a foundational lens for analyzing collaborative dynamics in Oman's air cargo sector. Its focus on identifying, engaging, and aligning the interests of diverse stakeholders offers critical insights into resolving inefficiencies and driving innovation (Freeman, 1984). By applying the theory, this research highlights how collaboration among stakeholders can support the strategic objectives outlined in Oman Vision 2040. This research builds upon existing stakeholder theory by applying it to a complex, multi-sectoral industry, highlighting the dynamics of collaboration in a regional logistics hub context.

Stakeholder collaboration is particularly critical for optimizing supply chain integration, ensuring seamless operations across various stages of logistics. Lessons from global hubs such as Singapore and Dubai highlight the importance of collaborative frameworks in creating efficient and resilient logistics networks. In Dubai, public-private partnerships (PPPs) have been instrumental in fostering innovation and streamlining logistics operations, demonstrating how coordinated efforts can enhance competitiveness (Al-Wahaibi, 2019). Similarly, Oman can leverage PPPs to share resources, align stakeholder interests, and adopt advanced technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT) to modernize its air cargo sector (Rejeb, Keogh, & Treiblmaier, 2019).

Moreover, collaboration is essential for workforce development and aligning regulatory frameworks with international standards. By fostering cross-sector alliances and knowledge-sharing initiatives, Oman can build a skilled workforce capable of managing advanced logistics technologies and addressing the dynamic needs of international markets. Training programs and certifications tailored to supply chain management, cargo handling, and digital logistics tools can empower employees and ensure long-term sectoral growth. Additionally, aligning regulatory policies with global best practices can attract international investors and logistics providers, further strengthening Oman's position in the global air cargo ecosystem (Mukhini, Balasa, & Maqbalia, 2021).

The importance of stakeholder collaboration extends to sustainability and innovation. Coordinated efforts can drive the adoption of sustainable practices, such as the use of sustainable aviation fuel (SAF) and energy-efficient infrastructure. Stakeholder alignment is also critical for ensuring that sustainability initiatives are cost-effective and widely adopted. Collaborative platforms, such as those used in global hubs, can facilitate research and development (R&D) and support Oman's transition toward greener logistics solutions (DHL, 2023).

Through effective stakeholder collaboration, the air cargo sector can act as a transformative enabler of Vision 2040. Aligning stakeholder interests, leveraging shared resources, and fostering innovation will allow Oman to overcome existing challenges, unlock new growth opportunities, and strengthen its position as a leading logistics hub in the region.

By applying stakeholder theory to the practical challenges of Oman's air cargo sector, this research contributes to the academic understanding of stakeholder alignment in multi-sectoral contexts rather than focusing on single industries. It underscores the importance of integrated frameworks that prioritize shared goals, resource optimization, and sustainable practices, bridging the gap between theoretical insights and practical applications.

1.2 Thesis Statement

This research aims to comprehensively evaluate and enhance the development of Oman's air cargo sector by identifying key challenges and opportunities, assessing the impact of stakeholder alignment and inter-sectoral collaboration, and proposing actionable strategies informed by global best practices. The study seeks to provide a detailed and multi-faceted analysis of the sector's current state, incorporating quantitative data, qualitative insights, and benchmarking with leading global air cargo hubs. By addressing critical issues and leveraging Oman's unique geographic and strategic advantages, this research aims to create a roadmap for improving efficiency, fostering collaboration, and increasing competitiveness in Oman's Air Cargo Sector. Ultimately, the findings aim to position Oman's air cargo sector for sustained growth and long-term success in the dynamic global logistics and trade landscape.

1.3 Problem Statement and Research Gap

The practical problem facing Oman's air cargo sector is that, despite substantial infrastructure investments and its prime geographic location at the crossroads of Asia, Europe, and Africa, performance remains constrained by fragmented governance, weak inter-agency coordination, limited cold-chain capacity, and underdeveloped digital systems. These gaps hinder Oman's ability to capture regional transhipment flows and support national diversification priorities. Without addressing these issues, Oman risks falling behind better coordinated hubs such as Dubai, Singapore, and the Netherlands, undermining the sector's contribution to Vision 2040.

The theoretical gap arises because, although stakeholder theory is widely recognised in management research (Freeman, 1984; Donaldson & Preston, 1995), its application to logistics ecosystems, where aviation, customs, exporters, and regulators interact, remains underexplored. Existing studies often focus on single industries or dyadic relationships, overlooking how governance structures and alignment mechanisms operate in multi-sectoral contexts, particularly in small-market or emerging economies.

This thesis therefore responds to both layers: (1) by addressing Oman's practical need for more effective governance and alignment in cargo logistics; and (2) by extending stakeholder theory to a new empirical domain, operationalising engagement, governance, and alignment within a national logistics ecosystem.

1.4 Objectives and Research Questions of the Study

This DBA study is guided by three primary objectives, each supported by specific research questions designed to facilitate a comprehensive analysis:

Objective 1: Identify and analyze the key factors affecting the performance of Oman's air cargo sector.

The primary aim of this objective is to gain a deeper understanding of the operational dynamics of Oman's air cargo sector and identify the barriers impeding its growth. This includes examining critical factors such as current governance and collaborative efforts, infrastructure capabilities, regulatory frameworks, market dynamics, and technological gaps.

- **Research Questions**:

- What are the main challenges currently facing Oman's air cargo sector?
- What opportunities exist for improving the sector's performance?

Those questions seek to uncover both internal and external factors that influence the sector's performance. Internally, this may involve exploring challenges related to stakeholder alignment and inter-sectoral collaborations, limited infrastructure capacity, workforce development, and the adoption of advanced technologies. Externally, factors such as global market trends, competitive pressures, and regulatory barriers will be analyzed alongside opportunities for sectoral expansion, particularly in emerging markets.

Objective 2: Evaluate the impact of stakeholder alignment and inter-sectoral collaboration on Oman's air cargo sector.

The successful development of Oman's air cargo sector is dependent on effective coordination and alignment among stakeholders, including government agencies, private sector operators, logistics providers, and international partners. Intersectoral collaboration between logistics, transportation, and trade sectors also plays a pivotal role in ensuring seamless operations and fostering growth.

- **Research Question**:
  - How do stakeholder alignment and intersectoral collaboration influence the efficiency and growth of the air cargo sector in Oman?

This question aims to evaluate the current state of stakeholder alignment and identify gaps that hinder effective collaboration. By exploring successful case studies and industry examples, the research will assess how improved coordination and synergies across related sectors can enhance operational efficiency, reduce bottlenecks, and stimulate sectoral growth.

Objective 3: Propose actionable strategies for enhancing the sector's competitiveness.

In an increasingly interconnected and competitive global economy, Oman's air cargo sector must adopt innovative practices and strategies to maintain and improve its competitiveness. Benchmarking against leading global hubs offers valuable insights into successful operational

models, technological integration, and customer-focused service strategies that can be adapted to Oman's context.

- **Research Question**: What are the best practices from global air cargo hubs that can be implemented in Oman?

This question focuses on identifying and analyzing strategies employed by global air cargo hubs such as Singapore's Changi Airport, the Netherlands' Schiphol Airport, and the UAE's Dubai International Airport. These strategies include investments in advanced cargo handling technologies, streamlined regulatory processes, specialized free zones, and integrated multimodal logistics systems. The research will examine how such practices can be tailored to Oman's unique geographical, economic, and institutional environment.

The objectives and research questions outlined above provide a clear roadmap for this study, facilitating a systematic exploration of Oman's air cargo sector. By identifying the challenges and opportunities within the industry, assessing the role of collaboration and innovation, and benchmarking global best practices, the study aims to deliver actionable strategies to revitalize and enhance Oman's air cargo sector. This, in turn, will contribute to the broader goals of economic diversification and sustainable growth as outlined in Oman Vision 2040.

These objectives and research questions (figure 1) are designed to provide a holistic understanding of the sector's current state while identifying practical solutions to drive its future growth and success.

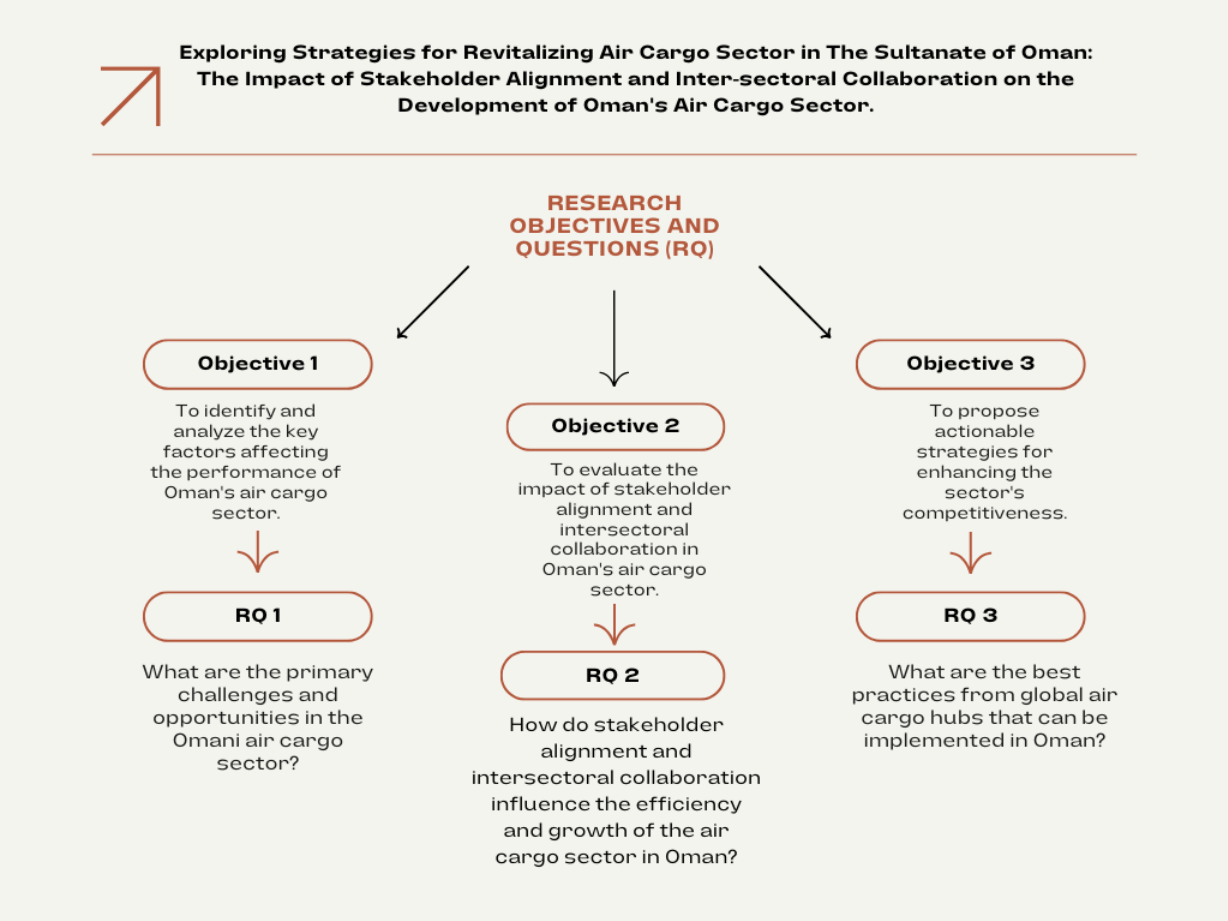


Figure 1: Research Objectives and Questions for Revitalizing the Air Cargo Sector in Oman

1.5 Significance of the Study

This study is significant for several reasons, particularly in its potential to address critical gaps in the performance and competitiveness of Oman's air cargo sector. As a vital component of the country's logistics and transportation ecosystem, the sector has a direct impact on Oman's ability to achieve its economic diversification goals. By identifying the key factors affecting its performance and proposing actionable strategies, the study provides a foundation for evidence-based decision-making and policy formulation.

Moreover, this research highlights the importance of stakeholder alignment and inter-sectoral collaboration in overcoming existing challenges and unlocking the sector's full potential.

Improved coordination among government bodies, private sector entities, and logistics providers is essential for fostering innovation, efficiency, and growth. This collaborative approach aligns with global trends, where successful air cargo hubs leverage partnerships and integrated logistics solutions to maintain their competitiveness.

Additionally, the study benchmarks global best practices and tailors them to Oman's unique context. By drawing insights from leading air cargo hubs, such as those in Dubai, Singapore, and Netherlands, the research offers practical recommendations that can be readily implemented. These strategies are designed to enhance the sector's operational efficiency, infrastructure capabilities, and market positioning, thereby elevating Oman's status in the regional and global air cargo landscape.

This study also contributes to the theoretical development of stakeholder theory by exploring its application within the context of the air cargo sector. It extends the theory by demonstrating how stakeholder alignment and inter-sectoral collaboration are not merely operational necessities but are foundational to strategic competitiveness and sector resilience. By linking stakeholder theory to real-world challenges in Oman's air cargo sector, this research illustrates the dynamic interplay between theory and practice. It provides new insights into how stakeholder interests can be harmonized to foster innovation and efficiency, thus offering a nuanced understanding of the role of stakeholder theory in addressing complex, multi-sectoral challenges. This theoretical contribution adds depth to the existing literature on stakeholder management, logistics, and supply chain dynamics, making it relevant for both academic inquiry and practical application.

Finally, the findings of this study have broader implications for Oman's economic development. A thriving air cargo sector can stimulate trade, attract foreign investment, and create employment opportunities, contributing to the country's long-term economic growth. By addressing both the challenges and opportunities within the sector, this research supports Oman's broader vision of becoming a diversified and sustainable economy under Oman Vision 2040.

1.6 Structure of the Thesis

The thesis is structured as follows:

1. **Introduction:** This opening chapter lays the groundwork for the entire thesis, outlining the research's background, setting forth the study's objectives, and underscoring its

significance. It introduces the reader to the vital role of the air cargo sector within Oman's economic framework and the global supply chain, highlighting the challenges that currently hinder its growth and the potential benefits of its revitalization.

2. **Literature Review:** The literature review chapter examines existing scholarly work on global air cargo trends, identifying both opportunities and obstacles within the sector. It addresses operational and strategic challenges across various countries, focusing on infrastructure, regulatory frameworks, technology adoption, and the role of integrated logistics zones. A dedicated section presents the theoretical foundation of the study, with a focus on Stakeholder Theory. This theory is explored in detail and synthesized with insights from the empirical literature to develop the study's conceptual framework, which guides the subsequent methodological and analytical approach. The review also benchmarks practices from leading air cargo hubs to contextualize Oman's position and inform the strategic recommendations.

3. Methodology**:** This section describes the mixed-methods approach utilized for data collection and analysis, combining both quantitative and qualitative research methods to ensure a comprehensive understanding of the sector. The methodology chapter will detail the use of quantitative data analysis, including cargo volumes and trade flow statistics, the survey alongside qualitative methods such as stakeholder interviews and examples of successful air cargo revitalization efforts in similar economies. This approach allows for a multifaceted exploration of the sector's challenges and opportunities.

4. **Findings and Results:** This chapter presents the core research findings, systematically analyzing the data collected to address the study's objectives. It examines Oman's air cargo sector, focusing on descriptive statistics of cargo volumes, import-export dynamics, and seasonal variations. The chapter also incorporates benchmarking insights from leading global air cargo hubs, highlighting best practices and strategies applicable to Oman. Quantitative findings from stakeholder surveys provide a snapshot of challenges, opportunities, and priorities, while qualitative insights from interviews delve deeper into sector-specific issues and collaborative dynamics. The integration of these findings offers a comprehensive view of the sector's current state and potential growth pathways.

5. **Discussion:** The discussion chapter interprets the findings presented in the results chapter, critically evaluating their implications in the context of the study's objectives and research questions. It connects the findings to the broader literature, drawing comparisons with global best practices and highlighting their relevance to Oman's air cargo sector. This chapter explores how the identified challenges, opportunities, and stakeholder dynamics align with or diverge from established theories and industry trends. It also addresses the strategic implications of the findings, offering a nuanced analysis of potential pathways for sectoral growth, policy reforms, and enhanced stakeholder collaboration. The discussion serves as a foundation for the recommendations presented in the final chapter.

6. **Conclusion and Recommendations:** This final chapter synthesizes the key findings from the study, providing a concise summary of the challenges and opportunities facing Oman's air cargo sector. It draws directly from the results to outline actionable recommendations addressing stakeholder misalignment, weak inter-sectoral collaboration, limited market diversification, regulatory inefficiencies, and infrastructure constraints. The proposed strategies aim to enhance stakeholder coordination, promote cross-sector integration, invest in advanced technologies, and leverage Oman's strategic location to increase competitiveness in global trade.The chapter also includes a clear articulation of the research limitations, discussing constraints related to data availability, methodological scope, and generalisability. It closes with a reflection on broader policy implications for Oman's logistics ecosystem and outlines key areas for future research to extend the study's contribution.

7. **References:** The final section of the thesis provides a comprehensive list of all scholarly sources and literature cited throughout the research. This includes academic journals, industry reports, case studies, and theoretical works that have contributed to the thesis's foundation, ensuring that the research is grounded in established knowledge and current insights into the air cargo sector.

To effectively address the strategic, operational, and institutional challenges outlined in this introduction, it is essential to ground the research within established academic and industry knowledge. The following chapter presents a comprehensive review of the relevant literature, examining global air cargo trends, stakeholder engagement frameworks, inter-sectoral collaboration models, and the application of stakeholder theory in complex logistics environments.

This review not only contextualizes Oman's current air cargo dynamics within a broader global framework but also identifies critical gaps, best practices, and theoretical foundations that inform the study's conceptual model and methodological direction.

Chapter 2: Literature Review

Revitalizing the air cargo sector in the Sultanate of Oman is both a strategic priority and a pressing necessity amid shifting global trade dynamics and regional competition. This literature review explores the strategies needed to enhance the sector's performance by examining international trends, benchmarking leading cargo hubs such as Singapore, the Netherlands, and the UAE, and identifying context-specific opportunities and challenges. Despite national efforts to position Oman as a logistics gateway in the Middle East, the sector continues to face structural obstacles. These include limited stakeholder alignment and weak inter-sectoral collaboration, gaps in the adoption of advanced technologies like blockchain and predictive analytics, an underdeveloped and fragmented service portfolio, shortages in skilled labor, and insufficient integration of sustainability practices. The review offers a comprehensive synthesis of current knowledge and aims to inform a roadmap for transforming Oman's air cargo industry into a competitive, resilient, and future-ready sector.

To understand the strategic and operational challenges facing the air cargo sector, this literature review examines relevant studies and reports. The review includes literature published from 2010 to 2024, selected through keyword searches in academic databases such as "air cargo," "logistics," "Oman," " aviation", "strategic challenges," "stakeholder alignment", "stakeholder theory" and "operational challenges." Databases like SUPrimo, PubMed, MedPlus, Google Scholar, SpringerLink, Emeraldinsight, and Wiley were used to screen the source documents. This approach ensures a comprehensive understanding of the current issues and trends affecting the sector.

This chapter aims to address the gap in the literature regarding the specific strategic and operational challenges faced by Oman's air cargo sector and how these can be mitigated through innovative strategies and technologies. By identifying and analyzing these gaps, the research will contribute to the fields of operations management, air cargo strategies, and innovation in the sector.

Specifically, this review will draw from these academic areas to develop a conceptual framework that will guide the empirical research.

The chapter first outlines the broader context of the air cargo industry, discussing global trends, challenges, and opportunities. It then introduces stakeholder theory as the primary theoretical frameworks guiding this research. This theory provides insight into the role of stakeholder alignment, resource utilization, and regulatory mechanisms in shaping sectoral efficiency and competitiveness. The literature review further examines studies on air cargo infrastructure, logistics integration, and technology adoption, highlighting their impact on operational performance.

A key contribution of this chapter is the development of a conceptual framework that synthesizes findings from the literature into a structured model. This framework illustrates the interconnected relationships between stakeholder engagement, inter-sectoral collaboration, regulatory efficiency, digital transformation, and sectoral competitiveness. By contextualizing these constructs within Oman's economic and policy landscape, the framework provides a structured approach for the study, guiding the research methodology and analytical focus.

The insights derived from this literature review underscore the critical areas where improvements are needed in Oman's air cargo sector. The discussion identifies regulatory inefficiencies, limited stakeholder coordination, and slow adoption of digital technologies as key barriers to competitiveness. However, by leveraging global best practices and aligning sectoral strategies with Oman Vision 2040, the literature suggests that Oman can position itself as a leading logistics hub in the region.

1. Context of this Study

1.1 Global Trends in Air Cargo

The global air cargo industry has undergone substantial transformations in recent years, shaped by evolving trade dynamics, technological advancements, regulatory changes, and shifting consumer behaviors. While air cargo accounts for only a small fraction of global trade volume, it remains economically significant due to its role in transporting high-value, time-sensitive goods such as pharmaceuticals, electronics, and perishables (IATA, 2023). The industry has benefited from the

continued expansion of e-commerce, digital logistics innovations, and the growing integration of global supply chains, factors that have collectively driven increased demand for efficient and reliable air freight services (Serfontein & Govender, 2021).

The COVID-19 pandemic further underscored the sector's resilience and adaptability. While passenger aviation faced unprecedented declines, air cargo demand surged due to the urgent need for transporting medical supplies, vaccines, and e-commerce shipments (Sun et al., 2022). Airlines repurposed passenger aircraft for cargo-only operations, demonstrating the industry's ability to pivot in response to crises. Moreover, the pandemic accelerated the adoption of digital tools such as electronic airway bills (e-AWB) and automated customs clearance systems, streamlining air cargo operations while reducing reliance on manual processes (IATA, 2022). As a result, digitalization has become a fundamental driver of efficiency and cost-effectiveness in modern air cargo operations.

E-commerce growth has also had a profound impact on the air cargo industry, significantly increasing demand for express shipping services and last-mile logistics solutions (Florido-Benítez, 2023). According to the International Air Transport Association (IATA), global e-commerce shipments accounted for approximately 22% of total air cargo volumes in 2022, a trend expected to rise with the continued expansion of digital trade platforms and cross-border retailing (IATA, 2023). With rising consumer expectations for rapid and trackable deliveries, logistics providers are enhancing their capabilities through automation, AI-driven logistics, and real-time cargo tracking technologies (Gavalas et al., 2022). Blockchain-based solutions have also improved supply chain transparency, allowing for more secure and efficient cargo tracking.

Sustainability concerns have become an increasingly important factor in shaping the industry. Regulatory pressures and shifting consumer preferences are pushing air cargo operators toward greener aviation practices, including the adoption of sustainable aviation fuel (SAF), carbon offset programs, and fuel-efficient aircraft designs (Amicarelli et al., 2021). Major logistics players such as DHL, FedEx, and UPS have committed to reducing their carbon footprints by investing in electrified ground transportation, biofuels, and AI-optimized flight routes to minimize fuel consumption (IATA, 2023). The push for environmental responsibility has also led to increased investment in lightweight materials for cargo containers, energy-efficient cargo hubs, and carbon credit initiatives to balance emissions from freight transport.

Geopolitical instability has also been a defining characteristic of the modern air cargo industry. Trade wars, regional conflicts, and supply chain disruptions have forced air cargo providers to reassess their routing strategies and operational risk mitigation approaches (Caldara et al., 2022). For example, the Russia-Ukraine conflict in 2022 led to widespread rerouting of cargo flights, increasing transit times and fuel costs. Similarly, the U.S.-China trade tensions have led to shifts in global supply chains, with logistics firms seeking alternative trade routes and strategic partnerships to reduce exposure to political uncertainties. These factors underscore the need for a resilient and adaptable air cargo industry capable of navigating an increasingly complex global landscape.

Another notable trend is the advancement of autonomous air cargo technologies. Emerging innovations such as unmanned aerial vehicles (UAVs) and autonomous cargo drones are being explored as cost-effective solutions for last-mile deliveries in remote regions (Min, 2023). Companies like Amazon Prime Air and UPS Flight Forward have already piloted drone-based cargo deliveries, demonstrating their potential for enhancing delivery efficiency and reducing operational costs. Furthermore, advancements in artificial intelligence (AI) and predictive analytics are enabling air cargo operators to forecast demand fluctuations, optimize cargo loads, and enhance route planning efficiency (Zamani et al., 2023). By leveraging AI-driven logistics platforms, companies can mitigate the impact of supply chain disruptions and enhance real-time decision-making.

Another emerging area of focus is multimodal transport integration, which seeks to combine air cargo with other logistics modes, such as sea and rail, to create more cost-effective and flexible transportation networks. This approach has been particularly effective in hubs like Dubai, Singapore, and Hong Kong, where integrated logistics corridors enable seamless movement of cargo between ports, rail terminals, and air freight centers (Chen et al., 2017). The increased use of sea-air cargo hubs has proven to be an efficient solution for shippers balancing cost and speed considerations. As global trade dynamics continue to evolve, such multimodal approaches are expected to gain more prominence, offering greater resilience against supply chain shocks.

Looking ahead, the future of air cargo will be shaped by continued technological advancements, regulatory shifts, and market diversification. As the industry seeks to enhance efficiency, sustainability, and reliability, stakeholders will need to adopt data-driven solutions, invest in green

logistics, and explore new trade corridors. For Oman, these global trends offer valuable lessons for modernizing its air cargo sector, fostering stakeholder collaboration, and aligning industry strategies with Oman Vision 2040's objectives of economic diversification and enhanced global connectivity.

1.2 Challenges and Opportunities in Air Cargo

Despite its strategic importance in global trade, the air cargo sector faces persistent challenges that hinder operational efficiency and profitability. One of the foremost challenges is regulatory complexity, with customs clearance procedures and international trade regulations creating bottlenecks that slow down cargo movement and increase costs (Bombelli et al., 2020). Differing national regulations, security screening requirements, and non-harmonized trade agreements further complicate international air cargo operations. These regulatory inconsistencies can lead to delays, increased compliance costs, and operational inefficiencies, particularly in regions where customs digitalization remains limited (Pereira et al., 2021). Implementing single-window clearance systems, like those successfully adopted in Singapore and the European Union, can improve regulatory efficiency and streamline international trade flows.

Infrastructure limitations also present a significant challenge to air cargo efficiency. Congestion at major cargo hubs, inadequate cold chain logistics, and insufficient airport handling capacity constrain growth, particularly in emerging markets (Taderera et al., 2023). The increasing reliance on perishable goods transport, including pharmaceuticals and fresh produce, highlights the need for specialized temperature-controlled facilities and advanced cargo-handling infrastructure (Wang et al., 2023). Unlike leading air cargo hubs such as Dubai and Hong Kong, many airports in developing regions lack dedicated cargo terminals and seamless multimodal integration, leading to inefficiencies in cargo transfer and processing (Smith et al., 2020).

Competition from alternative transport modes is another critical factor affecting air cargo. Maritime and rail freight provide cost-effective solutions for bulk transportation, reducing the reliance on air cargo for non-time-sensitive shipments (Smith et al., 2020). The rapid expansion of intercontinental rail freight networks, such as China's Belt and Road Initiative (BRI), has offered shippers cost-effective alternatives that challenge air cargo's dominance in some trade lanes (Zhao & Zhou, 2021). While air cargo remains the fastest transport mode, its high operational costs

necessitate greater efficiency, service specialization, and digital transformation to maintain competitiveness.

However, despite these challenges, several opportunities exist for improving efficiency and market positioning within the air cargo sector. The expansion of global air cargo networks and the formation of strategic alliances between airlines, logistics providers, and freight forwarders offer a pathway to improved connectivity and market access (Rejeb et al., 2021). The adoption of cargo alliances, such as those developed under SkyTeam Cargo and WOW Cargo Alliance, enables airlines to optimize fleet utilization, share resources, and extend market reach.

Digital transformation is a major enabler of competitiveness in the air cargo industry. The adoption of electronic airway bills (e-AWB), AI-driven predictive analytics, blockchain-based logistics platforms, and IoT-enabled cargo tracking facilitates operational optimization, cost reduction, and improved transparency across the supply chain (IATA, 2022). AI-based demand forecasting tools help airlines and freight forwarders anticipate volume fluctuations, reducing empty flight legs and improving load efficiency (Gavalas et al., 2022). Blockchain-enabled smart contracts streamline payment settlements and regulatory compliance, reducing administrative burdens and enhancing trust among stakeholders (Wang et al., 2023).

The growing demand for specialized cargo services, particularly in pharmaceutical logistics, temperature-controlled shipments, and high-value goods transportation, presents a significant growth opportunity for air cargo carriers. Pharmaceutical supply chains, in particular, require stringent temperature monitoring and Good Distribution Practice (GDP)-compliant handling (Oman Airports, 2023). Cargo operators that invest in advanced cold chain logistics and real-time monitoring solutions will be better positioned to capture this growing market segment.

Multimodal logistics integration is another key area of opportunity. Seamless integration between air, sea, and land transport modes can improve supply chain resilience, reduce costs, and enhance service reliability. Hubs such as Singapore and Dubai have successfully developed multimodal logistics corridors, allowing cargo to transition efficiently between air and sea freight (Chen et al., 2017). Oman, with its strategic location and growing investment in free zones, has the potential to develop a regional logistics gateway by enhancing air cargo connectivity with its major seaports, including Salalah and Duqm.

The adoption of sustainability initiatives also presents an opportunity for air cargo operators to align with global environmental goals while improving cost efficiency. Airlines are increasingly investing in fuel-efficient aircraft, carbon offset programs, and sustainable aviation fuel (SAF) adoption to reduce their environmental impact (Amicarelli et al., 2021). The International Air Transport Association (IATA) has set a target for net-zero carbon emissions by 2050, pushing airlines to integrate green logistics strategies into their operations (IATA, 2023). Cargo operators that embrace eco-friendly supply chain solutions will gain a competitive advantage as sustainability compliance becomes a prerequisite for international trade partnerships.

1.3 The Omani Air Cargo Sector: Strengths and Weaknesses

Oman is strategically positioned at the crossroads of Europe, Asia, and Africa, making it a potential regional logistics hub. Recognizing the sector's importance for economic diversification, the Omani government has invested significantly in modernizing air cargo infrastructure as part of Oman Vision 2040 (Oman Vision 2040, 2020). Key infrastructure developments include the expansion of Muscat International Airport's cargo terminal, which has an annual handling capacity of over 350,000 tons, and Salalah Airport, which plays a vital role in facilitating regional air freight operations (Oman Airports, 2023). In addition, the Port of Salalah, Duqm Port, and Sohar Port complement air cargo operations by serving as multimodal logistics gateways that link maritime trade with aviation cargo (Taderera et al., 2023).

Oman's competitive advantages in the air cargo sector are driven by several factors. Firstly, its geographic location allows it to function as a logistics hub connecting key markets in Europe, Asia, and Africa. Secondly, robust investments in logistics infrastructure, including the establishment of free zones such as the Salalah Free Zone and Sohar Free Zone, have enhanced the country's capacity to handle cargo efficiently and attract global trade partners. Thirdly, the government's policy support for trade facilitation and private sector investment has enabled regulatory reforms that improve logistics competitiveness (Oman Vision 2040, 2020).

Despite these strengths, several challenges persist that limit Oman's competitiveness in the air cargo sector. A key issue is **stakeholder misalignment**, where fragmented coordination between regulatory bodies, logistics providers, and airport authorities leads to inefficiencies in cargo processing and supply chain integration (Govindan & Jha, 2024). Unlike major air cargo hubs such

as Amsterdam Schiphol Airport, which operates under a collaborative decision-making (CDM) framework that aligns stakeholders, Oman still faces challenges in establishing a unified logistics governance structure (Herath & Herath, 2023).

Digital transformation in air cargo remains underdeveloped in Oman, limiting operational efficiency and transparency. Leading air cargo hubs such as Singapore and Amsterdam have implemented AI-driven cargo tracking, automated customs clearance systems, and blockchain-based supply chain solutions to improve cargo throughput and reduce delays (Herath & Herath, 2023). Oman, however, has yet to fully adopt these advanced digital solutions, which hampers its ability to streamline cargo processing and improve real-time visibility of shipments.

Another significant challenge is **regulatory inefficiency**, with lengthy customs procedures and inconsistent tariff structures creating delays and increasing the cost of doing business in Oman's air cargo sector (Pereira et al., 2021). The lack of harmonization between customs authorities and trade facilitation agencies results in operational bottlenecks that reduce Oman's attractiveness as a regional logistics hub. In contrast, regulatory frameworks in Dubai and Hong Kong emphasize automated customs clearance and free trade agreements, which expedite cargo processing and enhance overall logistics efficiency.

Oman's trade imbalance is another structural issue affecting its air cargo sector. The country's **import volumes exceed export volumes**, leading to inefficiencies in cargo load balancing and revenue generation (Taderera et al., 2023). This imbalance highlights the need for a more diversified and export-oriented air cargo strategy, particularly in high-value industries such as pharmaceuticals, perishables, and e-commerce logistics. Countries like the Netherlands and Singapore have successfully leveraged niche air cargo markets to drive exports, providing Oman with a model for sectoral diversification and value-added logistics services (Rejeb et al., 2021).

Furthermore, **Oman's cold chain logistics sector remains underdeveloped**, limiting the country's ability to support pharmaceutical and perishable goods transportation (Oman Airports, 2023). While major hubs like Frankfurt and Doha have invested heavily in GDP-compliant temperature-controlled storage to handle vaccine and fresh food shipments, Oman currently lacks the infrastructure necessary to support large-scale pharmaceutical logistics operations (Wang et al., 2023). Addressing this gap requires strategic investments in cold chain logistics, as well as

partnerships with global pharmaceutical and agricultural exporters to stimulate demand for temperature-sensitive air freight services.

Opportunities for Oman's Air Cargo Sector

The literature highlights several opportunities for enhancing Oman's air cargo sector and positioning the country as a regional logistics hub. A critical opportunity lies in **digital transformation**, as studies have shown that implementing AI-powered cargo tracking, blockchain-based supply chain solutions, and automated customs clearance systems improves efficiency and reduces administrative burdens (IATA, 2023). Research on air cargo hubs such as Singapore and Amsterdam have demonstrated that digitalization enhances real-time cargo visibility, streamlines customs processes, and minimizes delays, making air freight operations more competitive (Rejeb et al., 2021; Herath & Herath, 2023).

The expansion of free zones and multimodal connectivity is another widely recognized strategy for improving air cargo efficiency. Studies on Dubai Logistics City and Qatar's Free Zones indicate that integrating air, sea, and land transport within free zones fosters seamless logistics corridors, attracts foreign investment, and enhances trade efficiency (Taderera et al., 2023; Oman Airports, 2023). Comparative research suggests that Oman's Salalah, Sohar, and Duqm free zones can leverage similar models to increase connectivity and facilitate efficient transshipment cargo handling (Florido-Benítez, 2023).

The development of specialized cargo segments is also a key area of focus in air cargo literature. Research on air freight market trends underscores the increasing demand for cold chain logistics in pharmaceuticals, high-value perishables, and express cargo services, making temperature-controlled logistics a priority for many air cargo hubs (Govindan & Jha, 2024). The success of Frankfurt and Doha's pharmaceutical cargo handling facilities has demonstrated the importance of GDP-compliant cold storage and multimodal integration, positioning these hubs as preferred logistics centers for medical and perishable goods (Wang et al., 2023; Pereira et al., 2021). Literature suggests that Oman's air cargo sector can expand into these specialized markets by investing in advanced cold chain logistics infrastructure and attracting pharmaceutical and agricultural exporters.

Another critical aspect discussed in existing studies is **regulatory reforms and trade facilitation** as a means to improve air cargo efficiency. Research has emphasized the need for streamlined customs clearance procedures, harmonized tariff structures, and the adoption of Single Window Systems, which have proven effective in reducing supply chain bottlenecks and enhancing trade efficiency (Oman Vision 2040, 2020; Herath & Herath, 2023). The implementation of automated customs clearance systems in Dubai and Singapore provides a strong model for how regulatory improvements can support air cargo growth (Pereira et al., 2021).

Finally, literature on **stakeholder collaboration initiatives** highlights their role in enhancing air cargo operations. Studies on Amsterdam Schiphol's Collaborative Decision-Making (CDM) framework emphasize that integrated stakeholder engagement models improve communication, align objectives, and create efficient logistics strategies (Rejeb et al., 2021). Research suggests that establishing a National Logistics Council in Oman, bringing together government agencies, private sector logistics providers, and trade stakeholders, could foster an integrated approach that aligns with Oman Vision 2040's objectives for economic diversification and sustainable growth (Govindan & Jha, 2024).

By synthesizing these insights from the literature, Oman's air cargo sector can identify strategic areas for development. Research suggests that digital transformation, multimodal connectivity, specialized cargo investments, regulatory reforms, and stakeholder collaboration are critical factors influencing the success of air cargo hubs worldwide. By applying these insights, Oman can align its strategies with international best practices, enhancing its competitiveness in the global air cargo industry (Taderera et al., 2023).

1.4 Benchmarking Against Leading Air Cargo Hubs

Oman's air cargo sector has been studied in the context of global best practices implemented by leading logistics hubs. Dubai International Airport has integrated its air cargo operations with Jebel Ali Port, establishing a multimodal logistics network that facilitates rapid freight movement and cost efficiency (Ziadah, 2018). This model of connectivity between air and sea transport has been examined in multiple studies, particularly in its role in reducing cargo transit times and optimizing supply chain operations (Rejeb et al., 2021). Dubai's Logistics Corridor Initiative has been

identified as a framework that enhances connectivity between airports, seaports, and free zones, creating a streamlined cargo management system that ensures efficient transshipment.

Singapore Changi Airport has been extensively studied as a leading example of digital transformation in air cargo. Research indicates that blockchain-based logistics platforms, automated cargo handling, and predictive analytics have played a critical role in improving efficiency and transparency within its operations (Rejeb et al., 2021). Singapore's implementation of AI-driven predictive analytics has been shown to reduce cargo processing times, improve real-time tracking, and enhance customs clearance efficiency (Taderera et al., 2023). The Singapore TradeNet System, a fully integrated digital trade and customs processing platform, has been identified in studies as a benchmark model for regulatory efficiency and trade facilitation improvements.

Amsterdam Schiphol Airport has been examined in logistics literature for its role in stakeholder collaboration, particularly through its Collaborative Decision-Making (CDM) framework (Romero-Silva & Mota, 2022). Studies show that Schiphol's Cargo Community System enhances cooperation among logistics stakeholders, promoting real-time data exchange and operational coordination (Govindan & Jha, 2024). Research suggests that integrated data platforms involving customs authorities, freight forwarders, and air cargo carriers have contributed to greater transparency and efficiency in cargo movement. Schiphol's stakeholder-driven model is often cited as an approach that improves cargo throughput and regulatory compliance.

Beyond these hubs, literature also examines other major air cargo operators. Qatar Airways Cargo, for instance, has been studied for its expansion into global freight networks, investment in modern freighter aircraft, and adoption of digital freight management systems (Wang et al., 2023). Similarly, Frankfurt Airport's Air Cargo Community has been referenced in studies on public-private partnerships in logistics infrastructure, demonstrating the role of collaborations between government agencies and private investors in expanding terminal capacity and implementing security-enhancing technologies (Herath & Herath, 2023).

Existing research on multimodal transport connectivity highlights the significance of integrating air cargo with seaports and free zones to improve supply chain efficiency and cargo mobility. Studies suggest that the adoption of automated cargo tracking systems, AI-based demand forecasting, and blockchain-powered customs processing has resulted in measurable gains in

operational efficiency and market competitiveness in leading air cargo hubs (Taderera et al., 2023). Additionally, public-private partnerships in logistics infrastructure development have been shown to foster collaborative frameworks between government entities, logistics firms, and trade regulators, thereby promoting efficient cargo handling and policy alignment (Govindan & Jha, 2024).

Academic literature also highlights the broader implications of benchmarking global air cargo best practices. Comparative studies suggest that Dubai, Singapore, Amsterdam, Qatar, and Frankfurt serve as examples of logistics optimization, stakeholder integration, and regulatory streamlining. Research identifies these factors as influential in improving cargo movement efficiency, regulatory harmonization, and infrastructure modernization in air cargo hubs (Taderera et al., 2023). Oman's geographic location and ongoing infrastructure development have been analyzed within this context, indicating a foundation for potential expansion in air cargo operations. However, studies also note challenges related to regulatory inefficiencies, stakeholder misalignment, and the need for digital integration, which have been identified as areas requiring further investigation and policy alignment.

By analyzing these global models, literature provides insights into the strategic considerations influencing air cargo sector growth. Research continues to explore the role of technological adoption, multimodal connectivity, and regulatory frameworks in shaping the performance of air cargo hubs. These findings contribute to a broader understanding of how benchmarking successful air cargo systems informs the ongoing development of regional and national logistics sectors.

While the literature provides valuable insights into global best practices, regulatory models, and technological advancements adopted by leading air cargo hubs, several critical limitations remain. First, much of the research focuses on individual hub success stories without examining how such practices translate into **multi-sectoral national contexts**, like Oman's. Second, there is a lack of empirical studies applying stakeholder theory to investigate how fragmented governance, institutional misalignment, and inter-agency coordination challenges affect logistics performance, particularly in emerging economies.

These gaps point to the need for a more integrated theoretical and empirical approach that examines how stakeholder alignment and cross-sector collaboration shape sectoral competitiveness. This study addresses that gap by applying stakeholder theory as a guiding lens to

explore how diverse actors, including regulators, cargo operators, logistics firms, and adjacent industries, can collaboratively drive transformation in Oman's air cargo sector.

The next section presents the theoretical background, focusing on stakeholder theory and its relevance to the research questions and conceptual framework guiding this study.

2. Stakeholder Theory

2.1 Overview of Stakeholder Theory

Stakeholder theory, initially introduced by Freeman (1984), provides a foundational framework for understanding how organizations interact with various stakeholders to achieve sustainable growth, operational efficiency, and long-term strategic advantage. The theory challenges the traditional shareholder-centric view (Jensen, 2002) by asserting that businesses must consider the interests of multiple stakeholders, including regulatory bodies, industry players, employees, customers, and the wider community. The core premise is that organizations that effectively engage their stakeholders can create shared value, improve decision-making, and enhance business resilience.

Since its introduction, stakeholder theory has evolved through various extensions and refinements. Donaldson and Preston (1995) categorized stakeholder theory into descriptive, instrumental, and normative perspectives. The descriptive approach explains how firms manage stakeholder relationships in practice, the instrumental perspective argues that stakeholder management leads to improved firm performance, while the normative view posits that firms have an ethical obligation to consider stakeholder interests. Freeman, Phillips, and Sisodia (2020) further expanded on these dimensions, integrating the corporate social responsibility (CSR) and sustainability aspects of stakeholder theory, emphasizing its growing relevance in global business environments.

Stakeholder theory is particularly relevant in complex, multi-actor industries such as air cargo, where coordination among multiple entities, including government agencies, logistics providers, airlines, freight forwarders, and trade associations, is essential for operational success (Govindan & Jha, 2024). Effective stakeholder engagement in the air cargo sector has been linked to increased

efficiency, reduced delays, improved regulatory compliance, and enhanced service reliability (Pereira et al., 2021). The dynamic nature of global air cargo operations necessitates a collaborative governance model, where key stakeholders participate in decision-making to streamline processes and optimize cargo movement.

One of the most widely used analytical tools within stakeholder theory is the **power-interest matrix**, introduced by Mitchell, Agle, and Wood (1997). This framework categorizes stakeholders based on their level of influence and urgency, enabling organizations to prioritize engagement strategies accordingly. For example, regulatory authorities and major logistics firms are often classified as high-power, high-interest stakeholders, requiring continuous collaboration and engagement. In contrast, local trade associations and community groups may hold lower power but remain important in ensuring social acceptance and compliance with sustainability practices (Rejeb et al., 2021).

Further developments in stakeholder theory emphasize the role of stakeholder salience, which determines the degree to which a firm's management prioritizes stakeholder interests. Jones, Harrison, and Felps (2018) argued that firms that proactively balance stakeholder interests can achieve superior financial and operational performance, particularly in highly regulated industries such as aviation and logistics. Their findings suggest that organizations that adopt inclusive decision-making processes, stakeholder mapping techniques, and dynamic governance structures are better equipped to navigate industry challenges and achieve long-term sustainability.

Recent literature also explores the integration of stakeholder theory with digital transformation. Studies highlight that technological advancements, such as AI-driven stakeholder management systems and blockchain-enabled transparency frameworks, have facilitated more effective stakeholder collaboration in logistics and supply chain management (Herath & Herath, 2023). Digital tools now allow for real-time communication, enhanced data sharing, and automated compliance monitoring, strengthening multi-stakeholder ecosystems in air cargo operations.

As stakeholder theory continues to evolve, its applicability to logistics and aviation industries remains critical. Research emphasizes that the successful implementation of stakeholder-driven governance models, regulatory harmonization, and technology-en

abled stakeholder coordination plays a pivotal role in optimizing air cargo sector efficiency and competitiveness (Taderera et al., 2023). By examining how global air cargo hubs integrate stakeholder engagement practices, further insights can be gained into best practices for enhancing collaboration and regulatory compliance in Oman's air cargo sector.

Critical Review of Stakeholder Theory Applications in Logistics and Governance

Stakeholder theory has been progressively applied to logistics and transport governance to explain coordination, accountability, and value creation within multi-actor networks. Its operationalization across logistics contexts has generated three main streams of application. First, *network-governance approaches* conceptualise logistics systems as inter-organizational networks governed through participant-based, lead-organization, or network-administrative-organization (NAO) structures (Wang, 2023). These models assume the existence of stable institutions, shared objectives, and high relational trust. While effective in mature logistics hubs such as the Netherlands and Singapore, these assumptions may not hold in developing ecosystems characterised by fragmented mandates and evolving governance capacity.

Second, research on *collaborative decision-making (CDM)* within airport and port operations focuses on information sharing and coordination efficiency. Empirical studies at Amsterdam Schiphol show that data-driven collaboration among customs, airlines, and freight forwarders improves punctuality and throughput (Zúñiga et al., 2024). Yet, CDM success depends on robust digital infrastructure and regulatory coherence, conditions that remain partial in emerging economies.

Third, *stakeholder-driven sustainability and port-strategy models* extend the theory toward social and environmental dimensions. Studies such as Alamoush et al. (2024) and Satta et al. (2025) demonstrate how stakeholder engagement enhances ports' energy transition and green innovation. However, these contributions are predominantly situated in high-governance contexts, overlooking implementation challenges where institutional frameworks and enforcement mechanisms are weaker.

Scholars have recently acknowledged that transferring these frameworks to emerging markets demands accounting for *institutional voids* and *logistics-maturity differentials* (World Bank LPI, 2023). Where regulatory oversight is fragmented, collaboration costs increase and data-sharing

incentives decline (Gao et al., 2017). Consequently, classical stakeholder models may over-predict the effectiveness of coordination mechanisms unless they are adapted to local governance realities.

To address these contextual limitations, recent work proposes integrating digital transformation as a mediating or enabling mechanism that supports stakeholder collaboration in constrained environments (Rejeb et al., 2021; Le Pira, 2024). Digital platforms can partially substitute for institutional deficiencies by standardising information exchange and enforcing transparency, but their efficacy still depends on regulatory efficiency and trust. Therefore, the convergence of stakeholder alignment, governance capacity, and digital enablement represents a frontier in stakeholder-theory research within logistics.

Theoretical Gap

Although stakeholder theory has been extensively employed to analyse collaborative governance in logistics networks, its application to *national air-cargo systems in emerging economies* remains limited. Existing models prioritise network efficiency and sustainability in mature hubs but rarely integrate (i) stakeholder alignment and inter-sectoral collaboration as interdependent governance mechanisms; (ii) regulatory efficiency as a contextual determinant of collaboration success; and (iii) digital transformation as a mediating enabler of competitiveness. No comprehensive framework currently links these dimensions within the institutional realities of Gulf or middle-income economies. This study fills that theoretical gap by extending stakeholder theory to the Omani context, characterised by transitional logistics maturity and evolving regulatory structures, to explain how governance alignment, collaboration, and digital enablement jointly influence air-cargo sector performance and alignment with Oman Vision 2040 (Alamoush et al., 2024; World Bank LPI, 2023).

2.2 Application of Stakeholder Theory in Oman's Air Cargo Sector

Oman's air cargo sector involves a diverse range of stakeholders, including regulatory authorities such as the Civil Aviation Authority, cargo operators, logistics providers, and airport management companies. Additionally, secondary stakeholders, such as agricultural exporters, technology service providers, trade associations, and financial institutions, contribute indirectly to the sector's development. The interconnected nature of these stakeholders necessitates a strategic approach to engagement and collaboration to optimize efficiency and competitiveness.

Studies on Oman's air cargo sector highlight significant misalignment among key stakeholders, which leads to inefficiencies and underutilized resources. Research by Govindan and Jha (2024) emphasizes that fragmented decision-making among regulatory bodies, logistics operators, and private firms results in duplicated efforts, delays in policy implementation, and gaps in inter-agency coordination. The absence of a centralized governance mechanism for stakeholder collaboration in Oman's air cargo sector has been identified as a key barrier to operational efficiency.

Comparisons with leading global hubs such as Amsterdam Schiphol, Singapore Changi, and Dubai International Airport demonstrate the effectiveness of structured stakeholder collaboration in enhancing sectoral efficiency. Amsterdam's Collaborative Decision-Making (CDM) framework, for example, integrates airlines, airport authorities, freight forwarders, and customs officials into a centralized governance model, facilitating real-time communication and reducing operational inefficiencies (Herath & Herath, 2023). Schiphol's model emphasizes data sharing, collective decision-making, and performance-driven coordination, which has led to optimized cargo throughput, improved regulatory compliance, and enhanced service reliability.

Similarly, Dubai International Airport's integration with Jebel Ali Port has been recognized as a successful case of multimodal stakeholder collaboration, where seamless coordination between port and airport authorities, logistics operators, and government agencies has streamlined cargo transfer processes (Rejeb et al., 2021). Studies indicate that such integration reduces bottlenecks, accelerates customs processing, and enhances Oman's ability to compete in global logistics markets (Taderera et al., 2023). However, Oman currently lacks a comprehensive multimodal logistics framework, which limits the efficiency of cargo movement between its major airports and ports.

Another major challenge in Oman's stakeholder ecosystem is regulatory misalignment. Oman's air cargo industry operates under a multi-agency regulatory framework, where different entities oversee aviation policy, customs procedures, and trade regulations. The absence of a unified regulatory framework has resulted in overlapping mandates, delays in policy execution, and inconsistencies in customs regulations (Pereira et al., 2021). In contrast, Singapore's aviation sector operates under an integrated regulatory approach, where government agencies, logistics

firms, and technology providers work within a shared compliance framework, enabling streamlined trade processes and efficient air cargo movement (Wang et al., 2023).

Furthermore, the digitalization gap in Oman's air cargo sector has been identified as a barrier to effective stakeholder collaboration. While global air cargo hubs have embraced AI-driven logistics platforms, blockchain-based supply chain management, and automated customs clearance, Oman is still in the early stages of digital adoption (Herath & Herath, 2023). Research suggests that technology-driven stakeholder engagement models, such as those implemented in Singapore and Hong Kong, have resulted in greater transparency, enhanced cargo tracking, and improved regulatory efficiency (Govindan & Jha, 2024). Oman's lagging adoption of digital solutions contributes to information silos, delays in cargo clearance, and increased transaction costs, further complicating stakeholder collaboration.

Given these challenges, existing literature suggests that adopting structured stakeholder engagement models, similar to those in Amsterdam, Singapore, and Dubai, could improve coordination within Oman's air cargo industry. Research highlights the potential benefits of establishing a national governance framework, a single-window regulatory platform, and an integrated digital stakeholder management system to bridge gaps in communication, streamline decision-making, and optimize cargo handling operations (Taderera et al., 2023). Examining best practices from global logistics hubs can provide insights into how Oman's air cargo sector can overcome its fragmented stakeholder landscape and regulatory inefficiencies while leveraging its geographic advantages and ongoing infrastructure investments to enhance competitiveness.

2.3 Challenges in Stakeholder Alignment

Stakeholder misalignment poses a persistent barrier to efficiency and integration in Oman's air cargo sector. While infrastructural and regulatory challenges have been addressed earlier, this section focuses on the fragmented coordination among actors such as customs, airport authorities, and logistics providers. Pereira et al. (2021) identify Oman's dispersed regulatory responsibilities and lack of unified governance as key contributors to delays and duplicated processes. Without structured platforms for cross-sector dialogue, alignment of priorities remains limited.

Comparative studies underscore the effectiveness of collaborative governance. Schiphol's Cargo Community System and Dubai's Integrated Logistics Corridor demonstrate how shared data

platforms and coordinated planning between public and private stakeholders streamline operations and enhance responsiveness (Govindan & Jha, 2024). In contrast, Oman's partial digitisation and reliance on manual procedures hinder real-time coordination and amplify information silos (Herath & Herath, 2023).

Cold chain logistics and multimodal integration remain underdeveloped, particularly in Suhar and Duqm, partly due to the absence of a cohesive stakeholder vision. Global hubs like Frankfurt and Doha have linked investment strategies with clear institutional collaboration, enabling them to lead in pharmaceutical and perishable cargo handling (Rejeb et al., 2021). Oman's segmented approach prevents similar outcomes.

From a theoretical standpoint, these challenges reflect low stakeholder salience and the absence of collaborative mechanisms that stakeholder theory identifies as critical for shared value creation (Mitchell, Agle & Wood, 1997). Addressing misalignment thus requires formalized engagement structures to ensure coherence in strategic direction, execution, and investment planning.

Although the literature outlines stakeholder coordination mechanisms in leading hubs, it rarely explores how such frameworks can be adapted to emerging economies with fragmented institutional landscapes. Oman's case is under-researched, particularly in terms of cross-sectoral governance and stakeholder alignment across aviation, trade, and regulatory actors. This study addresses that gap by offering an empirical analysis grounded in stakeholder theory to uncover institutional misalignments and propose integrated solutions suited to Oman's logistics transformation.

2.4 Best Practices in Stakeholder Collaboration

Successful air cargo hubs implement structured stakeholder engagement frameworks that foster collaboration and efficiency. Lessons from leading global air cargo hubs highlight best practices that Oman can adopt to improve stakeholder alignment and operational effectiveness.

Research by Motyka and Njoya (2020) points to collaborative governance models as essential in improving logistics performance. Frankfurt Airport employs a centralized governance framework that integrates government agencies, logistics firms, and trade associations, facilitating seamless decision-making and stakeholder alignment. Similarly, Singapore's blockchain-enabled digital

freight corridors have significantly enhanced regulatory compliance, improved transparency, and optimized cargo processing (Rejeb et al., 2021). Dubai Logistics City exemplifies the success of integrating private sector expertise with public sector infrastructure investment, fostering innovation and efficiency in cargo management (Ziadah, 2018).

Lægreid and Rykkja (2022) argue that successful inter-sectoral coordination in complex systems, such as air cargo logistics, requires centralized governance structures supported by clearly defined key performance indicators (KPIs). These indicators promote transparency and accountability while aligning diverse actors toward common goals. Their work emphasizes the importance of leadership in facilitating inter-agency collaboration and establishing coherent policy frameworks, a perspective particularly relevant to Oman's fragmented regulatory landscape.

This section has examined stakeholder theory as a foundational framework for improving collaboration and efficiency in Oman's air cargo sector. The findings reveal significant stakeholder misalignment, stemming from regulatory fragmentation, infrastructure constraints, and limited digital integration. Benchmarking global best practices suggests that Oman can enhance sectoral performance by adopting collaborative decision-making models, improving regulatory harmonization, and investing in digital transformation. Implementing a National Logistics Council to oversee stakeholder coordination and governance would be a critical step toward aligning efforts and achieving the objectives outlined in Oman Vision 2040.

To consolidate these strands, it is necessary to examine the implicit assumptions underpinning prevailing stakeholder-governance models and to assess their transferability to Oman's institutional landscape and logistics maturity. The following matrix refines core assumptions found in the network-governance, A-CDM/data-sharing, and sustainability-oriented stakeholder literatures, contrasts them with Oman's context (cross-ministerial mandates, evolving coordination forums, uneven digital capabilities, and transitional Logistic Performance Index profile), and derives implications for this study's conceptualisation of stakeholder alignment, inter-sectoral collaboration, regulatory efficiency, and digital transformation.

Table ... Assumptions in prevailing stakeholder-governance models and their relevance to Oman's air-cargo context

Model / stream	**Core assumptions in the literature**	**Oman fit (evidence / observation)**	**Implications for this study**
Network governance (participant, lead-organisation, NAO)	Dense ties; clear goal consensus; capable meta-governor; high trust and legitimacy (Provan & Kenis, 2008; Wang, 2023).	Cross-ministerial mandates and evolving coordination forums imply partial goal consensus and variable meta-governance capacity.	Hybrid design likely: NAO-style meta-governance for agenda-setting/accountability, with issue-specific working groups for time-bound initiatives.
A-CDM / data-sharing regimes	Mature digital infrastructure; high-quality data; stable SOPs; sustained trust (Madern, 2014; Zúñiga et al., 2024).	Digital capabilities improving but uneven; data standards and incentives to share are not yet uniform.	Treat digital transformation as a mediator/enabler; performance gains are contingent on data governance and process reliability.
Port/airport sustainability stakeholder models	Strong regulatory backstops; experienced authorities; stakeholder forums with enforcement	Vision-driven policymaking supports ambition, but prioritisation/enforcement across agencies remains variable.	Elevate regulatory efficiency as a first-order construct shaping collaboration outcomes.

	"teeth" (Alamoush et al., 2024; Satta et al., 2025).		
Institutional environment	High institutional density lowers transaction costs and coordination risk (Khanna & Palepu, 2010; Gao et al., 2017; World Bank LPI, 2023).	Transitional logistics maturity: strengths in infrastructure co-exist with variability in process reliability and competence.	Collaboration payoffs depend on targeted streamlining and credible meta-governance; avoid "plug-and-play" transfer from mature hubs.

Taken together, the matrix qualifies claims of straightforward transferability from high-maturity hubs: coordination benefits are conditional on governance form, regulatory efficiency, and digital readiness. Accordingly, this review positions digital transformation as a mediating/enabling mechanism (rather than a solution) linking stakeholder alignment and inter-sectoral collaboration to competitiveness outcomes, conditional on regulatory efficiency. This perspective directly informs the study's conceptual framework and motivates the research gaps articulated in the next section.

2.5 Research Gaps and Research Questions

While existing literature offers valuable insights into global air cargo operations, stakeholder collaboration, and technology adoption, several significant gaps remain, particularly in the context of emerging economies like Oman. These gaps are outlined as follows:

- **Lack of integrated stakeholder theory applications in national air cargo systems**: Much of the literature treats air cargo as a technical or operational domain, rather than a multi-actor, governance-driven system. Very few studies apply stakeholder theory to

analyze alignment, engagement, or governance dynamics in the air cargo sector, especially in the Middle East.

- **Limited research on cross-sectoral collaboration in logistics**: Although inter-sectoral collaboration is often referenced as a goal, empirical studies detailing how sectors such as agriculture, tourism, and manufacturing interact with aviation in practice are lacking. The Oman context is particularly under-represented.
- **Insufficient focus on institutional misalignment and governance fragmentation**: While regulatory inefficiencies are discussed in general terms, few studies explore how overlapping institutional mandates and lack of unified governance structures affect competitiveness and logistics performance.
- **Neglect of context-specific, strategic frameworks**: Benchmarking studies highlight best practices from global hubs, but few frameworks are tailored to the realities of smaller, underperforming ecosystems with latent potential, such as Oman's.

These research gaps inform the following study, which applies stakeholder theory to examine Oman's air cargo sector through the lens of stakeholder alignment, inter-sectoral collaboration, and enabling mechanisms. Based on these gaps, the research seeks to answer the following questions:

- **RQ1**: What are the main challenges currently facing Oman's air cargo sector?
- **RQ2**: How do stakeholder alignment and intersectoral collaboration influence the efficiency and growth of the air cargo sector in Oman?
- **RQ3**: What are the best practices from global air cargo hubs that can be implemented in Oman?

The next section introduces the conceptual framework developed to address these research questions.

3. Conceptual Framework Development

3.1 Overview of the Conceptual Framework

The conceptual framework (Figure 2) developed for this study captures the complex relationships between stakeholder engagement, inter-sectoral collaboration, and enabling mechanisms such as governance, regulatory efficiency, and digital transformation. Together, these elements influence the competitiveness of Oman's air cargo sector and its strategic alignment with the goals of Oman Vision 2040.

Clarification of Key Constructs

For analytical clarity, the thesis applies the following definitions consistently across Chapters 3–5:

Stakeholder alignment : the extent to which key actors in the air-cargo ecosystem (regulators, airports, logistics operators, and related sectors) share coherent goals, priorities, and actions aligned with Oman Vision 2040 objectives. Alignment reflects the *outcome* of effective engagement and governance processes (Freeman 1984; Donaldson & Preston 1995).

Inter-sectoral collaboration : the structured cooperation between the air-cargo sector and adjacent sectors such as logistics, fisheries, agriculture, manufacturing, and tourism to achieve shared outcomes through information sharing, resource integration, and joint planning (Bryson et al., 2015; Peters 2018).

Governance : the system of formal roles, rules, and decision-making mechanisms through which diverse public- and private-sector actors coordinate, ensure accountability, and maintain policy coherence (Lægreid & Rykkja 2022; OECD 2021).

These constructs form the analytical building blocks of the conceptual framework and are operationalised empirically in Chapter 4.

The framework is designed to present a clear flow from theoretical foundations through contextual constructs and enabling mechanisms, culminating in sectoral outcomes. It illustrates how engagement and collaboration create the conditions for effective governance and regulatory improvements, while digital transformation serves as a cross-cutting enabler of efficiency and

resilience. The model also demonstrates how these interactions lead to enhanced competitiveness, expressed in terms of higher throughput, deeper integration into global supply chains, and strategic alignment with national development priorities.

The framework is not only descriptive but also analytical and prescriptive. It provides a diagnostic view of existing challenges and opportunities, identifies mechanisms for improvement, and highlights strategies that can be adapted from international best practices. It therefore forms the foundation for the empirical study, shaping the research questions and guiding the methodological approach.

3.2 Research Objectives and Key Constructs

The framework is structured around the study's three primary objectives, each corresponding to a domain of constructs:

1. **To identify and analyse the key factors influencing performance in Oman's air cargo sector.** This objective corresponds to the contextual constructs of stakeholder engagement and inter-sectoral collaboration, which provide the starting point for assessing challenges and opportunities.
2. **To evaluate the impact of stakeholder alignment and collaboration on efficiency and competitiveness.** This objective is reflected in the enabling mechanisms, governance, regulatory efficiency, and digital transformation, that translate stakeholder relationships into systemic improvements.
3. **To propose actionable strategies for enhancing competitiveness by adapting global best practices.** This objective relates to the framework's outcome, sectoral competitiveness, which is measured by operational efficiency, throughput, global integration, and Vision 2040 alignment.

Accordingly, the framework integrates three interconnected domains:

- **Contextual Constructs**: *Stakeholder Engagement* and *Inter-Sectoral Collaboration*. These represent the foundational conditions shaping sectoral performance.

- **Enabling Mechanisms**: *Stakeholder Governance*, *Regulatory Efficiency*, and *Digital Transformation*. These mediate the influence of contextual constructs and translate collaboration into practical change.
- **Outcomes**: *Enhanced Sectoral Competitiveness*, expressed through measurable indicators that demonstrate progress towards national logistics goals.

This structure provides a logical and sequential flow: from contextual realities to enabling capacities, and finally to sectoral outcomes. It ensures that the framework is aligned with the research objectives and directly addresses the study's questions.

3.3 Theoretical Foundations

The framework is grounded in **Stakeholder Theory (Freeman, 1984)**, which emphasises the importance of managing relationships among interdependent actors with diverse interests, power, and influence. This theoretical lens is particularly suited to sectors like air cargo, where outcomes are shaped by the alignment of multiple stakeholders, including regulators, airport operators, logistics providers, exporters, and adjacent industries such as agriculture, fisheries, and tourism.

In this context, Stakeholder Theory serves two purposes:

- **Diagnostic**: identifying misalignments, governance gaps, and conflicting priorities that hinder sectoral efficiency.
- **Prescriptive**: informing the design of governance structures, regulatory frameworks, and collaborative mechanisms that institutionalise alignment and accountability.

Donaldson and Preston (1995) argue that stakeholder alignment is both a moral imperative and a strategic necessity in achieving sustainable outcomes. Mitchell, Agle and Wood (1997) extend this by highlighting stakeholder salience, actors with power, urgency, and legitimacy must be engaged for systemic improvements to succeed.

By applying these perspectives, the framework situates stakeholder engagement and collaboration within Oman's institutional environment, ensuring that theoretical insights are adapted to national

realities. This also aligns with the principles of Vision 2040, which emphasise integration, diversification, and cross-sectoral collaboration as pathways to sustainable competitiveness.

3.4 High-Level Synthesis of Literature into the Conceptual Model

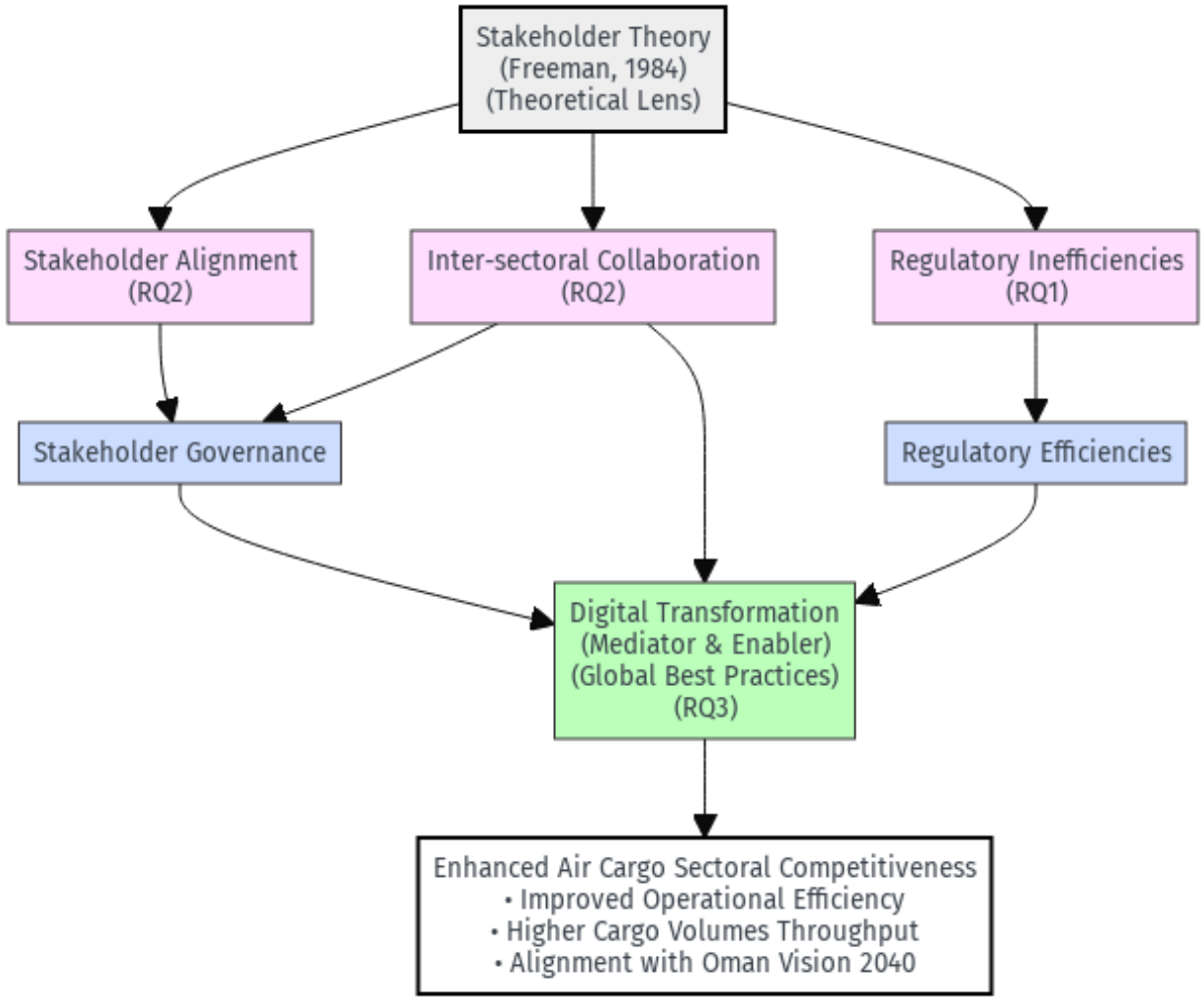
The framework integrates findings from the literature review and benchmarks them against global best practices, which provide valuable lessons for Oman's air cargo sector.

- **Amsterdam Schiphol Airport** exemplifies collaborative governance models where decision-making is shared among airlines, logistics providers, and regulators. This structure fosters trust, enhances regulatory efficiency, and reduces bottlenecks (Rejeb et al., 2021).
- **Singapore Changi Airport** highlights the potential of digital transformation. The use of blockchain and data-driven platforms has enhanced transparency, streamlined customs processes, and improved supply chain resilience (Taderera et al., 2023).
- **Dubai International Airport** demonstrates how centralised governance and strong institutional leadership can align stakeholders, optimise cargo flows, and enable rapid adoption of innovations (Ziadah, 2018).

These examples confirm that sectoral competitiveness is driven not only by infrastructure but also by effective governance, stakeholder alignment, and digital integration. They also illustrate the importance of tailoring best practices to national contexts. While Singapore and Dubai benefit from centralised institutional frameworks, Oman requires adaptive models that balance collaboration with regulatory oversight.

Thus, the framework synthesises global lessons with domestic realities, creating a model that is both theoretically rigorous and practically applicable to Oman's logistics transformation.

3.5 Conceptual Framework Model



The conceptual framework (Figure 2) integrates contextual constructs, enabling mechanisms, and outcomes into a coherent structure informed by Stakeholder Theory.
At the base lies Stakeholder Theory (Freeman, 1984), which serves as the theoretical lens for understanding actor relationships in the air cargo sector. From this foundation emerge three key domains, each linked to the research questions.

- **Contextual Constructs (RQ1):** The framework begins with the recognition of *regulatory efficiency* as a critical factor in overcoming bottlenecks and streamlining processes.

Addressing regulatory challenges provides the foundation for improved alignment and sectoral collaboration.

- **Alignment Mechanisms (RQ2):** Two constructs, *stakeholder alignment* and *inter-sectoral collaboration*, represent the conditions necessary for systemic improvement. These mechanisms reflect the importance of engaging diverse actors, reducing silos, and fostering cooperation across aviation, logistics, and related industries.
- **Enabler (RQ3):** *Digital Transformation* acts as both mediator and enabler, drawing from global best practices. It supports the operationalisation of alignment and collaboration through technologies such as blockchain, IoT, and predictive analytics, increasing transparency, agility, and resilience.

Together, these constructs lead to the **Outcome: Enhanced Air Cargo Sectoral Competitiveness**, expressed through:

- Improved operational efficiency,
- Higher cargo throughput,
- Deeper integration into global supply chains, and
- Strategic alignment with Oman Vision 2040.

By structuring the flow from contextual challenges (RQ1) to mechanisms of alignment (RQ2) and enablers of change (RQ3), the model provides both explanatory clarity and practical guidance.

The model positions governance as the enabling structure, inter-sectoral collaboration as the process mechanism, and stakeholder alignment as the outcome that drives the competitiveness of Oman's air-cargo sector in line with Vision 2040.

Conceptual Framework Description

This conceptual framework provides a structured, theoretically grounded, and empirically informed model for revitalising Oman's air cargo sector. It begins with contextual challenges related to regulatory efficiency, advances through mechanisms of alignment and collaboration, and

incorporates digital transformation as a mediator and enabler of best practices. It culminates in outcomes that define competitiveness in measurable terms, aligned with Oman Vision 2040.

By integrating theory, literature, and benchmarking insights, the framework demonstrates a clear progression from foundations to outcomes. It highlights the interdependence of constructs, strengthens the linkages between collaboration, alignment, and digital transformation, and provides an analytical tool for guiding both research and practice.

Operationalisation of Key Constructs

Construct	Description	How It Is Measured/Observed
Stakeholder alignment	Outcome construct: degree of shared goals, policy coherence, and coordinated action across air-cargo actors.	*Survey:* items on shared vision, goal congruence, and coordination effectiveness. *Interviews:* evidence of convergent priorities, joint KPIs, and cooperative initiatives. *Benchmarking:* degree of alignment mechanisms in hub cases (e.g., Singapore, Dubai).
Inter-sectoral collaboration	Process construct: intensity and quality of coordination between aviation and other national sectors supporting logistics and exports.	*Survey:* frequency and perceived impact of cross-sector projects. *Interviews:* examples of joint programmes or data-sharing arrangements. *Secondary data:* formal agreements or committees linking sectors.
Governance	Structural construct: formal mechanisms, roles, and accountability frameworks guiding coordination.	*Survey:* clarity of mandates, transparency, and regulatory efficiency. *Interviews:* existence of councils, escalation paths, and KPI monitoring. *Benchmarking:* governance architectures at leading hubs.

Building on these insights, the next chapter outlines the research methodology employed to empirically investigate these constructs. It presents the rationale for a mixed-methods approach

and details the data collection and analysis techniques used to explore how Oman can revitalize its air cargo sector in alignment with national strategic goals.

Chapter 3: Methodology

This chapter outlines the methodological foundation that underpins the present research. Given the complexity of Oman's air cargo sector and the multi-dimensional nature of the challenges under investigation, the study adopts a pragmatic, mixed-methods approach that integrates both quantitative and qualitative techniques. This dual methodology is essential to ensure a comprehensive understanding of the sector's performance, stakeholder alignment, inter-sectoral collaboration, and potential strategies for revitalization. The chapter begins by justifying the choice of research design and philosophical orientation, particularly the adoption of pragmatism, which values practical solutions to real-world problems and embraces both objective and subjective sources of knowledge. This philosophical stance is especially appropriate for this research, which aims to provide actionable policy and managerial recommendations grounded in empirical data.

The rationale for using a mixed-methods approach is rooted in the need to capture the nuanced realities of Oman's air cargo operations. Quantitative data, including cargo volumes, import-export ratios, and survey results from industry stakeholders, offer measurable indicators of sectoral performance and reveal patterns over time. Meanwhile, qualitative data gathered through interviews and benchmarking exercises add depth by capturing the lived experiences and expert insights of key actors within the ecosystem. These complementary sources of data allow for triangulation, enhancing the reliability and validity of the research outcomes.

This chapter details the sequential phases of the research process. Phase One addresses the quantitative strand of the study, including descriptive statistical analysis of cargo data and a survey administered to 120 sector professionals, of which 86 responses were received. The sampling strategy, combining purposive and random techniques, ensured broad representation across strategic and operational roles in the sector. Phase Two focuses on the qualitative dimension, consisting of semi-structured and structured interviews with 15 high-level experts from government, airport authorities, cargo operators, and related sectors such as logistics, agriculture, and tourism. The chapter also outlines the benchmarking process used to compare Oman with leading air cargo hubs in Singapore, Dubai, and the Netherlands, extracting lessons applicable to the Omani context.

Additionally, this chapter explains the tools and instruments employed for data collection, including the design and administration of survey questions via SurveyMonkey and the development of interview protocols tailored to extract policy-relevant insights. The process of data analysis is then described in detail, with qualitative data examined through thematic analysis and quantitative data evaluated using descriptive statistics to assess trends, and disparities.

In keeping with academic standards, the chapter also addresses key ethical considerations, including informed consent, confidentiality, and data security, ensuring that participants' rights and information were protected throughout the research. Limitations of the chosen methodology, such as potential sampling bias and the challenges of integrating diverse data types, are acknowledged and mitigated through transparency, reflexivity, and adherence to rigorous validation procedures.

Through this comprehensive methodological framework, the chapter establishes the foundation for the empirical findings presented in the following chapter. It ensures that the study's conclusions are not only theoretically robust but also practically relevant to policymakers, industry leaders, and other stakeholders working to advance the strategic goals of Oman Vision 2040.

Research Design

Rationale and Philosophy

The study adopted a mixed-methods approach. According to Shan (2023), the mixed methods approach acknowledges the insufficiencies of a single method in capturing the complexities of a real-world phenomenon. Thus, integrating numeric and non-numeric data helped the researcher gain a detailed view of the strategies for revitalizing the air cargo sector in the Sultanate of Oman. Oman's air cargo sector is complex, comprising several stakeholders, policy dynamics, and operational challenges. The mixed methods approach allowed the researcher to approach such complexities from diverse angles. Integrating the two research techniques allows researchers to cross-validate study outcomes (Creswell and Plano Clark, 2018; Tashakkori and Teddlie, 2010). If qualitative interviews revealed challenges, the quantitative data quantified their impacts. Equally, quantitative data guided further exploration in qualitative interviews. Additionally, qualitative insights provided rich narratives, and the numerical data offered statistical patterns and

data. The two techniques together created a holistic understanding. Policymakers in Oman's air cargo sector and other practitioners in the industry need practical insights; hence, combining the two techniques informed evidence-based strategies.

Ontology and Epistemology

The study's philosophical stance is rooted in pragmatism (Morgan, 2007), reflecting the need for both subjective and objective perspectives to address the complex challenges of Oman's air cargo sector. Pragmatism as an ontological position emphasizes that the nature of reality is dynamic and context-dependent. In this study, the reality of the air cargo sector is viewed as multifaceted, shaped by stakeholder interactions, policy frameworks, and operational dynamics. This ontological stance aligns with the mixed-methods approach, which accommodates both qualitative and quantitative perspectives.

From an epistemological standpoint, the study adopts a pluralistic view (Creswell and Plano Clark, 2018), where knowledge is derived through both subjective interpretations (qualitative interviews) and objective measurements (quantitative data). The qualitative component captures stakeholders' lived experiences and narratives, offering insights into collaboration opportunities and operational inefficiencies. In contrast, the quantitative component measures trade flows, cargo volumes, and other statistical patterns to provide an evidence-based foundation for strategy development. This pluralistic epistemology ensures that the research findings are both nuanced and actionable, meeting the practical needs of policymakers and practitioners.

The design entailed collecting qualitative data through interviews and then quantitative data to complement and extend the researcher's understanding. The findings were merged during the analysis process for a cohesive narrative, and qualitative themes supports the quantitative testing. The qualitative interviews revealed nuanced challenges the stakeholders face, and quantitative data quantified trade flows, and cargo volumes. Further, qualitative insights were vital in guiding strategy development, and quantitative data assessed the efficacy of proposed strategies. Qualitative interviews were crucial in uncovering collaboration opportunities, while quantitative data highlighted the existing collaborative efforts. With an approach aligned with the complex Oman air cargo sector and combining quantitative and qualitative techniques, the researcher provided practical recommendations for revitalizing the sector.

Phase 1: Quantitative Technique

Cargo volumes and import-export ratios

The researcher conducted metric examinations on cargo volumes and import-export ratios of air cargo. Evaluating cargo volumes was ideal for understanding the sector's overall trend in cargo movements and assessing possible decline or growth over time. The examination entailed tracking cargo volumes in tonne-kilometers on a six-years basis from air cargo registers. The researcher compared the present volumes with previous data in the past years. Import-export data were essential in evaluating the balance between outbound and inbound cargo and identifying possible trade imbalances. The process entailed calculating the ratio of inbound to outbound and assessing whether Oman's air cargo sector is skewed towards exports or imports.

Survey

The researcher collected quantitative data by conducting a survey between February and April 2024. The survey was designed to gather insights from stakeholders involved in Oman's air cargo sector. It included targeted questions (see Appendix 2) for cargo operators, regulators, and professionals in aviation, logistics, and related sectors. The survey focused on capturing data about operational challenges, terminal utilization, and the perceived impact of stakeholder alignment and inter-sectoral collaboration. Additionally, responses from representatives of government agencies provided input on policy influence and regulatory developments. The collected data were analyzed during May and June 2024, using statistical techniques to identify key patterns and ensure the reliability of the findings.

Quantitative Survey Sample

Quantitative surveys were vital for collecting data about Oman's air cargo sector. The researcher targeted stakeholders directly involved in the sector's policymaking, logistics, and operations and gathered valuable quantitative data. The survey focused on specific stakeholders in the sector, including cargo operators and managers, regulators and officers from the government, trade bodies, and industry associations. Survey questions were distributed to cargo operators and managers involved in daily operations to provide information about operational efficacy, utilization rates, and challenges. Similarly, the quantitative survey questions were sent to

regulators and government officials to seek their views on sector development, regulations, and policies. Such individuals play a crucial role in the sector; hence, understanding their perceptions was vital. The researcher distributed the survey questions to individuals from trade bodies and industry associations to collect information about collaborative practices and efforts.

Ensuring representation from a wide range of roles was vital. The main roles considered when distributing quantitative survey questions were managers, operators, regulators, and industry associations. The managers contacted with the survey questions included individuals responsible for managing the sector's supply chain, logistics, and cargo terminal. Some of the operators contacted were cargo handlers and freight forwarders. Additionally, the researcher sent survey questions to the government, the ministry of transport, and other agencies. The questions were also filled by individuals representing industry forums and trade bodies—diversity across a wide range of roles within Oman's air cargo allowed for an all-inclusive perception. Population sample for the quantitative survey questions was selected using both purposeful and a random sampling technique. The sampling approach for quantitative surveys involved a combination of purposeful sampling and random sampling to ensure representation from a wide range of roles within Oman's air cargo sector.

At the initial stage, the researcher employed purposeful sampling to identify and target key stakeholders with direct involvement in the sector, including managers, regulators, cargo operators, and representatives from industry associations. These individuals were selected based on their roles and expertise in logistics, policymaking, and terminal operations, ensuring that the survey reached participants with relevant knowledge and experience.

In the secondary stage, the identified managers and key participants distributed the survey further within their respective organizations, facilitating a random selection process. This secondary distribution allowed the survey to reach additional participants, such as cargo handlers, freight forwarders, and staff involved in day-to-day operations. The inclusion of this secondary random sampling ensured a diverse range of perspectives while maintaining relevance to the sector.

The study's quantitative survey targeted a total of 120 participants. Initially, surveys were distributed to 20 managers and experts in Oman's air cargo and related sectors. These managers were selected based on their roles and expertise using purposeful sampling. Subsequently, each manager distributed the survey further to 5 of their team members, who were randomly selected

within their organizations. Out of the 120 distributed surveys, 86 responses were received, resulting in a response rate of 71.67%. This high response rate ensured robust data collection, representing diverse perspectives across strategic and operational roles within Oman's air cargo sector.

This two-stage approach ensured a diverse sample that represented various perspectives across operational and strategic roles in Oman's air cargo sector

By combining purposeful and random sampling techniques, the researcher ensured that the sample was both diverse and representative of the various roles and responsibilities within Oman's air cargo sector. This approach captured wide-ranging insights into operational challenges, stakeholder alignment, and collaborative practices.

Sampling limitations and challenges

The quantitative survey sampling followed a two-stage approach, combining purposeful sampling and random sampling to ensure diversity and representation. While this approach allowed for wide-ranging perspectives, it also presented several challenges. During the purposeful sampling stage, accessing key managers and experts was time-consuming, and some participants were unavailable due to their schedules. In the random sampling stage, ensuring that managers distributed surveys to team members without bias was challenging. Uneven representation across organizational roles and participant availability further affected the distribution process. To address these challenges, the researcher provided clear guidelines for survey distribution, maintained close communication with managers, and reviewed participant profiles to ensure diversity. Despite these challenges, the sampling approach achieved a response rate of 71.67%, providing robust data for analysis.

Phase 2: Qualitative Technique

Benchmarking with best air cargo hubs

Yin (2018) argues that case studies are effective tools for understanding complex, real-world practices and drawing lessons from successful examples. Exploring strategies for revitalizing the

air cargo sector in the Sultanate of Oman entailed benchmarking successful examples. The researcher identified air cargo sectors in economies with characteristics similar to Oman's economy to understand the aspects that make them successful. Adapting the insights and aspects into Oman's context by considering operational, geographical, and cultural differences was vital. Benchmarking assisted significantly in the formulation of context-specific strategies. The criteria for selecting benchmarking examples entailed two main aspects: similarity in economies and success rates within the air cargo sectors. The researcher identified regions or countries portraying economic characteristics similar to Oman's. Factors such as logistic infrastructure, trade volume, and GDP were vital in identifying the ideal economies. Additionally, the researcher focused on air cargo sectors demonstrating collaboration, efficiency, and growth and looked for evidence of stakeholder engagement, streamlined processes, and increased cargo volumes.

The researcher explored the strategies utilized by the successful sectors. The analysis primarily considered operational changes, incentives, and policies within the successful sectors. However, the researcher investigated other aspects, such as private-public partnerships, regulatory reforms, and investment infrastructure. Additionally, the researcher aimed to understand the successful sector's collaborative efforts, hence exploring the collaboration rate among key stakeholders, including the regulators, government agencies, logistic companies, airlines, and cargo operators. The objective was to recognize the successful collaboration models used. Benchmark analysis entailed assessing successful sectors' approaches to optimize terminal utilization. Thus, the researcher aimed to identify the sectors' successful capacity management, cargo handling, and innovative practices. Analyzing successful sectors helped the researcher learn and highlight applicable practices to Oman's context. The cargo hubs contributed significantly to informing evidence-based strategies for revitalizing Oman's air cargo industry.

Comparator Selection Criteria

To ensure transparency and replicability, comparator hubs were selected using a criteria-based purposeful approach rather than convenience alone. The selection considered several factors. First, the geographical role of each hub as an intercontinental cargo gateway linking Asia, Europe, and the Middle East was important to ensure relevance to Oman’s positioning. Second, operational excellence was taken into account, with priority given to hubs that consistently demonstrated high throughput, efficient terminal utilisation, and resilience during disruptions. Third, the governance

and stakeholder alignment structures of each hub were examined, since the ability to coordinate diverse actors through institutional mechanisms is central to this study's objectives. Fourth, digital maturity was assessed, focusing on hubs that had advanced adoption of technologies such as electronic air waybills, blockchain systems, and cargo community platforms. Fifth, regulatory efficiency was considered, particularly the presence of customs facilitation through single-window clearance or risk-based inspection regimes. Finally, contextual proximity to Oman was included as a criterion, ensuring that comparators were not only successful globally but also shared certain geographical, institutional, or market characteristics.

On the basis of these considerations, three hubs were chosen. Dubai International Airport was selected as a leading Gulf comparator with geographical and cultural proximity to Oman. Singapore Changi Airport was included as an exemplar of digital maturity and operational efficiency. Amsterdam Schiphol Airport was selected because of its reputation for strong stakeholder governance models and community-based approaches. Together, these cases ensured that the benchmarking exercise was anchored in a systematic rationale and directly linked to the constructs under investigation.

Transferability and Contextual Fit

Benchmarking insights were not assumed to be universally applicable to Oman, and their transferability was critically assessed against the Sultanate's structural and institutional realities. This assessment involved examining the prerequisites required for each practice to function effectively, such as the presence of integrated IT systems or regulatory frameworks. It also required recognising Oman's constraints, including its smaller market scale, fragmented governance arrangements, and uneven digital readiness. The analysis then considered possible adaptation pathways, for example piloting a practice within a limited scope such as perishables handling at Muscat before scaling up, or establishing cross-agency steering groups prior to adopting a cargo community system. Finally, each practice was categorised in terms of its overall transferability, high, medium, or low, depending on how readily it could be applied in Oman's context.

Table X: Transferability Matrix of Benchmarking Practices

Practice from Comparator Hub	Prerequisites	Oman's Constraints	Adaptation Pathway	Transferability
Single-window customs & e-Freight (Singapore)	Integrated customs IT, legal framework, airline adoption	Limited IT integration across agencies; partial e-AWB use	Pilot in perishables lane at Muscat, expand gradually	**High**
Cargo Community System (Amsterdam)	Governance platform, stakeholder buy-in, data-sharing protocols	Siloed agencies, limited digital culture	Establish joint steering group → phased rollout	**Medium–High**
Slot/appointment system for terminal capacity (Dubai)	Predictive analytics, cargo scheduling software	Current manual scheduling, limited predictive tools	Start with high-variance commodities (e.g., perishables)	**Medium**
Free-zone governance and landlord model (Dubai)	Single landlord authority, integrated regulations	Multiple landlord structures, overlapping mandates	MoU-based joint governance body	**Medium**
Scale-driven consolidation practices (Amsterdam)	Very high throughput volumes, network density	Oman's smaller market size	Limited transfer; adopt only for regional niche cargo	**Low**

Qualitative interviews

Qualitative interviews allowed the researcher to directly engage the country's air cargo sector stakeholders. Through the interviews, the researcher explored the main stakeholders' insights, experiences, and perspectives about the challenges in the sector, collaboration opportunities, and potential strategies. Understanding the current situation requires formulating practical strategies (Liu, 2022). Hence, it was necessary to interview cargo operators, government officials, and industry experts. The participants were asked about their precise challenges, such as stakeholder misalignment and inter-sectoral collaboration, operational bottlenecks, regulatory hurdles, underutilization of terminals, import-export disparities, and low cargo volumes. The interviews also helped the researcher identify strategies vital for the sector's revitalization by exploring

operational improvements, policy changes, stakeholders' alignment, inter-sectoral collaboration and cargo operations from the participants. The interviews were crucial in exploring operational improvements, policy changes, innovative approaches and the best air cargo practices worldwide.

Effective interview questions should be well-structured to allow in-depth exploration of the topic under investigation (Martiny et al., 2021). Thus, the researcher adopted both structured and semi-structured interviews to ensure flexibility. Open-ended questions encouraged the respondents to provide comprehensive responses. The Open-ended structure also allowed the participants to share their views freely. Additionally, the structure of the interview questions allowed for probing specific points as the respondents shared their views. Using follow-up questions assisted in uncovering the rich details, respondents would have needed to provide. Semi-structured interviews provided rich data that enabled the researcher to formulate evidence-based and practical strategies for revitalizing the country's air cargo sector.

Qualitative interviews sampling

Selection of Participants

The target population for the study was comprised of industry experts, government officials, terminal managers, cargo operators, and high level representatives from sectors related to Oman's air cargo sector. Industry experts included people with wide-ranging knowledge of logistics and industry trends in air cargo operations and logistic sector. Such individuals included experts with practical experience, chain experts, and cargo managers. In contrast, officers from the government were individuals from agencies relevant to air cargo, such as of Civil Aviation authority and Ministry of Transport. Such a representative provided vital information about existing regulations, policies, and possible reforms. Airports CEOs, Terminal managers and cargo operators are directly involved in the management of terminals and provide crucial information about the existing utilization rates, operational constraints, and challenges. Representatives from other sectors, such as manufacturing, agriculture, fisheries, technology, Oman Vision 2040 National Programs Chiefs and tourism sector leaders, provided information and aided in identifying potential collaborative synergies and opportunities.

Purposeful Sampling technique

The researcher adopted purposeful sampling. Mweshi and Sakyi (2020) referred to purposeful sampling as a technique that entails selecting respondents based on a certain criterion. The

technique allowed for the selection of respondents based on their knowledge and involvement in the sector. Oman's air cargo sector is complex. Hence, purposeful sampling was ideal and allowed the researcher to select participants with wide-ranging sector knowledge. Due to the sector's complexity, collecting data from the individuals directly involved in the logistics management, policy formulation, other related sectors and cargo operations was essential. The selection criteria were based on expertise, involvement, and diversity. Thus, the targeted participants were primarily professionals with extensive current or previous experience in air cargo procurement, logistics, and operations management. The professionals provided information about challenges in the sector and potential strategies. All the participants were directly or indirectly involved in Oman's air cargo sector. The government officials who contacted them were overseeing the industry and regulating air transport policies. Terminal managers and cargo operators were ideal for the study since they are involved in the daily operation of Oman's air cargo sector, and representatives from related industries such as tourism, technology and logistics are involved as frequent consumers of the sector's services. The researcher ensured diversity within the population sample by having respondents with different roles, perspectives, and backgrounds. According to Rahman *et al.* (2022), diversity in a population sample ensures holistic viewpoints from the participants. The researcher contacted 21 experts, including government officials, terminal managers, cargo operators, and representatives from related industries such as tourism, technology, and logistics. These individuals were selected for their extensive current or prior experience in air cargo procurement, logistics, and operations management. Of the 21 contacted, 15 experts participated in interviews, while 6 were unable to participate due to their busy schedules. Despite this, the response rate of 71.43% (15/21) is considered robust for qualitative research, ensuring a sufficient and diverse sample. This challenge was anticipated given the demanding nature of their roles within Oman's air cargo sector. However, the 15 participants interviewed represent a diverse and experienced subset, ensuring the research objectives were met.

Sampling Limitations and Challenges

Despite the efficacy of purposeful sampling, the researcher experienced several challenges and limitations. Stratton (2021) noted that the main challenges associated with sampling techniques include difficulties in accessing the selected participants. The researcher needed help accessing some participants, particularly government officials and industry professionals. The participants had busy schedules; some had limited availability, and others needed more time to prepare. The

researcher overcame the challenge by leveraging the industry contacts and networks and introducing the stakeholders personally. Also, the researcher faced challenges in ensuring balanced representation from the diverse roles within Oman's air cargo sector. Some stakeholder groups were underrepresented, while others were overrepresented. However, adopting a purposeful sampling technique allowed intentional selection of participants based on their level of knowledge and involvement in the sector. The researcher avoided representation challenges associated with purposeful sampling by ensuring diversity within the population sample. Curtis and Keeler (2021) noted sampling bias as a common challenge of purposeful sampling. The researcher was aware that bias could arise while recruiting the participants. The challenge was addressed by ensuring transparency and distributing survey questions randomly. Despite the limitations, the researcher ensured that the population sample was diverse.

Table 1: Methods Used in the Study

Phase	**Method**	**Purpose**	**Data Collected**	**Sampling Technique**	**Sample Size & Response Rate**
Phase 1	**Quantitative Technique**				
	Cargo volumes and import-export ratios	To assess sectoral trends in cargo movement and evaluate trade imbalances.	- Cargo volumes (tonne-kilometers over six years). - Ratios of inbound vs. outbound cargo.	Sector's reports	N/A
	Survey	To gather detailed data	- Data on operational	Purposeful sampling	120 surveys

		on operational challenges, terminal utilization, stakeholder alignment, and inter-sectoral collaboration.	efficacy, regulatory impact, and policy insights.	(initial stage) Random sampling (secondary stage).	distributed (20 managers + 5 team members each). 86 responses received (**71.67% response rate**).
Phase 2	**Qualitative Technique**				
	Benchmarking with best air cargo hubs	To analyze strategies, operational changes, policies, and stakeholder collaboration from successful air cargo hubs.	- Insights on operational best practices, policy reforms, and stakeholder engagement.	Purposeful selection of 3 main cargo hubs based on economic and operational similarities to Oman.	N/A
	Qualitative interviews	To explore stakeholders' insights into sector challenges, collaboration opportunities,	- Challenges (e.g., operational bottlenecks, regulatory hurdles). -	Purposeful sampling targeting experts, terminal managers, cargo	21 experts contacted; 15 interviews completed (**71.43%**

		and strategies for revitalization.	Collaboration opportunities. - Policy and operational strategies.	operators, and policymakers.	**response rate**).
Sampling Limitations and Challenges		- Difficulty accessing some participants (busy schedules). - Ensuring balanced representation across roles. - Risk of sampling bias in purposeful sampling and uneven random distribution by managers.			

Sampling Strategy and Rationale

This study employed purposeful sampling to identify information-rich cases across policymaking, regulation, terminal operations, logistics provision, and related sectors, followed by a secondary random distribution for the survey to broaden coverage and reduce gatekeeper bias. The approach ensured role diversity while maintaining relevance to Oman's air-cargo value chain.

Sampling frame. The frame encompassed (i) government regulators and policy units; (ii) airport and terminal management; (iii) cargo operators and freight forwarders; and (iv) industry and trade bodies that interface with air cargo (e.g., exporters in agriculture and manufacturing, logistics associations).

Inclusion criteria. Participants were included if they had:

1. direct involvement in Oman's air-cargo value chain;
2. decision authority or operational responsibility;
3. a minimum of three years' sector experience; and
4. the ability to reflect on inter-sectoral collaboration and stakeholder alignment from their role perspective.

Exclusion criteria. Individuals without current or recent operational relevance, and purely academic roles with no sector engagement, were excluded.

Interviews (purposeful, adequacy). Interviews proceeded on a maximum-variation purposeful basis to cover the breadth of roles in the sampling frame. Data collection continued until thematic adequacy (saturation) was observed,i.e., repetition of codes and no emergence of new categories,evident after the 13th interview; two further interviews were conducted to confirm stability, resulting in 15 interviews overall.

Survey (two-stage). The survey used a two-stage design:

- Stage 1 (purposeful identification): key managers and experts were selected based on the inclusion criteria above to ensure that the instrument reached respondents with direct, role-specific knowledge.
- Stage 2 (secondary random distribution): each identified manager forwarded the survey to a small, randomly selected subset of team members within their unit, extending coverage to operational staff (e.g., cargo handlers, planners, forwarders) and mitigating single-respondent bias.

Bias mitigation and adequacy. To limit selection bias, the purposeful stage prioritised coverage across all role types in the sampling frame, and the secondary random stage diversified responses

within organisations. Achieved sample sizes (15 interviews; 86/120 survey responses) and role heterogeneity support adequacy for the study's mixed-methods aims and the analysis reported in subsequent chapters.

Collection of Data

Research Tools and Instruments

The main tools and instruments used during the study were SurveyMonkey for quantitative data and interviews for qualitative data. The researcher utilized SurveyMonkey to design and administer quantitative survey questions. SurveyMonkey effectively creates customized questionnaires, distributes them to the respondents, and collects the responses. Surveys are vital when collecting quantitative data (Adu & Miles, 2023). The researcher used surveys to collect information from the individuals involved in Oman's air cargo sector and other related sectors. The survey questions aligned with the study's research objectives and covered collaboration opportunities, strategies, challenges, and cargo volumes plus some open ended questions about best examples of cargo hubs. Khalifa and Selian (2021) referred to interviews as structured documents outlining questions for participants. The interviews for the present study were consistent and effectively guided conversation between the interviewer and the participants. The interview questions addressed specific aspects of Oman's air cargo sector which aligns with the main research questions and objectives. The survey template, interview questions plus the Email sent to participants, and consent forms are provided in Appendices 2, 3, 4 and 5, respectively.

Additionally, the researcher used authentic and relevant secondary sources such as reports, industry publications, government reports, and success stories from economies with similar characteristics. The secondary sources complemented surveys and interviews, provided context data from the past, and helped the researcher learn from the success of other sectors. The researcher extracted relevant insights from secondary sources and adapted them within the context of Oman air cargo. Data collection tools influence the trustworthiness of the study's outcome (Jain, 2021). Thus, the tools used in the present study were easy to use, reliable, and aligned with the research objectives. The SurveyMonkey was vital for efficiently collecting quantitative data, and interviews guided qualitative data collection to ensure consistency. All the tools were relevant and contributed to answering the research questions. The surveys quantified the stakeholders' perspectives and

trends, while interviews provided comprehensive insights, and secondary sources enriched the understanding of the topic.

The researcher utilized a structured survey comprising prearranged questions with fixed options. Structured surveys ensured consistency across the respondents. The questions were concisely designed and related to the topic under investigation. The researcher provided multiple choices for some questions and open ended for some questions as well. The survey was administered using SurveyMonkey electronically. Administering survey questions electronically has a wide range of benefits, including wide accessibility, allowing automation of data collection, and facilitating real-time tracking (Ryba et al., 2020). Using a web survey allowed the researcher to access a large audience within Oman's air cargo sector. Respondents accessed the questions at their convenience; hence, the researcher provided a grace period of 5 days for the respondents to return filled questionnaires. Filling in the questions took participants approximately 20-30 minutes, depending on the individual's knowledge of the topic. The participants' responses were recorded automatically and maintained in digital format. Hence, there was no manual data entry. The lack of manual data entry minimized errors. Nevertheless, the researcher monitored participants' response rates and times of completion.

The surveys provided clear instructions and explained the study's purpose to the respondents at the initial stages. Also, the participants were informed of the estimated time of completion. The survey was mobile devices-friendly since most participants accessed the questions using tablets and smartphones. All the questions were relevant to exploring strategies for revitalizing Oman's air cargo sector.

The structured interviews conducted with 14 participants formed a critical component of the data collection process. These interviews adhered to a predefined set of questions designed to capture specific insights about Oman's air cargo sector. The structured nature of these interviews ensured consistency in the data collection process while maintaining the reliability and comparability of responses across all participants. This methodology enabled the researcher to gather targeted information relevant to the research objectives and questions.

The use of structured interviews is widely recognized for its ability to standardize the data collection process, ensuring that all respondents address the same set of topics (Bryman, 2016). By employing this approach, the researcher ensured that each participant provided insights on key

themes, including challenges and opportunities in Oman's air cargo sector, stakeholder alignment, and intersectoral collaboration. The predefined questions facilitated the collection of comprehensive and specific data while minimizing the risk of deviations that could compromise the study's objectives.

Each interview lasted approximately 30 minutes and was shared via email with participants. Prior to distributing the interview questions, the researcher reiterated the study's purpose, outlined the confidentiality measures, and obtained the participants' consent to record their responses. Participants were encouraged to provide detailed and thoughtful answers, and the email format allowed them to respond at their convenience, ensuring a comprehensive and reflective approach to answering the questions.

Structured interviews offer a balance of control and depth. While the format is rigid, ensuring that all respondents are asked identical questions, it also allows for detailed exploration of participant responses through carefully designed follow-up questions. This approach enabled the researcher to probe for clarifications and delve deeper into responses where necessary, ensuring that all critical areas were adequately covered.

Throughout the interview process, the researcher adhered to ethical guidelines, prioritizing the comfort and autonomy of the participants. The use of a structured format did not inhibit participants from sharing their insights and experiences in detail. Instead, the uniformity of the questions created an environment where participants felt confident in discussing their perspectives within the defined framework. This approach facilitated the collection of high-quality data directly related to the objectives of the study.

In analyzing the interview data, the structured nature of the responses allowed for thematic analysis (Braun and Clarke, 2006). This methodological rigor enabled the researcher to identify recurring patterns, unique insights, and actionable strategies for revitalizing Oman's air cargo sector. Ultimately, the structured interviews provided a robust foundation for understanding the perspectives of key stakeholders and experts, contributing significantly to the development of well-informed and practical recommendations for the study.

Although only one participant had semi-structured interview but it gave the respondents the freedom for expressing themselves and opportunities to provide detailed responses. The main

benefits of utilizing semi-structured interviews are enabling the collection of rich data and enhancing understanding of the data (Reñosa *et al.*, 2021). The questions yielded rich and Oman's air cargo sector-specific data. The structure of the interviews eliminated constraints and allowed the respondents to freely share their insights, opinions, and experiences. Thus, the researcher understood the respondents' thought processes, motivations, and perspectives. The questions were designed to allow flexibility, and adjustment of questions during the interview to align with the respondents' answers. Such adaptability created opportunities for follow-up questions where necessary. Thus, the researcher constantly explored unexpected themes as the interviews progressed. The researcher followed a defined interview guide and maintained consistency in asking questions. All the questions were standardized. Although the researcher allowed opportunities to explore new themes, it ensured that essential research topics were covered. The researcher prioritized respondent's perspectives. A respondent-centered approach empowers the participants and facilitates a holistic view (Saarijärvi & Bratt, 2021). The respondents felt empowered and uniquely shared their lived experiences and expertise. The researcher gained a holistic viewpoint of the possible strategies for revitalizing Oman's air cargo.

Face-to-face interview was conducted and it lasts about half an hour. The researcher initiated the interview by reiterating the study's purpose and informing the participant that the interviews would solely be used for the study. Ensuring participants are comfortable sharing their experiences during the interviews is essential (Knott et al., 2022). The interview session was at comfortable and quiet environment to minimize disruptions. The researcher used recording devices with the participants' approval to capture the interview. Recording enhances accuracy during data transcription (Adeoye-Olatunde et al., 2021). Also, the researcher was keen to take notes simultaneously to capture the highlights of the interview. Throughout the interview session, follow-up questions were asked to optimize the semi-structured interview design, allowing the respondent to share their experiences, insights, and views in detail. The researcher paid attention to nonverbal and verbal cues and observed body language and tone in the participants' responses. Also, the researcher probed deeper when necessary to get the intended meaning. The researcher noted the key points and captured direct quotes where possible.

Justification of Methodological Choices and Alignment with Research Questions

The research adopts a sequential mixed-methods approach to comprehensively address the study's

research questions. This design integrates quantitative data (cargo volume trends and surveys) with qualitative insights (expert interviews and benchmarking) to triangulate findings.

- **RQ1** (Challenges and Opportunities): Required empirical evidence on current sector performance; addressed through descriptive statistical analysis of cargo data and survey responses from 86 participants.
- **RQ2** (Stakeholder Alignment and Collaboration): Explored through in-depth qualitative interviews, as this question required insights into inter-organizational dynamics, perceptions, and governance challenges.
- **RQ3** (Best Practices from Global Hubs): Answered using comparative benchmarking with international cargo hubs (Singapore, Amsterdam, Dubai), enabling the identification of transferrable strategies.

The mixed-methods approach is thus justified by the multi-dimensional nature of the research problem, allowing for both generalization and contextual depth.

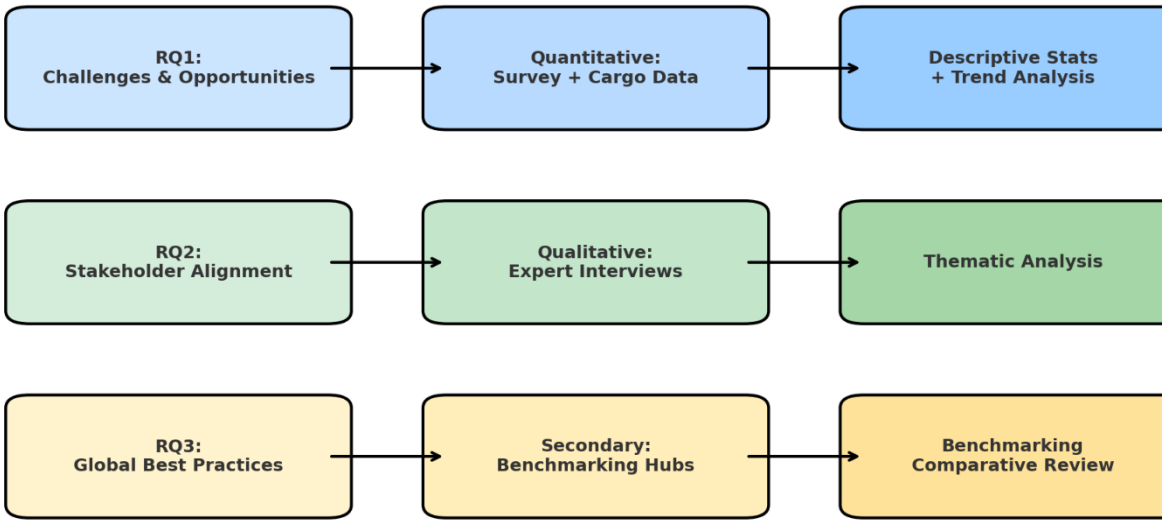


Figure 2: Visual Mapping of Research Questions to Methodological Components

The figure 3 and the table below illustrates the alignment between the research questions, data sources, methods used, and the justification for each methodological choice. This supports the rationale behind adopting a mixed-methods approach.

Table 2: Alignment of Research Questions with Data Sources, Methods, and Justification

Research Question	**Data Source**	**Method Used**	**Justification**
RQ1: What are the primary challenges and opportunities in the Omani air cargo sector?	Survey (n=86), Cargo Volume Data (2018–2023)	Descriptive Statistics, Trend Analysis	To identify operational bottlenecks, trends, and stakeholder perceptions.
RQ2: How do stakeholder alignment and intersectoral collaboration influence the efficiency and growth of the air cargo sector in Oman?	15 Expert Interviews + Open ended question of the survey	Thematic Analysis	To explore governance structures, perceptions, and collaboration mechanisms in depth.
RQ3: What are the best practices from global air cargo hubs that can be implemented in Oman?	Secondary Data on Singapore, Amsterdam, and Dubai	Benchmarking	To extract applicable strategic and operational insights from leading hubs.

Data Storage and Management

Management and storage of data is crucial when conducting a study. Thus, the researcher ensured that the data was systematically organized to facilitate effective retrieval and smooth analysis.

Different data types were stored in separate folders, including secondary data, survey responses, and interview transcripts. Additionally, it was essential to maintain version control for the different data types. Version numbers such as dates were used to label updated files. Metadata helps researchers enhance data traceability and understanding (McBeath, 2020). Data security was essential; the researcher stored the interview transcripts and survey responses in secure servers and regularly automated backups to minimize redundancy. Hard copy documents such as the consent forms were securely stored in cabinets and were accessed only by authorized parties. Access to the data was limited to specific permission and logins. Also, data transmission, especially for the surveys, was encrypted. Appropriate data management and secure storage approaches were vital in upholding the integrity and quality of the data during the collection and analysis processes.

Data analysis

Thematic Analysis for Qualitative Data

Thematic analysis is characterized by a series of activities searching for familiar or repeated themes, patterns, and sub-hemes in data (Lochmiller, 2021). The researcher explored interview transcripts to uncover repeated patterns, themes, and subthemes. Following the six stages of thematic analysis, the researcher extracted meaningful insights about Oman's air cargo sector. The first stage entailed familiarizing with the data, where the researcher went through the transcripts to understand the data's content, nuances, and context. The main activity at this stage was initiating the initial coding. Thus, the researcher highlighted key sentences and phrases related to strategies, collaborative opportunities, and challenges stakeholders face in Oman's air cargo sector. The second phase allowed for generation of initial codes. According to Morgan and Nica (2020), the second stage of thematic analysis entails generating initial codes without specific categories to help researchers capture the different aspects of the database.

Nevertheless, due to the nature of the present study, the researcher categorized initial coding into the challenges, collaborative opportunities, and possible strategies for revitalizing Oman's air cargo. Under the challenges category, the researcher generated initial codes based on the cargo volumes, import and export disparities, and regulatory hindrances. Also, it was easy for the researcher to generate initial codes about possible collaboration and opportunities, such as working with other sectors, establishing free zones, and joint efforts. Initial codes generated under the

possible strategies included improved investments in infrastructure and operations and reforming the existing policies.

The third stage entailed searching for potential themes. Researchers collate codes by grouping related codes and looking for connections and patterns (Wiltshire & Ronkainen, 2021). The researcher identified predominant themes of possible strategies, challenges, and collaborative opportunities. Themes were perceived as dominant if they were caught across the perspectives of different stakeholders. The fourth stage entailed reviewing the theme that emerged in the third stage. The main activities of this stage were refining the themes, which entailed referring back to the coding stage for effective definition. All the themes were defined clearly. According to Campbell *et al.* (2021), researchers must certify that the themes are built on the collected data. Hence, the researcher validated that the themes were validated against the interview transcripts.

The preceding stage allowed for opportunities to define and name the themes further. The researcher assigned labels that described each theme separately. Additionally, the researcher provided a comprehensive description of all the themes separately and included relevant quotes from the interviews where possible. The names of the themes should be aligned to the study's objectives and assist in answering the research questions (Humble & Mozelius, 2022). The sixth stage entailed writing the final report based on the collected data. The researcher prepared a narrative synthesis by summarizing the developed themes. The narrative contained information explaining the theme's relevance to Oman's air cargo sector. The researcher included excerpts from the interviews for illustration purposes on each theme. Also, the researcher provided evidence of the identified patterns that informed the developed themes across the data.

Descriptive statistics for Quantitative Data

Descriptive statistics describes and summarizes a database's main facets to allow researchers to understand the variability and central tendencies (Thunberg & Arnell, 2021; Cooksey, 2020). Descriptive statistics were vital in understanding cargo volumes, import and export ratios, and terminal utilization. The researcher calculated the cargo volume's standard deviation, median, and mean. Descriptive statistics helped the researcher understand the overall trends in cargo movement. Answering the research questions required the researcher to identify challenges and opportunities at air cargo sector. The researcher used descriptive statistics to calculate the average

import and export ratio and to evaluate possible trade imbalances. The approach assisted in quantifying the efficacy level of utilization of the cargo terminals. The analysis process entailed computing utilization rates such as the percentage terminal capacity.

Descriptive statistics helped the researcher explore possible relationships between diverse variables. The researcher used descriptive statistics to investigate the relationship between economic indicators and cargo volumes. Quantitative analysis was vital in exploring whether increased cargo volumes has an affect on improved terminal utilization and reduce the imbalance between inbound and outbound of cargo. Analyzing quantitative data utilizing descriptive statistics provided the researcher with an evidence-based understanding of Oman's air cargo, which, in turn, assisted in answering the research questions.

Ensuring Research Quality

Addressing Researcher Bias and Reflexivity

Researcher bias may occur when researchers' presumptions, preferences, and beliefs impact the processes of collecting, analyzing, and reporting data. Researcher bias results in inadvertent distortion of the research outcomes. According to Cairns-Lee et al. (2021), different types of researcher bias exist, including cultural, selection, and confirmation biases. Selection bias occurs when a researcher unintentionally favors certain participants or data over others. In contrast, confirmation occurs when a researcher interprets data to confirm their existing beliefs, while cultural bias happens when they interpret data based on their cultural background. The researcher mitigated bias by acknowledging possible biases and constantly reflecting on their assumptions about Oman's air cargo sector.

Reflexivity is the awareness of the researchers' assumptions, roles, and possible biases when conducting research (Cairns-Lee et al., 2021). Reflexivity entails reflecting on the potential impacts a researcher's viewpoints, experiences, and background may have on interpreting, analyzing, and collecting data. The researcher actively conducted the interviews, interpreted data, and made decisions. Hence, the researcher's subjectivity influenced the process. The researcher recognized that their viewpoints might have influenced the framing of the questions, interpretation of the interview responses, and data selection. The researcher's positionality enhances the

research's credibility. Reflexivity allowed the researcher to examine their assumptions critically to minimize potential bias.

Reliability and Validity

Reliability refers to the study's outcome's repeatability, stability, and consistency (Quintão et al., 2020). Reliability shows the degree to which the study produces dependable and consistent findings if repeated within the same conditions. The researcher enhanced reliability by adhering to a systematic code development process when analyzing qualitative data thematically. According to Kouam Arthur William (2024)**,** consistent coding enhances reliability. Also, the researcher comprehensively documented that analysis process; other researchers may replicate the process for validation. Additionally, the researcher relied on other techniques such as data entry checks, internal consistency, and test-retest. The researcher double-checked data entry to reduce risks of errors, where consistency in data entry ensured reliability. Administering the survey questions more than once to a subset of respondents enhanced reliability.

The validity of a study denotes the degree of the research's accuracy in measuring what it intended to measure (Mustafa, 2021). The researcher knew that the study needed to produce trustable and reliable outcomes corresponding to the real world. Different data sources, including secondary sources, case studies, and interviews to cross-validate outcomes. The technique enhanced validity by guaranteeing consistency across different sources of qualitative data. Also, sharing preliminary results with the respondents helped validate the data's accuracy. Feedback from the participants assisted in refining the interpretations and, in turn, enhanced the research's validity. The researcher reflected on their potential perspectives and biases. Validity when dealing with quantitative data is equally essential when dealing with qualitative data (Rose and Johnson (2020)**.** The researcher relied primarily on criterion and content validities. Throughout collecting data, the researcher aligned the survey questions with the study's objectives. Comparing survey responses against the existing data, such as the official reports on cargo volumes, enhanced the study's validity. Connection between the responses and the existing data showed validity. As a result, ensuring transparency about the researcher's positionality enhanced the study's overall validity.

Triangulation

Triangulation played a significant role in enhancing the study's robustness and validity. According to Natow (2020), triangulation entails utilizing different sources or methods of collecting data. The

main triangulation approach for the present study was combining numeric and non-numeric data, and integrating the two data types allowed for a comprehensive understanding of the strategies for revitalizing Oman's air cargo sector. Qualitative data offered context and depth, and quantitative data offered statistical trends. For instance, the interviews revealed the challenges stakeholders in the sector face, while quantitative data quantified the degree of the challenges. Combining qualitative and quantitative data guided strategy formulation and evaluation of the efficacy of the proposed strategies.

Triangulation also minimized the influence of biases associated with each approach when used singlehandedly (Bans-Akutey & Tiimub, 2021). The researcher was keen to strengthen the reliability and validity of the study's results. Triangulation entailed reporting the integration of the two data types transparently for the readers to evaluate the research's rigor. Integrating qualitative and quantitative data helped the researcher approach the study from diverse viewpoints. Further, the researcher acknowledged reflexivity, addressed possible biases, used triangulation, and aimed to enhance the research's robustness and validity.

Triangulation and Integration Procedures

Triangulation in this study was not only a methodological principle but also a structured process for integrating quantitative, qualitative, and secondary data. The aim was to ensure that conclusions were grounded in multiple strands of evidence rather than a single perspective.

1. Method-level integration.

Quantitative data (cargo volumes 2018–2023, import–export ratios, and survey responses from 86 participants) were systematically compared with qualitative insights from 15 expert interviews and benchmarking evidence from three comparator hubs (Dubai, Singapore, Amsterdam). This alignment allowed constructs such as terminal utilisation, regulatory efficiency, and collaboration to be examined across methods.

2. Joint displays.

Integration was operationalised through **joint display matrices** that aligned:

- constructs of interest,
- qualitative themes (with anonymised interview evidence),

- quantitative indicators (survey percentages, cargo trends),
- benchmarking evidence (global hub practices), and
- an integration judgement.

Integration judgements followed three categories:

- **Convergence** (when strands pointed in the same direction),
- **Complementarity** (when strands provided different but reinforcing insights), or
- **Dissonance** (when findings diverged and required explanation).

3. Meta-inferences.

From these displays, meta-inferences were drawn to generate higher-level conclusions. Where dissonance occurred, priority was given to evidence with stronger contextual validity (e.g., Oman's cargo records or sector stakeholders), but contradictions were noted to reflect sectoral tensions. This process ensured transparency and produced a clear audit trail from raw data to final inference.

By structuring triangulation procedurally, the study enhanced both reliability (cross-checking across methods) and explanatory power (showing how constructs interact across datasets).

Example Joint Display (RQ1: Challenges and Opportunities)

Construct	Qualitative Theme (Interviews)	Quantitative Indicator (Survey/Records)	Benchmarking Evidence	Integration Judgement	Meta-inference
Regulatory Efficiency	Stakeholders described "time-consuming manual clearance" and "fragmented procedures"	58% of survey respondents identified regulatory bottlenecks as a key challenge; import volumes consistently exceeded exports 2018–2023	Singapore's single-window and e-Freight adoption; Amsterdam's customs facilitation	**Convergence**	Streamlined clearance through single-window systems and digital documentation is critical for Oman.

Terminal Utilisation	Interviewees noted "idle capacity outside peak times"	Cargo volumes dropped sharply in 2020 (96,000 tons) and recovered unevenly to 158,000 tons by 2023	Dubai and Amsterdam use appointment/slot systems to manage peaks	**Complementarity**	Smoothing seasonal demand with predictive scheduling could optimise Oman's terminal capacity.
Stakeholder Collaboration	Interviewees highlighted "fragmented roles" and lack of shared KPIs	46% of survey respondents rated inter-agency coordination as weak	Schiphol's Cargo Community System integrating multiple stakeholders	**Convergence**	Institutionalised cargo community governance and KPIs are required to reduce silos in Oman.

Addressing Potential Errors and Biases

Additionally, the researcher enhanced the study's validity and reliability by addressing potential errors and biases. Typical biases in research emerge from the sampling process, participants' responses, and measurement errors (Arias *et al.*, 2023). The researcher addressed sampling bias by acknowledging the limitations of purposeful sampling, representativeness, and the sample size. By reporting transparently, readers may asses possible biases. Additionally, people contacted to fill out the survey questions were encouraged to provide honest responses, and the interviewees were also requested to be honest in their responses. Encouraging honesty in responses played a role in minimizing response bias. Throughout the data collection process, the researcher was keen on minimizing errors by ensuring accuracy in survey administration and transcription. Transparency in reporting, addressing potential biases, and embracing rigorous procedures significantly enhanced data and the overall study's reliability and validity. Such efforts contributed significantly to the study's robustness.

Ethical Considerations

Ethical considerations are vital when conducting a study. They upheld numerous ethical standards, including obtaining consent from the participants to ensure they understood the study's purpose and procedures. The consent informed participants that they were participating voluntarily and

could withdraw at any point if they were unwilling to proceed. The consent letters were sent to the selected participants before commencing the interviews. The content of the consent letters included the interview process, the possible duration of conducting the interviews, and the study explored strategies for revitalizing Oman's air cargo. Obtaining signed or verbal consent from participants is a vital ethical consideration (Pietilä*et al.*, 2020). The researchers assured participants' anonymity and confidentiality by protecting their private and confidential information. Anonymity was crucial in preventing participants' identities from being linked with certain data, while confidentiality ensured that the feedback they gave remained private. The participants were contacted at their convenience time, respecting their schedules.

Additionally, the files were securely stored and accessible only to authorized parties. The collected data was used only for the study. The researcher adhered to the academic writing rules and regulations, including appropriately referencing and citing borrowed data. Such guidelines enhance a study's integrity (Eaton, 2020). The researcher adhered to the rules of the land's cultural and religious protocols. Access fees, such as accessing certain websites, company publications, and libraries, were paid where necessary. The researcher was transparent in collecting data and reporting the study findings.

Limitations

Despite the efficacy of the mixed-method approach, the methodology had limitations mainly associated with the sample population. The sample size was limited to certain aspects, such as access to participants, resources, and time. Qualitative interviews are characterized by a small sample that may unnecessarily represent the general views of the entire population (Lester et al., 2020). Thus, the sample utilized might not represent the general views of all stakeholders in Oman's air cargo sector. The accuracy of the findings relied on the researcher's ability to integrate quantitative and qualitative data. Hence, the methodology was limited to the researcher's expertise in harmonizing the two data types to ensure they complement each other effectively. The methodology was also limited to the accuracy of the secondary data incorporated in the study. Data obtained from industry and government publications might have been published for purposes unrelated to the present study.

Nevertheless, the researcher employed a wide range of techniques to neutralize the effects of the limitations associated with the methodology. The interviewed individuals were selected intentionally based on their levels of knowledge and involvement in Oman's air cargo. The sampling technique allowed the researcher to attain diversity within the sector and, in turn, generalizability. Also, triangulation assisted in enhancing the study's generalizability. Potential biases were acknowledged, and the findings were reported transparently. Additionally, surveys were distributed using a random sampling technique, expanding the scope of data collection and reducing risks associated with self-selection bias. The researcher relied heavily on primary data collected from interviews and surveys, neutralizing the potential impacts of the secondary data. The researcher recognized the limitations associated with mixed methods and interpreted the findings cautiously.

Oman’s air cargo sector is complex, and investigating its revitalization strategies required contacting key stakeholders, including government officials and other individuals directly involved in daily operations, such as cargo operators and terminal managers. Individuals involved in a wide range of roles in the sector provided a holistic view that enriched the understanding of the data. Combining qualitative and quantitative data helped the researcher overcome the weaknesses of each technique when applied singlehandedly. A purposeful sampling technique was essential for intentionally selecting participants with wide-ranging knowledge about Oman’s air cargo. Analyzing the two types of data separately was essential, though integrating the outcomes cohesively into the final report relied heavily on the researcher’s ability and expertise. Triangulation was vital in enhancing the study’s validity and reliability. Upholding ethical standards is essential when conducting research.

Figure. 4 below provides a visual overview of the thesis structure and research flow, illustrating the logical sequence of the study. The diagram begins with the overarching research aim—exploring strategies for revitalizing the air cargo sector in the Sultanate of Oman,supported by three core objectives and corresponding research questions. It then traces the research process through the literature review and methodology, where a mixed methods approach integrates both primary data (surveys and expert interviews) and secondary data (cargo volume analysis and international benchmarking). The flow continues through the results phase, which includes a

71.1% survey response rate and findings from 15 expert interviews. These data sources inform the subsequent discussion, conclusion, and practical recommendations. The flowchart highlights the interconnectedness between the research components and reflects the alignment between the study's theoretical grounding, empirical evidence, and policy-oriented outcomes.

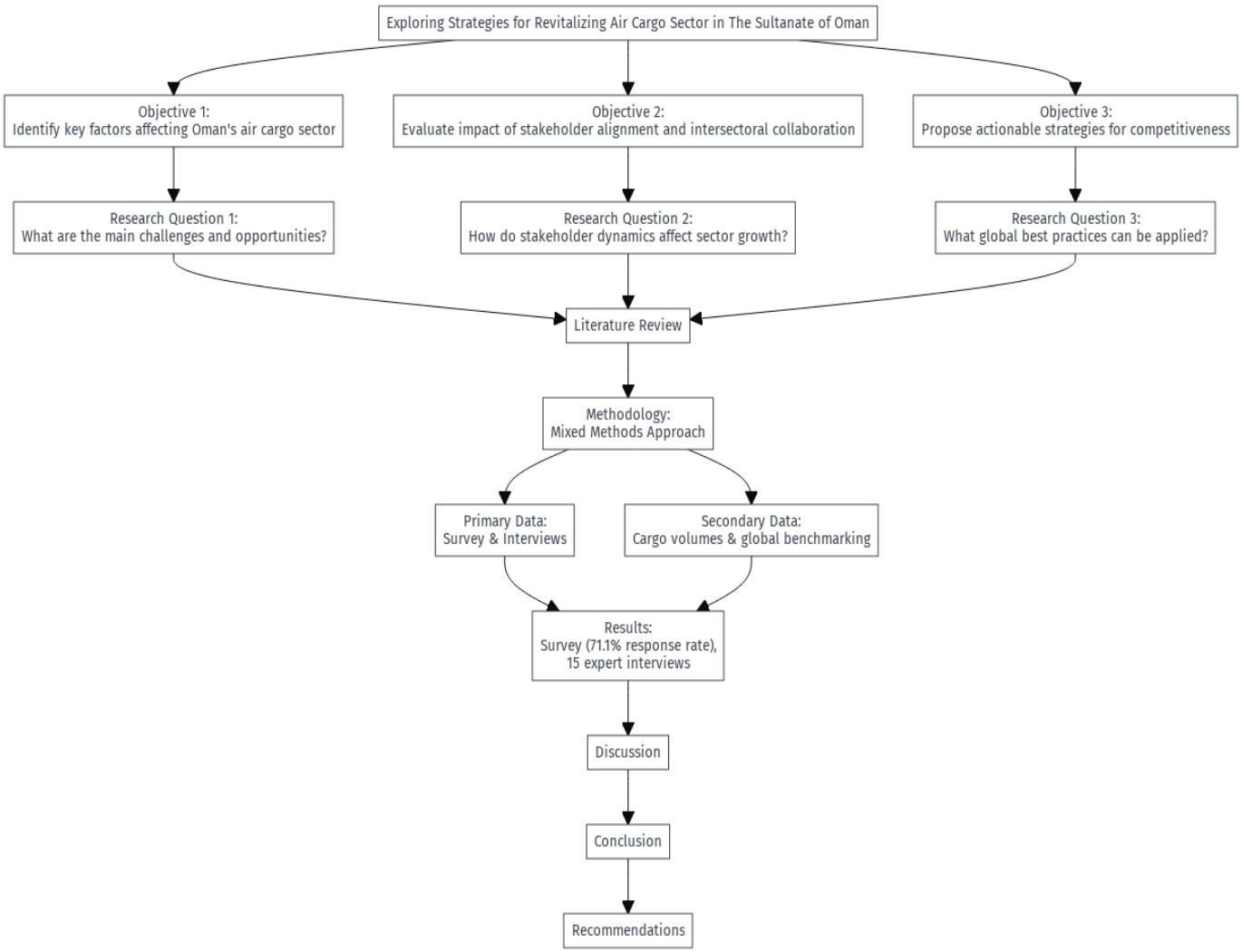


Figure 3: Thesis Structure and Research Flowchart for Revitalizing Oman's Air Cargo Sector

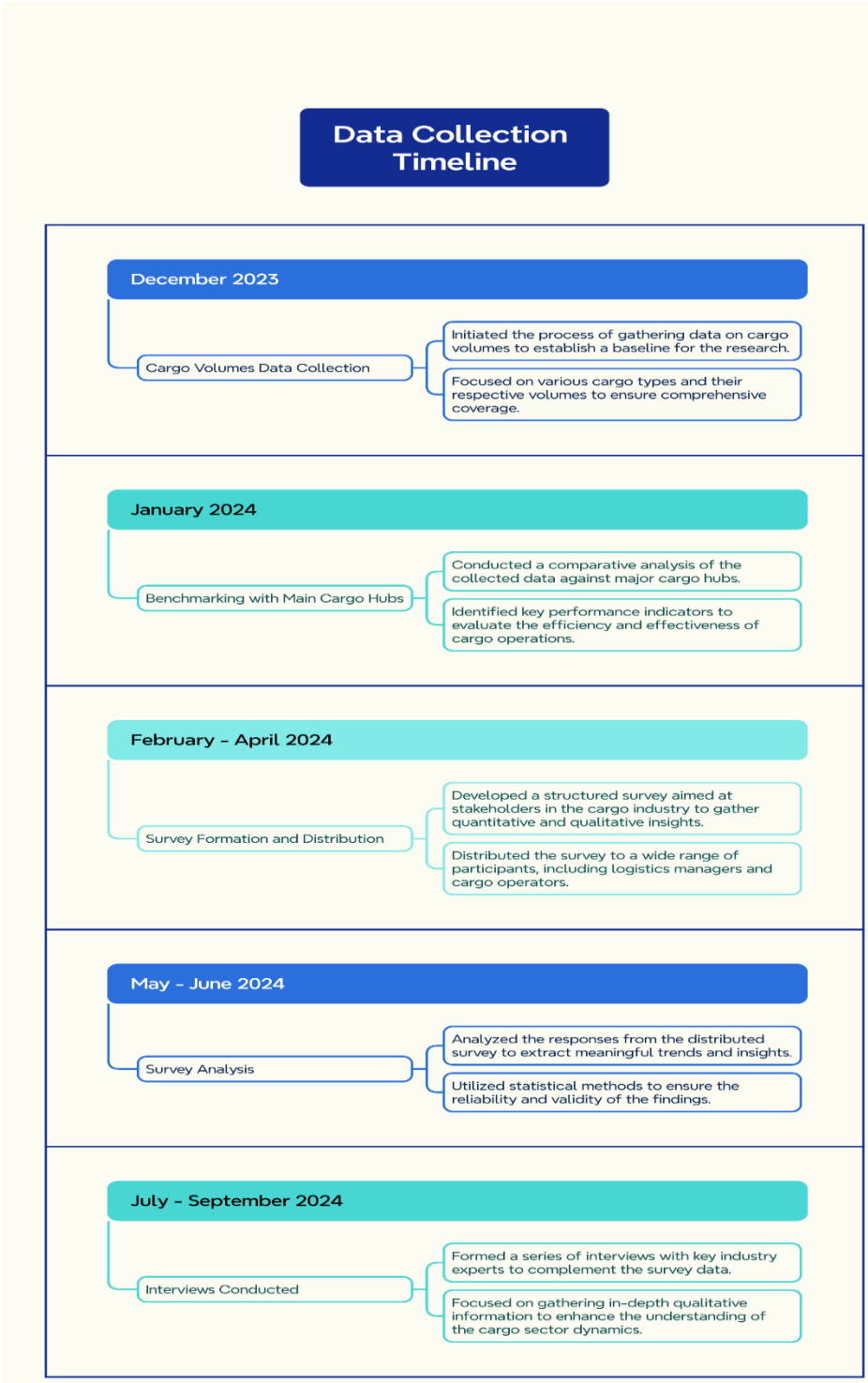

Data Collection Timeline
December 2023
Cargo Volumes Data Collection
Initiated the process of gathering data on cargo volumes to establish a baseline for the research.
Focused on various cargo types and their respective volumes to ensure comprehensive coverage.
January 2024
Benchmarking with Main Cargo Hubs
Conducted a comparative analysis of the collected data against major cargo hubs.
Identified key performance indicators to evaluate the efficiency and effectiveness of cargo operations.
February - April 2024
Survey Formation and Distribution
Developed a structured survey aimed at stakeholders in the cargo industry to gather quantitative and qualitative insights.
Distributed the survey to a wide range of participants, including logistics managers and cargo operators.
May - June 2024
Survey Analysis
Analyzed the responses from the distributed survey to extract meaningful trends and insights.
Utilized statistical methods to ensure the reliability and validity of the findings.
July - September 2024
Interviews Conducted
Formed a series of interviews with key industry experts to complement the survey data.
Focused on gathering in-depth qualitative information to enhance the understanding of the cargo sector dynamics.

Figure 4: Data Collection Timeline for the Study on Revitalizing Oman's Air Cargo Sector

The figure above describes data collection timeline. Data collection was carried out over several distinct phases aligned with the research design. In December 2023, the process began with the collection of secondary data on cargo volumes to establish a baseline. In January 2024, benchmarking was conducted with major international cargo hubs to assess operational and strategic alignment. Between February and April 2024, a structured survey was developed and distributed to logistics professionals, cargo operators, and relevant stakeholders to gather both quantitative and qualitative data. The responses were analyzed during May and June 2024, using descriptive statistics and reliability measures. Finally, between July and September 2024, in-depth interviews were conducted with industry experts across sectors, including logistics, regulation, and trade, to complement the survey findings and deepen the qualitative insights.

In summary, this chapter has outlined the research design and methodological approach adopted to explore strategies for revitalizing Oman's air cargo sector. By employing a pragmatic mixed-methods strategy, integrating both quantitative analysis of cargo trends and stakeholder surveys with qualitative interviews and benchmarking, the study ensures a comprehensive and multidimensional understanding of the sector's challenges and opportunities. Rigorous sampling techniques, data triangulation, and ethical protocols have been applied to ensure the credibility, reliability, and validity of the research findings. The insights gained through this methodology lay a robust foundation for the next chapter, which presents the empirical findings derived from both primary and secondary data. Chapter 4 will analyze the results of the survey and interviews, along with benchmarking data and descriptive statistics, to illuminate the current state of the sector and highlight key areas for strategic intervention.

Chapter 4: Findings

This chapter presents the empirical findings of the study in a structured and sequential manner, drawing on both primary and secondary data to comprehensively address the research objectives. It begins with a descriptive analysis of cargo volumes handled across Omani airports from 2018 to 2023, providing a foundational understanding of sectoral performance trends, including growth rates, import-export imbalances, and seasonal variations. This quantitative baseline enables an objective assessment of the sector's operational dynamics and underscores key performance bottlenecks.

Building on this foundation, the chapter then benchmarks Oman's air cargo sector against three globally recognized cargo hubs, Singapore, Dubai, and Amsterdam. These international case studies are used to extract best practices in stakeholder coordination, regulatory efficiency, digital transformation, and infrastructure integration. The benchmarking section highlights how strategic investments, policy reforms, and public-private collaboration have enabled these hubs to achieve high throughput, seamless operations, and global connectivity, offering transferable lessons for Oman.

The third section of the chapter presents the results of the quantitative survey distributed to stakeholders across logistics, government, and aviation-related sectors. These findings quantify perceptions regarding stakeholder alignment, regulatory frameworks, collaboration mechanisms, and technology adoption. The survey data also reflects stakeholder assessments of terminal utilization and the responsiveness of policy frameworks, offering statistical insights into the sector's operational climate.

Finally, the chapter delves into qualitative findings derived from semi-structured and structured interviews with 15 senior stakeholders representing government entities, airport operators, cargo

handlers, and adjacent sectors such as agriculture, fisheries, and tourism. These interviews provide rich narratives and contextualized perspectives that clarify the underlying causes of sectoral inefficiencies, highlight missed opportunities for inter-sectoral synergy, and reveal specific policy and operational challenges. The interview findings were synthesized into three key themes: key factors affecting performance, stakeholder alignment and inter-sectoral collaboration, and global best practices and strategies for competitiveness, each of which informed the strategic insights and recommendations proposed in the thesis.

The integration of these diverse data sources, cargo statistics, international benchmarks, survey metrics, and expert interviews, enables the construction of a multi-dimensional view of Oman's air cargo ecosystem. This layered approach allows for triangulation, validation, and the identification of strategic leverage points for sector revitalization. Ultimately, this chapter not only addresses the core research questions, regarding sector challenges, stakeholder dynamics, and transferable global practices, but also establishes the empirical basis for the discussion and strategic recommendations presented in subsequent chapters.

4.1 Cargo Volumes Analysis

This section analyzes cargo volume trends and presents a descriptive statistical analysis of cargo volume at Muscat International Airport (MCT) from 2018 to 2023, focusing on both import and export activity. This analysis addresses the research question, *"What are the primary challenges and opportunities in the Omani air cargo sector?"* by providing a foundational understanding of the sector's performance over time. The cargo volume data was sourced from government reports and industry publications, with all datasets thoroughly cleaned and verified to ensure accuracy. This quantitative examination establishes the sector's baseline performance, highlighting patterns that inform strategic decisions and setting the stage for the subsequent benchmarking analysis of successful global air cargo hubs.

Overall Cargo Volume Trends (2018-2023)

This section examines the overall trends in cargo volume at MCT Airport from 2018 to 2023, providing a general overview of the sector's performance during this period. By analyzing the total cargo volume handled each month and year, we can identify key patterns, fluctuations, and potential influencing factors.

The data reveals significant fluctuations in MCT's cargo volumes over the past six years, with a notable peak in 2019 followed by a sharp decline in 2020 due to the COVID-19 pandemic. The volumes began to recover in 2021 and have shown moderate growth through 2023, indicating a rebound but underscoring the sector's sensitivity to global economic disruptions.

Table 3: Trends in Average Cargo Volume and Key Insights (2018–2023)

Year	**Average Cargo Volume (Tons)**	**Key Insights**
2018	17,730	Stable demand with steady cargo volume
2019	19,585	Peak year due to regional trade expansion and increased airline connectivity and new cargo terminal opening
2020	8,006	Sharp decline due to pandemic-related restrictions (58% decrease)
2021-2023	13,142	Gradual rebound with moderate recovery and ongoing demand stabilization

The year-on-year trends illustrate the sector's capacity for growth while emphasizing the need for resilience-building strategies. A summary of the year-wise statistics is presented below:

Table 4:Year-on-Year Change and Volatility in Cargo Volume (2018–2023)

Year	**Mean Cargo Volume (TON)**	**Yearly Change (%)**	**Std Dev (TON)**
2018	17,730	—	1,655
2019	19,585	+10.46%	1,886
2020	8,006	-58.48%	5,495
2021	9,144	+14.22%	2,203
2022	12,230	+33.82%	2,280
2023	13,142	+7.46%	1,603

To visualize the changes in cargo volume over time, two figures are presented. Figure 1 illustrates the total monthly cargo volume handled at MCT Airport over the six-year period. The graph reveals a clear upward trend in cargo volume from 2018 to 2019, suggesting a period of growth

for the air cargo sector. However, this growth is abruptly interrupted in 2020 with a sharp decline in cargo volume, coinciding with the global outbreak of the COVID-19 pandemic. This decline highlights the sector's vulnerability to external shocks and global economic downturns. Encouragingly, the graph also demonstrates a strong recovery trend from 2021 onwards, with cargo volumes steadily increasing, indicating the sector's resilience and potential for growth in the post-pandemic period.

Figure 6 provides a consolidated view of the total annual cargo volume handled at MCT Airport for each year from 2018 to 2023. This representation allows for a direct comparison of year-on-year performance, further emphasizing the impact of the 2020 pandemic on cargo volume. The bar chart clearly shows the peak in 2019, the sharp drop in 2020, and the subsequent year-on-year recovery from 2021 to 2023.

- **Line Graph:** The line graph below plots the total monthly cargo volume over the six years, highlighting key trends such as the decline in 2020 and the subsequent recovery.

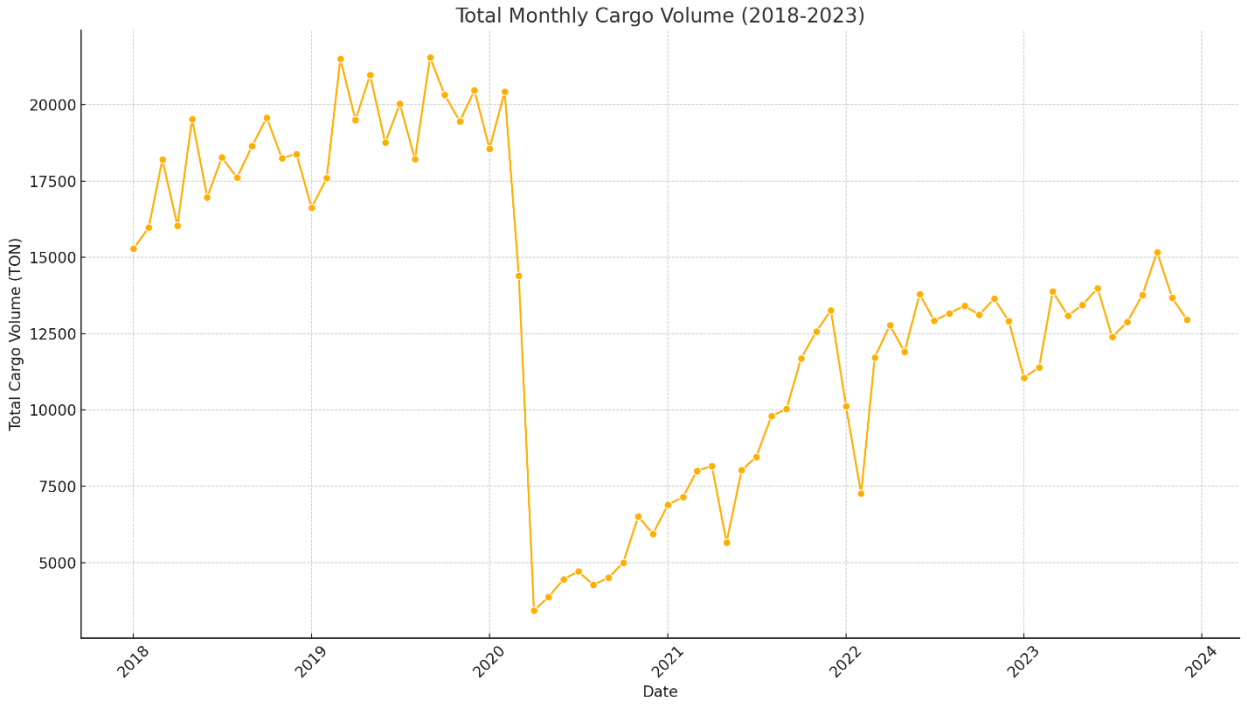


Figure 5: Total Monthly Cargo Volume at MCT Airport (2018–2023)

- **Bar Chart:** The bar chart below shows the total annual cargo volume for each year, providing a clear comparison of year-on-year performance.

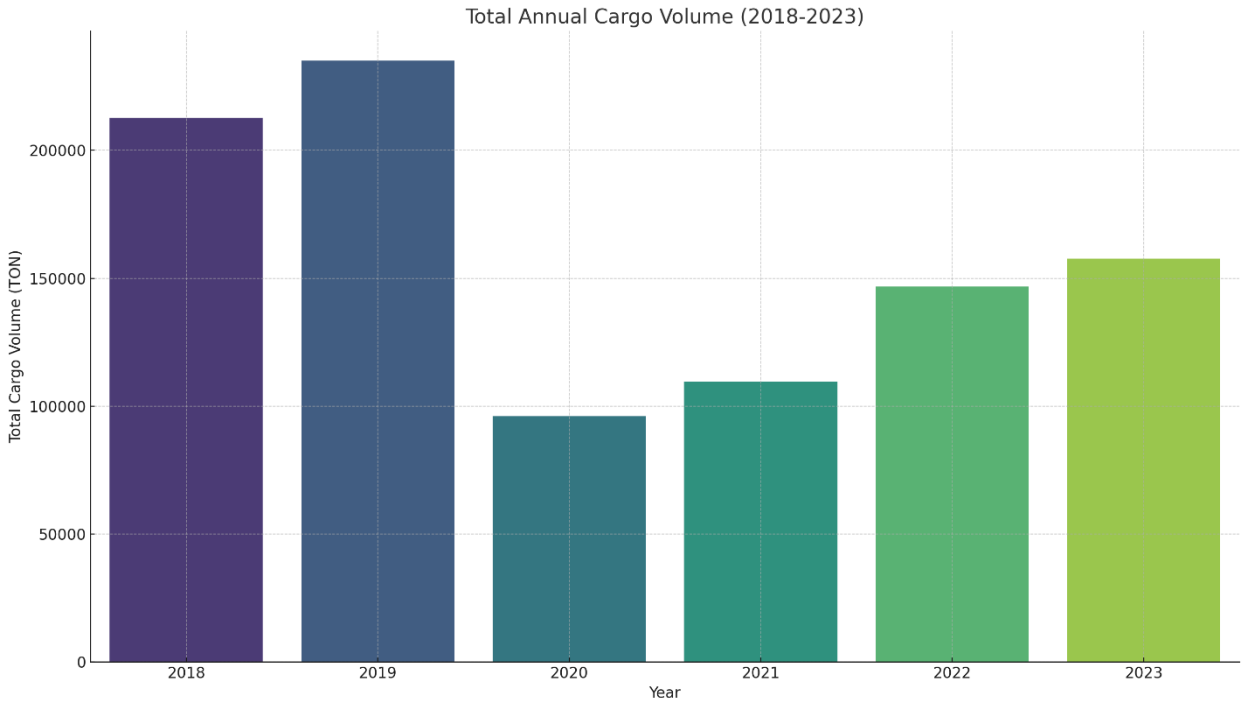


Figure 6: Total Annual Cargo Volume at MCT Airport (2018–2023)

This trend analysis shows that Oman's air cargo sector, while vulnerable to global shocks, demonstrates clear potential for sustained recovery. The rebound in cargo volumes post-2020 suggests that strategic investments in infrastructure and some stakeholder alignment are beginning to yield results but still not in a clear governance structure. These findings establish a performance baseline and will guide the comparative benchmarking in the next section.

Seasonal Variations

Monthly data from 2018 to 2023 also reveals distinct seasonal variations. Cargo volumes typically peak in March, May, and October, while the lowest volumes occur in January, February, and the summer months (June and July). This seasonality reflects broader trade cycles and highlights periods of peak demand likely linked to holiday seasons, tourism cycles, and agricultural trade surges.

The analysis of seasonal trends reveals distinct patterns in Oman's air cargo sector. Peak activity is observed during the periods of March to May and October, aligning with trade preparations ahead of summer and the holiday season. These months present an opportunity for Oman to optimize resource allocation and staffing to handle peak demand efficiently. Conversely, lower activity levels are noted during January to February and throughout the summer months,

corresponding to post-holiday downturns and reduced regional trade activity. These off-peak periods offer a strategic window for scheduling maintenance and building capacity in preparation for the busier months.

Recognizing these seasonal trends is crucial for effective resource planning and operational efficiency. Additionally, the identified patterns provide a foundation for developing export-oriented logistics services during low-activity periods. Such initiatives could help smooth seasonal demand fluctuations, enhancing the sector's overall resilience and performance.

Import vs. Export Analysis

The data reveals a persistent imbalance in import and export volumes, with imports consistently exceeding exports over the six-year period. This imbalance reflects Oman's reliance on imported goods and limited export diversification, highlighting an area where strategic improvement is needed. By focusing on expanding export-oriented production, particularly in high-potential sectors such as fisheries and agriculture, Oman can enhance its role as a regional cargo hub and improve the sector's long-term sustainability.

Yearly Import vs. Export Changes:

Year	Import Volume Change (%)	Export Volume Change (%)
2019	+9.03%	+12.81%
2020	-53.20%	-68.69%
2021	+7.94%	+29.30%
2022	+20.43%	+60.58%
2023	+9.20%	+4.82%

Table 5: Annual Percentage Change in Import and Export Volumes (2019–2023)

Annual Percentage Change in Import and Export Volumes (2019–2023)

The above trends underscore a crucial opportunity: by increasing exports, Oman can rebalance its air cargo operations. Specifically, focusing on sector-specific export growth (e.g., seafood, fresh produce, and manufacturing) can help Oman leverage its strategic geographic location, connecting to East African markets and establishing itself as a transit hub between Asia and Europe.

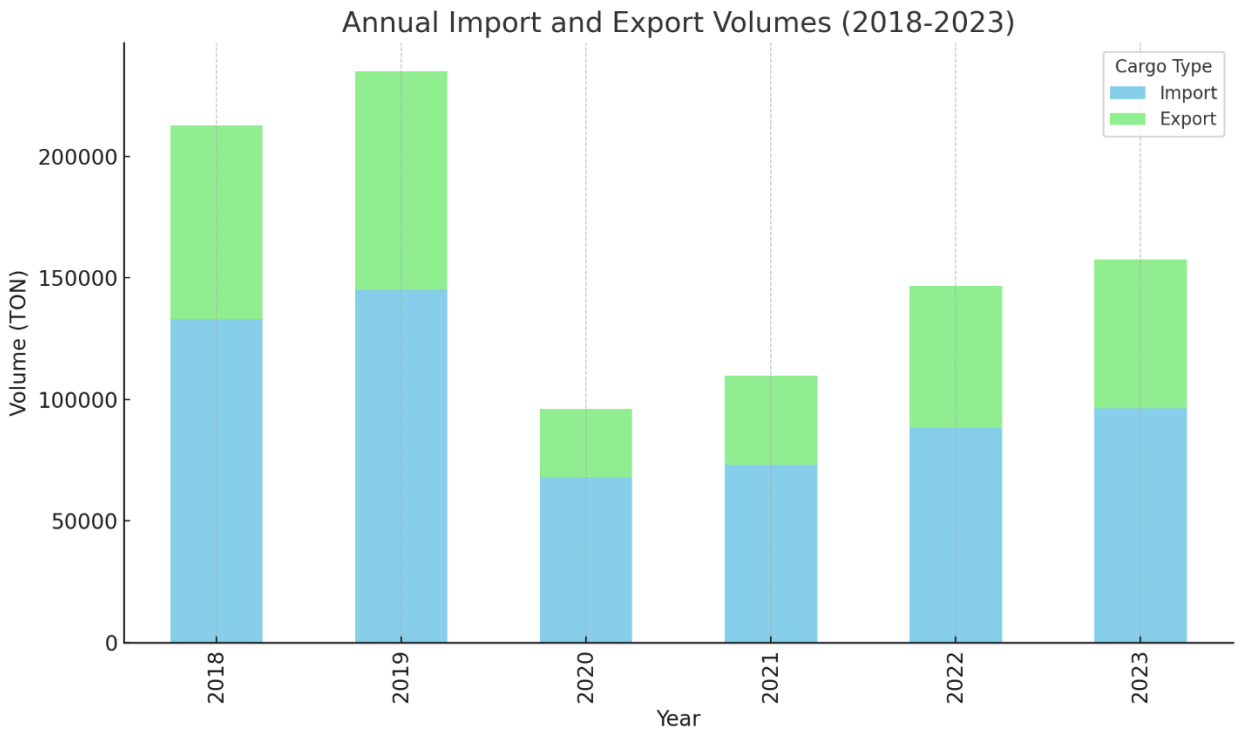


Figure 7: Annual Import and Export Volumes at MCT Airport (2018–2023)

Seasonal Variations in Cargo Volume

Building upon the analysis of overall trends and import-export dynamics, this section delves into the seasonal variations in cargo volume at MCT Airport. Understanding these fluctuations is crucial for optimizing resource allocation, anticipating demand surges, and tailoring operational strategies to specific periods.

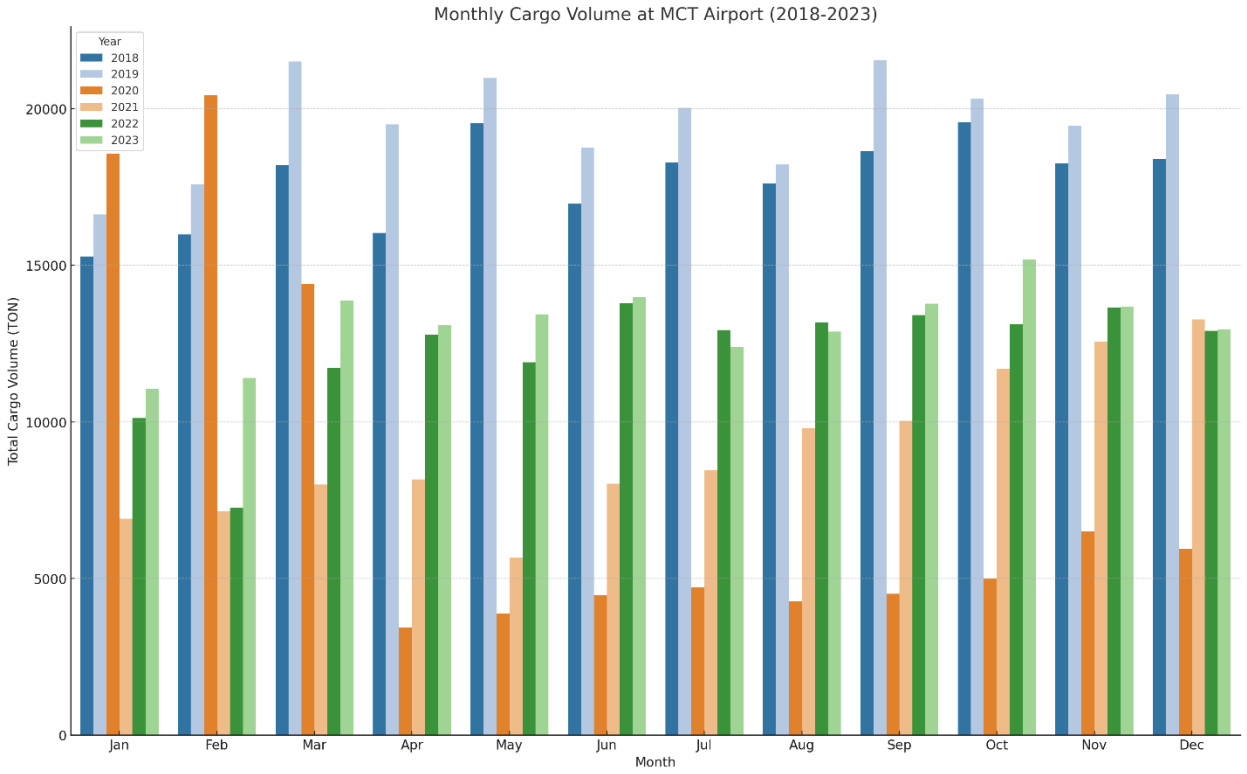


Figure 8: Monthly Cargo Volume at MCT Airport by Year (2018–2023)

Identifying Peak and Off-Peak Months

Identifying Peak and Off-Peak Months

Analyzing Figure 8 reveals consistent patterns of high and low cargo volume throughout the years:

Table 6: Peak and Off-Peak Months

Period	Month(s)	Description
Peak Months	**March**	**Consistently high cargo volumes are observed in March across most years, indicating this month as a peak period for air cargo at MCT Airport.**
	May	**Another month with consistently higher cargo volumes, suggesting a peak in cargo handling during this period.**

	October	**High cargo volumes in October, indicating a strong performance towards the end of the year.**
Off-Peak Months	**January**	**Consistently lower cargo volumes are observed in January, marking it as an off-peak month.**
	June and July	**These mid-year months consistently show lower cargo volumes, highlighting a seasonal dip during the summer period.**
	February	**Generally lower cargo volumes, indicating a continuation of the off-peak trend from January.**

The peak months of March, May, and October can be explained by various factors, including seasonal trade cycles, agricultural harvests, and preparations for major holidays or events. On the other hand, the off-peak months, January, February, June, and July, may be influenced by post-holiday slowdowns, summer vacations, or other seasonal trends that lead to reduced cargo volumes. Recognizing these patterns is crucial for strategic planning and resource allocation, as it enables businesses to optimize operations during peak periods and enhance efficiency during quieter times.

Summary of Key Challenges and Opportunities

The Cargo Volumes Analysis highlights three key challenges and opportunities:

Challenges:

- Vulnerability to global economic disruptions, as illustrated by the sharp decline in 2020.
- Significant seasonal fluctuations in cargo volumes.
- A persistent import-export imbalance, limiting growth potential.

Opportunities:

- Diversifying export services and focusing on high-value sectors such as perishable goods and e-commerce.
- Strategic alignment of resource planning with seasonal demand patterns.
- Leveraging Oman’s geographic location to enhance connectivity and establish specialized export zones.

These findings provide a quantitative foundation for understanding the sector's performance, while offering insights into areas where strategic interventions can improve resilience and competitiveness. These themes will be further explored in the subsequent benchmarking section, where successful practices from global air cargo hubs are analyzed. Following this analysis, the next section will examine successful air cargo hubs, identifying best practices and strategies that can inform Oman's development.

4.2 Benchmarking with main cargo hubs

Introduction to Benchmarking

Building on the insights from the Cargo Volumes Analysis, this section examines three leading global air cargo hubs: Dubai International Airport, Singapore Changi Airport, and Amsterdam Airport Schiphol. These hubs were chosen for their distinct strengths in connectivity, operational efficiency, and stakeholder collaboration, areas where Oman has opportunities for growth. By analyzing the practices that have enabled these hubs to succeed, this section addresses the research question, *"What best practices from global air cargo hubs can be adapted to enhance Oman's competitiveness?"* Those examples will provide strategic insights that set the stage for the subsequent survey analysis on stakeholder priorities within Oman.

The insights gained from these cargo hubs will directly contribute to achieving the following research objectives:

- **Objective 1: To identify and analyze the key factors affecting the performance of Oman's air cargo sector.** By analyzing the success factors of leading hubs, the chapter will shed light on critical areas such as infrastructure, technology, regulation, stakeholder collaboration, and innovation, which are also vital for Oman's performance.
- **Objective 2: To evaluate the impact of stakeholder alignment and intersectoral collaboration in Oman's air cargo sector.** The case studies will provide concrete examples of how effective collaboration among stakeholders (government, airport operators, airlines, logistics providers) contributes to efficiency and growth in the air cargo sector, addressing the research question: **How do stakeholder alignment and**

intersectoral collaboration influence the efficiency and growth of the air cargo sector in Oman?

- **Objective 3: To propose actionable strategies for enhancing the sector's competitiveness.** Through the identification of best practices and a comparative analysis of different approaches, the chapter will lay the groundwork for developing targeted recommendations tailored to the specific challenges and opportunities present in the Omani air cargo sector.

A comparative analysis of Oman's air cargo sector with other regions reveals critical insights that can help Oman address its challenges and enhance its competitiveness. Singapore stands as a global leader in air cargo logistics due to its strategic geographic location and comprehensive infrastructure. According to Huynh, Kim, and Ha (2020) Changi Airport, the primary air cargo hub, has consistently ranked among the top airports globally for cargo handling. Singapore has heavily invested in technological innovations, such as automated cargo handling systems, blockchain, and predictive analytics, which streamline logistics and reduce turnaround times (Rejeb et al., 2021). For instance, the e-Freight@Singapore initiative aims to digitalize the entire air cargo supply chain. Singapore has fostered a collaborative ecosystem involving government agencies, airlines, and freight forwarders. The Changi Air Cargo Community collaborates to improve operational efficiency and address common challenges (Lin, 2019). Comparing Oman with Singapore, Oman's customs procedures remain inflexible and less digitalized, leading to longer processing times. Investing in automation and simplifying customs regulations could significantly enhance Oman's competitiveness.

According to Akhavan et al. (2020), the Netherlands, with its strategic location in Europe, is renowned for its efficient logistics network. Amsterdam Airport Schiphol serves as a central hub for global cargo flows. Schiphol employs CDM, a process that involves all stakeholders in real-time decision-making to optimize cargo operations. Schiphol has adopted predictive analytics to anticipate cargo flows, reduce congestion, and improve resource allocation (Romero-Silva and Mota, 2022). The data-driven approach enables proactive planning, reducing delays and enhancing customer satisfaction. Schiphol's Smart Cargo Mainport Program integrates various digital platforms, allowing seamless data exchange between stakeholders, reducing paperwork, and improving transparency (Romero-Silva and Mota, 2022). In contrast, Oman's reliance on

traditional logistics practices limits its ability to optimize cargo operations. Adopting predictive analytics and data integration could streamline Omani cargo logistics.

Ziadah (2018) argue that the UAE has established itself as a leading air cargo hub through significant investments in infrastructure and innovation. Emirates SkyCargo and Etihad Cargo, the two major carriers, dominate the regional market. Emirates SkyCargo and Etihad Cargo have implemented cutting-edge technologies like AI, blockchain, and IoT to improve efficiency and customer experience (Florido-Benítez, 2023). The Emirates SkyCargo White Cover Advanced solution provides temperature-controlled pharmaceutical transportation, utilizing IoT sensors. The UAE has enacted several regulatory reforms to streamline cargo operations. Dubai Customs' Authorized Economic Operator (AEO) program simplifies clearance procedures for trusted traders, reducing delays. According to Ziadah (2018), Dubai International Airport and Abu Dhabi International Airport offer comprehensive global connectivity, supported by extensive cargo networks and partnerships. Emirates SkyCargo's 'Cargo Connect' system allows seamless interlining between different carriers. Oman Air Cargo faces stiff competition from these regional giants due to their extensive global networks and innovative solutions. While Oman Air Cargo has expanded its network, regulatory frameworks remain conservative compared to the UAE, limiting its global reach. Comparing Oman with Singapore, the Netherlands, and the UAE highlights specific areas where Oman can improve its air cargo sector. Taderera et al. (2023) noted that streamlining customs procedures, investing in predictive analytics, and adopting collaborative decision-making are crucial steps toward achieving global competitiveness.

The chapter is structured as a series of three main cargo hubs examples, each providing:

- **An overview of the air cargo hub's operations and performance.**
- **An analysis of the key factors contributing to their success.**
- **Identification of specific best practices relevant to Oman's context.**

Following the individual examples, a cross analysis will compare and contrast the three hubs, highlighting common themes, different approaches, and overarching best practices. This comparative perspective will provide a comprehensive understanding of successful strategies adaptable to different contexts and inform the development of tailored recommendations for Oman's air cargo sector in the subsequent chapter.

Example 1: Dubai International Airport

Overview of Air Cargo Operations and Performance

Dubai International Airport (DXB) is one of the world's leading air cargo hubs, handling over 2.2 million tonnes of cargo in 2024, supported by its advanced infrastructure and 24/7 operational capabilities (Dubai Airports, 2024). The airport's operations are closely integrated with the wider logistics ecosystem of Dubai, particularly through seamless connectivity with Jebel Ali Port, which recorded 15.5 million TEUs in 2024, making it one of the largest maritime gateways globally (DP World, 2024). Dubai's strategic location at the intersection of Asia, Europe, and Africa reinforces its role as a global trade gateway, enabling rapid multimodal cargo transfers (TFI, 2024). Infrastructure developments such as Dubai Logistics City and continuous investments in specialized logistics zones have enhanced throughput and attracted international freight operators (Alkaabi and Debbage, 2018). These factors collectively contribute to DXB's performance as a high-capacity, strategically positioned hub that supports large-scale cargo flows across air and sea modalities.

Key Factors Contributing to Success

Table 7: Key Factors Contributing to Success

Key Success Factor	Description
Strategic Location	Dubai's geographical position enables it to serve as a central hub for cargo flows between major regions, particularly Europe, Asia, and Africa.
Infrastructure Integration	The seamless connection between DXB and Jebel Ali Port creates a multimodal transport network, enabling swift transitions between air and sea transport.
Proactive Government Policies	Dubai's government offers a business-friendly environment with incentives to attract global logistics firms, including tax exemptions and simplified customs procedures.

Technological Advancements	DXB consistently invests in the latest logistics technologies to optimize cargo handling and reduce turnaround times.
Global Logistics Firms Presence	Firms like Aramex and Agility have established their regional headquarters and distribution centers in Dubai, further enhancing its role as a logistics hub.

Best Practices Applicable to Oman

Table 8: Best Practices Applicable to Oman

Best Practices Applicable to Oman	Description
Multimodal Transport	Oman should focus on improving the integration of its airports with seaports, particularly through its strategic ports such as Sohar and Salalah. This could replicate the successful air-sea integration seen in Dubai.
Infrastructure Investment	Developing world-class logistics facilities and cargo terminals in Oman's airports would attract global logistics players and enable faster cargo processing.
Business-Friendly Environment	Oman can create a more attractive investment climate for global firms by streamlining regulatory procedures, offering tax incentives, and improving customs processes.

Example 2: Singapore Changi Airport

Overview of Air Cargo Operations and Performance

Singapore Changi Airport is globally recognised for its operational excellence and innovation in air cargo logistics. In 2024, Changi handled approximately 1.99 million tonnes of cargo, representing a 14.6 percent year-on-year increase driven by high-value sectors such as electronics, pharmaceuticals, and e-commerce (Stat Times, 2025; Air Cargo Week, 2025). The airport's

advanced infrastructure includes temperature-controlled terminals and modular cold-chain solutions operated by SATS, enabling efficient handling of perishable and sensitive cargo (Stat Times, 2023; SATS, n.d.). Changi's logistics ecosystem is supported by the Changi Airfreight Centre (CAC) and the Airport Logistics Park of Singapore (ALPS), which provide integrated airside access, bonded warehousing, and customs facilitation within a dedicated free-trade zone (UFL Group, 2025). The airport has also invested significantly in automation, digital platforms, and data analytics to improve cargo visibility and processing speed. Its Cargo Community System, a digital platform connecting various stakeholders, enhances transparency, coordination, and throughput (Air Cargo News, 2022). These strategic capabilities reinforce Changi's position as a leading regional hub for time-sensitive and high-value cargo movements in Southeast Asia.

Key Factors Contributing to Success

Table 9: Key Factors Contributing to Success

Key Factors Contributing to Success	Description
Strategic Geographical Position	Singapore's location in the heart of Southeast Asia makes it a vital transit point for goods moving between Asia, Europe, and the Americas.
Operational Excellence	Changi Airport's world-class infrastructure and advanced cargo handling systems ensure the efficient movement of cargo with minimal delays.
Technological Innovation	The airport consistently adopts the latest digital technologies, including data analytics and automation, to optimize logistics processes.
Strong Regulatory Framework	Singapore provides a transparent, efficient regulatory environment that facilitates smooth customs procedures and promotes free trade.
Industry Collaboration	Changi Airport maintains strong partnerships with airlines, freight forwarders, and logistics companies, ensuring seamless collaboration across the supply chain.

Best Practices Applicable to Oman

Table 10: Best Practices Applicable to Oman

Best Practices Applicable to Oman	Description
Technological Integration	Oman should invest in digital infrastructure to improve cargo handling, including real-time data systems that optimize resource allocation and improve supply chain visibility.
Streamlined Regulatory Processes	Like Singapore, Oman can enhance trade facilitation by simplifying customs procedures and creating a more efficient regulatory framework.
Collaborative Partnerships	Oman can foster partnerships with industry stakeholders, such as airlines and logistics providers, to strengthen its air cargo ecosystem and ensure better service delivery.

Example 3: Amsterdam Airport Schiphol & The Netherlands' Logistics Ecosystem

Overview of Air Cargo Operations and Performance

Amsterdam Airport Schiphol is a key node in Europe's logistics network, facilitating both intra-European and international cargo flows. In 2023, the airport handled approximately 1.38 million tonnes of cargo, supported by more than 15,000 dedicated freighter movements alongside belly freight operations (Schiphol Group, 2023). Its strong multimodal connectivity is underpinned by direct integration with the Netherlands' road, rail, and maritime systems, particularly through the Port of Rotterdam, enabling efficient and continuous cargo transfers (Topsector Logistiek, 2022). Schiphol specialises in high-value and time-sensitive cargo, including pharmaceuticals, perishables, and electronics. The airport has also committed to sustainability-focused logistics by investing in energy-efficient warehousing, digital clearance systems, and collaborative green supply chain practices (Sustainability in the Rhine Scheldt Delta, 2021; Schiphol Group, 2024). Initiatives such as the Smart Cargo Mainport Program enhance real-time data sharing, reduce

processing time, and support sustainable intermodal transport. These features establish Schiphol as one of Europe's most efficient and environmentally responsible air cargo hubs.

Key Factors Contributing to Success

Table 11: Key Factors Contributing to Success

Key Factors Contributing to Success	Description
Multimodal Connectivity	Schiphol benefits from an extensive network of roads, railways, and waterways, enabling efficient transfers between air, road, and sea transport.
Proximity to the Port of Rotterdam	The close relationship with Europe's largest seaport allows goods arriving by sea to be quickly transferred to Schiphol for air distribution, enhancing overall supply chain efficiency.
Sustainability Focus	The Netherlands is a leader in green logistics, with Schiphol adopting eco-friendly practices such as energy-efficient cargo handling and promoting the use of alternative fuels.
Government and Industry Collaboration	The success of Schiphol is built on strong collaboration between public authorities, private companies, and research institutions, driving innovation and sustainability.
Digital Integration	Advanced logistics IT systems enable real-time tracking and efficient management of cargo flows, improving operational efficiency.

Best Practices Applicable to Oman

Table 12: Best Practices Applicable to Oman

Best Practices Applicable to Oman	Description

Multimodal Infrastructure Development	Oman should prioritize building a multimodal transport network that links its air cargo hubs with seaports, rail, and road networks, similar to Schiphol's integration with the Port of Rotterdam.
Sustainable Logistics	Oman can adopt green logistics practices by investing in energy-efficient technologies and promoting the use of environmentally friendly transport modes, aligning with global trends toward sustainability.
Public-Private Partnerships	Oman should encourage collaboration between the government, logistics providers, and academic institutions to foster innovation and build a competitive logistics ecosystem.
Digital Logistics Systems	Investing in advanced IT systems to track cargo and manage logistics operations will help Oman improve efficiency and attract international trade flows.

Comparative Analysis and Implications for Oman

The analysis of the three global air cargo hubs , Dubai, Singapore, and Amsterdam , offers valuable insights into the key factors that have contributed to their success. Despite the differences in their strategies, these hubs share several common characteristics that have played a pivotal role in shaping their competitiveness. These include a strategic geographical location, robust and well-developed infrastructure, continuous technological innovation, and strong collaborative partnerships between public and private sector stakeholders.

However, each of these hubs has adopted a unique approach in maximizing its competitive advantage. Dubai, for instance, has strategically focused on integrating air and sea transport, capitalizing on its prime geographical location to position itself as a central node for global trade. Its seamless connection between Dubai International Airport (DXB) and Jebel Ali Port has created a highly efficient multimodal transport network, enabling swift transitions between air and sea cargo movements.

In contrast, Singapore has built its success on operational excellence and innovation, with a particular emphasis on high-value sectors such as electronics and pharmaceuticals. Singapore Changi Airport has invested heavily in advanced cargo handling systems and digital technologies, allowing for optimized logistics processes and minimal delays. The country's strong regulatory

framework and commitment to free trade have further enhanced its attractiveness as a global logistics hub.

Meanwhile, Amsterdam Airport Schiphol has prioritized developing extensive multimodal connectivity and promoting sustainability within its logistics operations. Its proximity to the Port of Rotterdam, Europe's largest seaport, allows for efficient transfers between sea and air transport, enhancing overall supply chain efficiency. Additionally, Amsterdam's success is strongly supported by close collaboration between government bodies, private sector operators, and research institutions, all working together to foster innovation and sustainable logistics practices.

Drawing on these international best practices, several strategic recommendations can be proposed for Oman to enhance its air cargo sector. Firstly, Oman should prioritize strategic infrastructure investment, particularly in developing multimodal connectivity that links its airports with key seaports, rail networks, and road systems. Strengthening these connections will significantly improve the efficiency of cargo movements and support the country's ambition to become a regional logistics hub.

Secondly, embracing innovation and technology is essential. Investing in advanced logistics IT systems, real-time data platforms, and digitalization initiatives will help Oman improve operational efficiency, enhance customer experience, and increase its competitiveness in the air cargo sector.

Thirdly, regulatory reforms are crucial to creating a more business-friendly environment. Establishing efficient customs procedures, simplifying regulatory processes, and aligning with international trade standards will attract more global logistics firms to operate within Oman.

Finally, fostering stakeholder collaboration is vital for ensuring sustainable growth. Encouraging partnerships between government agencies, private logistics companies, and academic institutions will drive innovation, facilitate knowledge sharing, and create a more cohesive logistics ecosystem.

By adopting these strategies, Oman will be well-positioned to enhance its air cargo capabilities, strengthen its role in global supply chains, and support its broader economic diversification objectives as outlined in Oman Vision 2040.

Benchmarking Summary table

Table 13:Benchmarking Summary table

Aspect	Dubai International Airport	Singapore Changi Airport	Amsterdam Airport Schiphol	Implications for Oman
Strategic Location	Crossroads between Europe, Asia, and Africa	Central location in Southeast Asia	Central location in Europe, synergy with Port of Rotterdam	Leverage strategic location to become a key global trade gateway
Infrastructure and Logistics	Advanced infrastructure, integrated with Jebel Ali Port	State-of-the-art cargo terminals, advanced handling capabilities	Extensive multimodal connectivity (air, road, rail, sea)	Develop integrated transport infrastructure connecting ports and airports
Innovation and Technology	Focus on technology to enhance efficiency and customer experience	Leader in digitalization and data analytics	Advanced logistics IT systems for real-time tracking and efficient cargo management	Embrace digitalization and invest in advanced logistics IT systems
Regulatory Environment	Business-friendly, attractive incentives for global logistics players	Efficient customs procedures, commitment to free trade	Effective policies and planning by port authorities and government	Create a transparent and business-friendly regulatory environment
Stakeholder Collaboration	Engages major regional logistics firms	Strong partnerships with airlines,	Exemplary public-private partnerships	Foster public-private partnerships and

		freight forwarders, ground handling companies	involving government, private sector, research bodies	industry collaboration
Sustainability Focus			Emphasis on green logistics and circular economy	Implement green logistics practices and promote a circular economy
Scale and Scope	Large scale, integrating maritime and air cargo	Focus on operational excellence and innovation	Focus on multimodal connectivity and sustainability	Prioritize large-scale, integrated logistics infrastructure
Focus Areas	Economic diversification, leveraging strategic location for global trade	Innovation and service quality, catering to high-value industries like electronics	Sustainability, green logistics, and circular economy	Align air cargo development with broader economic diversification strategies
Regulatory and Economic Approach	Proactive, flexible regulatory environment to attract international logistics players	Transparent, efficient regulatory framework promoting ease of doing business	Comprehensive policies addressing economic and environmental concerns	Streamline customs procedures, reduce bureaucratic hurdles

These best practices directly inform strategic recommendations for Oman, addressing the challenges identified in the Cargo Volumes Analysis and providing a roadmap for sector growth.

Following this examination of global best practices, the next section will present the survey results, offering quantitative insights into the perspectives and priorities of Oman's air cargo stakeholders.

4.3 Survey Results

Introduction

The primary aim of this research is to explore strategies for revitalizing Oman's air cargo sector, with a particular focus on stakeholder alignment and inter-sectoral collaboration. To address the research objectives comprehensively, a survey was selected as one of the primary data collection methods. The survey was distributed to 120 participants, achieving a response rate of 71.67%. This method was appropriate for the study's research questions for several key reasons.

The survey targeted a total of 120 participants directly involved in Oman's air cargo and related sectors. The initial 20 managers and senior professionals were selected through purposeful sampling, based on their strategic roles in cargo operations, regulatory oversight, airport terminal management, and logistics coordination. These individuals were accessed through a combination of professional networks, industry contacts, and referrals facilitated by the researcher's affiliation with the Civil Aviation Authority and related national logistics committees. Their positions included cargo terminal directors, freight forwarding managers, airline cargo officers, logistics consultants, and regulatory specialists.

Each of these 20 participants was then asked to distribute the survey to five operational staff members within their respective organisations. These secondary participants were selected randomly from teams involved in ground handling, customs coordination, import/export documentation, and supply chain management. This two-stage approach ensured both strategic and operational perspectives were captured. Out of the 120 distributed surveys, 86 responses were received, yielding a response rate of 71.67%. This high response rate provided a reliable and diverse data set aligned with the research objectives, especially those exploring stakeholder alignment, inter-sectoral collaboration, and operational challenges in Oman's air cargo sector.

The survey enabled the collection of both quantitative and qualitative data, which were essential for gaining a comprehensive understanding of the sector's challenges and opportunities. By using a mixed-methods approach, the survey provided not only numerical insights through multiple-choice and rating-scale questions but also rich, qualitative feedback through open-ended responses.

This allowed for a more nuanced analysis that could capture the depth and breadth of perspectives on the air cargo sector's current state.

Additionally, the survey facilitated access to a large and diverse group of stakeholders, ensuring broad representation across different sectors involved in air cargo. This diversity was crucial for capturing the varied viewpoints of individuals working in aviation, logistics, regulatory bodies, and related industries. The high response rate ensured that the findings were representative and provided a reliable foundation for further analysis.

The structured format of the survey was particularly suited for exploring issues related to stakeholder alignment and collaboration. By asking consistent questions across participants, the survey made it possible to directly compare responses from different groups, thus highlighting areas of agreement and misalignment between stakeholders. This data provided valuable insights into how different entities perceive their roles and responsibilities in the air cargo ecosystem.

Moreover, the survey was a time- and resource-efficient method, allowing the collection of comprehensive data from a large sample in a relatively short timeframe. Given the scope of the research and the number of participants involved, the survey was the most practical method for gathering data while ensuring a balance between depth and coverage.

Finally, the use of a survey was instrumental in identifying general trends and patterns across the sector. These trends, particularly in areas such as operational challenges, regulatory barriers, and collaboration efforts, formed the basis for proposing actionable strategies aimed at enhancing the sector’s competitiveness. The survey findings provided a broad overview of the issues at hand, which was later complemented by more in-depth insights from the interviews.

This section presents the survey findings, beginning with respondent demographics, followed by multiple-choice question results, an analysis of open-ended responses, and an integration of these findings into the broader context of the research objectives

Demographics of Respondents

Q1: What is your involvement with the air cargo or aviation sector?

- **Direct involvement in air cargo**: 29.07% (25 responses)
- **Involved in aviation**: 31.40% (27 responses)
- **Part of government or policy-making**: 12.79% (11 responses)
- **General awareness**: 12.79% (11 responses)
- **No direct involvement**: 13.95% (12 responses)

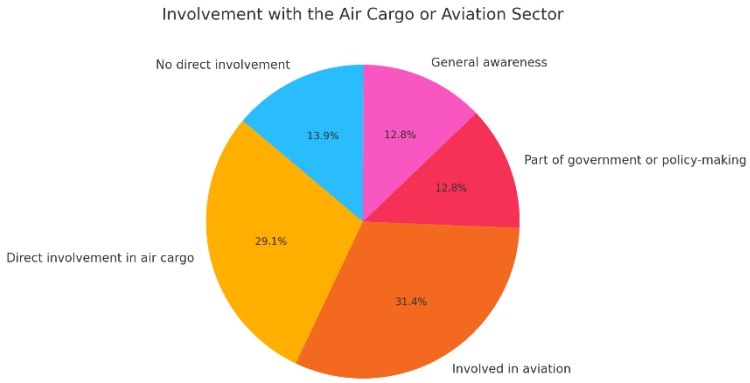


Figure 9: Respondents' Involvement with the Air Cargo or Aviation Sector

A significant portion of the respondents are directly involved in the air cargo or aviation sector, with a combined 60.47% indicating either direct involvement in air cargo or aviation. This confirms that the survey successfully reached participants with practical experience and sector-specific insights.

The remaining 39.53% of respondents included individuals working in government or policy-making roles (12.79%), those with general awareness (12.79%), and those reporting no direct involvement (13.95%). While the latter category may not participate in daily air cargo operations, they were selected based on their indirect or adjacent sector relevance, including roles in agriculture, fisheries, trade facilitation, customs, IT logistics solutions, and investment promotion, all of which interface with the air cargo ecosystem. Their responses provided valuable insights into inter-sectoral collaboration, regulatory awareness, and external stakeholder expectations.

Their inclusion aligns with the study's objective of exploring stakeholder alignment and cross-sector collaboration, and adds depth to the understanding of how non-aviation actors perceive the effectiveness and integration of Oman's air cargo sector.

Q2: How many years have you been associated with or aware of the air cargo sector?

- **<1 year**: 22.35% (19 responses)
- **1-5 years**: 18.82% (16 responses)
- **6-10 years**: 14.12% (12 responses)
- **10 years and above**: 44.71% (38 responses)

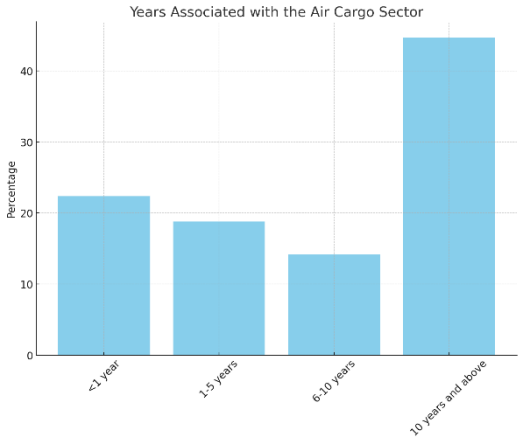


Figure 10: Respondents' Years of Association with the Air Cargo Sector

The majority of respondents (44.71%) have over ten years of experience or awareness in the air cargo sector, indicating a well-informed participant base. This experience distribution suggests that the insights and feedback are grounded in substantial industry experience, which is valuable for understanding long-term trends and challenges.

Q3: Which describes your role best in relation to the air cargo sector?

- **Operational**: 28.24% (24 responses)
- **Strategic Planning**: 28.24% (24 responses)
- **Policy Making**: 8.24% (7 responses)
- **Research/Academic**: 3.53% (3 responses)
- **Other**: 31.76% (27 responses)

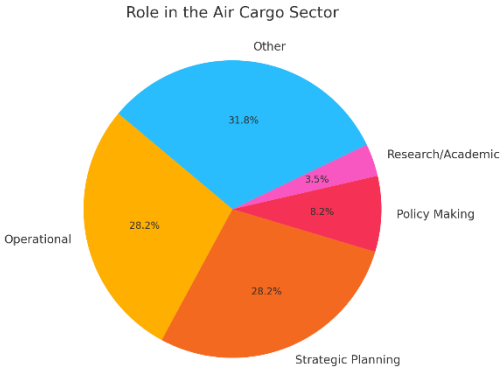


Figure 11: Respondents' Roles in the Air Cargo Sector

The majority of respondents (58.82%) are involved in strategic planning, highlighting a significant focus on long-term goals and the overall direction of the sector. Operational roles account for 28.24%, indicating a substantial proportion of respondents are engaged in the day-to-day functioning of air cargo activities. Policy making and

research/academic roles are represented by smaller percentages (8.24% and 3.53% respectively), reflecting the specialized nature of these areas.

Q4: In which geographic region of Oman do you primarily operate or focus in terms of air cargo activities?

- **Muscat**: 73.26% (63 responses)
- **Dhofar**: 5.81% (5 responses)
- **Batinah**: 1.16% (1 response)
- **Dakhiliyah**: 0.00% (0 responses)
- **Other**: 4.65% (4 responses)
- **Not applicable**: 15.12% (13 responses)

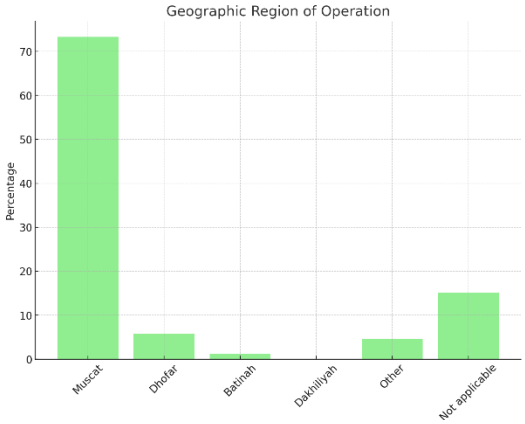


Figure 12: Geographic Region of Operation of Respondents

A substantial majority of the respondents (73.26%) are based in Muscat, which is the primary hub for air cargo activities in Oman. The distribution suggests that Muscat is central to the air cargo sector, with limited representation from other regions like Dhofar and Batinah. This concentration could indicate regional disparities in air cargo infrastructure and activities.

Q5: How would you rate the overall performance of Oman's air cargo sector?

- **Very Poor**: 2.33% (2 responses)
- **Poor**: 16.28% (14 responses)
- **Average**: 56.98% (49 responses)
- **Good**: 20.93% (18 responses)
- **Excellent**: 3.49% (3 responses)

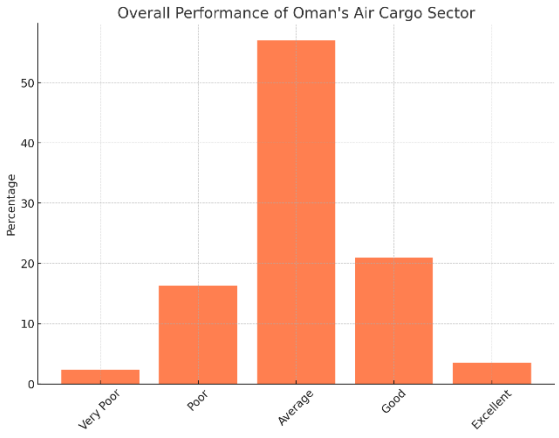


Figure 13: Respondents' Assessment of the Overall Performance of Oman's Air Cargo Sector

The majority of respondents (56.98%) rate the performance of Oman's air cargo sector as average, with a significant portion (20.93%) rating it as good. Only a small fraction (3.49%) rate it as excellent, while 16.28% consider it poor, and 2.33%

very poor. This distribution indicates that while there is room for improvement, there is a general sense of satisfactory performance within the sector.

The survey results provide a comprehensive overview of the perspectives of individuals involved in Oman's air cargo sector. The majority of respondents have significant experience and are directly involved in operational or strategic roles, primarily based in Muscat. While the overall performance of the sector is rated as average to good, there is a clear indication of areas needing improvement to achieve higher satisfaction levels among stakeholders.

Findings from Multiple Choice Questions

Q6: What are the root causes of low cargo volumes and imbalanced import-export ratios in Oman?

Answer Choices and Responses:

- **Lack of diversified markets**: 66.67% (54 responses)
- **Inadequate infrastructure**: 16.05% (13 responses)
- **Regulatory constraints**: 17.28% (14 responses)

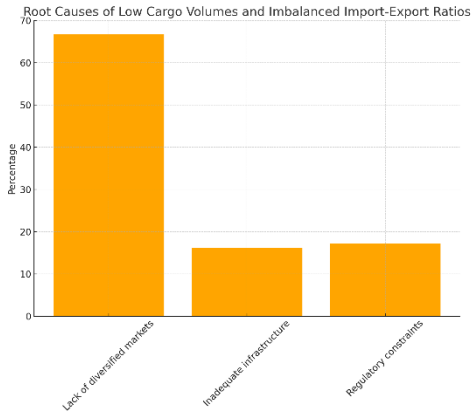


Figure 14: Root Causes of Low Cargo Volumes and Imbalanced Import-Export Ratios

A significant majority of respondents (66.67%) identified the lack of diversified markets as the primary root cause of low cargo volumes and imbalanced import-export ratios in Oman. This highlights a critical area for development in expanding the range of markets and industries within the country.

Additional comments from respondents provided further insights:

1. **Lack of Industrial Production**: Some respondents emphasized the need for increased industrial production in Oman to boost export volumes. The suggestion to focus on transit cargo and establish Oman as a hub for cargo operations was also mentioned, indicating that strategic positioning and stronger airline operations with wide-body aircraft and freighters are essential.

Example: "Lack of industrial production in case of export, the only way to increase and boost volume is through transit cargo making Oman a hub, which cannot happen unless you have strong airline operating multi sectors with wide body and freighters."

2. **Need for Production Lanes**: There were suggestions to develop production lanes for specific products, such as garments, seafood, and re-export goods. This would help create a more robust export base.

Example: "Oman had to focus more on having some production lanes for garments (like Bangladesh) and other products, seafood, and re-export."

3. **Market Size and Competition**: Some respondents pointed out that Oman's small market size and high competition intensity are significant barriers to increasing cargo volumes.

Example: "Oman's small market, and the high intensive competition."

4. **Aircraft Capacity**: The use of small, narrow-body aircraft was mentioned as a limitation, suggesting the need for larger aircraft to handle more significant cargo volumes.

Example: "Small narrow body aircrafts."

5. **Comprehensive Challenges**: One respondent indicated that all listed factors contribute to the issue, reinforcing the need for a multifaceted approach to addressing these challenges.

Example: "All above."

The survey identified the root causes of low cargo volumes and imbalanced import-export ratios in Oman as primarily stemming from the lack of diversified markets (66.67%), with additional challenges including inadequate infrastructure (16.05%) and regulatory constraints (17.28%).

Q7: Identify the biggest challenge facing Oman's air cargo sector.

- **Infrastructure**: 19.77% (17 responses)
- **Policy and Regulation**: 29.07% (25 responses)
- **Market Demand**: 69.77% (60 responses)
- **Technology**: 4.65% (4 responses)
- **Collaboration**: 37.21% (32 responses)
- **Other (please specify)**: 9.30% (8 responses)

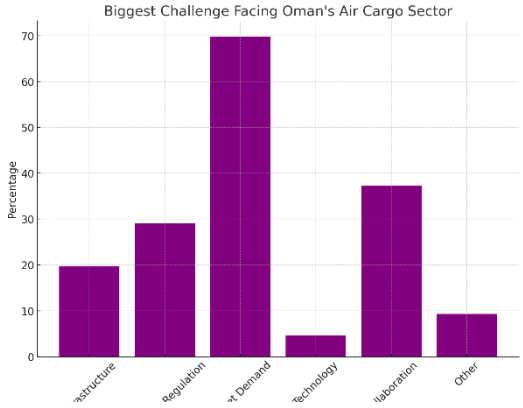


Figure 15: Biggest Challenges Facing Oman's Air Cargo Sector

Market demand is identified as the biggest challenge, with nearly 70% of respondents highlighting it.

Q8: Are you aware of the development plans like free zones around airports?

- **Yes, fully aware**: 36.05% (31 responses)
- **Somewhat aware**: 53.49% (46 responses)
- **Not aware**: 10.47% (9 responses)

The majority of respondents are aware of development plans such as free zones around airports, with 36.05% fully aware and 53.49% somewhat aware. This indicates a good level of awareness about strategic development initiatives, which is essential for garnering support and participation from various stakeholders.

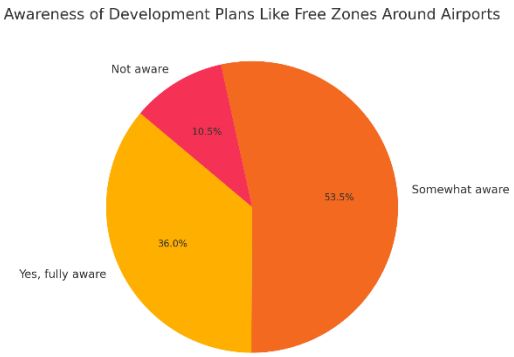


Figure 16: Awareness of Development Plans Like Free Zones Around Airports

Q9: In your view, what is the most effective strategy to enhance Oman's air cargo sector?

- **Infrastructure Development**: 24.42% (21 responses)
- **Policy Reforms**: 24.42% (21 responses)
- **Market Expansion**: 65.12% (56 responses)
- **Technology Integration**: 20.93% (18 responses)
- **Stakeholder Collaboration**: 56.98% (49 responses)
- **Other (please specify)**: 11.63% (10 responses)

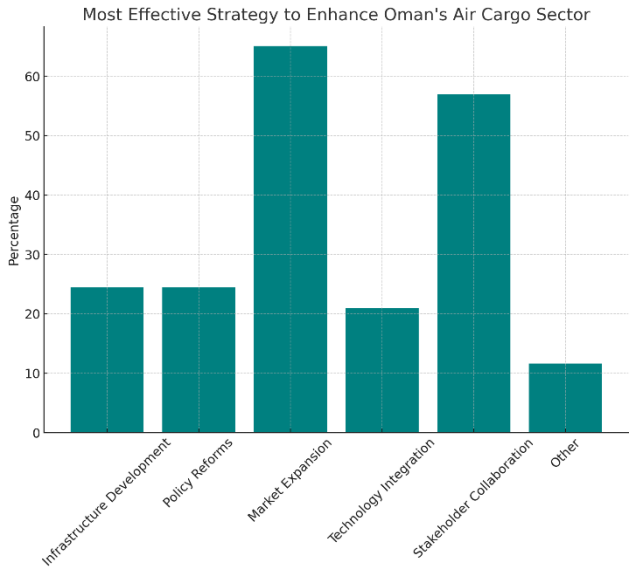


Figure 17: Most Effective Strategies to Enhance Oman's Air Cargo Sector

Market expansion was identified by 65.12% of respondents as the most effective strategy to enhance Oman's air cargo sector. Stakeholder collaboration (56.98%) and infrastructure development (24.42%) were also highlighted as critical strategies, with technology integration receiving support from 20.93% of respondents

Q10: Rate the importance of inter-sectoral collaboration for the air cargo sector.

- **Not Important**: 0.00% (0 responses)
- **Somewhat Important**: 2.33% (2 responses)
- **Important**: 22.09% (19 responses)

- **Very Important**: 33.72% (29 responses)
- **Essential**: 41.86% (36 responses)

A significant majority of respondents (75.58%) consider inter-sectoral collaboration to be either very important or essential. This underscores the necessity of cooperation among various sectors to address challenges and leverage opportunities in the air cargo sector. The absence of responses indicating that collaboration is not important highlights the universal recognition of its value.

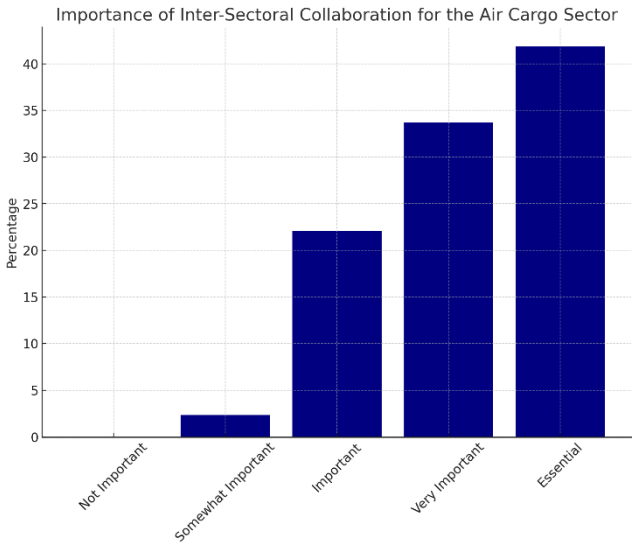


Figure 18: Importance of Inter-Sectoral Collaboration for the Air Cargo Sector

Q11: What potential impact do you foresee from the development of free zones around airports?

- **No Impact**: 1.16% (1 response)
- **Minor Impact**: 3.49% (3 responses)
- **Moderate Impact**: 18.60% (16 responses)
- **Major Impact**: 53.49% (46 responses)
- **Transformational Impact**: 23.26% (20 responses)

The development of free zones around airports is anticipated to have a significant positive impact, with 53.49% of respondents predicting a major impact and 23.26% foreseeing a transformational impact.

Q12: How can technological advancements specifically benefit Oman's air cargo sector?

- **Efficiency Improvement**: 81.40% (70 responses)
- **Cost Reduction**: 52.33% (45 responses)
- **Expanding Reach**: 46.51% (40 responses)

- **Enhancing Safety**: 31.40% (27 responses)
- **Other (please specify)**: 1.16% (1 response)

The survey revealed that 73.26% of respondents primarily operate in Muscat, reflecting its role as the central hub for air cargo activities in Oman. When asked to identify the root causes of low cargo volumes, 66.67% cited the lack of diversified markets, followed by 17.28% citing regulatory constraints. Regarding strategies for improvement, 65.12% emphasized market expansion as the most effective approach.

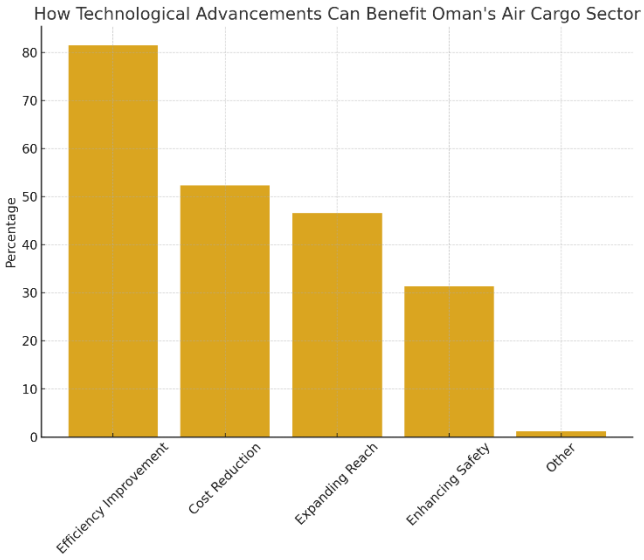


Figure 19: How Technological Advancements Can Benefit Oman's Air Cargo Sector

Q13: What is the key opportunity for Oman's air cargo sector in the next 5 years?

- **Expanding Global Reach**: 72.09% (62 responses)
- **Embracing Technological Innovations**: 29.07% (25 responses)
- **Enhancing Policy Framework**: 30.23% (26 responses)
- **Collaborative Ventures**: 46.51% (40 responses)
- **Other (please specify)**: 4.65% (4 responses)

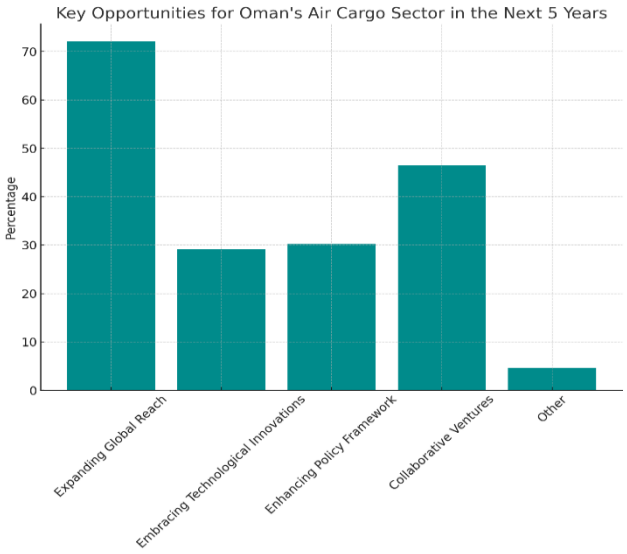


Figure 20: Key Opportunities for Oman's Air Cargo Sector in the Next 5 Years

Expanding global reach was identified as the key opportunity for Oman's air cargo sector over the next five years, with 72.09% of respondents highlighting its importance. Collaborative ventures were noted by 46.51% of respondents, while

enhancing the policy framework (30.23%) and embracing technological innovations (29.07%) were also identified as opportunities, though less frequently.

Q14: Can you describe the main challenges currently facing Oman's air cargo sector compared with regional trends?

- **Global market trends**: 54.88% (45 responses)
- **Geopolitical events**: 4.88% (4 responses)
- **Infrastructure limitations**: 21.95% (18 responses)
- **Regulatory barriers**: 18.29% (15 responses)

The responses highlight several key challenges facing Oman's air cargo sector in comparison with regional trends. Over half of the respondents (54.88%) cited global market trends as a primary challenge, indicating that Oman's air cargo sector is significantly impacted by broader economic conditions, trade patterns, and competitive dynamics in the global marketplace. Infrastructure limitations were identified by 21.95% of respondents, suggesting that existing facilities and logistical capabilities are inadequate to meet current and future demands. This aligns with earlier findings where infrastructure development was emphasized as a critical strategy for sector enhancement. Regulatory barriers were mentioned by 18.29% of respondents, indicating that complex and restrictive regulations hinder the growth and efficiency of the air cargo sector. This is consistent with feedback on the need for policy reforms and streamlined regulatory processes. Lastly, geopolitical events, though less frequently cited (4.88%), still pose a challenge, as they can disrupt trade routes, affect market stability, and create uncertainty that impacts cargo operations.

Additional Comments from the open box:

Table 14: Additional Comments from the open box

Theme	Comment
Maturity of Regional Air Cargo Sectors	"One respondent pointed out the maturity of neighboring air cargo sectors as a challenge, suggesting that Oman needs to catch up with more developed regional players."
National Carrier Operations	"The limited operation of the national carrier was mentioned, highlighting the need for Oman Air to increase its focus on air cargo potential and expand its fleet with freighters and wide-body aircraft."
Clear Strategy and Dedicated Team	"The availability of a clear strategy with a dedicated team or organization working on it was identified as crucial. This indicates the need for focused and coordinated efforts to drive the sector's development."
Export Volumes	"Lack of export volumes was noted as a challenge, underscoring the need to boost production and create more export opportunities."
Complex Regulations	"Complicated rules and policies were mentioned, reinforcing the need for regulatory simplification and reform."
Focus on Transit Cargo	"A respondent emphasized the importance of focusing on transit cargo to compensate for the limited local market demand. This can be achieved through a strong Oman Air network and sufficient aircraft capacity, particularly wide-body aircraft."
Technology adaption	"We understand the importance of digital tools, but the expertise and resources required for their implementation remain a challenge."

The main challenges facing Oman's air cargo sector, as identified by respondents, include global market trends, infrastructure limitations, regulatory barriers, and the maturity of regional competitors.

Q15: How do you feel about the future prospects of Oman's air cargo sector?

- **Very Pessimistic**: 0.00% (0 responses)
- **Pessimistic**: 6.98% (6 responses)

- **Neutral**: 29.07% (25 responses)
- **Optimistic**: 43.02% (37 responses)
- **Very Optimistic**: 20.93% (18 responses)

The majority of respondents have a positive outlook on the future prospects of Oman's air cargo sector, with 43.02% feeling optimistic and 20.93% feeling very optimistic. This optimistic sentiment is a positive indicator of confidence in the sector's potential for growth and development. A neutral stance is held by 29.07% of respondents, while only a small fraction (6.98%) are pessimistic.

Q16: What impact do you think increased regional collaboration in the Middle East will have on Oman's air cargo sector?

- **No Impact**: 2.33% (2 responses)
- **Minor Impact**: 3.49% (3 responses)
- **Moderate Impact**: 29.07% (25 responses)
- **Major Impact**: 55.81% (48 responses)
- **Transformational Impact**: 9.30% (8 responses)

Increased regional collaboration in the Middle East is expected to have a substantial positive impact on Oman's air cargo sector. A majority of respondents (55.81%) believe it will have a major impact, while 9.30% foresee a transformational impact.

Q17: What factors contribute to the underutilization of cargo terminals in Oman?

- **Operational inefficiencies**: 32.91% (26 responses)
- **Lack of technological integration**: 13.92% (11 responses)
- **Inadequate management practices**: 53.16% (42 responses)

The responses highlight several key factors contributing to the underutilization of cargo terminals in Oman. Over half of the respondents (53.16%) identified inadequate management practices as a primary factor, suggesting issues with strategic planning, resource allocation, and operational

oversight at the terminals. Operational inefficiencies were cited by 32.91% of respondents, indicating that problems with day-to-day operations, such as delays, poor coordination, and suboptimal processes, hinder effective utilization. Additionally, 13.92% of respondents pointed to the lack of technological integration as a contributing factor, highlighting the potential for advanced technologies to improve efficiency and utilization rates.

Additional Comments: Factors Contributing to the Underutilization of Cargo Terminals in Oman

Table 15: Additional Comments: Factors Contributing to the Underutilization of Cargo Terminals in Oman

Theme	Comment
Demand and Market Diversification	"One respondent noted that demand and lack of a diversified market are critical issues. This suggests that the current market demand does not justify the existing terminal capacity, and there is a need to explore and develop new market opportunities."
Capacity vs. Connectivity	"Another respondent highlighted that the existing capacity can handle much more than the current demand. They emphasized that building capacity alone will not drive demand without improving connectivity. Example: 'The existing capacity can handle 350k tonnes while current demands stood at 170k. Building capacity or effect will not drive demand since the connectivity is not there.'"
Collaboration Across Sectors	"Multiple respondents mentioned the lack of collaboration among different sectors and stakeholders. Improved coordination and joint efforts could help create demand and optimize terminal utilization. Example: 'Lack of collaboration aiming to create demand between sector stakeholders.'"
Market Size and Supply-Demand Dynamics	"The size of the market and the balance between supply and demand were also identified as contributing factors. Limited national carriers' operations and insufficient commercial markets were specifically mentioned. Example: 'Less volume of cargo, insufficient commercial markets.'"

The underutilization of cargo terminals in Oman is attributed to several factors, with inadequate management practices being the most significant, followed by operational inefficiencies and a lack of technological integration. Additional comments highlight the importance of market diversification, improved connectivity, and collaboration among stakeholders.

Analysis of Open-Ended Questions

In response to the open-ended question, "Please share any additional thoughts on improving Oman's air cargo sector," participants provided valuable insights that have been categorized into themes aligned with the thesis objectives and research questions.

Key Challenges: Participants highlighted several key challenges impacting the sector. Over half (54.88%) cited global market trends as a significant factor, with infrastructure limitations (21.95%) and regulatory barriers (18.29%) also frequently mentioned. Some noted the need to diversify markets and improve connectivity, with a few respondents stressing that the current capacity exceeds demand, making further capacity building ineffective without addressing connectivity.

Opportunities: Suggestions for improvement focused on market diversification, expanding international connections, and developing sea-to-air cargo capabilities, particularly at Salalah Airport and Raysut Port. Participants emphasized the potential of Oman’s strategic location to serve as a logistics hub for the Middle East and beyond.

Stakeholder Alignment: Clear strategy and stakeholder collaboration were recurring themes. Respondents called for stronger leadership, more unified efforts among stakeholders, and better inter-sectoral collaboration, particularly across logistics, fisheries, and agriculture, to drive demand and optimize the sector’s performance.

Actionable Strategies: Participants recommended focusing on effective management, technological advancements, infrastructure development, and regulatory reforms. They also highlighted the importance of cost-competitive pricing and the need to simplify customs processes to attract more business.

The additional comments and insights provided by the respondents emphasize a multifaceted approach to improving Oman's air cargo sector. Key recommendations include leveraging professional vision and strategic planning, enhancing collaboration and unity among stakeholders, focusing research efforts, and learning from global and regional best practices. Investments in

widebody freighters, infrastructure development, and improving connectivity are essential. Engaging the public and media, along with a customer-centric approach, can further enhance the sector's growth and competitiveness.

Conclusion

The survey results provide a comprehensive insight into the current state and future potential of Oman's air cargo sector. The data reveals that while there is significant involvement and experience within the sector, several critical challenges need to be addressed to achieve growth and competitiveness. These challenges include a lack of diversified markets, inadequate infrastructure, and regulatory constraints.

Key opportunities identified include market expansion, technological integration, and enhanced stakeholder collaboration. The emphasis on the importance of inter-sectoral collaboration and the development of free zones around airports indicates a clear pathway for strategic development. Moreover, the positive outlook of the majority of respondents towards the future of the sector is encouraging, suggesting that with the right strategies, Oman can position itself as a leading air cargo hub in the region.

The additional insights from open-ended responses underscore the need for focused strategic planning, improved connectivity, and the adoption of global best practices. By leveraging these insights, Oman can enhance its air cargo sector, driving economic growth and expanding its global reach.

The quantitative insights from the survey complement the upcoming qualitative findings from interviews, which will provide in-depth perspectives on sectoral challenges and opportunities. Following this quantitative foundation, the next section will present the Interview Findings, offering a deeper exploration of the sector’s potential for growth through stakeholder insights and lived experiences.

4.4 Interview Findings

This section presents insights gathered from 15 interviews with experts from the air cargo, aviation, technology, agriculture, fisheries, logistics, tourism, and regulatory sectors in Oman. These interviews were conducted to explore challenges and opportunities in Oman's air cargo sector, examine stakeholder alignment and collaboration, and identify strategies for enhancing the sector's competitiveness. The findings presented here are based on a manual thematic analysis of the interview data, where key themes were identified, coded, and organized to align with the research questions and interview objectives. First, the discussion of the results relating to the key factors affecting the performance of Oman's air cargo sector will be presented. This theme included the challenges and opportunities identified through interviews. Following this, this section will focus on the impact of stakeholder alignment and inter-sectoral collaboration. The last part will also explore actionable strategies for enhancing competitiveness in Oman's air cargo sector.

Full anonymized interview transcripts are available upon request and stored securely in accordance with university data policies.

Overview of Interviews

The interview process was a crucial component of the study, involving 14 structured and 1 semi-structured interviews with experts across sectors relevant to Oman's air cargo industry. The structured interviews provided a consistent exploration of key research objectives, while the semi-structured interview allowed participants to expand on specific topics, offering deeper insights into particular areas of expertise. The Semi structured interview was based on the participant request.

Rationale for Interviews

Interviews were selected as the primary method for qualitative data collection to capture the in-depth perspectives and nuanced understanding that were essential to addressing the complexities of the air cargo sector in Oman. While the survey data provided a quantitative overview, the interviews offered qualitative insights into areas such as regulatory dynamics, infrastructure utilization, and inter-sectoral collaboration, which could not be fully captured through surveys

alone. This approach was critical in identifying stakeholder alignment issues, sectoral collaboration, and global best practices.

Participant Overview

The 15 participants represented a wide range of industries, ensuring diverse perspectives on the air cargo sector and guided by the Stakeholders approach. Participants included government officials, logistics providers, industry experts, and representatives from regulatory bodies, providing comprehensive insights into the sector's challenges and opportunities. This diversity allowed for a thorough exploration of issues related to infrastructure, stakeholder collaboration, and competitiveness.

Interview Structure

The interviews were structured around three main research objectives:

1. **Challenges and Opportunities** within Oman's air cargo sector.
2. **Stakeholder Alignment and Collaboration** across various sectors.
3. **Actionable Strategies** for enhancing the competitiveness of the sector through global best practices.

The structured interviews ensured consistency in addressing these objectives, while the semi-structured interviews provided additional depth, allowing participants to elaborate on specific topics or raise new issues. See Appendix 3 for the interview questions.

Table 16 provides a detailed summary of the 15 interviews conducted, including participant ID, sectoral affiliation, duration, interview type, and format. The diversity of sectors represented, from regulatory and logistics to agriculture and technology, ensured a comprehensive perspective on Oman's air cargo ecosystem. Most interviews were structured and completed via email, while one participant requested a semi-structured voice-recorded interview.

Table 16: Overview of Interview Participants by Sector, Format, and Interview Type

Interviewee (P#)	**Sector**	**Role**	**Interview Type**	**Format**
P1	Airport	Senior Manger	Structured	Email
P2	Ground Handling	Operation Manger	Structured	Email
P3	Agriculture	Director	Structured	Email
P4	Logistics	Senior Director	Structured	Email
P5	Freezone/ Logistics	Executive Manager	Structured	Email
P6	Regulatory	Director General	Structured	Email
P7	Cargo Handling	Strategy Manger	Structured	Email
P8	Freezone / regulatory/ Logistics	Operation Manager	Structured	Email
P9	Tourism	Executive Director	Structured	Email
P10	Airport	Senior Manager	Structured	Email
P11	Fisheries	Senior Director	Structured	Email

P12	Regulatory	Policy Maker	Structured	Email + Voice recorded and transcribed
P13	Oman Vision 2040	Senior Manager	Structured	Email
P14	Technology	Director	Structured	Email + Voice recorded and transcribed
P15	Airport	Chief Executive Officer	Semi-structured	Voice recorded and transcribed

Thematic Analysis

Thematic analysis was conducted manually to ensure a grounded interpretation of interview data, directly aligned with the research objectives and guiding questions. A total of 15 interviews were analyzed, and emergent insights were grouped into three overarching themes: (1) Key Factors Affecting the Performance of Oman's Air Cargo Sector, (2) Impact of Stakeholder Alignment and Inter-sectoral Collaboration on Oman's Air Cargo Sector, and (3) Global Best Practices and Adaptable Strategies. These themes are supported by rich qualitative evidence drawn directly from participants across government, private sector, and logistics operations. Detailed quotes are available in Appendix 9.

Theme 1. Key Factors Affecting the Performance of Oman's Air Cargo Sector

1.1 Challenges Facing Oman's Air Cargo Sector

Participants identified a range of structural and operational challenges constraining the growth and performance of Oman's air cargo sector. These challenges were grouped into six key subcategories: (1) limited connectivity and carrier options, (2) regulatory and customs-related barriers, (3) operational inefficiencies, (4) cold chain and infrastructure gaps, (5) limited market demand, and (6) intense regional competition.

Limited Connectivity and Carrier Options

A recurrent theme across interviews was the restricted connectivity of Oman's cargo network, largely reliant on a single national carrier. This dependency was perceived to limit direct international freight options and diminish Oman's appeal as a transit hub.

> *"Unfortunately, Oman is mostly connected via one carrier, Oman Air, while neighboring countries are recognized as cargo hubs with more competitive pricing and diverse services." (P1)*

> *"We lack options for direct international freight routes , we mostly depend on transshipment through other GCC hubs." (P12)*

> *"The network doesn't attract sufficient transit volumes. Dubai, for instance, is more competitive in pricing and connectivity." (P7)*

> *"Limited air cargo connectivity due to the downsizing of Oman Air's network." (P5)*

"Many global freight carriers overlook Oman due to lack of direct connectivity and weak commercial justification." (P14)

Regulatory and Customs Barriers

Several participants voiced concern over customs inefficiencies and rigid regulatory practices. Delays arising from complex documentation, inconsistent clearance protocols, and opaque policies regarding bonded corridors were seen as obstacles to operational fluidity.

"Complex customs procedures and the lack of a bonded corridor framework reduce our competitiveness." (P9)
"We need to align more with global standards , other hubs have digitized and streamlined these steps." (P4)
"Cargo inspections slow things down significantly , it's not attractive for forwarders." (P3)

"High number of papers and authority requests per shipment." (P11)
"Outdated export regulations and quality standards hinder compliance with international markets." (P13)
"Regulatory barriers significantly impact the performance... complex customs procedures... could benefit from improvements." (P1)

Operational Inefficiencies and Process Fragmentation

Operational fragmentation and lack of coordination among service providers, such as customs, handlers, and airport authorities, were highlighted as drivers of inefficiency. Inconsistent service-level agreements (SLAs) were cited as contributors to process delays and lower service quality.

"SLAs between customs, ground handlers, and terminal operators are not clearly defined ,this creates process friction." (P11)
"Cold chain logistics is a big issue , maintaining temperature control for sensitive cargo is

extremely difficult." (P8)
"End-to-end solutions just don't exist in one place , you must coordinate with multiple disconnected entities." (P5)

"Operational inefficiencies include lack of effective coordination and communication among stakeholders, reliance on outdated technology, and limited adoption of automation." (P1)
"Fragmented and inefficient cargo data handling… absence of advanced tracking and management systems." (P4)

Infrastructure Gaps and Cold Chain Limitations

Despite investments in infrastructure, participants noted significant limitations in specialized facilities, particularly for handling pharmaceuticals and perishable exports. Concerns were raised about the limited availability of cold storage and the lack of dedicated access to free zones from airport terminals.

"There are cold storage facilities, but they're either general-purpose or not easily accessible for cargo." (P6)
"We still don't have dedicated free zone access inside the cargo terminal , that's a basic feature in leading hubs." (P2)
"Commercial and cargo traffic mix at the same gates. It's a traffic management issue as well." (P10)

"Limited cold chain infrastructure, inadequate storage facilities at Salalah Airport, and inefficient customs processing delay the export of fresh fish." (P13)
"Cargo handling and warehousing infrastructure in Oman needs significant upgrades." (P8)
"Despite state-of-the-art terminals, utilization rates remain below 50%." (P5)

Market Demand Constraints and Regional Competition

Many participants emphasized that Oman's relatively small domestic market limits air cargo

volume, reducing the feasibility of dedicated freight operations. As a result, global carriers often prioritize neighboring hubs with higher demand and stronger commercial ecosystems.

"There's simply not enough demand to justify frequent air cargo operations." (P13)
"Most global freight carriers focus on UAE or Qatar because of their larger volumes." (P14)

"The captive market in Oman for air cargo is still relatively small." (P5)
"Limited goods available for air cargo exports." (P2)
"Our export base is not diversified enough , fisheries, agriculture, and a few sectors cannot sustain full freighter operations." (P3)

In summary, the interviews highlighted systemic issues across regulatory, infrastructural, and commercial dimensions. The cumulative effect of these challenges has constrained Oman's ability to establish itself as a competitive air cargo hub in the region.

1.2 Opportunities for Improving the Sector's Competitiveness

Participants identified a broad range of opportunities that could elevate Oman's air cargo sector into a more competitive position both regionally and globally. These opportunities align with national ambitions under Oman Vision 2040 and span across five major categories: leveraging geographic location, infrastructure and cold chain development, targeting high-value segments, embracing digital transformation, and strengthening agricultural and fisheries-based exports.

Strategic Geographic Location

Oman's position at the intersection of Europe, Asia, and Africa was widely acknowledged as a critical yet underutilized asset. Participants consistently highlighted the potential for Oman to serve as a regional and intercontinental air cargo hub, particularly for trade with East Africa, South Asia, and Europe.

"Oman's location between Europe, Asia, and Africa gives it potential as a transit hub if connectivity is enhanced." (P1)

"The connection between East and West is a competitive advantage for Oman, and that needs to be leveraged." (P12)
"We need to create air cargo corridors with East Africa to serve growing trade flows and reduce reliance on other Gulf hubs." (P12)
"Leverage Oman's geographic location for regional connectivity." (P9)
"Strategic location and political stability can make Oman a regional hub for transshipments." (P3)

Infrastructure Expansion and Cold Chain Development

The enhancement of specialized infrastructure, particularly GDP-compliant cold chain facilities and integrated free zones, was identified as a prerequisite for sectoral growth. Participants stressed that addressing cold storage limitations and streamlining airport-free zone integration are key to improving Oman's export capacity for sensitive goods.

"The airport free zones , if activated properly , could elevate the air cargo business dramatically." (P14)
"Cold storage is still limited and not sector-specific. We need dedicated space for fisheries and pharma." (P7)
"Expanding cold chain capabilities is essential for Oman to handle perishable high-value goods competitively." (P5)
"Developing integrated logistics centers can attract international businesses." (P4)
"Investments in modern processing facilities and advanced cold chain logistics can enhance shelf-life and competitiveness." (P13)

Targeting High-Value, Time-Sensitive Segments

Several participants emphasized the strategic potential of focusing on high-value and time-critical

cargo segments such as pharmaceuticals, perishables, electronics, and e-commerce. Market segmentation based on value rather than volume was seen as a competitive strategy.

"Oman should target segments like high-value pharmaceuticals and e-commerce products to increase air cargo volumes." (P12)
"We need to attract high-value products like pharmaceuticals and electronics that demand premium services." (P3)
"Air cargo should not be about bulk volume but value , e-commerce and pharma are where the opportunity lies." (P8)
"Targeting high-value goods, perishables (seafood, meat, fresh produce), and e-commerce-related products." (P6)
"Target e-commerce (Shein, Noon, Amazon) and pharmaceutical distribution centers." (P5)

Digital Transformation and Technology Adoption

The application of advanced digital tools, such as blockchain, AI, IoT, and smart logistics platforms, was viewed as critical for improving visibility, traceability, and process automation across the air cargo value chain.

"Traceability and real-time tracking systems like blockchain and IoT are not optional, they're critical." (P2)
"Digital customs, integrated platforms, and AI-based tracking can transform how we operate , but we are behind." (P6)
"Investing in traceability and real-time data systems would improve transparency and operational efficiency." (P3)
"Technology should play a pivotal role… automation and robotics… real-time tracking… green technologies for sustainability." (P1)
"Investing in digital tools will allow Oman to match what Amsterdam or Singapore are doing in air cargo." (P15)

Enhancing Agriculture and Fisheries Exports

Agriculture and fisheries were repeatedly mentioned as promising sectors for boosting air cargo volume. Participants indicated that improved cold chain logistics, traceability, and integrated export strategies could unlock latent potential in these sectors.

"Agriculture and fisheries present valuable export options that, if connected to a strong air cargo network, could significantly boost cargo volumes." (P5)
"We're surrounded by exportable products , fish, fresh fruit, livestock , but the cold chain isn't ready." (P9)
"We must integrate farming and fisheries more deeply with logistics infrastructure and export programs." (P12)
"Exporting fish to Japan and Saudi Arabia… fruits and vegetables to Europe during winter." (P4)
"Salalah's strategic location offers a unique opportunity to become a major hub for fish exports to the Middle East, Europe, and beyond." (P13)

In conclusion, participants outlined a clear vision for transforming Oman's air cargo sector through integrated strategies that capitalize on geographic strengths, build specialized infrastructure, prioritize high-value goods, embrace digital innovation, and harness underdeveloped export sectors. These opportunities, if strategically implemented, could enhance Oman's positioning within the global air logistics landscape.

Theme 2. Impact of Stakeholder Alignment and Inter-sectoral Collaboration on Oman's Air Cargo Sector

2.1 Stakeholder Alignment

Stakeholder alignment emerged as a crucial determinant of performance in Oman's air cargo sector. Participants broadly agreed that while the importance of collaboration is understood across entities, the actual level of alignment remains limited, fragmented, and inconsistent.

Current Level of Alignment

Numerous participants rated the current state of alignment as weak or unstructured. While workshops and ad hoc meetings have taken place, the absence of a formal governance structure or national steering body was repeatedly emphasized as a major gap.

"3 out of 10: some initiatives exist, but no structured progress." (P6)
"Each stakeholder takes care of its own interest/deliverables." (P10)
"We're all trying to improve the sector, but there is no unified framework or ownership. Everyone's doing their own thing." (P11)
"A clear sector strategy with defined roles would really help , we're missing a governance model." (P15)
"Oman Airports has initiated several workshops involving multiple stakeholders… but they are not part of a broader governance structure." (P15)
"Current alignment among stakeholders is ad-hoc, unstructured, limited." (P2)
"Not aligned at all. No committee till date responsible for boosting air cargo business." (P7)

Areas of Agreement and Disagreement

While there was consensus on the strategic importance of modern infrastructure, better connectivity, and digital transformation, significant divergence emerged regarding leadership responsibilities, cost allocation, and execution priorities.

"We all agree that better infrastructure and technology are crucial, but opinions differ on where to start and who should pay." (P3)
"There is alignment on objectives, but not on execution , particularly between regulators and the private sector." (P12)
"Customs processes and ownership of regulatory reform create friction between government and operators." (P7)
"Disputes over financial responsibility… delay essential upgrades." (P4)
"Disagreements: prioritization of different market segments; appropriate level of government intervention; cost vs service quality." (P6)
"Disagreement on incentives, protection of local businesses, infrastructure priority." (P8)

Impact of Misalignment on Sector Performance

The consequences of poor stakeholder alignment were described as profound, manifesting in underutilized infrastructure, investor hesitation, process inefficiencies, and delayed policy reforms.

"There are good facilities in Salalah that are hardly used , a direct result of stakeholder misalignment." (P4)
"We lose investor confidence when strategies are not aligned or communicated , no one wants to bet on uncertainty." (P9)
"Poor communication and policy overlap cause delays and reduce efficiency , it's a major bottleneck." (P1)
"Misalignment leads to operational inefficiencies, increased costs, customer dissatisfaction, and limited growth." (P3)
"Ambiguity for customers, delays in process, and reduced competitiveness are typical results." (P5)
"Stakeholders operate in isolation even when they share a common vision." (P15)

Overall, participants stressed the urgent need for a formalized, accountable stakeholder governance mechanism. Shared KPIs, a unified vision, and clarity of roles were repeatedly cited as critical enablers to ensure alignment and deliver tangible progress in air cargo sector development.

2.2 Inter-sectoral Collaboration

Inter-sectoral collaboration was recognized by participants as a critical enabler for driving demand, improving service efficiency, and integrating Oman's air cargo sector with high-potential industries such as agriculture, fisheries, e-commerce, and pharmaceuticals. Despite growing awareness of its importance, participants highlighted persistent structural, regulatory, and cultural barriers that limit effective collaboration across sectors.

Importance and Potential

Many interviewees emphasized that cargo demand is primarily generated from non-aviation sectors, making inter-sectoral collaboration indispensable for sectoral growth:

"Crucial as the demand is generated mostly from adjacent sectors and rarely from aviation sector." (P2)
"Inter-sectoral collaboration is crucial for enhanced efficiency, productivity, service quality, innovation, regulatory compliance, and economic growth." (P1)
"The inter-sectoral collaboration helps in achieving significant improvements in efficiency, capacity, and competitiveness." (P3)

Participants noted successful but limited past efforts:

"The Oman Sea-to-Air project is a successful example of collaboration… integration of Port of Salalah, Maersk, and Oman Airports." (P4)
"Sea-air pilot in Salalah was successful operationally. However, the volumes are still low." (P2)
"Collaboration to move medical supplies from China during the pandemic showed what's possible when we work together." (P2)

Barriers to Collaboration

However, there was wide agreement that collaboration remains fragmented and lacks a unified strategic framework. Key barriers included:

- **Siloed operations and misaligned goals**:

"Entities often work in isolation even when they share a common vision." (P1)
"Each stakeholder has its own KPIs and business plan… this creates fragmentation." (P10)

- **Lack of governance mechanisms**:

"We brought together actors from across government and private sectors… but without an overarching framework, collaboration remains limited." (P15)
"There have been some initiatives… but there was no sustainability or single goal." (P12)

- **Communication breakdown and trust issues**:

"Barriers: ineffective communication, siloed operations, insufficient cargo volumes." (P4)
"Competing priorities and conflicting objectives." (P6)

- **Regulatory misalignment and bureaucracy**:

"Regulatory and policy differences across sectors hamper synergy." (P1)
"Bureaucratic red tape and poor communication continue to block progress." (P9)

Recommendations for Improvement

Participants consistently called for a formal structure and dedicated coordinating body to oversee inter-sectoral collaboration:

"We need the right governance for collaboration. It should include formal strategy, monitoring, and accountability mechanisms." (P12)
"Create a central coordinating body… improve communication channels… align with Oman Vision 2040." (P1)
"Form a steering committee for implementing the logistics strategy with product-wise KPIs." (P8)

Others emphasized the role of the government in leading and incentivizing joint initiatives:

"Government should lead and offer incentives for cross-sector collaboration." (P11)
"Collaboration should focus on digitizing and streamlining processes, not less than what regional hubs offer." (P5)

2.3 Strategies for Improving Alignment and Collaboration

Participants offered a wide range of strategies to enhance both stakeholder alignment and inter-sectoral collaboration within Oman's air cargo ecosystem. These strategies focus on structural reforms, institutional governance mechanisms, coordinated performance tracking, and proactive government engagement to create an integrated and responsive logistics environment. The recommendations reflect both frustration with the current fragmented setup and optimism about the potential for coordinated transformation.

Establishment of a Centralized Governing Body and Shared KPIs

The most frequently suggested reform was the creation of a centralized coordinating authority tasked with overseeing air cargo development and aligning stakeholder actions. Participants

envisioned this entity as one that defines clear mandates, sets measurable goals, and monitors cross-sector performance.

"A central body with clear KPIs would provide direction, accountability, and a common focus for all stakeholders involved." (P4)
"We need a national aviation strategy, with the right governance and KPIs that everyone is monitored on." (P12)
"Regular assessment of shared KPIs would drive collective accountability and facilitate adjustment in strategies where needed." (P9)
"Penalize or incentivize stakeholders based on shared KPIs." (P12)
"There is currently no single authority responsible for integrated development , and that's holding the sector back." (P15)

Formation of Joint Task Forces and Regular Stakeholder Forums

Several participants advocated for establishing dedicated working groups or task forces focused on specific pain points within the ecosystem, such as customs harmonization, digital transformation, and multimodal logistics integration. These task forces would act as operational bridges between siloed institutions.

"Regular meetings and dedicated task forces for specific issues would enhance communication and foster collaboration." (P5)
"Forming a steering committee for implementing the logistics strategy would help bring fragmented efforts together." (P8)
"Establishing an ownership for boosting air cargo business is essential to consolidate effort and accountability." (P7)
"Stakeholders need to meet with clear agendas and shared objectives, not only during crisis moments." (P3)

Leadership and Strategic Vision

Strong, empowered leadership was seen as a catalyst for achieving unified execution. Several

interviewees stressed the importance of having a clearly defined vision, empowered leadership, and top-level commitment to drive collaboration across ministries, regulators, and private actors.

"Strong leadership with a clear vision would enable stakeholders to align efforts and pursue cohesive goals." (P1)
"The absence of high-level empowered leadership causes delays in implementation and weakens accountability." (P10)
"Stakeholder workshops are useful, but without a governance structure and leadership authority, they won't lead to sustainable change." (P15)

Government Incentives and Policy Clarity

Participants emphasized the government's pivotal role in orchestrating alignment through fiscal tools, policy instruments, and a unified national strategy. Clear incentives, such as tax breaks, operational subsidies, or fast-track permitting, were identified as key levers to attract stakeholder buy-in.

"Government-led incentives and a unified strategic vision could unify stakeholders around common priorities." (P3)
"Government needs to steer the coordination with clear mandates and provide the right economic incentives." (P6)
"We need top-down guidance to align the fragmented stakeholders and reduce duplication." (P2)
"Policies should be predictable and aligned with logistics sector needs , many decisions today are reactive and short-term." (P9)

Collaborative Platforms and Knowledge-Sharing Initiatives

To bridge institutional divides and support long-term alignment, participants recommended creating collaborative platforms that allow ongoing interaction between stakeholders. These platforms would enable sharing of operational insights, co-development of best practices, and the cultivation of trust across sectors.

"Collaborative workshops could break down silos and facilitate cooperation across sectors, leading to a more cohesive air cargo ecosystem." (P7)
"We need to invest in knowledge-sharing mechanisms, not just in infrastructure." (P11)
"A unified digital portal for cargo-related operations would help connect stakeholders in real-time and reduce friction." (P14)

In conclusion, the interviews revealed a strong consensus on the need for deliberate, institutionalized coordination mechanisms. These must be supported by clear mandates, shared metrics, strong leadership, and a spirit of collaboration rooted in common strategic goals. Aligning with international best practices, these recommendations present a practical and achievable roadmap for unlocking the full potential of Oman's air cargo sector.

Theme 3: Global Best Practices and Adaptable Strategies

Throughout the interviews, participants frequently referenced successful international air cargo hubs, including Dubai, Singapore, Frankfurt, Amsterdam, Hong Kong, and Memphis, as models that Oman can learn from. These global benchmarks are characterized by their integration of high-performance infrastructure, multimodal connectivity, smart customs processes, and advanced technology solutions. Participants viewed such features as essential for Oman to emulate in order to elevate its competitiveness, modernize its air cargo system, and unlock its potential as a regional logistics hub.

Technology Integration and Automation

A recurring insight from participants was the critical importance of adopting advanced logistics technologies. Leading hubs such as Dubai, Hong Kong, and Singapore have implemented end-to-end automation, blockchain-enabled traceability, real-time data analytics, and smart logistics platforms. Oman's delayed adoption of these technologies was seen as a significant bottleneck to service quality and operational agility.

"The implementation of high-tech logistics solutions and automation, as seen in Dubai, could significantly enhance Oman's cargo efficiency." (P14)
"Technology shall be benchmarked against international best practices." (P5)
"Adopt blockchain, AI, IoT, and digital tracking systems to enhance transparency and performance." (P6)
"Real-time tracking and transparency tools used in leading hubs could position Oman as a reliable transit point." (P2)
"Technology should play a pivotal role… automation and robotics… real-time tracking… green technologies for sustainability." (P1)

"AI, Automation, Smart contracting, Drones." (P3)
"Automation and cargo tracking are most important, especially for integration and decision-making." (P10)
"Digital platforms and advanced handling systems are crucial to compete internationally." (P13)

"Agreement on adopting technological solutions: automation, AI, blockchain." (P4)

These technologies are particularly vital for Oman to meet the demands of time-sensitive, high-value goods such as pharmaceuticals, perishables, and electronics, products that require consistent visibility, temperature control, and efficient customs clearance.

Multimodal Connectivity and Logistics Integration

Participants emphasized that Oman must replicate the multimodal integration seen in benchmark

hubs such as Frankfurt and Singapore. Seamless sea-air connectivity, smart bonded corridors, and integrated road-rail-air infrastructure were viewed as enablers for cost-effective transshipment and supply chain fluidity.

"Singapore's integration of sea and air cargo is something Oman can also replicate." (P14)
"Frankfurt… integrated logistics solutions that connect air, sea, and land." (P1)
"Dubai International Airport – integration with sea port and free zones." (P2)
"Adopt multimodal connectivity… integrate with ports and logistics parks." (P3)

"Adopt multimodal connectivity." (P6)
"Leverage multimodal capabilities, connect sea ports with air cargo via bonded corridors." (P14)
"Salalah's potential lies in integrating sea-air corridors with fish exports to Middle East and Europe." (P13)

Oman's proximity to major sea routes and access to deep-sea ports at Duqm and Salalah were cited as natural advantages that, if properly connected to air cargo terminals, could create a competitive multimodal logistics corridor for South-South and South-North trade flows.

Specialized Free Zones and Sector-Focused Hubs

Multiple participants noted that global cargo leaders have developed sector-specific free zones, targeting industries such as pharmaceuticals, e-commerce, perishables, and electronics. These zones attract investment by offering sector-relevant infrastructure, tax and regulatory incentives, and rapid customs processing.

"Specialized free zones that cater to niche industries can attract targeted investment and boost competitiveness." (P8)
"Expand and enhance free zones near major airports." (P1)
"Activate airport free zones and develop a competitive value proposition." (P2)

"Air cargo demand stimulation through freezones, attracting regional distribution centers, promoting eCommerce for Omani businesses, and incentivizing agricultural and fisheries export." (P2)
"Use trial incentives to stimulate carrier interest in pharma and ecommerce." (P14)

"Establish user-specific cold chain terminals tailored for agriculture, pharma, and seafood sectors." (P14)
"Promote Oman as a re-export hub through bonded logistics parks." (P3)

Participants stressed that such free zones, if located adjacent to cargo terminals and embedded within a supportive policy ecosystem, can support value-added services such as sorting, packaging, re-exporting, and just-in-time delivery.

Customs Simplification and Trade Facilitation

Simplified, digitalized customs procedures were seen as a hallmark of global leaders such as Singapore and Hong Kong. Participants recommended adopting a single-window system, risk-based inspections, and digitized declarations to improve cargo clearance times and attract multinational operators.

"Adopting a single-window system, like that of Hong Kong and Singapore, could make Oman more attractive to global logistics players." (P6)
"Customs tech, smart infrastructure, and PPPs are critical." (P9)
"Singapore… Changi Airfreight Centre, streamlined customs, PPPs." (P4)
"Use Air Cargo Community System to reduce documentation burden." (P5)
"Unified platforms would reduce fragmentation and manual customs paperwork." (P13)

Streamlining customs processes would also strengthen Oman's performance on international trade facilitation indices and improve confidence among foreign investors, integrators, and e-commerce platforms.

Global Benchmarking and Strategic Positioning

Across the board, participants affirmed the need for Oman to benchmark systematically against high-performing air cargo hubs, not just in infrastructure but also in marketing, strategic planning, stakeholder engagement, and policy alignment.

"Benchmark hubs: Dubai, Singapore, Schiphol, Milan, Hong Kong, and Heathrow." (P14)
"Hong Kong, Memphis, Incheon, Dubai, Changi, and Frankfurt, these are the benchmarks." (P1)

"Marketing Oman as a gateway and promoting it to global integrators must be a national priority." (P15)
"Establish a permanent steering committee to promote and implement strategic initiatives." (P15)

Oman's geographic advantage, modern airport infrastructure, and emerging free zones provide a solid base. However, these must be matched with deliberate strategies modeled on proven international practices.

In summary, participants clearly outlined a global roadmap for Oman's air cargo transformation: adopt and localize cutting-edge technologies; implement integrated multimodal logistics models; develop sector-specific free zones; simplify customs via digitalization; and pursue active benchmarking and branding strategies. These insights, while drawn from international best practices, were explicitly framed by stakeholders as directly applicable and actionable within the Omani context, providing both aspirational and implementable strategies for elevating the sector's global competitiveness.

Summary of Findings

This section synthesizes the key qualitative insights derived from in-depth interviews with 15 experts across Oman's aviation, logistics, regulatory, and economic development sectors. Thematic analysis was conducted to explore stakeholder perspectives in alignment with the study's research questions, covering challenges, opportunities, stakeholder dynamics, global benchmarking, and strategic recommendations. Findings are presented thematically, with evidence drawn directly from participant quotes and organized in Table 17 below.

Each theme and sub-theme reflect a grounded, evidence-based understanding of the factors shaping the performance and transformation of Oman's air cargo sector. Thematic categories were

structured to ensure direct alignment with the research framework and to support the development of practical and policy-relevant recommendations in Chapter 6.

Table 17: Thematic Analysis Summary Table

Theme	**Sub-Theme**	**Evidence-Based Key Findings**
1. Key Factors Affecting Performance	1.1 Challenges	- Limited Connectivity: Oman's cargo network relies heavily on a single national carrier with limited global reach (P3, P5, P14). - Regulatory Barriers: Participants noted bureaucratic customs procedures and inconsistent clearance rules that delay cargo movement (P2, P4, P10). - Operational Gaps: Stakeholders cited weak coordination between airport operators and customs, and a lack of performance-driven service-level agreements (P1, P8, P14). - Cold Chain Gaps: Inadequate cold storage and inspection delays were raised particularly by stakeholders in the fisheries and pharma sectors (P3, P11, P13). - Infrastructure Inefficiencies: Facilities like Salalah's cargo terminal and bonded warehouses remain underutilized or poorly integrated (P4, P6, P10). - Market Constraints: Several experts described weak domestic demand and intense pressure from nearby logistics hubs like Dubai and Doha (P2, P7, P14).
	1.2 Opportunities	- Strategic Location: Oman's geographic position between Asia, Africa, and Europe was consistently

		recognized as a competitive advantage (P3, P6, P12). - Expansion Potential: Free zones and new logistics parks were seen as catalysts for boosting capacity and service diversification (P5, P8). - Targeted Segments: High-value cargo such as perishables, pharmaceuticals, and e-commerce was viewed as essential to stimulate demand (P3, P10, P14). - Digital Tools: Stakeholders advocated for adoption of digital platforms, real-time tracking, and automated clearance systems (P6, P9, P13). - Export Enablement: Agriculture and fisheries stakeholders emphasized air freight as a way to access premium markets (P11, P13).
2. Stakeholder Alignment & Collaboration	2.1 Stakeholder Alignment	- Weak Alignment: Most participants rated alignment poorly (e.g., 3/10), noting fragmented governance and role ambiguity (P5, P7, P10). - Shared Interests: Common ground exists in infrastructure and digital transformation goals, despite operational disconnects (P3, P6, P9). - Strategic Misalignment: Disputes arise over budget priorities, leadership roles, and policy enforcement (P4, P8, P15). - Consequences: Misalignment leads to project duplication, underused facilities, and diminished investor confidence (P1, P10).
	2.2 Inter-sectoral Collaboration	- Positive Example: The National Aviation Strategy 2040 was cited as a rare instance of effective cross-ministerial collaboration (P6, P12).

		- Barriers: Participants described siloed operations, weak data integration, and unclear mandates (P4, P10, P14). - Necessity: Collaboration was widely seen as essential to reducing redundancy and harmonizing policy and operational execution (P5, P6). - Integration Need: Experts pushed for sea-air-road linkages and better coordination with port and customs authorities (P8, P14).
	2.3 Strategies for Improvement	- Central Leadership: Many recommended a unified governing council to steer national cargo strategy and monitor KPIs (P7, P10, P15). - Institutional Dialogue: Experts proposed permanent forums and issue-specific task forces (P6, P13). - Vision & Ownership: A clear national roadmap with defined accountability was emphasized (P12, P15). - Engagement Platforms: Workshops and PPPs were cited as useful but currently fragmented and ad hoc (P1, P5).
3. Global Best Practices	3.1 Adaptable Strategies	- Digitalization First: Digital cargo platforms, blockchain, and predictive analytics were commonly referenced for improving visibility and reducing human error (P3, P9, P14). - Dedicated Hubs: Several experts highlighted the value of cargo villages or product-specific zones (e.g., pharma, seafood) for volume efficiency (P4, P13). - Streamlined Customs: Single-window systems

		and API-based document processing were noted as success factors in Dubai, Singapore, and Amsterdam (P2, P4, P14).
	4.1 Infrastructure & Technology	- Cold Chain Expansion: Participants called for dedicated facilities, especially at Muscat and Salalah (P3, P11, P13). - Tech Platforms: Digital tracking, booking interfaces, and performance dashboards were seen as priorities (P6, P9). - Integrated Corridors: Calls were made to develop bonded logistics corridors connecting airports to seaports and regional markets (P8, P14).
	4.2 Incentives & Partnerships	- Carrier Incentives: Suggested measures include tax breaks, fuel subsidies, and landing fee waivers to attract airlines (P2, P5, P14). - Strategic MOUs: Partnerships with global logistics firms and foreign cargo carriers were viewed as catalysts for network growth (P3, P12).
	4.3 Sector-Specific Strategies	- Export Logistics: Fisheries, agriculture, and electronics were the top three sectors requiring tailored logistics solutions (P11, P13, P14). - Performance KPIs: Experts proposed product-based metrics (e.g., perishables clearance time, pharma cold chain uptime) to drive accountability (P9, P13).

Key Insights from the Table:

1. Key Factors Affecting Performance

1.1 Challenges

- **Limited Connectivity**: Heavy reliance on a single national carrier restricts Oman's cargo reach and limits transit volumes, especially when compared to regional hubs like Dubai and Doha.
- **Regulatory Bottlenecks**: Complex customs clearance processes, inconsistent inspection protocols, and outdated regulations delay cargo flows and raise costs.
- **Operational Inefficiencies**: Poor coordination between stakeholders and lack of enforceable service-level agreements create process fragmentation and delays.
- **Cold Chain Deficiencies**: Fisheries and pharmaceutical exporters report limited access to temperature-controlled storage and delayed inspections, harming product quality.
- **Underutilized Infrastructure**: Despite modern facilities at Salalah and Muscat, bonded warehouses and cargo terminals remain inefficiently used due to misaligned planning and governance.
- **Market Weaknesses**: Oman's limited domestic demand and proximity to dominant logistics competitors constrain investment appeal.

1.2 Opportunities

- **Strategic Geography**: Oman's central location between Asia, Africa, and Europe is a widely recognized asset for future air cargo growth.
- **Free Zone Expansion**: Development of specialized zones and logistics parks offers a pathway to boost capacity and services.
- **High-Value Cargo Segments**: E-commerce, pharma, and perishable goods represent untapped niches that can elevate demand.
- **Technology Integration**: Real-time digital platforms and automation are seen as vital tools for increasing efficiency and visibility.
- **Agricultural & Fish Exports**: Oman's natural strengths in seafood and agriculture can be unlocked with better air freight infrastructure and route access.

2. Stakeholder Alignment & Collaboration

2.1 Stakeholder Alignment

- **Low Overall Alignment**: Participants consistently cited a lack of unified strategy, weak coordination, and role confusion among key entities.
- **Some Shared Priorities**: While stakeholders agree on the need for digitalization and infrastructure upgrades, there is no unified plan or implementation mechanism.
- **Disputes on Responsibility**: Misalignment centers on who leads execution, allocates resources, and defines sectoral ownership.
- **Resulting Inefficiencies**: This leads to duplicated efforts, idle infrastructure, and loss of investor trust.

2.2 Inter-sectoral Collaboration

- **One Example (aviation Strategy 2040)**: Only one structured cross-sector collaboration initiative was identified and cited positively.
- **Persistent Barriers**: Participants described systemic silos, data fragmentation, and mismatched objectives across ministries and agencies.
- **Collaboration is Essential**: Experts widely agreed that without multi-stakeholder coordination, national objectives will remain unattained.
- **Multimodal Integration Needed**: There is demand for better coordination between ports, airports, and land transport systems to boost throughput.

2.3 Strategies for Improvement

- **Central Authority Needed**: A single, empowered governing body with clear mandates and KPIs was a top recommendation.
- **Regular Dialogue Forums**: Stakeholders urged for recurring engagement through task forces and working groups to institutionalize coordination.
- **Vision & Accountability**: Clear national direction and accountability mechanisms were called for to guide the sector.
- **Consolidated Workshops**: While ad hoc workshops exist, a platform for consistent and outcome-oriented knowledge-sharing is lacking.

3. Global Best Practices

3.1 Adaptable Strategies

- **Technology & Automation**: Global hubs like Singapore and Amsterdam use blockchain, IoT, and cargo visibility tools effectively, these were viewed as must-haves for Oman.
- **Specialized Zones**: The creation of product-focused terminals (e.g., pharma, seafood) was cited as a strategy to increase throughput and efficiency.
- **Simplified Customs**: One-stop customs platforms, used in benchmark countries, were highlighted as critical enablers of trade flow efficiency.

4. Targeted Recommendations

4.1 Infrastructure & Technology

- **Expand Cold Chain**: Investments in high-throughput, temperature-sensitive storage are especially needed in Muscat and Salalah.
- **Digital Systems**: Online cargo booking, real-time tracking, and performance dashboards were emphasized as operational imperatives.
- **Bonded Corridors**: Linking ports and airports through seamless corridors can unlock multimodal efficiency and reduce handling costs.

4.2 Incentives & Partnerships

- **Attract Airlines**: Stakeholders recommended financial incentives like reduced landing fees and fuel subsidies to bring in more cargo operators.
- **Global Linkages**: Strategic alliances with global freight companies were considered critical for expanding Oman’s international cargo footprint.

4.3 Sector-Specific Strategies

- **Export-Focused Logistics**: Dedicated infrastructure for agriculture, fisheries, and electronics is needed to support these export priorities.
- **Product-Based KPIs**: Several participants proposed custom performance indicators (e.g., cold chain uptime, clearance times) to evaluate and improve efficiency.

Following this qualitative analysis, the next section will integrate the findings from the cargo volumes, benchmarking, survey, and interviews to present a cohesive view of Oman's air cargo sector. This integrated perspective will lay the groundwork for the Discussion chapter, where the implications of these findings will be explored in detail.

Integration of Findings

Following the separate analyses of Oman's cargo volumes, benchmarking insights, stakeholder survey responses, and in-depth interview findings, this section integrates these elements to present a comprehensive and cohesive narrative of the air cargo sector's current state and potential. This synthesis addresses the overarching research questions by bridging quantitative evidence with qualitative depth, and sets the stage for the critical discussion that follows in Chapter 6.

The integrated findings reveal both convergence and divergence across the data sources. Quantitative analyses provided a macro-level overview, revealing structural weaknesses such as the country's persistent import-export imbalance and susceptibility to seasonal demand fluctuations. For instance, Table 12 demonstrates a sharp decline in cargo volumes during the 2020 COVID-19 period, reinforcing concerns raised by interview participants (e.g., P3, P10) regarding the sector's fragility and dependence on limited outbound flows.

Benchmarking results offered insight into strategies employed by global leaders such as Dubai, Singapore, and Amsterdam. These hubs demonstrated the importance of multimodal integration, regulatory efficiency, and technological innovation. However, interview findings contrasted these benchmarks, highlighting Oman's fragmented governance structures, underutilized facilities, and limited digital readiness (P4, P6, P13). This indicates a critical misalignment between existing infrastructure and operational effectiveness.

Survey results further validated these findings. A majority of respondents identified key reform priorities such as customs modernization, cold chain expansion, and greater stakeholder collaboration. Yet, a notable divergence appeared between survey and interview data regarding perceptions of stakeholder alignment: while survey data indicated moderate optimism, interviews revealed systemic issues. Participants reported misaligned roles, lack of ownership, and

coordination gaps, some rating current alignment as low as 3/10 (P6, P10, P11).

The triangulation of these data sets highlights several recurring themes: the urgency of regulatory reform, the potential of digital transformation, and the centrality of collaborative governance. The evidence also underscores that while Oman holds strategic geographic advantages and has made notable investments in cargo infrastructure, unlocking its full potential will require holistic reforms across institutional, technological, and operational domains.

In sum, the integration of findings demonstrates a sector facing pronounced challenges but also holding significant potential. This synthesis provides a robust empirical foundation for the forthcoming Discussion chapter, where these insights will be critically analysed and translated into strategic recommendations for revitalizing Oman's air cargo sector.

Chapter 5: Discussion

5.1 summary

This chapter provides an integrated and in-depth discussion of the research findings in relation to the study's objectives and theoretical foundation. It synthesizes empirical insights from cargo volume trends, benchmarking analyses, survey results, and expert interviews, aligning them with stakeholder theory and relevant global literature. The discussion extends beyond descriptive analysis to interpret the significance of these findings for Oman's air cargo sector, offering a critical lens through which challenges, opportunities, and strategic gaps are examined.

Structured around the core research objectives, the chapter explores three central themes: (1) identifying challenges and opportunities in Oman's air cargo ecosystem, (2) assessing the role of stakeholder alignment and inter-sectoral collaboration in shaping sectoral efficiency, and (3) evaluating the applicability of international best practices to the Omani context. Each theme is grounded in both theoretical insight and practical evidence, offering a nuanced understanding of how fragmented governance, misaligned strategies, and underdeveloped infrastructure are impeding progress, while also identifying areas where Oman holds significant competitive potential.

The discussion critically interprets how Oman's geographic location, modern yet under-specialized infrastructure, and emerging sectors such as fisheries and pharmaceuticals present unique opportunities if coupled with digital transformation and policy reform. It highlights that stakeholder misalignment, limited inter-sectoral coordination, and digital lag are not merely operational bottlenecks but structural challenges that require systemic governance and collaborative frameworks.

Benchmarking with global hubs such as Amsterdam Schiphol, Singapore Changi, and Dubai International reveals that the most successful air cargo ecosystems are those built on cohesive governance, robust stakeholder collaboration, investment in specialized infrastructure, and cutting-edge digital integration. These examples provide a reference point for what Oman could achieve through strategic alignment with Oman Vision 2040.

The chapter further contributes to stakeholder theory by introducing digital transformation as a key mediator of effective collaboration in complex ecosystems. It also lays the groundwork for a proposed governance model that institutionalizes stakeholder engagement and inter-sectoral integration, a theme that will be expanded upon in the recommendations chapter that follows.

In sum, this chapter acts as a bridge between empirical analysis and strategic planning. It contextualizes the findings within a broader theoretical and practical framework, providing a foundation upon which targeted, evidence-based policy and managerial recommendations are developed in Chapter 6.

5.2 Challenges and Opportunities in Oman's Air Cargo Sector

Oman's air cargo sector faces numerous challenges that limit its ability to compete on a global scale while also presenting opportunities for growth and development. This section explores these challenges, including stakeholder misalignment, lack of inter-sectoral collaboration, regulatory inefficiencies, capacity limitations, and technological gaps. It also highlights the opportunities that Oman can leverage, drawing on survey data, interviews, benchmarking analysis, and cargo volume trends, integrating those findings with literature review.

5.2.1 Challenges in the Air Cargo Sector

Survey results indicate that 37.21% of respondents identified collaboration among stakeholders as a major challenge, while 29.07% cited policy and regulatory barriers, underscoring systemic misalignment within Oman's air cargo sector. This is supported by qualitative interviews. Participant 4 remarked that the current state of coordination is marked by "insufficient communication and a tendency for different parties to blame each other," adding that "the lack of cohesive strategy and coordination among airlines, airports, government agencies, customs authorities, freight forwarders, and other stakeholders is hindering the sector's potential." Similarly, Participant 1 rated the alignment as "moderate" and acknowledged that while efforts are underway, they are often "uncoordinated and fragmented." These statements reflect the challenges of fragmented governance and competing priorities that reduce strategic clarity and operational efficiency.

This aligns with Freeman's (1984) stakeholder theory, which posits that achieving long-term competitiveness requires aligning stakeholder interests through cooperative engagement. Herath and Herath (2023) further support this by demonstrating how structured stakeholder models, such as the Collaborative Decision-Making (CDM) framework at Amsterdam Schiphol, can optimize resource use and streamline operations. In Oman's case, the absence of such a framework results in underutilized infrastructure, as evidenced by the underperformance of facilities like the Salalah cargo terminal. These findings suggest an urgent need to institutionalize collaborative platforms and centralized governance to enhance alignment and sectoral cohesion

The interviews identified a broad spectrum of key stakeholders critical to Oman's air cargo ecosystem. As confirmed by participants 1, 3, 7, 8, 10, 11, and 13, these include government and regulatory bodies such as the Ministry of Transport, the Civil Aviation Authority (CAA), and the Royal Oman Police , Customs, alongside operational actors like Oman Airports Management Company, Oman Air, ground handlers, and cargo carriers. Participant 13 noted, "Key stakeholders include the Ministry of Agriculture, Oman Airports, fish traders, logistics providers, and Oman Air," emphasizing the diversity and interdependence of players in the sector.

However, while collaboration exists, alignment among these actors remains fragmented. Participant 4 observed that "the current level of alignment among stakeholders in the Omani air

cargo sector appears to be lacking, characterized by insufficient communication and a tendency for different parties to blame each other," adding that this misalignment contributes to the underutilization of facilities such as Salalah Airport.

This issue resonates with literature by Pereira et al. (2021), who argue that stakeholder misalignment can lead to regulatory inefficiencies, operational delays, and reduced competitiveness. The lack of shared KPIs and governance mechanisms, echoed by Participant 15's comment that "a clear sector strategy with defined roles would really help, we're missing a governance model", further exacerbates inefficiencies.

In line with stakeholder theory (Freeman, 1984; Phillips et al., 2003), which underlines the need for strategic alignment among actors to achieve collective objectives, the findings underscore the necessity of a unified approach to drive operational performance and innovation. Participant 11 emphasized this by stating, "We're all trying to improve the sector, but there is no unified framework or ownership. Everyone's doing their own thing."

The emphasis on best practices of the intra- and inter-sector stakeholder collaborations that include government entities, the private sector, as well as research bodies serves as a clear indication of a comprehensive framework to support industry performance (Herath, and Herath, 2023). Such partnerships are crucial for developing more efficient solutions for air cargo management, as they allow cooperation between industry's related stakeholders.

Survey results show that 59.30% of respondents identified weak inter-sectoral coordination as a critical challenge for Oman's air cargo sector. Furthermore, 75.58% considered inter-sectoral collaboration to be either "very important" or "essential," underscoring its recognized value in enabling sectoral growth and integration.

Despite this perceived importance, interviews revealed that meaningful and structured collaboration across industries, such as agriculture, fisheries, manufacturing, and logistics, remains limited. Participant 13 stated, *"There is no proper coordination with producers. This results in missed opportunities for export development and volume growth."* Similarly, Participant 8 observed, *"There is little coordination with agriculture and fisheries despite their export potential. This limits the cargo base."*

Participant 14 emphasized the need for multimodal integration, noting, *"Linking sea-air cargo in Oman is not yet fully developed… there's a missing synergy between our seaports and airports."*

Participant 4 reflected on the temporary success of collaboration during the pandemic, stating, *"Collaboration happened well during COVID-19 when urgency forced us to act together, but now it's back to business-as-usual silos."* Meanwhile, Participant 12 stressed the need for institutional platforms: *"We need structured engagement platforms that bring in agriculture, fisheries, and even tourism… otherwise we miss out on scale and synergy."*

These insights are consistent with literature emphasizing the importance of integrated supply chains. Govindan and Jha (2024) highlight that inter-sectoral collaboration enhances logistics performance and unlocks new market opportunities. Benchmarking studies of Singapore and Amsterdam further demonstrate that aligning air cargo operations with national economic strategies can accelerate growth in high-value segments such as perishables and electronics. While stakeholders recognize the potential of inter-sectoral collaboration, the lack of structured governance, shared platforms, and strategic coordination continues to hinder the full realization of Oman's air cargo potential

Govindan and Jha (2024) argue that effective inter-sectoral collaboration enables the creation of integrated supply chains, unlocking significant market opportunities and enhancing performance. Benchmarking insights from Singapore support this view, demonstrating how aligning logistics strategies with national economic priorities fosters growth in high-value goods such as perishables and electronics. Oman's inability to replicate such integrated frameworks restricts its capacity to diversify exports and fully leverage its geographic and infrastructural assets.

In the context of the air cargo sector, inter-sectoral collaboration refers to the coordinated engagement of related industries, such as transport, logistics, agriculture, fisheries, technology, and trade, to align goals, harmonize operations, and optimize outcomes. Participant 14 underscored this point, stating, *"Linking sea-air cargo in Oman is not yet fully developed… there's a missing synergy between our seaports and airports."* Despite Oman's investment in high-performing seaports, limited integration with air cargo systems was cited as a major constraint to competitiveness.

Interviewees emphasized that while some successful collaborations were observed during the COVID-19 pandemic, these efforts were often short-lived. Participant 4 noted, *"Collaboration happened well during COVID-19 when urgency forced us to act together, but now it's back to business-as-usual silos."* This reflects the lack of long-term, institutionalized mechanisms for cross-sectoral engagement.

Survey results reinforce these qualitative findings. Specifically, 75.58% of respondents rated inter-sectoral collaboration as either "very important" or "essential" to the development of the air cargo sector. Moreover, 59.30% identified weak inter-sectoral coordination as a critical issue. These data indicate strong stakeholder awareness of the need for cross-sector engagement, but also a recognition that Oman currently lacks the frameworks to implement it effectively. The integration of air cargo with other sectors, particularly agriculture, fisheries, and maritime transport, is essential to unlocking Oman's logistics potential. However, without structured and continuous collaboration mechanisms, the sector remains fragmented and under-optimized.

Effective collaboration in Oman's air cargo sector is currently hindered by several structural barriers. These include the absence of a common strategic vision, inconsistencies in regulations and policies, resource constraints, and uneven adoption of technological advancements. As Govindan and Jha (2024) emphasize, such challenges undermine integrated supply chain development and hinder sector-wide efficiency, communication, and innovation. Interviews with sector experts confirmed this fragmentation. Participant 4 remarked, *"There is no structured framework for regular communication or data sharing across stakeholders. Everyone uses their own systems, and this creates delays and duplication."*

This lack of cohesive collaboration reduces the sector's effectiveness and prevents the realization of strategic synergies across industries such as logistics, agriculture, and maritime transport. Cross-sector coordination, therefore, becomes essential not just for boosting operational performance but also for enhancing service quality, increasing economic returns, and positioning Oman as a competitive logistics hub.

The importance of alignment and collaboration among stakeholders is well-supported in the literature. Freeman (1984) and Freeman et al. (2020) argue that stakeholder alignment facilitates shared goals, fosters innovation, and builds resilience in complex systems. Motyka and Njoya

(2020) emphasize the effectiveness of centralized governance models, such as that of Frankfurt Airport, in streamlining operations and minimizing redundancy. Similarly, Herath and Herath (2023) highlight how Amsterdam Schiphol's Collaborative Decision-Making (CDM) model and Rejeb et al. (2021) point to digital freight corridors as examples of how integrated coordination enhances regulatory compliance and operational outcomes.

Govindan and Jha (2024) further assert that collaborative logistics frameworks, particularly when aligned with national economic strategies, are key to unlocking new market potential and building sustainable supply chains. This aligns with the perspectives of interviewees who consistently called for improved institutional mechanisms. Participant 4 proposed: *"We need to adopt best practices of communicating with stakeholders through using standard formats and tools for sharing information as they occur."*

Additionally, survey data reinforced the need for structured coordination. A significant 56.98% of respondents identified stakeholder collaboration as a top strategy to enhance the air cargo sector, and 75.58% rated inter-sectoral collaboration as "very important" or "essential." These figures reflect a strong consensus on the need for integrated, cross-functional engagement.

To address these gaps, participants recommended the establishment of a central coordinating body or task force responsible for overseeing collaborative efforts and aligning stakeholder initiatives with national logistics objectives. Such mechanisms would improve information sharing, reduce duplication, and align investment decisions, creating a stronger foundation for sector-wide progress.

A lack of coordinated governance frameworks also emerged as a significant challenge, particularly in aligning strategic direction across key stakeholders in Oman's air cargo sector. This issue is explored further in Section 5.3, where stakeholder alignment and inter-sectoral collaboration are analyzed in depth, drawing on governance insights from Lægreid and Rykkja (2022). Participants emphasized the absence of a unified decision-making body and clearly defined mandates. Participant 15 noted, *"We don't have a governance model in place. Everyone is doing their own thing, there's no central strategy."* Similarly, Participant 11 stated, *"Each entity sets its own priorities, which causes duplication and slows things down."*

Regulatory inefficiencies were also widely cited. According to the survey results, 29.07% of respondents identified policy and regulation as the biggest challenge affecting the sector, second only to market demand. Interviewees echoed this concern, highlighting inconsistent customs procedures and complex tariff structures that hinder cargo movement. As Participant 4 observed, *"Regulatory hurdles delay operations, and the lack of alignment with international standards is a key barrier."*

These findings are supported by literature emphasizing the value of regulatory harmonization in enhancing logistics competitiveness. Motyka and Njoya (2020) discuss the European Union's Single European Sky initiative as a model of streamlined regulation that improves cargo flow across borders. Oman has yet to implement a comparable framework, leaving it at a disadvantage relative to regional hubs like Dubai and Doha. Rejeb et al. (2021) also emphasize that modern cargo ecosystems depend on integrated digital and legal infrastructures to ensure compliance, minimize delays, and reduce friction across the supply chain.

Taken together, both qualitative and quantitative evidence suggest that without coordinated governance and regulatory modernization, Oman's air cargo sector will continue to face bottlenecks that limit its efficiency and global competitiveness

According to Xia, Li, and He (2023), freight operations tend to be more centralized than passenger transport, utilizing fewer airports within a wider catchment area, typically up to 12 hours, due to the reliance on Road Feeder Services (RFS) for ground transport (Bombelli, Santos, and Tavasszy, 2020). This model enables a hub-and-spoke architecture that enhances consolidation and operational efficiency. However, Oman's heavy dependence on a single national carrier, Oman Air, limits its ability to exploit this architecture effectively. As Participant 1 noted, *"We are at a disadvantage compared to our neighboring hubs due to limited air cargo routes."* Similarly, Participant 7 explained, *"Dubai's and Qatar's national carriers operate globally with large fleets. Oman's limited network means we lose out on transit cargo."*

Survey data reinforces this concern: 69.77% of respondents identified market demand as the most significant challenge facing Oman's air cargo sector. This suggests that despite sufficient infrastructure and operational capacity, demand remains subdued due to limited connectivity and competition from better-integrated regional hubs. This sentiment was echoed by Participant 1, who

added, *"The existing capacity can handle much more than the current demand, but we don't have the network to attract that volume."*

This finding aligns with benchmarking insights from global hubs such as Dubai and Singapore, which have adopted strong connectivity strategies and diverse fleet capabilities to stimulate demand and attract transit volumes (Rejeb et al., 2021; Herath & Herath, 2023). Without similar strategic planning, Oman's air cargo infrastructure risks remaining underutilized.

Moreover, effective air cargo operations increasingly rely on digital transformation to remain competitive in a dynamic global market. Technologies such as AI, blockchain, and predictive analytics are becoming standard in leading hubs, as highlighted by Florido-Benítez (2023). Oman's relative lag in this area poses additional challenges. Participant 11 emphasized this issue by stating, *"Customs clearance is a major bottleneck. There's no integrated platform or automated process, it's all still too manual."* This reflects broader operational inefficiencies that undermine Oman's competitiveness.

Participant 5 further commented, *"We lack end-to-end logistics solutions. Forwarders have to coordinate between disconnected systems, which delays shipments and adds cost."* These challenges point to the urgent need for Oman to invest in both digital tools and international network expansion to create a more efficient and competitive air cargo ecosystem.

Regulatory policies play a critical role in ensuring the safety, security, and operational efficiency of air cargo systems. However, fragmented regulatory environments and inconsistent customs procedures remain significant impediments to performance in Oman's context. Survey data show that 29.07% of respondents identified policy and regulation as one of the most pressing challenges in the sector. This perception is echoed in interviews, where Participant 1 remarked, *"Complex customs procedures, while generally effective, could benefit from improvements to become more flexible and efficient."* Similarly, Participant 11 stated, *"Customs regulations and bonded corridor approvals lack clarity, this slows down cargo flows unnecessarily."*

These observations align with global benchmarking studies that demonstrate how harmonized and transparent regulatory frameworks significantly improve cargo throughput. For instance, airports like Amsterdam Schiphol and Singapore Changi have adopted single-window systems and

collaborative customs models that streamline clearance processes and enhance trade facilitation (Rejeb et al., 2021; Taderera et al., 2023). Oman's inability to implement such integrated systems contributes to operational delays and limits its competitiveness in regional logistics.

Another structural challenge is Oman's lack of market diversification, cited by 66.67% of survey respondents as the root cause of low cargo volumes and import-export imbalances. Interview insights reinforced this view. Participant 6 noted, *"Our export portfolio is very narrow, fish, livestock, some perishables, but we lack industrial exports or manufactured goods that create consistent air freight demand."* Moreover, Participant 7 explained, *"We still depend on narrow-body aircraft, which limits our ability to move large cargo or accept transit shipments from wide-body freighters."*

This combination of limited product diversity and restricted aircraft capacity constrains Oman's ability to scale up air cargo volumes or position itself as a regional transshipment hub. Benchmarking with cargo powerhouses like Dubai shows that a diversified export base and flexible cargo infrastructure are key enablers of sectoral resilience (Herath & Herath, 2023).

Oman's air cargo infrastructure, particularly its cold storage and specialized handling capabilities, remains underdeveloped, further weakening its global competitiveness. Survey responses identified infrastructure as a challenge in both Q6 and Q7, with 19.77% directly selecting it as one of the top challenges. Participant 13 highlighted this shortfall clearly: *"We need proper cold storage zones for sensitive goods. Right now, our systems are either general-use or completely missing in some terminals."* Participant 8 added, *"Salalah has potential, but the infrastructure for pharma or seafood exports is still very basic."*

These issues have been repeatedly highlighted in international literature. Studies on Dubai International Airport show that temperature-controlled zones and GDP-compliant handling are essential for serving high-value sectors such as pharmaceuticals and perishable exports (Florido-Benítez, 2024). Without these facilities, Oman will continue to struggle in attracting time-sensitive, high-yield cargo.

The findings reveal that only 34.88% of respondents reported using advanced digital tools such as blockchain and IoT in their air cargo operations, indicating a limited level of digital adoption across

the sector. Interview participants consistently identified cost barriers, limited technical expertise, and organizational resistance as major obstacles to implementing such technologies. As Participant 6 explained, *"We know automation is needed, but digital customs, integrated platforms, and AI-based tracking are expensive, and the expertise isn't here yet."* Similarly, Participant 2 emphasized, *"Traceability and real-time tracking systems like blockchain and IoT are not optional, they're critical, but we're behind."*

This gap is especially concerning when compared with leading global hubs. For example, Amsterdam's Smart Cargo Mainport Program demonstrates how real-time data integration, predictive analytics, and AI-enabled tools can streamline cargo flows and enhance customer satisfaction (Taderera et al., 2023). Without similar investments, Oman remains at a technological disadvantage that undermines both efficiency and global competitiveness.

In addition to technological lag, regional competition emerged as a substantial concern: 62.79% of respondents identified neighboring hubs like Dubai and Doha as significant competitive threats. These regional peers benefit from advanced infrastructure, strong government backing, and fully integrated multimodal logistics networks. Participant 5 observed, *"We are surrounded by countries that offer faster clearance, better connectivity, and more cargo-friendly policies. It's hard to compete."* Furthermore, Participant 9 stated, *"Oman focuses too much on livestock and express cargo, it's too narrow. We need to widen our services if we want to grow."*

This insight is consistent with the literature, which stresses that differentiation and niche strategies are essential for smaller cargo markets to stay competitive in saturated regions (Rejeb et al., 2021). Without expanding into high-value verticals such as pharmaceuticals, e-commerce, and perishables, supported by appropriate infrastructure and services, Oman risks stagnation in its cargo volumes and limited appeal to global logistics players.

5.2.2 Opportunities in the Air Cargo Sector

Oman's strategic location at the intersection of Europe, Asia, and Africa provides a substantial competitive advantage for becoming a regional logistics and air cargo hub. This geographic opportunity was acknowledged by 72.09% of survey respondents, who identified expanding global

reach as the most promising opportunity for the sector over the next five years. Participant 6 highlighted, “Oman’s location gives it an edge, if we improve connectivity.” The literature supports this view, noting that Oman’s positioning enables it to serve growing markets in East Africa and South Asia, provided that multimodal transport systems and trade facilitation measures are effectively implemented (Chen et al., 2017; Oman Vision 2040, 2020). Benchmarking with Dubai shows how integrated air, sea, and land connectivity can enhance trade volumes and transform a location into a global cargo gateway (Rejeb et al., 2021).

Another critical area of opportunity lies in cold chain logistics. Studies by Govindan and Jha (2024), Pereira et al. (2021), and Wang et al. (2023) emphasize that high-value sectors such as pharmaceuticals and perishable goods depend on GDP-compliant, temperature-controlled infrastructure. Participant 13 stated, “Investing in infrastructure for high-value goods will enable us to tap into lucrative global markets.” The importance of such infrastructure is well-demonstrated by hubs like Singapore and Doha, which have capitalized on cold chain capabilities to diversify exports and support re-export activities. Oman’s ability to replicate this model could significantly strengthen its position in high-yield segments like fisheries, agriculture, and biopharmaceuticals.

Digital transformation is another area where Oman can achieve operational gains and enhance competitiveness. Only 34.88% of survey respondents indicated the use of digital tools such as blockchain and IoT in their operations, suggesting a gap in digital maturity. Participant 5 commented, “Using the latest technology to speed up the process and use AI tools to improve the sector” is essential. The literature underscores this point: Herath and Herath (2023) and Rejeb et al. (2021) describe how predictive analytics, automated customs systems, and integrated platforms, like Amsterdam’s Smart Cargo Mainport Program, have streamlined cargo handling and enabled real-time decision-making. Such systems improve transparency, efficiency, and traceability, and are particularly crucial in highly competitive regional environments.

Oman also has the potential to benefit from the global surge in e-commerce and express cargo services. Participant 2 explained that “air cargo demand stimulation through free zones, attracting regional distribution centers, promoting eCommerce for Omani business to expand globally and promoting/incentivizing agricultural and fisheries export are some of the aspects that can contribute to the growth of the air cargo sector.” This is supported by Rejeb et al. (2021), who stress that integrated logistics systems and digitalized value chains are crucial for meeting the

demands of the e-commerce sector. Furthermore, Herath and Herath (2023) emphasize the role of logistics parks and smart customs in facilitating cross-border e-commerce, something Oman can develop in its airport-linked free zones.

Free trade and logistics zones around airports also present strong opportunities. Survey data shows that 53.49% of respondents believe such zones will have a major impact on the sector, and 23.26% expect a transformational impact. Literature confirms this view: Rejeb et al. (2021) and Florido-Benítez (2023) highlight how the expansion of airport-centric free zones, such as those in Incheon and Dubai, has catalyzed growth by providing infrastructure, incentives, and streamlined regulations for global logistics operators.

In terms of sectoral diversification, several interviewees emphasized the importance of expanding beyond traditional sectors such as livestock and fisheries. This aligns with Govindan and Jha's (2024) recommendation to develop integrated supply chains that link agriculture, logistics, and trade to unlock value. The diversification of exports is also supported by Taderera et al. (2023), who highlight the need for hub strategies to focus not only on cargo volumes but also on the nature and diversity of goods handled.

Finally, Oman's recovery from the COVID-19 pandemic has revealed sectoral resilience and renewed potential for growth. Participant insights and secondary data confirm that air cargo operations demonstrated flexibility during global disruptions, and Oman can now build on this foundation. Seasonal peaks, such as in March, May, and October, offer planning cues for resource allocation and service improvements, enabling greater efficiency across the supply chain. This finding reflects trends discussed by Florido-Benítez (2023), who emphasized adaptive scheduling and smart forecasting as tools to respond to volatile demand in the post-pandemic era.

Taken together, these opportunities, strategic location, cold chain investment, digital transformation, e-commerce expansion, free zone development, and export diversification, present Oman with a roadmap to enhance its air cargo competitiveness. Realizing this potential will require coordinated governance, targeted investment, and stakeholder alignment, as also emphasized in Oman Vision 2040 and in best-practice cases documented in global benchmarking literature.

5.3 Stakeholder Alignment and Inter-sectoral Collaboration

Addressing stakeholder misalignment and fostering inter-sectoral collaboration are essential for unlocking the full potential of Oman's air cargo sector. This section synthesizes evidence from survey responses, interviews, cargo volume trends, and benchmarking with leading global hubs, grounding the analysis in the relevant literature.

Survey data revealed that 56.98% of respondents identified conflicting priorities among stakeholders as a significant challenge. This misalignment manifests in fragmented strategies, duplicated initiatives, and operational inefficiencies. Participant 4 explained, "Each organization operates with its own agenda, which leads to inefficiencies and delays in decision-making," highlighting the absence of coordinated planning, particularly at Salalah Airport despite its strategic positioning.

Cargo volume analysis further supported these insights, indicating that coordination gaps among customs, airport authorities, and freight forwarders result in poor throughput during peak periods, thereby weakening supply chain reliability. Benchmarking with Amsterdam Schiphol illustrates how a formalized framework like the Collaborative Decision-Making (CDM) model can align stakeholders through shared performance metrics and coordinated planning. The absence of such mechanisms in Oman contributes to resource underutilization and deters international logistics firms and carriers from investing in the market.

Stakeholder theory (Freeman, 1984) posits that long-term competitiveness in complex systems such as air logistics relies on harmonizing stakeholder interests. This theoretical framework is reinforced by Herath and Herath (2023), who emphasize that models like CDM enhance transparency and resilience through collaborative governance. In Oman's context, the lack of such frameworks has resulted in fractured priorities and siloed decision-making, weakening the sector's responsiveness to market shifts.

The interviews identified a wide spectrum of stakeholders vital to Oman's air cargo ecosystem, including regulatory agencies, national carriers, port authorities, and logistics providers. Participant 13 noted, "Key stakeholders include the Ministry of Agriculture, Oman Airports, fish traders, logistics providers, and Oman Air," illustrating the interdependence of actors across the value chain. Yet, collaboration among these actors remains largely ad hoc and informal. Participant

11 stated, “We’re all trying to improve the sector, but there is no unified framework or ownership. Everyone’s doing their own thing.”

This fragmentation is not unique to Oman. However, comparative benchmarking with Singapore and Dubai reveals that these hubs have achieved greater alignment by linking their air cargo strategies with national economic goals. In Singapore, for instance, the Economic Development Board integrates the air cargo sector with agriculture and manufacturing, ensuring a consistent flow of goods into high-value global markets (Govindan and Jha, 2024). These strategies contrast sharply with Oman’s current siloed approach.

Survey findings also underscored the importance of inter-sectoral collaboration, with 59.30% of respondents identifying weak coordination between sectors such as agriculture, fisheries, and logistics as a major barrier. Participant 13 stated, “There is no proper coordination with producers. This results in missed opportunities for export development and volume growth.” Similarly, Participant 8 noted, “There is little coordination with agriculture and fisheries despite their export potential. This limits the cargo base.”

These views align with the findings of Rejeb et al. (2021), who argue that the failure to integrate key sectors undermines export diversification and operational efficiency. Oman’s underperformance in high-potential sectors, like seafood, livestock, and pharmaceuticals, is exacerbated by insufficient cold chain logistics and disjointed interactions between producers and transport providers.

To address these issues, the literature advocates for centralized governance platforms. Pereira, Lohmann, and Houghton (2021) emphasize that stakeholder engagement enhances service quality, reduces regulatory friction, and facilitates investment. Participant 4 echoed this sentiment: “We need to adopt best practices of communicating with stakeholders through using standard formats and tools for sharing information as they occur.” Similarly, Participant 15 emphasized the need for clearly defined mandates, stating, “We don’t have a governance model in place. Everyone is doing their own thing, there’s no central strategy.”

Laegreid and Rykkja (2022) stress that inter-sectoral coordination should be supported by measurable performance indicators and transparent decision-making tools. Participant 5 stated, “We need to adopt technology and automated processes and establish the key performance

indicators for the collaborative work streams with partners for a given year," underscoring the importance of shared accountability mechanisms.

Participants also proposed concrete institutional reforms. Participant 7 advocated for the "ownership and committee establishment to drive the air cargo business," while Participant 8 stressed the "integration of multimodal transport and establishment of cold chain logistics" to enhance competitiveness.

Benchmarking with Dubai's integration of logistics with its tourism and agriculture sectors illustrates the benefits of such cross-sector engagement, enabling cost reductions, enhanced service quality, and access to broader markets. The example of Singapore similarly shows that alignment with national development plans ensures predictable cargo volumes and investor confidence.

Survey data reinforces this need for structural coordination, with 75.58% of respondents rating inter-sectoral collaboration as either "very important" or "essential." Additionally, 56.98% highlighted stakeholder collaboration as a top strategy to improve Oman's air cargo sector. These findings confirm that stakeholders acknowledge the urgency of moving from isolated initiatives toward integrated platforms and joint accountability structures.

While these findings underscore the collective recognition of the need for collaboration, they also mask important perceptual differences among stakeholder groups. The divergence between the survey results and interview insights reveals underlying perceptual and institutional gaps within Oman's air cargo ecosystem. While survey respondents, largely comprising operational managers and mid-level staff, expressed optimism about digital readiness and sectoral reform, interview participants, most of whom were senior decision-makers, highlighted persistent governance fragmentation and implementation delays. This contrast reflects a difference in proximity to policy formulation versus execution. It suggests that optimism at the operational level is driven by recent infrastructure investments and modernization discourse, whereas experts' caution stems from direct experience with regulatory inefficiencies and coordination barriers across agencies.

These contradictions carry important implications for stakeholder alignment. They indicate that policy objectives and strategic messages are not consistently internalized across institutional levels, limiting the effectiveness of reform initiatives. From a stakeholder theory perspective (Freeman, 1984; Donaldson and Preston, 1995), this misalignment reflects a lack of shared

understanding and communication between influential and dependent stakeholder groups, which may hinder collective progress toward Vision 2040 targets. Bridging this perception gap requires transparent communication channels, participatory decision-making mechanisms, and periodic feedback loops that align strategic intent with operational reality.

To conclude, Oman must prioritize the institutionalization of stakeholder alignment and inter-sectoral collaboration. This can be achieved through the formation of a National Logistics Council, supported by structured communication tools, joint performance indicators, and sector-specific task forces. Such mechanisms will not only improve efficiency and service quality but also enable Oman to transform its air cargo sector into a globally competitive, innovation-driven logistics hub.

5.4 Global Best Practices for Air Cargo Hubs

Benchmarking Oman's air cargo sector against global leaders such as Singapore, Dubai, Amsterdam, Frankfurt, and Hong Kong provides valuable insights into the structural and strategic mechanisms that underpin international success. These hubs have advanced their competitive positions through strategic infrastructure investments, robust digital transformation, integrated stakeholder coordination, and adaptive regulatory frameworks. This section critically evaluates these practices, drawing on interview insights, survey findings, cargo volume analysis, and literature review, to assess their relevance and adaptability within the Omani context.

Infrastructure development stands as a foundational pillar in the competitiveness of global air cargo hubs. International leaders like Dubai International Airport and Singapore Changi have consistently invested in specialized cargo terminals equipped with temperature-controlled storage, high-speed handling systems, and product-specific facilities. Amsterdam Schiphol's perishable center and Dubai's dedicated seafood and pharmaceutical zones illustrate how infrastructure tailored to high-value goods is essential for capturing market share. In Oman, however, stakeholders have identified persistent gaps.

These concerns are reflected in interviews. Participant 6 observed, "There are cold storage facilities, but they're either general-purpose or not easily accessible for cargo." Participant 5 added, "One such area that deserves special attention is the area of perishable commodities, for which we have to create dedicated structures." The lack of specialized infrastructure not only limits

Oman's ability to serve sectors like fisheries and pharmaceuticals but also constrains its attractiveness as a transshipment hub. Literature on global best practices supports this finding. Florido-Benítez (2024) highlights how GDP-compliant cold chains and automated cargo handling systems enhance reliability and reduce spoilage in high-value exports.

Benchmarking further reveals that Dubai's logistics parks and free zones, such as Dubai Logistics City and Jebel Ali Free Zone, integrate warehousing, customs, and multimodal transport within one ecosystem, reducing turnaround time and increasing throughput. Similarly, Frankfurt Airport combines bonded corridors and temperature-controlled zones to facilitate pharmaceutical exports under EU GDP compliance. Oman can draw from these examples to enhance its infrastructure with logistics parks, specialized cargo zones, and multimodal connectivity that integrates air, sea, and land.

Digital transformation is another defining feature of high-performing air cargo ecosystems. Amsterdam's Smart Cargo Mainport and Singapore's e-Freight@Singapore have revolutionized operations through the use of predictive analytics, blockchain, and fully digitized customs platforms. These systems reduce manual interventions, accelerate cargo clearance, and enhance supply chain visibility. According to Q12 of the stakeholder survey, 81.4% of participants believe technological innovation is essential for advancing Oman's air cargo performance, yet only 34.88% currently report using advanced technologies like blockchain or IoT.

Interview findings substantiate this digital gap. Participant 6 noted, "Digital customs, integrated platforms, and AI-based tracking can transform how we operate , but we are behind." Participant 2 explained, "Traceability and real-time tracking systems like blockchain and IoT are not optional, they're critical, but we're behind." Participant 15 emphasized, "Investing in digital tools will allow Oman to match what Amsterdam or Singapore are doing in air cargo."

The literature reinforces this perspective. Rejeb et al. (2021) assert that blockchain and predictive analytics significantly improve tracking accuracy, transparency, and throughput efficiency. Taderera et al. (2023) demonstrate how predictive analytics enable real-time cargo allocation and risk management, leading to improved performance and cost savings. For Oman, the absence of these systems constrains scalability and responsiveness, particularly during seasonal peaks. Investment in digital freight corridors, workforce upskilling, and API-based integration between customs, airlines, and forwarders would represent critical progress in this area. Beyond digital

transformation, understanding broader global market trends is equally essential to contextualize Oman's strategic positioning within the evolving air cargo landscape.

Global Market Trends and Oman's Strategic Positioning

The global air-cargo industry is experiencing profound structural change driven by technological innovation, environmental imperatives, and evolving trade dynamics. Four interrelated trends stand out as reshaping competitiveness: digitalisation, the growth of cross-border e-commerce, sustainability transitions, and supply-chain reconfiguration in response to geopolitical and pandemic-related disruptions. Together these trends are redefining how nations position themselves within global logistics networks (IATA, 2023; Florido-Benítez, 2024).

Digitalisation has become a decisive differentiator among cargo hubs. Artificial intelligence, predictive analytics, and blockchain technologies enable real-time data exchange, accurate forecasting, and traceability across multimodal supply chains (Rejeb et al., 2021). Airports such as Amsterdam Schiphol and Singapore Changi have embedded these tools within integrated cargo-community systems, reducing clearance times and increasing visibility from origin to destination (Taderera et al., 2023). For Oman, where only one-third of operators report using advanced digital tools, accelerating digital adoption is essential to connect national cargo flows to global digital freight corridors. Establishing interoperable data platforms between customs, airports, and logistics providers would not only enhance transparency but also strengthen Oman's appeal to global freight forwarders seeking digitally enabled gateways.

E-commerce expansion is another defining force. Online retail now drives an estimated quarter of global air-cargo volumes, stimulating demand for express logistics and small-parcel fulfillment services (IATA, 2023). Leading hubs such as Dubai World Central and Hong Kong International have positioned themselves as regional e-commerce consolidation points through automated sorting centres and partnerships with integrators like DHL and Amazon (Gavalas et al., 2022). Oman's geographic location on east–west and north–south trade routes offers comparable potential, yet the country lacks specialized e-commerce handling zones and rapid-clearance systems. Developing dedicated facilities within Muscat and Salalah free zones, combined with simplified customs for cross-border parcels, would allow Oman to capture part of the surging regional online-retail traffic from South Asia and East Africa.

Sustainability transitions are now shaping investor and airline preferences. Global carriers are committing to net-zero carbon targets by 2050, adopting sustainable aviation fuels (SAF), electrified ground operations, and carbon-offset mechanisms (Amicarelli et al., 2021). Hubs such as Singapore and Frankfurt have embedded green-logistics standards into their national aviation strategies, linking environmental performance to competitiveness. Oman can differentiate itself in the Gulf region by embedding sustainability within its cargo-hub narrative, through incentives for SAF usage, energy-efficient cold-chain infrastructure, and digital emissions tracking aligned with Vision 2040's environmental goals.

Finally, **supply-chain diversification** following COVID-19 and geopolitical tensions has prompted manufacturers to seek new routes and logistics bases outside congested mega-hubs. Emerging "Middle Corridor" and "South-South" trade lanes have increased demand for reliable secondary hubs that offer both resilience and strategic connectivity (Caldara et al., 2022). Oman's ports at Sohar, Duqm, and Salalah, when integrated with air-cargo terminals, position the country to serve as a neutral and stable trans-shipment alternative linking Asia, Africa, and Europe. Strengthening multimodal corridors and promoting Oman as a risk-diversification hub can attract multinational logistics players seeking redundancy in global supply chains.

Those global trends redefine what it means to be competitive in air cargo. Competitiveness is no longer measured solely by throughput volumes but by a hub's ability to offer **digital connectivity, environmental credibility, and supply-chain resilience**. Oman's strategic response should therefore move beyond infrastructure expansion to a coordinated strategy that integrates digital transformation, green logistics, and e-commerce facilitation within a cohesive governance framework. By aligning national logistics policy with these global market trajectories, Oman can transition from a geographically advantaged but under-utilized player to an agile, sustainable, and technology-enabled hub in the evolving global cargo ecosystem.

Stakeholder collaboration is another dimension where Oman lags behind global exemplars. Amsterdam's CDM model institutionalizes joint planning between customs, airlines, handlers, and freight forwarders through shared dashboards and round-the-clock coordination. This model significantly reduces dwell times, increases transparency, and improves network resilience. In contrast, Oman's fragmented coordination remains a bottleneck. As per survey data, 37.21% of

respondents cited stakeholder collaboration as a core challenge, aligning with prior findings in section 5.2.

Participants reinforced this through qualitative responses. Participant 4 remarked, “The lack of a unified mechanism for collaboration often leads to delays and missed opportunities for optimization.” Participant 11 further stated, “Customs regulations and bonded corridor approvals lack clarity, this slows down cargo flows unnecessarily.” These quotes reflect systemic inefficiencies that undermine operational harmony and market responsiveness.

Freeman’s (1984) stakeholder theory emphasizes that coordinated stakeholder action is central to achieving sectoral efficiency. Motyka and Njoya (2020) provide empirical support, showcasing Frankfurt Airport’s centralized governance as a model for minimizing conflict and streamlining logistics processes. The absence of such mechanisms in Oman results in duplication of efforts, underutilized assets, and reduced investor confidence. To resolve these gaps, Oman could implement a centralized logistics council that coordinates KPIs, promotes digital integration, and resolves institutional frictions, mirroring the CDM framework.

Policy innovation is the fourth area where benchmarking offers valuable lessons. Singapore’s single-window system for cargo clearance provides near-instantaneous customs approvals by integrating documentation, payment, and inspection modules. Similarly, Dubai offers incentives for innovation, including reduced tariffs, bonded zones, and streamlined licensing. In Oman, by contrast, regulatory inconsistencies remain a major bottleneck. Survey responses showed that 29.07% of participants listed policy and regulation as a significant challenge.

Interviewees echoed these findings. Participant 1 shared, “Complex customs procedures, while generally effective, could benefit from improvements to become more flexible and efficient.” Participant 4 highlighted, “Regulatory hurdles delay operations, and the lack of alignment with international standards is a key barrier.” The literature supports the urgency of reform. Motyka and Njoya (2020) describe the EU’s Single European Sky initiative as a model of regulatory harmonization that increases cargo velocity and transparency. Without similar streamlining, Oman risks being bypassed by international carriers in favor of more business-friendly environments.

Several additional strategies emerged from stakeholder interviews and benchmarking studies. One promising avenue is the creation of specialized free zones tailored to high-value sectors such as e-

commerce, pharmaceuticals, and perishables. Participant 8 explained, “Specialized free zones that cater to niche industries can attract targeted investment and boost competitiveness.” Participant 2 added, “Air cargo demand stimulation through free zones, attracting regional distribution centers, promoting eCommerce for Omani businesses to expand globally, and incentivizing agricultural and fisheries exports are all essential.”

This aligns with studies by Rejeb et al. (2021), who underscore that niche specialization allows smaller logistics hubs to remain competitive amidst regional giants. Singapore’s Seletar Aerospace Park and Dubai’s Dubai CommerCity offer templates for integrating sector-specific incentives, digitalization, and rapid customs clearance to attract targeted investment. Oman could replicate this approach through export processing zones supported by logistics corridors and bonded warehouses.

Participants also pointed to the need for multimodal integration. Participant 14 stated, “Linking sea-air cargo in Oman is not yet fully developed… there’s a missing synergy between our seaports and airports.” The literature and cargo benchmarking reinforce this. Pereira et al. (2021) demonstrate how Singapore’s port-airport coordination allows for transshipment within a 3-hour window, enabling flexible routing and improved reliability. Oman, with its proximity to major seaports like Sohar and Salalah, has the latent potential to establish multimodal corridors that compete with UAE offerings, provided digital and infrastructural investments follow.

Green logistics also emerged as a future-facing opportunity. While not directly emphasized in interviews, literature such as Florido-Benítez (2024) points to the role of sustainable aviation fuels (SAF), electric ground handling equipment, and emissions tracking in elevating hub competitiveness. Oman could differentiate itself regionally by integrating sustainability metrics into its air cargo strategies, an area not yet saturated in the Gulf market.

The potential of branding Oman as a regional logistics hub was mentioned in multiple interviews. Participant 14 observed, “If we talk about Singapore, they're a hub for air cargo logistics in Asia. Dubai is also a big hub, and in Europe, Lufthansa is a leader in air cargo. Having the right tools, equipment, and carriers is key.” This highlights the importance of projecting a competitive narrative to global stakeholders, through strategic marketing, international certifications (e.g., IATA CEIV Pharma), and partnerships with multinational integrators like DHL or UPS.

Finally, fostering public-private partnerships (PPPs) was emphasized as a mechanism for driving innovation, attracting investment, and sharing risk. Survey results supported this, with a majority of respondents indicating that joint initiatives between regulators, operators, and private firms would strengthen Oman's position. Participant 5 highlighted, "We need KPIs for collaborative work streams with partners for a given year." Participant 7 called for "ownership and committee establishment to drive the air cargo business." These suggestions reflect a clear demand for institutional frameworks to operationalize collaboration.

In summary, the success of global air cargo hubs rests on a convergence of four pillars: specialized infrastructure, digital transformation, stakeholder alignment, and regulatory innovation. Oman's strategic location, existing airport assets, and regional ambitions position it well to adapt these best practices. However, meaningful progress will require bold investments, policy coherence, and sustained coordination among stakeholders. By drawing lessons from hubs like Singapore, Amsterdam, and Dubai, and tailoring them to the national context, Oman can unlock its potential as a resilient, connected, and competitive air cargo gateway. Aligning these strategies with Oman Vision 2040 will be critical for realizing a high-performing logistics ecosystem that strengthens national exports, enhances multimodal connectivity, and positions the Sultanate as a key regional trade enabler. Building on these benchmarking insights, the next subsection critically assesses the transferability of these stakeholder-governance models to Oman's institutional landscape and logistics maturity.

Critical Theoretical Reflection: Transferability and Contextual Relevance

While stakeholder theory provides a robust foundation for analysing coordination and governance in complex logistics networks, the findings of this study indicate that many of its established applications assume institutional conditions not yet fully developed in Oman. Classical network-governance models, such as those proposed by Provan and Kenis (2008), presuppose shared objectives, high trust among actors, and capable meta-governance, characteristics typical of mature logistics hubs like the Netherlands and Singapore. In contrast, Oman's air-cargo ecosystem operates within a transitional governance landscape, marked by overlapping mandates, evolving regulatory frameworks, and uneven digital capacity. Consequently, stakeholder alignment and inter-sectoral collaboration can yield efficiency gains only when supported by mechanisms that enhance regulatory efficiency and institutional coherence.

Evidence from Amsterdam's Collaborative Decision-Making (CDM) system (Madern, 2014; Zúñiga et al., 2024) and Singapore's digital freight corridor (Rejeb et al., 2021) shows that technological integration improves collaboration only when embedded in stable governance and accountability structures. In Oman, however, digital transformation acts as a conditional enabler, facilitating coordination only if regulatory bottlenecks, data-governance standards, and performance metrics are simultaneously addressed. This challenges the assumption, common in logistics literature, that digitalisation automatically delivers efficiency (Wang, 2023; Alamoush et al., 2024). The study thus re-conceptualises digital transformation as a mediating mechanism linking stakeholder collaboration to competitiveness, contingent on regulatory quality and institutional readiness.

Furthermore, the results reveal that hybrid governance arrangements are more appropriate for emerging logistics contexts. A Network Administrative Organisation (NAO)-style structure, supported by flexible, issue-specific working groups, can balance central oversight with operational adaptability. Such hybridisation refines stakeholder theory by recognising the institutional constraints of middle-income economies and integrating governance capacity as a contextual variable (Provan and Kenis, 2008; Lægreid and Rykkja, 2022).

Overall, this critical reflection reinforces that theoretical models developed in high-maturity logistics environments must be adapted rather than transplanted. Oman's Logistic Performance Index profile, with strong infrastructure yet moderate customs, tracking, and logistics-competence scores (World Bank, 2023), underscores the importance of tailoring governance reforms and digital investments to the country's institutional maturity. By empirically integrating stakeholder alignment, inter-sectoral collaboration, regulatory efficiency, and digital transformation, this study extends stakeholder theory to explain competitiveness in transitional logistics systems.

5.5 Theoretical and Practical Implications

This section outlines the theoretical and practical contributions of the study, highlighting how the findings expand on existing frameworks and provide actionable insights for Oman's air cargo sector. The discussion integrates the study's findings with the literature reviewed in Chapter 2 and addresses implications for both theory and practice.

The central focus of this thesis, stakeholder alignment and intersectoral collaboration, underpins the theoretical and practical contributions of the research. By addressing challenges and opportunities in Oman's air cargo sector and benchmarking with global air cargo hubs, this study delivers actionable insights to enhance the efficiency and competitiveness of the sector.

5.5.1 Theoretical Implications

This research extends Freeman's (1984) stakeholder theory by addressing the complexities of stakeholder alignment within a multi-sectoral and interdependent environment, particularly in the air cargo sector. While traditional stakeholder theory focuses on relationships within a single organization or industry, this study expands its scope to highlight the necessity of intersectoral collaboration. The findings emphasize that misalignment among stakeholders, manifested in conflicting priorities and fragmented strategies, creates inefficiencies that impede sectoral growth and limit operational effectiveness. By integrating stakeholder alignment with governance models, this study proposes a structured engagement mechanism to address these inefficiencies. Specifically, the absence of a central coordinating body in Oman's air cargo sector underscores a key gap in stakeholder theory, how governance structures influence multi-sector collaboration. The findings suggest that frameworks such as Amsterdam Schiphol's Collaborative Decision-Making (CDM) model can serve as blueprints for integrating stakeholder input into national decision-making processes.

This study introduces digital transformation as a key theoretical mediator in stakeholder theory. Traditionally, stakeholder theory has focused on human and organizational interactions, often overlooking the role of technological enablers. The research findings reveal that digital tools such as blockchain, IoT-enabled cargo tracking, and predictive analytics act as fundamental mechanisms for achieving stakeholder alignment in complex ecosystems. Blockchain technology enhances transparency and trust by creating secure, immutable data-sharing platforms, IoT-enabled monitoring ensures real-time tracking of goods, addressing inefficiencies in perishable cargo logistics, and predictive analytics facilitates data-driven decision-making, minimizing operational delays caused by misaligned stakeholder priorities. These insights broaden stakeholder theory by positioning digital transformation as not just an operational tool but a theoretical construct that mediates stakeholder interactions. Oman's air cargo sector, currently constrained by

limited adoption of digital tools, highlights the risks of technological stagnation in stakeholder alignment.

This study further refines stakeholder theory by emphasizing the need for formalized stakeholder governance structures. The research identifies the absence of centralized governance, such as Oman's proposed National Logistics Council (NLC), as a fundamental barrier to stakeholder alignment. Unlike leading global air cargo hubs that integrate structured collaboration models, Oman lacks a formalized approach to intersectoral engagement. The findings suggest that implementing a multi-tiered governance model, involving strategic oversight boards, operational task forces, and industry forums, can enhance stakeholder alignment. This theoretical contribution moves beyond conventional stakeholder engagement models by advocating for structured governance mechanisms as essential components of stakeholder theory in complex industries like air cargo.

The study extends stakeholder theory to emphasize horizontal alignment across sectors. Traditionally, stakeholder theory has focused on vertical alignment within organizations. However, in sectors like air cargo, where success is contingent on seamless integration with industries such as agriculture, fisheries, and tourism, horizontal alignment becomes equally critical. For example, Oman's inability to leverage its fisheries and agriculture industries within the air cargo supply chain highlights systemic barriers caused by disconnected strategies. The findings suggest that global benchmarks, such as Singapore's Economic Development Board, provide valuable models for aligning national economic priorities with logistics strategies. By demonstrating how structured cross-sector collaboration can enhance supply chain efficiencies, this research positions intersectoral collaboration as a key extension of stakeholder theory.

Summary of Theoretical Contributions

Table 18: Summary of Theoretical Contributions

Theoretical Contribution	Description
Extending Stakeholder Theory	Incorporating multi-sectoral governance structures to address stakeholder misalignment.
Integrating Digital Transformation	Positioning technology as a theoretical mediator that enables real-time coordination and transparency.

Formalizing Stakeholder Engagement	Advocating for governance frameworks such as the National Logistics Council (NLC) to improve strategic alignment.
Expanding Scope of Stakeholder Interactions	Emphasizing horizontal alignment across industries, ensuring seamless integration between aviation, logistics, and trade sectors.

By refining stakeholder theory to include governance structures, technological enablers, and intersectoral collaboration, this study contributes to the ongoing theoretical discourse on stakeholder dynamics in multi-sector industries. These insights provide a robust foundation for future research on governance models, digital transformation in logistics, and stakeholder alignment in emerging economies.

5.5.2 Practical Implications

The practical implications of this research are divided into policy and managerial domains, in line with the applied orientation of a Doctorate in Business Administration (DBA). Each implication is supported by triangulated evidence from stakeholder interviews, survey data, benchmarking results and academic literature, thereby enhancing the validity and strategic relevance of the findings.

The findings of this study present actionable insights for both policymakers and industry leaders aiming to revitalize Oman's air cargo sector. At the policy level, the research emphasizes the urgent need to establish a National Logistics Council to serve as a centralized governance platform, aligning national strategies, facilitating inter-agency coordination, and improving stakeholder communication. This recommendation is reinforced by benchmarking evidence from successful international hubs such as Amsterdam (Collaborative Decision-Making model) and Singapore (TradeNet system).

In terms of managerial implications, the study provides a roadmap for digital transformation within Oman's air cargo operations. The adoption of integrated digital platforms, such as real-time cargo tracking, AI-powered demand forecasting, and automated customs clearance, can significantly enhance service reliability. Implementing these technologies will require investment not only in infrastructure but also in workforce upskilling and cross-sector integration.

A recommendation that spans both policy and managerial domains is the development of Good Distribution Practice (GDP)-compliant cold chain logistics. Policymakers can play a vital role by offering targeted incentives and supporting infrastructure investment, while logistics operators must ensure compliance through proper facility upgrades and personnel training. This integrated effort would enhance Oman's ability to support high-value exports and reduce its trade imbalance.

From a policy standpoint, expanding Oman's global air connectivity is also crucial. Strategic aviation agreements, the diversification of air cargo routes, and encouraging the use of wide-body freighters can position Oman as a regional transit hub, particularly serving African and South Asian markets.

Finally, the study highlights a managerial priority: the need to strengthen inter-sectoral collaboration between the air cargo sector and industries such as agriculture, technology, and tourism. This can be achieved through the implementation of formal partnership frameworks, shared performance indicators, and co-investment initiatives, ensuring alignment with the broader objectives of Oman Vision 2040.

Policy and Managerial Implications for Revitalizing Oman's Air Cargo Sector

Table 19: Policy and Managerial Implications for Revitalizing Oman's Air Cargo Sector

Practical Area	**Policy Implications**	**Managerial Implications**
National Logistics Governance	Establish a National Logistics Council to coordinate strategy and inter-agency collaboration.	
Digital Transformation	Develop national strategies to promote adoption of digital cargo systems and cross-sector data integration.	Implement AI forecasting, real-time cargo tracking, and automated clearance systems.
Cold Chain Logistics (GDP-compliant)	Offer incentives and invest in infrastructure for GDP-compliant cold chain logistics.	Upgrade storage, train staff, and ensure compliance with pharmaceutical/perishable handling standards.

Global Air Connectivity	Negotiate bilateral air agreements and support diversification of cargo routes and international carriers.	Form strategic alliances and expand cargo operations using wide-body freighters.
Inter-sectoral Collaboration	Promote cross-sectoral integration aligned with Oman Vision 2040 through policy and institutional frameworks.	Establish joint KPIs, co-investment schemes, and formal partnerships with agriculture, tech, and tourism.

In synthesizing the practical implications of this research, it is evident that revitalizing Oman's air cargo sector necessitates a dual-pronged approach that integrates top-down policy reforms with bottom-up managerial innovation. The policy recommendations, including the establishment of a National Logistics Council and regulatory modernization, aim to address systemic inefficiencies and align institutional frameworks with international logistics standards. Concurrently, the managerial strategies outlined, ranging from investment in cold chain logistics to digital transformation, equip operational leaders with actionable tools to enhance competitiveness at the firm level. These interdependent layers of intervention underscore the importance of a coordinated, multi-stakeholder governance model.

Moreover, the implications presented here reflect the study's contribution to practice, a core expectation of DBA research. By triangulating insights from quantitative surveys, qualitative interviews, and global benchmarking along with supported literature, this study ensures that each recommendation is both empirically grounded and contextually relevant to Oman's socio-economic aspirations under Vision 2040. It also illustrates how stakeholder alignment, digital infrastructure, and inter-sectoral collaboration are not abstract ideals but strategic imperatives that can be translated into operational success. While the feasibility of implementation may vary depending on political will, institutional capacity, and market responsiveness, these insights provide a robust foundation for evidence-based decision-making and long-term transformation in Oman's air cargo ecosystem.

The discussion chapter provided a critical discussion of the findings in relation to the research objectives, integrating insights from surveys, interviews, benchmarking, and cargo volume

analysis with the literature. The analysis emphasized the importance of stakeholder alignment and intersectoral collaboration in addressing the challenges and unlocking the opportunities in Oman's air cargo sector.

The chapter highlighted several challenges, including stakeholder misalignment, limited inter-sectoral collaboration, regulatory inefficiencies, gaps in specialized infrastructure, and slow adoption of digital technologies. These barriers limit the sector's operational efficiency and global competitiveness. However, the findings also revealed significant opportunities, such as Oman's geographic advantage, potential for export diversification, and emerging markets in East Africa and South Asia.

Benchmarking with global hubs like Singapore, Dubai, and Amsterdam provided valuable insights into best practices, particularly in areas such as infrastructure investment, digital transformation, stakeholder collaboration, and regulatory reforms. These practices were critically analyzed for their applicability to Oman, resulting in tailored strategies for enhancing the sector's competitiveness.

The discussion also highlighted the theoretical contribution of the study, extending stakeholder theory by demonstrating the importance of alignment and inter-sectoral collaboration in multi-sectoral industries. The integration of technology as a mediator of collaboration was another key theoretical advancement. On a practical level, the study proposed actionable solutions, including improved governance structures, targeted infrastructure investments, digital adoption, and export-driven strategies, all designed to address systemic inefficiencies and foster growth
The insights and analysis in this chapter form the foundation for the recommendations that follow.

Proposed Governance Model for Stakeholder Alignment and Inter-Sectoral Collaboration in Oman's Air Cargo Sector

Purpose of the Governance Model

The governance model is designed to address the critical challenges of stakeholder misalignment and limited inter-sectoral collaboration in Oman's air cargo sector. Central to the model is the

establishment of the National Logistics Council (NLC), a platform aimed at aligning stakeholder priorities, streamlining decision-making, and fostering operational efficiency. Drawing on global best practices such as Amsterdam's Collaborative Decision-Making (CDM) framework, the model is adapted to Oman's unique economic and strategic context under Vision 2040.

Governance Structure

The proposed governance model is structured around three core components that work together to ensure alignment, operational efficiency, and stakeholder engagement.

At the top of the governance hierarchy is the Strategic Oversight Board, which comprises senior representatives from government agencies such as the Civil Aviation Authority and the Ministry of Transport, alongside key private sector operators and economic development councils. This board is tasked with defining the long-term vision for Oman's air cargo sector, approving major policy reforms, and ensuring compliance with international regulatory standards. Its overarching role is to align the sector's objectives with the broader goals of Oman Vision 2040, ensuring coherence and accountability.

Supporting the Strategic Oversight Board are specialized Operational Task Forces, which focus on addressing specific challenges within the air cargo sector. These task forces are organized around key areas such as regulatory reform, infrastructure development, digital transformation, and supply chain integration. Their primary responsibility is to develop actionable plans and implement targeted solutions to enhance efficiency and capacity. For instance, one task force may prioritize the streamlining of customs procedures through the implementation of a single-window clearance system, while another focuses on advancing cold chain logistics and temperature-controlled storage infrastructure. These task forces report directly to the Strategic Oversight Board, ensuring that their initiatives align with the sector's strategic objectives.

The third component of the governance model is the Stakeholder Engagement Platform, which facilitates communication and collaboration among diverse stakeholders, including representatives from key industries such as agriculture, fisheries, and tourism, as well as international logistics firms and airlines. Regular forums are organized to provide a platform for stakeholders to discuss challenges, share insights, and propose solutions. This platform ensures transparency and

accountability, fostering a collaborative environment where stakeholders are actively engaged in decision-making processes.

Key Features of the Model

The governance model incorporates several innovative features aimed at addressing operational inefficiencies and enhancing collaboration. One of its defining characteristics is the emphasis on data-driven decision-making. By leveraging real-time data platforms that integrate Internet of Things (IoT) and blockchain technologies, the model enables stakeholders to access accurate and timely operational insights. This facilitates informed decision-making and enhances supply chain efficiency. Predictive analytics further support this process by forecasting cargo demand, identifying bottlenecks, and optimizing cargo flows.

Another critical feature is the focus on integrated planning and execution. The governance model emphasizes continuous communication and coordination between key entities, including government agencies, airport authorities, and private sector operators. This alignment reduces fragmentation and ensures that planning and execution timelines are synchronized, resulting in seamless operations.

Policy harmonization is also a cornerstone of the model. The introduction of a single-window clearance system simplifies customs procedures and aligns regulatory processes with international standards. This not only reduces delays but also enhances Oman's appeal as a logistics hub for global trade. Financial incentives, such as subsidies and tax breaks, encourage inter-sectoral collaboration between logistics providers and industries such as agriculture and fisheries, promoting efficiency across supply chains. Additionally, the establishment of dedicated export zones for high-value goods bolsters Oman's competitiveness in international markets.

Implementation Plan

The governance model is implemented in three distinct phases to ensure a smooth and sustainable transformation. The initial phase focuses on establishing the foundational structures, such as forming the Strategic Oversight Board and launching pilot programs for digital transformation initiatives, including blockchain-based customs clearance. During this phase, key infrastructure gaps are identified, and an investment roadmap is developed.

In the second phase, attention shifts to scaling up infrastructure and operational capabilities. Cold chain logistics and temperature-controlled storage facilities are rolled out at major airports, and the single-window clearance system is fully implemented. The scope of stakeholder forums is expanded to include regional trade partners, fostering greater collaboration and integration.

The final phase involves refining the governance processes to adapt to evolving market needs. By this stage, Oman is positioned as a regional logistics hub, leveraging its geographic advantages and advanced infrastructure to attract international clients. Dedicated export zones are scaled up, and regional trade routes are expanded to support the nation's export-oriented industries.

Expected Outcomes

The governance model delivers several transformative outcomes for Oman's air cargo sector. Stakeholder alignment is significantly enhanced through a centralized governance structure, reducing fragmentation and fostering strategic cohesion. Inter-sectoral collaboration improves as key industries, such as agriculture and fisheries, are integrated into logistics operations, promoting seamless supply chain coordination. Operational efficiency is bolstered by real-time data-sharing systems and advanced technologies, which optimize resource allocation and reduce delays. Harmonized policies and investments in modern infrastructure elevate Oman's global competitiveness, attracting international clients and increasing cargo volumes. Finally, the model directly supports economic diversification by aligning air cargo operations with export-driven industries, contributing to sustainable growth under Oman Vision 2040.

Governance Model Overview

Table 20: Governance Model Overview

Component	Description	Key Responsibilities
Strategic Oversight Board	High-level body with representatives from government,	Define long-term vision, approve major policies, oversee compliance with international standards.

	private sector, and economic councils.	
Operational Task Forces	Sector-specific working groups focused on areas like regulatory reforms, digital transformation, etc.	Develop actionable plans, implement solutions, monitor progress, report to the Strategic Oversight Board.
Stakeholder Engagement Platform	Continuous dialogue among industries, logistics providers, and trade partners.	Facilitate communication, provide feedback, propose solutions, ensure transparency and accountability.

Key Features	**Details**
Data-Driven Decision-Making	IoT and blockchain for real-time insights and predictive analytics to optimize cargo flows.
Integrated Planning	Shared platforms for communication and coordination across entities.
Policy Harmonization	Single-window clearance systems, alignment with international standards to attract global providers.
Incentives for Collaboration	Tax breaks and subsidies to encourage partnerships between logistics providers and industries.

Implementation Plan	
Short Term (Year 1–2)	Establish governance structures, launch pilot programs, identify infrastructure gaps.
Medium Term (Year 3–5)	Scale cold chain logistics, implement single-window clearance systems, expand stakeholder forums.
Long Term (Year 5+)	Expand trade routes, refine processes, and position Oman as a regional logistics hub.

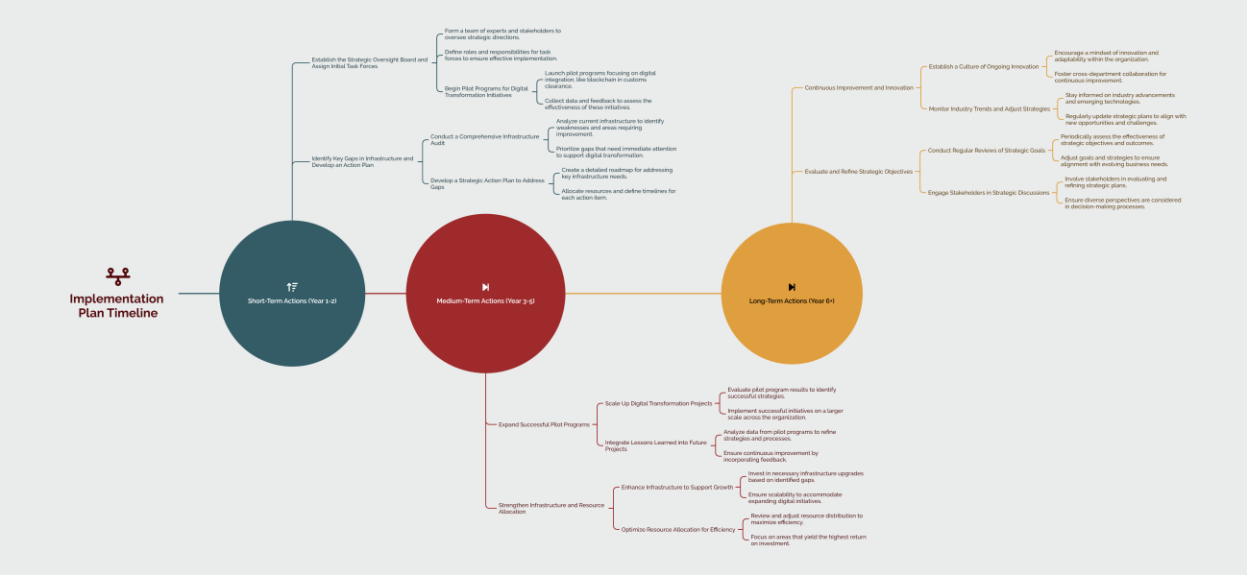


Figure 21: Implementation Plan Timeline for Revitalizing Oman's Air Cargo Sector

5.6 Answering the Research Questions

This section synthesizes the findings of the study by directly addressing the three core research questions, linking empirical evidence with theoretical insights and practical relevance. These responses are grounded in a comprehensive mixed-methods approach, including stakeholder interviews, quantitative surveys, benchmarking analysis, and review of cargo volume data from 2018 to 2023. The resulting narrative bridges theory and practice, offering robust answers that form the basis for policy recommendations and strategic interventions to be presented in the subsequent sections.

Research Question 1: What are the primary challenges and opportunities in the Omani air cargo sector?

The findings of the study identified a comprehensive set of systemic, infrastructural, and operational challenges that have collectively hindered the full potential of Oman's air cargo sector. One of the most pressing issues is stakeholder misalignment. The research revealed that conflicting objectives and a lack of coordinated strategic vision among various entities, such as regulatory authorities, airport operators, and private logistics firms, have led to fragmentation. For example, despite the strategic location and expansion of infrastructure at Salalah Airport, underutilization remains a recurring theme due to inadequate coordination and planning across stakeholders.

Another notable challenge pertains to regulatory inefficiencies. Delays in customs clearance processes, inconsistencies in tariff application, and overlapping jurisdictional mandates have resulted in procedural bottlenecks that adversely affect the efficiency and reliability of cargo movement. These inefficiencies not only deter international partners but also create avoidable delays in domestic trade logistics, weakening Oman's competitive positioning in the region.

The study also uncovered a significant gap in digital infrastructure. While global air cargo hubs have adopted smart logistics technologies, such as blockchain for cargo tracking, AI-powered demand forecasting, and IoT-enabled monitoring systems, Oman is still in the nascent stages of adopting such tools. This lag in digital transformation limits operational transparency, reduces supply chain visibility, and increases transaction costs across the sector. Compounding this issue is the insufficient investment in specialized cold chain logistics infrastructure. This is particularly critical for the transport of temperature-sensitive goods like seafood, pharmaceuticals, and horticultural products, areas where Oman has demonstrated strong production capabilities.

Another underlying concern is the lack of strong inter-sectoral collaboration. The research found that while industries such as agriculture, fisheries, tourism, and manufacturing are all dependent on efficient air cargo services, their integration into logistics planning is minimal. This siloed approach results in missed opportunities to optimize export pathways, diversify markets, and streamline the supply chain ecosystem.

However, the study also identified significant untapped opportunities. Oman's geographical position at the convergence of major international trade routes remains a strong competitive advantage. The potential to serve fast-growing markets in East Africa, South Asia, and Europe offers considerable room for strategic expansion. Moreover, several high-value sectors, such as pharmaceuticals, fisheries, and agriculture, present viable avenues for air cargo-led growth, provided the infrastructural and regulatory barriers can be addressed.

Technological integration, particularly the adoption of digital platforms for customs, cargo tracking, and scheduling, represents a transformational opportunity. The incorporation of such technologies can reduce inefficiencies, improve traceability, and enhance customer satisfaction. Furthermore, benchmarking data showed that collaborative governance models and integrated planning systems employed by leading hubs like Singapore and Amsterdam have proven instrumental in boosting cargo throughput and streamlining operations. This suggests that Oman's

path to revitalization lies not only in infrastructure development, but in governance reform and strategic digital modernization.

Research Question 2: How do stakeholder alignment and inter-sectoral collaboration influence the efficiency and growth of the air cargo sector in Oman?

Stakeholder alignment was found to be a fundamental prerequisite for sectoral efficiency and strategic cohesion. Misaligned incentives among public and private actors were shown to result in duplicated investments, regulatory delays, and missed synergies. The study observed that platforms enabling coordinated planning, such as the proposed National Logistics Council, could significantly improve policy coherence and drive shared ownership of outcomes across stakeholders.

Participants in both the interviews and surveys frequently highlighted how the absence of alignment contributed to fragmented implementation of logistics projects, inefficient use of cargo terminals, and delays in institutional decision-making. In several cases, cargo terminals that were designed to accommodate perishable exports were underutilized due to a lack of communication between agricultural exporters and airport authorities. Conversely, alignment was seen as a driver of operational clarity, with stakeholders expressing the need for a centralized platform to ensure shared metrics, coordinated schedules, and synchronized investments.

The absence of formal mechanisms for cross-sector collaboration has led to fragmented supply chains, particularly between logistics providers and producers in upstream sectors like agriculture and fisheries. The research showed that such disjointed planning impairs supply chain integration and increases logistical costs, thereby weakening the competitive positioning of Omani exports. Structured collaboration, if effectively implemented, can unlock synergies that improve cargo handling efficiency, minimize losses, and enhance product quality, particularly in sensitive industries such as aquaculture and fresh produce.

Digital transformation was also identified as a critical enabler in strengthening both stakeholder alignment and inter-sectoral collaboration. The use of real-time data sharing platforms, blockchain-enabled clearance systems, and automated performance monitoring tools can dramatically improve transparency, build trust, and increase accountability. These digital tools act

not only as operational enhancers but also as strategic mediators that foster a shared sense of purpose among ecosystem participants. Technologies such as predictive analytics can enable demand forecasting across sectors, aligning cargo supply with transportation capacity and reducing wasteful allocation of resources.

Research Question 3: What are the best practices from global air cargo hubs that can be implemented in Oman?

The study's benchmarking analysis with global leaders such as Singapore's Changi Airport, Amsterdam's Schiphol, and Dubai World Central revealed several best practices that Oman could adopt and tailor to its unique context. Chief among these is the implementation of collaborative governance models. For instance, Amsterdam's Collaborative Decision-Making (CDM) approach integrates stakeholders into a unified decision-making platform, enhancing throughput coordination and minimizing operational redundancies.

Another key lesson relates to customs efficiency. The single-window clearance systems used in Singapore and Dubai have dramatically improved cargo turnover times and minimized administrative burdens. Replicating such systems in Oman could yield similar benefits, particularly if supported by regulatory reform and inter-agency interoperability. Stakeholders interviewed during the research repeatedly emphasized the need for simplified, digitized customs processes to enhance efficiency and competitiveness.

Cold chain logistics emerged as another area of opportunity. Benchmarking showed that compliance with international GDP standards for temperature-sensitive cargo has enabled hubs like Dubai to capture large shares of the pharmaceutical logistics market. Investment in similar infrastructure in Oman would open up new market segments and support the country's efforts to become a regional leader in specialty cargo handling. Such advancements are particularly important given the country's aspirations to expand seafood and agricultural exports to European and Asian markets, where strict standards of quality and traceability are required.

Digitally integrated ecosystems were also found to be critical for long-term competitiveness. Programs such as the Smart Cargo Mainport initiative in Amsterdam, which leverages predictive analytics and IoT integration, have demonstrated clear operational gains. These innovations offer

Oman a roadmap for improving its cargo handling systems, enhancing resilience, and optimizing cost structures.

Collectively, these findings underscore that the transformation of Oman's air cargo sector must be holistic. Capital investments must be complemented by institutional reforms, regulatory alignment, and workforce upskilling. Adopting best practices in isolation will not suffice. Instead, a coordinated, locally adapted implementation strategy, anchored in stakeholder trust and digital innovation, will be essential for sustained success.

In conclusion, this chapter has comprehensively addressed the three core research questions that underpin this study. Section 5.2 critically explored the primary challenges and opportunities within Oman's air cargo sector, drawing on empirical data and literature to respond to Research Question 1. Section 5.3 examined the influence of stakeholder alignment and inter-sectoral collaboration on sectoral performance, directly addressing Research Question 2 through both theoretical and practical insights. Sections 5.4 and 5.4.1 evaluated global best practices and assessed their applicability to Oman's unique context, thereby answering Research Question 3. By integrating findings from surveys, interviews, benchmarking, and cargo volume analysis with stakeholder theory and relevant literature, this chapter provides a robust analytical foundation. These insights inform the evidence-based recommendations presented in Chapter 6 and contribute meaningfully to both academic discourse and practical strategies for revitalizing Oman's air cargo sector in line with national development objectives.

Chapter 6: Conclusions and Recommendations

This chapter brings the study to its culmination by weaving together the theoretical insights, empirical findings, and practical contributions generated throughout the research. The central aim is to provide a holistic synthesis of how Oman's air cargo sector can be revitalized through a multi-dimensional strategy centered on stakeholder alignment, inter-sectoral collaboration, and institutional innovation. It begins by revisiting the original research purpose and objectives,

emphasizing the need to bridge performance gaps in a sector that holds strategic value for Oman's logistics ambitions and economic diversification under Vision 2040.

The chapter addresses the core research questions by presenting a consolidated interpretation of the challenges, opportunities, and enablers uncovered through survey results, stakeholder interviews, cargo volume analysis, and benchmarking with global logistics hubs. These findings affirm that while Oman possesses the geographic potential to emerge as a regional logistics hub, it faces deep-rooted challenges, including governance fragmentation, regulatory inefficiencies, lack of digital infrastructure, and weak integration with upstream sectors like agriculture and fisheries.

In light of these findings, this chapter interprets the implications at both policy and managerial levels. It underscores that technical reforms alone are insufficient without a cohesive governance model and a digitally mature logistics ecosystem. Accordingly, the chapter outlines evidence-based recommendations designed to support national policy reforms, enable private sector innovation, and promote sector-wide collaboration. These strategies are aligned with global best practices but adapted to the specific institutional and economic context of Oman.

Furthermore, this chapter incorporates personal reflections that highlight the intersection between academic inquiry and professional experience. This dual lens has enriched the research with both strategic relevance and practical nuance, contributing to its credibility and depth. The final sections of the chapter acknowledge the study's methodological limitations and propose future research directions to further explore economic impact assessments, governance models, digital readiness, and sectoral integration.

Ultimately, this chapter offers a roadmap not just for enhancing the performance of the air cargo sector, but for transforming it into a catalyst of national competitiveness, trade facilitation, and economic resilience. The recommendations presented here are both a product of academic rigour and a call to action, inviting policy makers, industry leaders, and institutional stakeholders to collectively shape the future of Oman's air cargo ecosystem.

6.1 Revisiting the Research Purpose and Objectives

This research was undertaken in response to a pressing and strategic national issue: the persistent underperformance of Oman's air cargo sector within the context of an increasingly complex and rapidly evolving global logistics environment. Although Oman enjoys a highly strategic geographical location, situated at the vital intersection of three major continental trade routes spanning Europe, Asia, and Africa, the country has not yet capitalized on this advantage to establish itself as a dominant or competitive regional hub for air cargo operations. Several interrelated factors have contributed to this shortfall. Chief among them are fragmented governance structures that inhibit unified planning, persistent regulatory inefficiencies that hinder smooth cargo movement, a slow pace of digital transformation, and the absence of coherent inter-sectoral coordination mechanisms across key industries such as logistics, agriculture, fisheries, and manufacturing.

These compounding challenges do not only impede the effectiveness and international competitiveness of Oman's air cargo sector; they also pose a significant barrier to the broader national ambitions articulated under Oman Vision 2040. Specifically, these issues restrict the country's capacity to facilitate international trade, attract foreign investment, and diversify the economy away from oil dependency, core priorities under the national vision. Consequently, addressing these constraints is not merely a sectoral necessity but a national imperative.

The central purpose of this doctoral research, therefore, was to critically examine how improved stakeholder alignment and strengthened inter-sectoral collaboration can serve as strategic levers for revitalizing Oman's air cargo sector and enabling it to function as a globally competitive logistics hub. The study adopts a practice-oriented approach in alignment with the applied nature of a Doctorate in Business Administration (DBA). As such, it is designed to bridge the gap between academic theory and practical implementation, with the overarching aim of generating insights that are both conceptually robust and practically actionable.

To realise this purpose, the research pursued three primary objectives:

To identify and critically analyze the key challenges and opportunities influencing the performance of Oman's air cargo sector, drawing upon a rich base of both primary data

collected from key stakeholders and secondary sources including official statistics and global benchmarking studies.

To evaluate the impact of stakeholder alignment and inter-sectoral collaboration on the operational efficiency and strategic competitiveness of the sector, using stakeholder theory as a conceptual lens and supported by comparative benchmarking with successful international air cargo hubs.

To develop a set of evidence-based, contextually relevant strategies and policy recommendations that draw upon global best practices and are tailored to support Oman's national economic goals, logistics reforms, and international integration efforts.

To achieve methodological rigour and ensure robust data triangulation, the study employed a comprehensive mixed-methods research design. This included the collection and analysis of qualitative data through 14 structured and 1 semi-structured interviews with key informants across government, aviation, logistics, and industry. Additionally, a quantitative survey was conducted with a high response rate of 71.67%, reflecting strong stakeholder engagement. The research also incorporated a detailed analysis of Oman's cargo volumes from 2018 to 2023, offering a longitudinal view of the sector's operational trends and performance. Furthermore, benchmarking was carried out against globally recognized air cargo hubs, namely Amsterdam Schiphol, Singapore Changi, and Dubai International, to identify transferrable practices and lessons that can be adapted to the Omani context.

Through this rigorous and integrative methodology, the thesis contributes meaningfully not only to academic literature, particularly by extending the scope and applicability of stakeholder theory in the context of multi-sectoral air logistics, but also to policy and managerial practice. The study offers a set of structured, evidence-driven recommendations that can guide both high-level strategy formulation and ground-level execution, thereby supporting the transformation of Oman's air cargo sector in alignment with the country's long-term economic aspirations.

6.2 Interpretation and Implications of the Findings

The findings of this study provide more than a diagnostic overview of the challenges facing Oman's air cargo sector, they illuminate a transformative agenda that links performance

improvement with institutional coherence, strategic alignment, and national economic aspirations. By drawing on empirical evidence, stakeholder perspectives, and international benchmarking, the study situates Oman's air cargo sector within a broader context of systems thinking and integrated governance, advancing the conversation from problem identification to strategic interpretation and policy implications.

A central insight emerging from the study is that the underperformance of the sector is not due to isolated technical deficiencies but is rather the result of systemic misalignments. Fragmented planning, weak inter-agency coordination, and an absence of collaborative frameworks have constrained the sector's potential. The lack of a unified national logistics vision, shared across sectors such as aviation, agriculture, fisheries, and manufacturing, has prevented the creation of coherent value chains that can leverage Oman's geographical and infrastructural advantages.

This research reframes air cargo not merely as a transportation function but as a strategic enabler of Oman's broader developmental agenda. As an integral part of logistics ecosystems, air cargo serves as a facilitator of trade, a multiplier for sectoral growth, and a catalyst for economic diversification. Its effectiveness, therefore, is intricately linked to how well it is embedded within national industrial policies and how effectively it supports emerging sectors identified under Oman Vision 2040.

Moreover, the study confirms that stakeholder alignment and inter-sectoral collaboration are not optional enhancements, but core strategic imperatives. The evidence indicates that uncoordinated stakeholder actions have led to duplication of infrastructure investments (e.g., underutilized facilities in Salalah), inconsistent customs regulations, and the failure to capture niche cargo markets such as pharmaceuticals or high-value perishables. In contrast, international hubs such as Amsterdam Schiphol and Singapore's Changi Airport have institutionalized collaborative decision-making frameworks that align public, private, and regulatory stakeholders in a continuous performance loop. These cases provide practical illustrations of how collaborative governance can produce agility, innovation, and competitive resilience.

The findings also underscore the transformative role of digital technologies in enabling integration and performance monitoring. In Oman's case, the digital maturity of the sector remains low, with limited implementation of blockchain-based tracking, integrated booking systems, or real-time cargo visibility platforms. While some digital platforms are in developmental stages, the absence

of a sector-wide digital infrastructure hinders transparency and creates information asymmetries that impede coordination. By contrast, benchmarking has shown that hubs with advanced digital ecosystems, such as Dubai's Smart Gate and Amsterdam's Smart Cargo Mainport Program, are not only more efficient but also more adaptive to shocks and market shifts.

Interpreting these findings through the lens of Stakeholder Theory (Freeman, 1984), it becomes clear that sustainable performance improvements depend on managing interdependencies among actors whose interests, power, and information asymmetries can either enable or derail sectoral development. The application of this theory provides a conceptual rationale for why fragmented governance leads to strategic drift, while alignment fosters mutual accountability and system-wide learning. Stakeholder Theory, therefore, provides the theoretical foundation for many of the recommendations emerging from this research.

From a national policy perspective, the implications are profound. Oman stands at a strategic juncture where it must transition from fragmented reform efforts to a coherent transformation strategy that links infrastructure development with institutional reform, digital enablement, and human capital investment. Establishing a National Cargo Coordination Body or expanding the mandate of existing logistics councils to include air cargo could be instrumental in driving such change. This body should prioritize cross-sector data integration, policy coherence, and unified planning aligned with Vision 2040.

The findings also highlight the importance of institutional innovation. Rather than only expanding infrastructure or offering financial incentives, policy efforts should focus on creating agile regulatory frameworks that enable real-time decision-making, encourage private-sector participation, and support pilot programs for digital innovation. Investment in GDP-compliant cold chain infrastructure, for instance, would enable Oman to serve high-value sectors such as biotechnology, agri-tech, and precision medicine, which rely heavily on logistics speed and traceability.

For Omani exporters and logistics firms, the research underscores the need for sector-specific strategies. Exporters in fisheries, agriculture, and pharmaceuticals must be integrated into air cargo planning from the outset. Targeted incentives, coordinated scheduling of air freight services, and tailored regulatory support (e.g., faster phytosanitary inspections, packaging certifications) can help bridge the last-mile gap between production and global markets.

The global implications of this study also extend beyond Oman. For other small and medium-sized economies that face similar geographic constraints or sectoral fragmentation, Oman's journey offers a replicable model of how coordinated governance, supported by targeted digital and regulatory interventions, can drive competitiveness. The success of digital platforms and collaborative mechanisms in other regions reinforces the case for a move away from infrastructure-centric planning toward ecosystem-centric innovation.

This study's academic contribution lies in advancing an integrated framework that blends stakeholder theory, institutional analysis, and digital transformation literature within a logistics context. It also provides empirical validation of the proposition that logistics performance is a function not merely of capacity or capital but of alignment, coordination, and innovation. By capturing the relational and systemic dimensions of air cargo development, the research fills a notable gap in the literature on logistics modernization in emerging markets.

In conclusion, the implications of the findings are both strategic and actionable. At the macro level, Oman must rethink the governance and positioning of its air cargo sector within the logistics value chain. At the meso level, reforms must focus on creating digitally enabled, institutionally agile, and stakeholder-aligned ecosystems. And at the micro level, cargo operators and exporters must be empowered through technology, coordination platforms, and responsive policy instruments. The convergence of these layers can transform Oman's air cargo sector into a resilient, integrated engine for growth that contributes meaningfully to the nation's economic diversification objectives.

The next section will operationalize these interpretations into specific recommendations and action steps. It will propose a roadmap for institutionalizing collaborative governance, enhancing digital infrastructure, aligning cross-sector priorities, and positioning Oman as a competitive and connected logistics hub in the global air cargo landscape.

6.3 Recommendations for Practice and Policy

The findings of this research have culminated in a robust set of actionable recommendations that span both strategic policy domains and operational management levels. These recommendations, initially introduced within the discussion chapter under practical implications, are further

elaborated here to guide implementation by policymakers, government agencies, airport operators, cargo service providers, logistics companies, and sectoral partners. The practical orientation of these recommendations reflects the core philosophy of the Doctorate in Business Administration (DBA), which aims to bridge theory and practice by delivering actionable knowledge with real-world applicability.

At the heart of these recommendations is a systems-oriented approach that advocates for interlinked reforms rather than isolated technical adjustments. The research strongly supports the view that Oman's air cargo sector can only achieve sustained competitiveness and contribute meaningfully to national development if structural, institutional, and operational transformations are undertaken simultaneously.

Establishing a National Air Cargo Council: A key strategic recommendation is the formation of a National Air Cargo Council under the umbrella of the national air logistics strategy. This council should include representatives from government ministries (transport, commerce, agriculture, fisheries), regulators, airport authorities, cargo operators, and private sector stakeholders. Its role would be to foster collaborative governance, coordinate strategic planning, and ensure alignment across initiatives.

The rationale behind this recommendation draws from international benchmarks, notably the Collaborative Decision-Making (CDM) frameworks used at Schiphol and Changi airports. These councils facilitate data sharing, joint planning, and performance tracking, all of which have been proven to enhance operational efficiency. Implementing a similar council in Oman would enable the systematic alignment of sectoral goals and enhance accountability.

Enhancing Digital Capabilities through National Platforms: Digital transformation must be a cornerstone of Oman's air cargo revitalization strategy. The research revealed that fragmented data systems, lack of cargo visibility, and low automation are hindering progress. A national digital cargo platform should be developed to integrate booking, customs clearance, tracking, and performance analytics.

This platform, ideally supported by public-private partnerships, should deploy technologies such as blockchain for transparency, IoT for real-time monitoring, and predictive analytics for resource

optimization. It should be linked with other national trade platforms such as Bayan (customs) to streamline inter-agency coordination.

From a DBA perspective, this recommendation reflects a strategic operational change initiative that aligns IT strategy with sectoral performance goals, illustrating how digital innovation can drive both efficiency and trust.

Developing GDP-Compliant Cold Chain Infrastructure: The lack of GDP-compliant cold chain infrastructure is a critical gap, particularly for Oman's export ambitions in fisheries, agriculture, and pharmaceuticals. The study calls for targeted investment in cold storage, temperature-controlled cargo handling facilities, and specialized terminals across Muscat, Salalah, and Sohar.

Public-private partnership models should be explored, with investment incentives such as tax exemptions, streamlined land allocation, and support for international certification (e.g., WHO GDP standards). Workforce training should accompany this infrastructure development to ensure operational excellence.

This recommendation embodies the applied nature of the DBA, linking sectoral competitiveness to infrastructure strategy and capability building.

Institutionalizing Inter-Sectoral Coordination Mechanisms: Oman's air cargo sector must be embedded into the development strategies of upstream sectors such as agriculture, aquaculture, technology, and tourism. Ministries and sectoral agencies should establish formal working groups and coordination protocols to integrate logistics planning into their sectoral strategies.

This recommendation stems from the observation that sectoral silos are obstructing logistics alignment. Through integrated export strategies, the country can generate predictable cargo volumes, optimize route planning, and reduce leakage to regional hubs.

For DBA practitioners, this reflects a strategic stakeholder management challenge that can be addressed through facilitation, consensus-building, and shared metrics for cross-sectoral performance.

Reforming Regulatory Frameworks and Enhancing Process Efficiency: Oman's regulatory landscape, particularly in areas of customs clearance, cargo certification, and tariff policy, requires

reform. A national single-window cargo clearance system must be fully operationalized, supported by unified documentation, digital submission protocols, and integrated inspection services.

The study also recommends the introduction of a cargo facilitation taskforce to routinely monitor clearance times, address policy bottlenecks, and introduce automation where appropriate. Regulatory predictability will enhance Oman's attractiveness as a transshipment and export node.

This recommendation exemplifies the DBA principle of evidence-based policy reform grounded in organizational process improvement.

Promoting Regional Connectivity and Strategic Partnerships To boost cargo throughput and network centrality, Oman should negotiate air service agreements and strategic alliances with global freight carriers. Focus should be placed on establishing Oman as a regional re-export and transshipment hub.

Incentivizing carriers to use Muscat and Salalah as transit points, especially for East Africa, South Asia, and the GCC, would increase route density and frequency, making the hubs more viable for high-value time-sensitive exports.

For DBA scholars and practitioners, this recommendation involves international business strategy, competitive positioning, and logistics market development.

Monitoring and Evaluation through Key Performance Indicators (KPIs) Each of the above interventions must be accompanied by a monitoring and evaluation (M&E) framework that tracks sector-wide KPIs such as average clearance time, cargo volume growth, cold chain coverage, digital adoption rate, and stakeholder satisfaction.

Establishing a sectoral dashboard, hosted by the proposed National Air Cargo Council, would promote transparency, accountability, and continuous improvement. Benchmarking against global hubs should be done annually.

In line with DBA best practices, this recommendation reinforces the use of data-driven strategy execution and adaptive learning.

Strengthening Export-Led Cargo Clusters To optimize synergies, Oman can develop cargo-driven clusters around strategic export zones (e.g., fisheries in Duqm, agriculture in Dhofar). These

clusters should co-locate value-added services such as processing, packaging, and certification facilities adjacent to cargo terminals.

Cluster-based development supports scale economies, reduces logistics costs, and enhances the competitiveness of SMEs. Special Economic Zones (SEZs) should be leveraged to provide fiscal and regulatory incentives.

This recommendation reflects DBA principles of local economic development, cluster theory, and value-chain optimization.

Embedding Stakeholder Feedback into Policy Design Finally, stakeholder engagement should be institutionalized through annual logistics forums, customer satisfaction surveys, and regular feedback loops. Regulatory agencies and airport authorities must operate transparently and collaboratively.

The study found that inclusive policy design and transparent feedback mechanisms contribute to higher sectoral legitimacy and adoption of reforms.

This recommendation illustrates the DBA ethos of participatory leadership, stakeholder co-creation, and iterative policymaking.

In conclusion, these recommendations together create a holistic roadmap for revitalizing Oman's air cargo sector. They reflect a multi-dimensional change agenda that addresses governance, infrastructure, technology, human capital, and international positioning. More importantly, they are aligned with the DBA framework by translating empirical insights into practical, implementable strategies that can directly influence national policy and organizational performance. Through coordinated action, Oman can transform its air cargo sector into a model of strategic alignment, collaborative innovation, and global integration—contributing meaningfully to the vision of economic diversification and sustainable growth outlined in Oman Vision 2040.

Summary Table: Recommendations and Strategic Alignment

Table 21: Summary Table: Recommendations and Strategic Alignment

Recommendation Theme	Thesis Finding Link (from survey & interviews)	Global Benchmark Support	Vision 2040 Alignment
Collaborative Governance	Stakeholder misalignment and lack of coordinated planning	Singapore's TradeNet; Amsterdam's CDM	Governance efficiency and stakeholder engagement
Digital Transformation	Digital adoption gaps; inefficiencies in tracking and customs	Amsterdam's Smart Cargo Mainport Program; Singapore's digital corridors	Innovation, digital economy, and public-private integration
Cold Chain Infrastructure	Insufficient cold chain capacity for perishables and pharma	Dubai and Frankfurt's GDP-compliant facilities	Food security and healthcare logistics
Global Connectivity	Underutilized geographic advantage and poor air route integration	Dubai's Emirates SkyCargo routes; Singapore's strategic hub model	International trade facilitation and economic diversification
Inter-sectoral Alignment	Weak linkages between cargo sector and export-oriented sectors	Singapore and Amsterdam's integrated logistics ecosystem	Sectoral integration and sustainable development
Institutional Innovation	Fragmented regulatory environment and policy execution delays	EU's Digital Single Market logistics framework	Effective policy reform and agile public administration

Synthesis of Research Questions, Methods, Findings, and Recommendations

To provide a comprehensive overview of the study's logical structure, this section presents a synthesis that maps each research question to the corresponding methodology, findings, and practical recommendations. This alignment underscores the rigor of the research design and highlights how the insights generated contribute directly to actionable outcomes for Oman's air cargo sector.

The figure below visually summarizes the flow from research questions to methods, findings, and recommendations. This is followed by a detailed table elaborating the same logic in textual format for clarity and academic referencing.

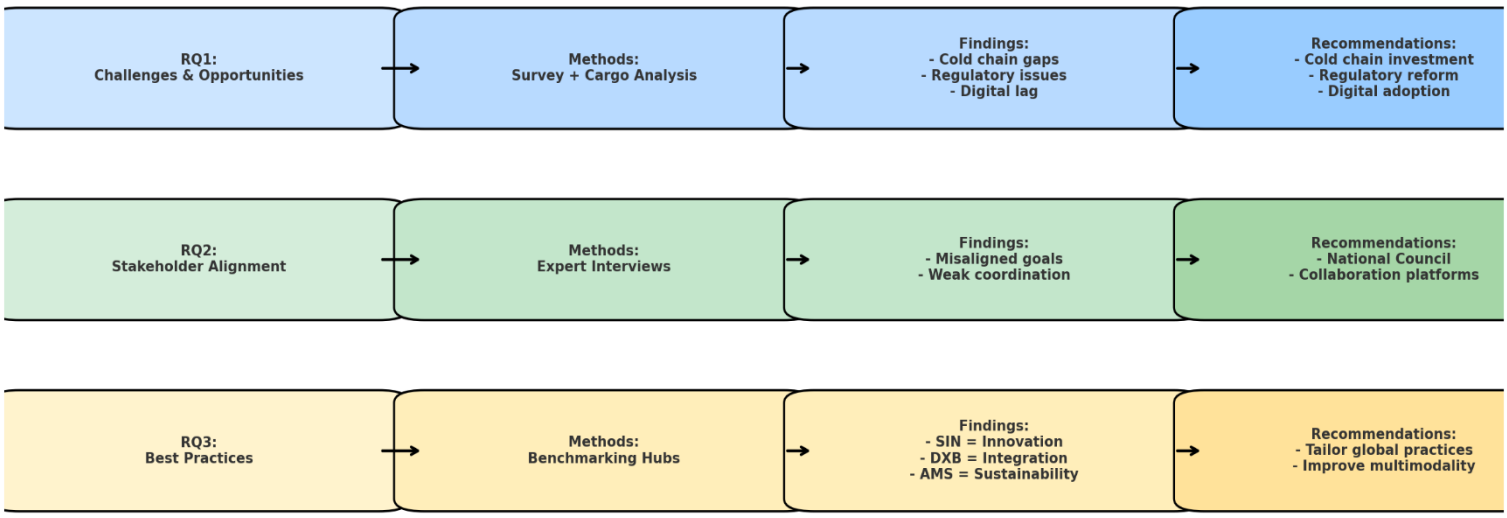


Figure 22: RQ_Method_Findings_Recommendations_Diagram.png

The table below provides a comprehensive overview linking each research question to the methodological approach employed, the key findings derived from the analysis, and the corresponding recommendations. This structure reflects the logical flow of the study from inquiry to insight and impact.

Table 22: RQ_Method_Finding_Recommendation_Table.docx

Research Question	Methodology Used	Key Findings	Recommendations
RQ1: What are the primary challenges	Quantitative analysis using	- Gaps in cold chain infrastructure	- Invest in cold chain logistics

and opportunities in the Omani air cargo sector?	descriptive statistics on cargo volumes (2018–2023); survey with 86 professionals.	- Regulatory fragmentation - Underutilization of digital technologies	- Harmonize and streamline regulations - Accelerate adoption of digital tools (e.g., blockchain, IoT)
RQ2: How do stakeholder alignment and intersectoral collaboration influence the sector's efficiency and growth?	Qualitative interviews with 15 experts across aviation, logistics, and related sectors; thematic analysis.	- Misaligned goals and responsibilities among institutions - Weak cross-sector coordination mechanisms	- Establish a National Logistics Council - Develop inter-ministerial collaboration platforms
RQ3: What are the best practices from global air cargo hubs that can be implemented in Oman?	Benchmarking analysis of Singapore, Dubai, and Amsterdam using secondary data.	- Singapore excels in innovation and automation - Dubai demonstrates strong multimodal integration - Amsterdam focuses on sustainability and PPPs	- Adapt best practices to Oman's context - Prioritize multimodal infrastructure - Foster sustainability initiatives in logistics

6.4 Personal Reflections as a Practitioner-Researcher

Undertaking this research has been one of the most challenging yet rewarding journeys of my professional and personal life. Balancing my responsibilities as a full-time leader at my work place,

pursuing a Doctorate in Business Administration (DBA) on a part-time basis, and caring for my family as a mother of four children required a sustained commitment to time management, resilience, and purpose.

My work position provided me with privileged insight into the strategic complexities, regulatory challenges, and institutional dynamics shaping Oman's aviation and logistics sectors. However, engaging with this research academically allowed me to move beyond intuition and practice, and to systematically interrogate the deeper structural and relational issues underpinning sector performance. This dual perspective, as both a practitioner and a researcher, proved invaluable in identifying real-world problems, translating them into meaningful research questions, and ensuring the practical relevance of the study's outcomes.

The academic journey itself introduced new disciplines and intellectual frameworks that have enriched my decision-making. Through the application of stakeholder theory, and benchmarking methodologies, I developed the ability to critically assess multi-stakeholder systems and formulate strategic responses grounded in empirical evidence. These tools have not only advanced my academic capabilities but also enhanced my strategic contributions in my professional role.

This process was far from easy. There were periods of exhaustion, competing deadlines, and moments of doubt, especially as I tried to balance thesis milestones with leadership duties and the emotional labour of parenting. Yet these very challenges were formative. They taught me perseverance, helped me prioritize with intention, and deepened my empathy for others navigating complexity.

Above all, this doctoral experience reinforced my belief that transformational change requires both vision and systems thinking, and that real impact emerges when academic insight is translated into actionable strategies through collaboration, trust, and institutional commitment. I now feel more empowered to contribute meaningfully to Oman's logistics transformation, both as a strategist and as a reflective leader.

6.5 Research Limitations

While this research was carefully designed to provide robust and actionable insights, several limitations must be acknowledged in the interest of academic rigour and transparency.

First, the scope of stakeholder engagement, though diverse, was limited to selected representatives from the air cargo sector, regulatory bodies, and a few interrelated industries such as agriculture, fisheries, and technology. Although the study included 14 structured and 1 semi-structured interviews and a quantitative survey with a 71.67% response rate, it did not capture the full breadth of all potentially relevant stakeholders, particularly from small-scale exporters, regional logistics firms, or end-users of air cargo services.

Second, the study's geographical focus was restricted to the Omani context. While this focus was essential for policy relevance, it limits the generalisability of the findings to other national contexts. Nonetheless, the benchmarking of international hubs such as Amsterdam, Singapore, and Dubai helped address this limitation by offering comparative insights.

Third, the study did not employ econometric modelling or simulation techniques to quantify the economic impact of proposed interventions, such as GDP-compliant cold chain development or air route expansion. Future research could complement these qualitative findings with financial projections or cargo flow simulations to strengthen policy decision-making.

Fourth, although care was taken to ensure data triangulation, the dynamic nature of Oman's logistics reforms means that the policy environment may evolve during or after the research period. This presents a limitation in terms of the long-term relevance of certain findings unless they are regularly re-evaluated.

Finally, researcher bias is an acknowledged limitation, particularly given the author's professional involvement in the sector. To mitigate this, methodological triangulation, anonymised data analysis, and supervisory oversight were employed to enhance objectivity and academic integrity.

Despite these constraints, the study provides a strong empirical and conceptual foundation for understanding and improving the air cargo sector in Oman, offering value to both academic inquiry and policy practice.

6.6 Suggestions for Future Research

This study has provided insight into the challenges and opportunities facing Oman's air cargo sector, particularly in relation to stakeholder alignment, inter-sectoral collaboration, and the adoption of international best practices. However, several avenues for further research have emerged directly from the findings and limitations of this study.

1. Financial Impact of Policy and Infrastructure Interventions

While this study identified the strategic importance of initiatives such as GDP-compliant cold chain logistics and expanded air connectivity, it did not quantify their economic impact. Future research could develop financial models or cost-benefit analyses to assess the return on investment and long-term economic benefits of these interventions, particularly for public-private partnerships and logistics infrastructure projects.

2. Stakeholder Engagement and Governance Mechanisms

The findings highlighted the absence of formal platforms for coordinated decision-making among stakeholders. Further research could explore the design and effectiveness of stakeholder governance frameworks in logistics, including how trust, incentives, and accountability mechanisms influence sustained alignment.

3. Cross-Sector Collaboration Models

This research identified weak operational linkages between the air cargo sector and upstream industries such as agriculture, fisheries, and technology. Future studies could examine case studies of successful collaboration models, focusing on how such partnerships are formed, maintained, and institutionalized in contexts similar to Oman.

4. Digital Readiness and Organisational Capability

Although digital transformation emerged as a critical enabler, the study did not assess the digital readiness of logistics firms in detail. Future research could investigate the capacity of Omani logistics providers, particularly small and medium-sized enterprises, to adopt and integrate digital systems such as real-time tracking, predictive analytics, and automated customs platforms.

By building on the specific insights and limitations of this research, these future studies can contribute to a deeper understanding of the practical pathways for transforming Oman's air cargo ecosystem and supporting the broader goals of Oman Vision 2040.

Final Thoughts

The journey to revitalizing Oman's air cargo sector requires more than incremental improvements, it demands visionary leadership, strategic investment, institutional innovation, and a culture of

continuous collaboration. As global logistics becomes increasingly complex, competitive, and digitally driven, Oman must position itself not only as a geographical gateway but also as a centre of operational excellence and policy coherence.

This thesis has illuminated the sector's untapped potential and provided a structured, evidence-based framework for unlocking it. The findings suggest that Oman's future competitiveness in air logistics depends not solely on infrastructure expansion or regulatory reform, but on building trust-based stakeholder ecosystems, investing in digital capabilities, and fostering cross-sector integration. By aligning strategic priorities across government, industry, and related sectors such as agriculture, fisheries, and tourism, Oman can transform its air cargo sector into a catalyst for economic diversification, trade facilitation, and global relevance.

While the challenges facing the sector, fragmented governance, misaligned incentives, and technological lag, are significant, they are not unresolvable. With the right leadership commitment and coordinated execution, Oman has the tools, talent, and geopolitical advantage to redefine its logistics identity. The examples of global leaders like Singapore, Amsterdam, and Dubai demonstrate that with clarity of purpose, collaborative governance, and targeted investment, even modest-sized economies can build world-class cargo ecosystems.

This study brings robust evidence to support a compelling case for action , a blueprint for rethinking how Oman approaches logistics planning, stakeholder engagement, and innovation in the air cargo sector. It offers practical insights for policymakers, regulators, industry leaders, and institutional actors to align efforts in building a more resilient, efficient, and globally integrated system. By adopting a systems-thinking approach and a bold national vision, Oman has the potential to position itself as a regional benchmark, advancing both economic competitiveness and the strategic goals of Oman Vision 2040.

References

Adeoye-Olatunde, O.A. and Olenik, N.L. (2021) ‘Research and scholarly methods: Semi-structured interviews’, JACCP: JOURNAL OF THE AMERICAN COLLEGE OF CLINICAL PHARMACY, 4(10), pp. 1358–1367. doi:10.1002/jac5.1441.

Adu, P. and Miles, D.A. (2023) ‘Planning and implementing the data collection process’, Dissertation Research Methods, pp. 202–237. doi:10.4324/9781003268154-15.

Air Cargo Week (2025) *Changi Airport handles 1.99 million tonnes of cargo in 2024*. [online] Available at: https://aircargoweek.com/changi-airport-handles-1-99-million-tonnes-of-cargo-in-2024/ [Accessed 28 June 2025].

Air Cargo News (2022) *Changi takes multimodal approach to growth*. [online] Available at: https://www.aircargonews.net/changi-takes-multimodal-approach-to-growth/1056755.article [Accessed 28 June 2025].

Åkerblad, L., Seppänen-Järvelä, R. and Haapakoski, K. (2020) 'Integrative strategies in mixed methods research', Journal of Mixed Methods Research, 15(2), pp. 152–170. doi:10.1177/1558689820957125.

Alkaabi, K. and Debbage, K.G. (2018) 'The geography of air freight: Connections between international trade and air freight networks', *Journal of Transport Geography*, 66, pp. 196–208.

Al-Wahaibi, A., 2019. Public-private partnerships in Oman's logistics sector: A roadmap for competitiveness. Middle East Logistics Review, 11(2), pp.34–42.

Aljadiri, R., Sundarakani, B. and El Barachi, M., 2023. Evaluating the Impact of COVID-19 on Multimodal Cargo Transport Performance: A Mixed-Method Study in the UAE Context. Sustainability, 15(22), p.15703.

Amicarelli, V. and Bux, C., 2021. Enhancing the Sustainability of the Aviation Industry: Airlines' Commitment to "Green" Practices. Amfiteatru Economic, 23(Special Issue No. 15), pp.934–947. [online] Available at: [Accessed 24 May 2025].

Amicarelli, V., Lagioia, G., Bux, C. and Mongelli, I., 2021. Enhancing the Sustainability of the Aviation Industry: Airlines' Commitment to Green Practices. ResearchGate. [online] Available at: [Accessed 24 May 2025].

Arias, F.D. et al. (2023) 'Biases in research studies', Translational Surgery, pp. 191–194. doi:10.1016/b978-0-323-90300-4.00082-3.

Bans-Akutey, A. and Tiimub, B.M. (2021) 'Triangulation in research', Academia Letters [Preprint]. doi:10.20935/al3392.

Barney, J.B., 1991. Firm resources and sustained competitive advantage. Journal of Management, 17(1), pp.99–120.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77–101.

Baxter, G. and Wild, G., 2021. The impact of digital technologies on the air cargo industry. International Journal of Aviation, Aeronautics, and Aerospace, 8(3), pp.1–20.

Boeing, 2023. Commercial Market Outlook 2023–2042. [online] Boeing. Available at: https://www.boeing.com/commercial/market/commercial-market-outlook [Accessed 23 May 2025].

Bombelli, A., Van Bockstaele, V., Buyle, S. and Dewulf, W., 2020. Solving the mystery of discrepancies and double counting in air cargo through demand and supply big data analysis. Journal of Air Transport Management.

Cairns-Lee, H., Lawley, J. and Tosey, P. (2021) 'Enhancing researcher reflexivity about the influence of leading questions in interviews', The Journal of Applied Behavioral Science, 58(1), pp. 164–188. doi:10.1177/00218863211037446.

Caldara, D. and Iacoviello, M. (2022) 'Measuring Geopolitical Risk', *American Economic Review*, 112(4), pp. 1194–1225. Available at: https://www.matteoiacoviello.com/gpr_files/GPR_PAPER.pdf [Accessed 28 May 2025].

Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A. and Raffo, A., 2022. The economic effects of trade policy uncertainty. Journal of Monetary Economics, 125, pp.1–18. https://doi.org/10.1016/j.jmoneco.2021.11.002

Campbell, K. et al. (2021) 'Reflexive thematic analysis for applied qualitative health research', The Qualitative Report [Preprint]. doi:10.46743/2160-3715/2021.5010.

Campbell, K.A., Orr, E., Durepos, P., Nguyen, L., Li, L., Whitmore, C., Jack, S.M., 2021. Reflexive Thematic Analysis for Applied Qualitative Health Research. The Qualitative Report, 26(6), pp.2011–2029. doi:10.46743/2160-3715/2021.4767.

Cargo, 2023. Air Cargo Market Analysis: 2023 Overview. [online] International Air Transport Association (IATA). Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/air-cargo-market-analysis-december-2023/ [Accessed 23 May 2025].

Carlan, V. and Vanelslander, T., 2021. Economic aspects of introducing artificial intelligence solutions in logistics and port sectors: The data entry case. Frontiers in Future Transportation, 2, p.710330. https://doi.org/10.3389/ffutr.2021.710330

Chen, X., Notteboom, T. and Liu, J., 2017. Transshipment hub selection from a shipper's and freight forwarder's perspective. Maritime Economics & Logistics, 19(3), pp.371–398.

Cooksey, R.W. (2020) 'Descriptive statistics for summarising data', Illustrating Statistical Procedures: Finding Meaning in Quantitative Data, pp. 61–139. doi:10.1007/978-981-15-2537-7_5.

Creswell, J.W. and Plano Clark, V.L., 2018. Designing and Conducting Mixed Methods Research. 3rd ed. Thousand Oaks: SAGE Publications.

Curtis, A.C. and Keeler, C. (2021) 'Sampling design in nursing research', AJN, American Journal of Nursing, 121(3), pp. 53–57. doi:10.1097/01.naj.0000737304.14564.51.

Dawadi, S., Shrestha, S. and Giri, R.A. (2021) 'Mixed-methods research: A discussion on its types, challenges, and criticisms', Journal of Practical Studies in Education, 2(2), pp. 25–36. doi:10.46809/jpse.v2i2.20.

DHL (2023) *Era of Sustainable Logistics – Middle East & Africa Chapter*. [online] Available at: https://www.dhl.com/us-en/campaign/era-of-sustainable-logistics/eosl-middle-east-and-africa.html [Accessed 28 April 2025].

DiMaggio, P.J. and Powell, W.W., 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American Sociological Review, 48(2), pp.147–160.

DP World (2024) *Jebel Ali Port Sets Container Throughput Record in 2024*. [online] Available at: https://www.dpworld.com/news/releases/dp-world-records-highest-cargo-volumes-at-jebel-ali-port-since-2015 [Accessed 28 June 2025].

Dubai Airports (2024) *DXB Records Highest Annual Traffic in 2024*. [online] Available at: https://media.dubaiairports.ae/dxb-records-highest-annual-traffic-in-2024-celebrating-a-decade-as-the-worlds-busiest-international-airport [Accessed 28 June 2025].

Eaton, S.E. (2020) 'Ethical considerations for research conducted with human participants in languages other than English', British Educational Research Journal, 46(4), pp. 848–858. doi:10.1002/berj.3623.

Florido-Benítez, L. and del Alcázar Martínez, B., 2025. The disruptive use of artificial intelligence (AI) will considerably enhance the tourism and air transport industries. Electronics, 14(1), p.16.

Florido-Benítez, L., 2023. The impact of logistics performance on trade: Evidence from Oman. Journal of Transport and Supply Chain Management, 17(1), pp.1–10. [online] Available at: https://jtscm.co.za/index.php/jtscm/article/view/701 [Accessed 24 May 2025].

Florido-Benítez, L., 2023. The Role of the Top 50 US Cargo Airports and 25 Air Cargo Airlines in the Logistics of E-Commerce Companies. Logistics, 7(1), p.8. [online] Available at: https://www.mdpi.com/2305-6290/7/1/8 [Accessed 24 May 2025].

Florido-Benítez, L., 2023. The role of the top 50 US cargo airports and 25 air cargo airlines in the logistics of e-commerce companies. Logistics, 7(1), p.8. https://doi.org/10.3390/logistics7010008

Fraport AG, 2025. Developing the Future of Frankfurt Airport's Cargo Hub. [online] STAT Times. Available at: https://www.stattimes.com/cargo-airports/developing-the-future-of-frankfurt-airports-cargo-hub-space-optimisation-space-development-and-digital-and-process-innovation-1354262 [Accessed 24 May 2025].

Fraport AG, 2025. Enabling Cargo - Frankfurt Cargohub. [online] Frankfurt Cargohub. Available at: https://www.frankfurt-cargohub.com/en/cargo-community/enabling-cargo.html [Accessed 24 May 2025].

Freeman, R.E., Phillips, R. and Sisodia, R., 2020. Tensions in stakeholder theory. Business & Society, 59(2), pp.213–231.

GAC Hong Kong, n.d. Freight services – Sea, air & land Hong Kong. GAC. [online] Available at: [Accessed 24 May 2025].

Gavalas, D., Syriopoulos, T. and Roumpis, E., 2022. The Impact of Information Technology towards Logistics Performance. Journal of Logistics Management, 11(2), pp.45–60.

Gavalas, D., Syriopoulos, T. and Roumpis, E., 2022. The Impact of Information Technology towards Logistics Performance. ResearchGate. [online] Available at: [Accessed 24 May 2025].

Govindan, K. and Jha, S., 2024. Structural model for analysis of key performance indicators for sustainable manufacturer-supplier collaboration: A grey-decision-making trial and evaluation

laboratory-based approach. International Journal of Production Research, 62(5), pp.1345–1362. [online] Available at: [Accessed 24 May 2025]

Gao, C., Zuzul, T., Jones, G. and Khanna, T. (2017) 'Overcoming institutional voids: A reputation-based view', *Strategic Management Journal*, 38(11), pp. 2147–2167.

Humble, N. and Mozelius, P. (2022) 'Content analysis or thematic analysis', European Conference on Research Methodology for Business and Management Studies, 21(1), pp. 76–81. doi:10.34190/ecrm.21.1.316.

International Air Transport Association (IATA), 2020. Air Cargo Market Analysis – 2019 Data. [online] IATA. Available at: [Accessed 23 May 2025].

International Air Transport Association (IATA), 2021. Our Commitment to Fly Net Zero by 2050. [online] Available at: https://www.iata.org/en/programs/sustainability/flynetzero/ [Accessed 24 May 2025].

International Air Transport Association (IATA), 2022. Air cargo market analysis: Resilience and recovery through innovation. [online] Available at: [Accessed 23 May 2025].

International Air Transport Association (IATA), 2022. e-freight / e-AWB - Cargo. [online] Available at: [Accessed 24 May 2025].

International Air Transport Association (IATA), 2022. e-freight / e-AWB - Cargo. [online] Available at: https://www.iata.org/en/programs/cargo/e/efreight/ [Accessed 24 May 2025].

International Air Transport Association (IATA), 2023. 2025 Vision for the Future of Air Cargo Facilities: Reimagining Logistics Through Technology and Innovation. [online] Available at: https://www.iata.org/contentassets/ea370e43f1e84cf6835650c2bec61885/2025-vision-for-the-future-of-air-cargo-facilities---reimagining-logistics-through-technology-and-innovation.pdf [Accessed 24 May 2025].

International Air Transport Association (IATA), 2023. Air Cargo Market Analysis - March 2023. [online] Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/air-cargo-market-analysis-march-2023/ [Accessed 24 May 2025].

International Finance Corporation (IFC), 2023. Temperature-Controlled Logistics: Emerging Market Opportunities. [online] IFC. Available at: https://www.ifc.org/content/dam/ifc/doc/mgrt/ifc-tcl-notes-tclemerging-web.pdf [Accessed 23 May 2025].

Jain, N. (2021) 'Survey versus interviews: Comparing data collection tools for exploratory research', The Qualitative Report [Preprint]. doi:10.46743/2160-3715/2021.4492.

Jiang, J., Klein, G. and Müller, R. (2022) 'Mixed-methods research for project management journal®', Project Management Journal, 53(3), pp. 215–218. doi:10.1177/87569728221088107.

Jones, T.M., Harrison, J.S. and Felps, W., 2018. How applying instrumental stakeholder theory can provide sustainable competitive advantage. Academy of Management Review, 43(3), pp.371–391.

Jensen, M.C. (2002) 'Value maximization, stakeholder theory, and the corporate objective function', *Business Ethics Quarterly*, 12(2), pp. 235–256.

Jones, T.M., Harrison, J.S. and Felps, W. (2018) 'How applying instrumental stakeholder theory can provide sustainable competitive advantage', *Academy of Management Review*, 43(3), pp. 371–391.

Khalefa, E.Y. and Selian, S.N. (2021) 'Non-random samples as a data collection tool in qualitative art-related studies', International Journal of Creative and Arts Studies, 8(1), pp. 35–49. doi:10.24821/ijcas.v8i1.5184.

Knott, E. et al. (2022) 'Interviews in the Social Sciences', Nature Reviews Methods Primers, 2(1). doi:10.1038/s43586-022-00150-6.

Kouam Arthur William, F. (2024) 'Mastering validity and reliability in academic research: Meaning and significance', International Journal of Research Publications, 144(1). doi:10.47119/ijrp1001441320246160.

Lester, J.N., Cho, Y. and Lochmiller, C.R. (2020) 'Learning to do qualitative data analysis: A starting point', Human Resource Development Review, 19(1), pp. 94–106. doi:10.1177/1534484320903890.

Liu, Y. (2022) ‘Paradigmatic compatibility matters: A critical review of qualitative-quantitative debate in mixed methods research’, SAGE Open, 12(1), p. 215824402210799. doi:10.1177/21582440221079922.

Lobe, B., Morgan, D. and Hoffman, K.A. (2020) ‘Qualitative data collection in an era of social distancing’, International Journal of Qualitative Methods, 19, p. 160940692093787. doi:10.1177/1609406920937875.

Lochmiller, C. (2021) ‘Conducting thematic analysis with qualitative data’, The Qualitative Report [Preprint]. doi:10.46743/2160-3715/2021.5008.

Lochmiller, C.R., 2021. Conducting thematic analysis with qualitative data. The Qualitative Report, 26(6), pp.2029–2044. doi:10.46743/2160-3715/2021.5008.

Logistics Middle East, 2023. Oman’s logistics sector eyes green growth with sustainable practices. [online] Available at: [Accessed 23 May 2025].

Lægreid, P. and Rykkja, L.H. (2022) ‘Governance and performance: Coordination for resilience in complex public sector environments’, Public Management Review, 24(3), pp. 331–350. doi:10.1080/14719037.2021.1916060.

Martiny, K.M., Toro, J. and Høffding, S. (2021) ‘Framing a phenomenological mixed method: From inspiration to guidance’, Frontiers in Psychology, 12. doi:10.3389/fpsyg.2021.602081.

Martínez-Fernández, S. et al. (2022) ‘Software engineering for AI-based systems: A survey’, ACM Transactions on Software Engineering and Methodology, 31(2), pp. 1–59. doi:10.1145/3487043.

McBeath, A. (2020) ‘Doing quantitative research with a survey’, Enjoying Research in Counselling and Psychotherapy, pp. 175–193. doi:10.1007/978-3-030-55127-8_10.

Min, H., 2023. Drones in last-mile delivery: A systematic review on efficiency. Transportation Research Part E: Logistics and Transportation Review. [online] Available at: [Accessed 24 May 2025].

Ministry of Transport, Communications and Information Technology (MTCIT), 2020. Strategy of Oman Logistics Center 2040. [online] Available at:

https://www.mtcit.gov.om/itaportal/Pages/Page.aspx?NID=873111&PID=1342488 [Accessed 24 May 2025].

Mitchell, R.K., Agle, B.R. and Wood, D.J., 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of Management Review, 22(4), pp.853–886.

Mitchell, R.K., Agle, B.R. and Wood, D.J., 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of Management Review, 22(4), pp.853–886. https://doi.org/10.5465/amr.1997.9711022105

Mohajan, H.K. (2020) 'Quantitative research: A successful investigation in Natural and Social Sciences', Journal of Economic Development, Environment and People, 9(4). doi:10.26458/jedep.v9i4.679.

Morgan, D.L. and Nica, A. (2020) 'Iterative thematic inquiry: A new method for analyzing qualitative data', International Journal of Qualitative Methods, 19, p. 160940692095511. doi:10.1177/1609406920955118.

Morgan, D.L. (2007) 'Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods', *Journal of Mixed Methods Research*, 1(1), pp. 48–76.

Motyka, A. and Tchouamou Njoya, E., 2020. Single European Sky: The Progress So Far. Journal of Aerospace Technology and Management, 12, e3920. [online] Available at: https://doi.org/10.5028/jatm.v12.1175 [Accessed 24 May 2025].

Mukhini, S., Balasa, A. and Maqbalia, F., 2021. Skills development and regulatory modernization for logistics growth in Oman. Omani Journal of Economic Policy, 5(1), pp.14–25.

Mustafa, C. (2021) 'Qualitative method used in researching the judiciary: Quality Assurance Steps to enhance the validity and reliability of the findings', The Qualitative Report [Preprint]. doi:10.46743/2160-3715/2021.4319.

Mweshi, G.K. and Sakyi, K. (2020) 'Application of sampling methods for the research design', Archives of Business Research, 8(11), pp. 180–193. doi:10.14738/abr.811.9042.

Natow, R.S. (2020) ‘The use of triangulation in qualitative studies employing elite interviews’, Qualitative Research, 20(2), pp. 160–173. doi:10.1177/1468794119830077.

Oman Airports, 2023. Muscat International Airport cargo operations overview. [online] Oman Airports. Available at: [Accessed 23 May 2025].

Oman Vision 2040, 2020. Oman Vision 2040 Booklet. [online] Available at: https://www.oman2040.om/uploads/publication/20231105221146-2023-11-05publication221143_.pdf [Accessed 24 May 2025].

Oman Vision 2040, 2020. Oman Vision 2040. [online] Oman Vision 2040 Implementation Follow-up Unit. Available at: [Accessed 23 May 2025].

Oxford Business Group, 2023. Logistics in Oman: A Gateway Strategy. [online] Available at: https://oxfordbusinessgroup.com/overview/gateway-oman-seeks-enhance-its-logistics-offering [Accessed 23 May 2025].

Pearson, N. et al. (2020) ‘Guidance for conducting feasibility and pilot studies for implementation trials’, Pilot and Feasibility Studies, 6(1). doi:10.1186/s40814-020-00634-w.

Pereira, A., Notteboom, T. and Pallis, A.A., 2021. Developing a digital transformation maturity model for port authorities. Research in Transportation Business & Management.

Phillips, R., Freeman, R.E. and Wicks, A.C., 2003. What stakeholder theory is not. Business Ethics Quarterly, 13(4), pp.479–502.

Pietilä, A.-M. et al. (2020) ‘Qualitative research: Ethical considerations’, The Application of Content Analysis in Nursing Science Research, pp. 49–69. doi:10.1007/978-3-030-30199-6_6.

Provan, K.G. and Kenis, P. (2008) ‘Modes of network governance: Structure, management, and effectiveness’, *Journal of Public Administration Research and Theory*, 18(2), pp. 229–252.

Qatar Airways Cargo, 2025. Qatar Airways Cargo: Two Decades of Excellence in Air Freight. [online] Qatar Airways. Available at: https://www.qrcargo.com/s/company/press-releases/a0z4K000007AvqdQAC/qatar-airways-cargo-two-decades-of-excellence-in-air-freight [Accessed 24 May 2025].

Qatar Airways Cargo, IAG Cargo and MASkargo, 2025. Qatar Airways Cargo, IAG Cargo and MASkargo Announce Intention to Launch a Global Cargo Joint Business. [online] Qatar Airways. Available at: https://www.qatarairways.com/press-releases/en-WW/249186-qatar-airways-cargo-iag-cargo-and-maskargo-announce-intention-to-launch-a-global-cargo-joint-business [Accessed 24 May 2025].

Quintão, C., Andrade, P. and Almeida, F. (2020) 'How to improve the validity and reliability of a case study approach?', Journal of Interdisciplinary Studies in Education, 9(2), pp. 273–284. doi:10.32674/jise.v9i2.2026.

Rahman, Md.M. et al. (2022) 'Sampling techniques (probability) for quantitative social science researchers: A conceptual guidelines with examples', SEEU Review, 17(1), pp. 42–51. doi:10.2478/seeur-2022-0023.

Rejeb, A., Keogh, J.G. and Treiblmaier, H., 2021. Strategic alliances in air cargo: Case study on SkyTeam Cargo and WOW Cargo Alliance. Logistics Research, 14(1), pp.1–12. [online] Available at: https://doi.org/10.23773/2021_1 [Accessed 24 May 2025].

ResearchGate, 2025. AI for Multimodal Transport Optimization: Integrating Air, Sea and Land Logistics for Efficiency. [online] Available at: [Accessed 24 May 2025].

Reñosa, M.D. et al. (2021) 'Selfie consents, Remote Rapport, and Zoom Debriefings: Collecting qualitative data amid a pandemic in four resource-constrained settings', BMJ Global Health, 6(1). doi:10.1136/bmjgh-2020-004193.

Rodrigue, J-P., 2015. Sea / Air Cargo Logistics: A New Form of Connectivity. LinkedIn. [online] Available at: [Accessed 24 May 2025].

Romero-Silva, R. and Mujica Mota, M., 2022. Trade-offs in the landside operations of air cargo hubs. Journal of Air Transport Management, 102, p.102240. [online] Available at: https://research.hva.nl/files/25187479/1_s2.0_S0969699722000734_main.pdf [Accessed 24 May 2025].

Rose, J. and Johnson, C.W. (2020) 'Contextualizing reliability and validity in qualitative research: Toward more rigorous and trustworthy qualitative social science in Leisure Research', Journal of Leisure Research, 51(4), pp. 432–451. doi:10.1080/00222216.2020.1722042.

Ryba, T.V. et al. (2020) ‘Developing mixed methods research in sport and exercise psychology: Potential contributions of a critical realist perspective’, International Journal of Sport and Exercise Psychology, 20(1), pp. 147–167. doi:10.1080/1612197x.2020.1827002.

Saarijärvi, M. and Bratt, E.-L. (2021) ‘When face-to-face interviews are not possible: Tips and tricks for video, telephone, online chat, and email interviews in qualitative research’, European Journal of Cardiovascular Nursing, 20(4), pp. 392–396. doi:10.1093/eurjcn/zvab038.

Schiphol Group (2023) *Cargo – Traffic Review 2023*. [online] Available at: https://www.schipholannualtrafficreview.nl/2023/cargo [Accessed 28 June 2025].

Schiphol Group (2024) *Annual Report 2023 – Sustainability and Operations*. [online] Available at: https://www.schiphol.nl/en/b2b/annual-report [Accessed 28 June 2025].

Serfontein, L. and Govender, K., 2020. The relationship between resilience and organisational control systems in the South African aviation industry. Journal of Transport and Supply Chain Management, 14, a598. https://doi.org/10.4102/jtscm.v14i0.598

Serfontein, L. and Govender, K., 2021. The relationship between resilience and organisational control systems in the South African aviation industry. ResearchGate. [online] Available at: [Accessed 24 May 2025].

Simatupang, T.M. and Sridharan, R. (2005) ‘An integrative framework for supply chain collaboration’, *The International Journal of Logistics Management*, 16(2), pp. 257–274.

Shan, Y. (2023) ‘Assessing philosophical foundations of mixed methods research’, Philosophical Foundations of Mixed Methods Research, pp. 1–10. doi:10.4324/9781003273288-1.

Shan, Y. (Ed.). (2023). Philosophical Foundations of Mixed Methods Research: Dialogues Between Researchers and Philosophers. London: Routledge.

Smeritschnig, F., 2013. WOW and SkyTeam Cargo: An In-depth Analysis of Strategic Alliances for Air Cargo Carriers and The Impact on Cargo Airlines' Operations and Success. Hamburg: Anchor Academic Publishing. [online] Available at: [Accessed 24 May 2025].

Smith, J., Brown, L. and Davis, M., 2020. Analysis of the barriers to multimodal freight transport and their impact on air cargo operations. European Transport Research Review. [online] Available at: [Accessed 24 May 2025].

Smith, J., Brown, L. and Davis, M., 2020. The interrelationship between ocean, rail, truck and air freight rates. Journal of Shipping and Trade, 5(1), pp.1–15. [online] Available at: [Accessed 24 May 2025].

Stratton, S.J. (2021) 'Population research: Convenience sampling strategies', Prehospital and Disaster Medicine, 36(4), pp. 373–374. doi:10.1017/s1049023x21000649.

Stat Times (2025) *Changi nearly hits 2 million tonne cargo throughput in 2024*. [online] Available at: https://www.stattimes.com/air-cargo/changi-nearly-hits-2-million-tonne-cargo-throughput-in-2024-1354286 [Accessed 28 June 2025].

Stat Times (2023) *Singapore Southeast Asia's cargo gem – temperature-controlled facility modular*. [online] Available at: https://www.stattimes.com/air-cargo/singapore-southeast-asias-cargo-gem-1350266 [Accessed 28 June 2025].

SATS (n.d.) *Air Cargo – SATS Ltd.* [online] Available at: https://www.sats.com.sg/our-services/details/air-cargo [Accessed 28 June 2025].

Sun, X., Wandelt, S. and Zhang, A., 2022. COVID-19 pandemic and air transportation: Summary of Recent Research, Policy Consideration and Future Research Directions. Transport Policy, [online] Available at: [Accessed 24 May 2025].

Sun, X., Wandelt, S. and Zhang, A., 2022. COVID-19 pandemic and air transportation: Summary of recent research, policy considerations and future research directions. Transport Policy, 117, pp.102–114.

Sun, X., Wandelt, S. and Zhang, A., 2022. COVID-19 pandemic and air transportation: Summary of recent research, policy considerations and future research directions. Transport Policy, 117, pp.102–114. https://doi.org/10.1016/j.tranpol.2021.12.015

Sustainability in the Rhine–Scheldt Delta (2021) *Green Supply Chain Management at Rotterdam and Amsterdam Ports*. *Sustainability*, 13(4), pp. 1–15. [online] Available at: https://www.mdpi.com/2071-1050/13/4/1688 [Accessed 28 June 2025].

Taderera, F., Al Balushi, M.S. and Masengu, R., 2023. Marketing Air Cargo and Courier Services in Oman as a Niche Logistics Market Segment and Delving into the Complex Intricacies of this High-Value Industry. European Journal of Science, Innovation and Technology, 3(1), pp.1–15. [online] Available at: https://ejsit-journal.com/index.php/ejsit/article/view/254 [Accessed 24 May 2025]

Taderera, F., Al Balushi, M.S. and Masengu, R., 2023. Marketing air cargo and courier services in Oman as a niche logistics market segment. ResearchGate. [online] Available at: [Accessed 24 May 2025].

Taderera, F., Al Balushi, M.S. and Masengu, R., 2023. Running logistics cargo centres in Oman and Zimbabwe: The key performance indicators and fault lines. International Journal of Engineering Technologies and Management Research, 10(2), pp.12–28. [online] Available at: https://www.granthaalayahpublication.org/ijetmr-ojms/ijetmr/article/view/1300/1060 [Accessed 24 May 2025].

Taderera, M., Al Balushi, A. and Masengu, M., 2023. Challenges and opportunities in Oman's air cargo sector: A benchmarking analysis. Journal of Transport and Logistics Studies, 9(2), pp.45–67.

Tashakkori, A. and Teddlie, C., 2010. Mixed Methodology: Combining Qualitative and Quantitative Approaches. Thousand Oaks: SAGE Publications.

Thunberg, S. and Arnell, L. (2021) 'Pioneering the use of technologies in qualitative research – a research review of the use of digital interviews', International Journal of Social Research Methodology, 25(6), pp. 757–768. doi:10.1080/13645579.2021.1935565.

TFI (2024) *The Role of Ports and Airports in UAE's Logistics Dominance*. [online] Available at: https://tfiworld.com/the-role-of-ports-and-airports-in-uaes-logistics-dominance [Accessed 28 June 2025].

Top sector Logistiek (2022) *Smart Cargo Mainport Program – Enhancing Air Cargo Efficiency and Integration*. [online] Available at: https://topsectorlogistiek.nl [Accessed 28 June 2025].

UNCTAD, 2023. Review of Maritime Transport 2023: Regional Logistics Performance. [online] Available at: https://unctad.org/webflyer/review-maritime-transport-2023 [Accessed 23 May 2025].

UFL Group (2025) *Singapore's Changi Airport charts a course*. [online] Available at: https://ufreight.com/singapores-changi-airport-charts-a-course/ [Accessed 28 June 2025].

Wang, Y. and Yip, T.L., 2023. Analysis of perishable goods transportation. European Journal of Business and Innovation Research, 11(7), pp.35–72. [online] Available at: [Accessed 24 May 2025]

Wang, Y., Li, X. and Zhang, H., 2023. Leveraging blockchain smart contracts for transparent supply chain management. International Journal of Logistics Research and Applications, 26(4), pp.350–365

Wang, Y., Li, X. and Zhang, H., 2023. Leveraging Blockchain Smart Contracts for Transparent Supply Chain Management. International Journal of Logistics Research and Applications, 26(4), pp.350–365. [online] Available at: [Accessed 24 May 2025].

Wiltshire, G. and Ronkainen, N. (2021) 'A realist approach to thematic analysis: Making sense of qualitative data through experiential, inferential and dispositional themes', Journal of Critical Realism, pp. 1–22. doi:10.1080/14767430.2021.1894909.

Wiltshire, G. and Ronkainen, N., 2021. A realist approach to thematic analysis: making sense of qualitative data through experiential, inferential and dispositional themes. Journal of Critical Realism, 20(2), pp.159–180. doi:10.1080/14767430.2021.1894909.

World Bank, 2021. Gulf Economic Update: COVID-19 Pandemic and the Road to Diversification. [online] Available at: [Accessed 23 May 2025].

Yin, R.K., 2018. Case Study Research and Applications: Design and Methods. 6th ed. Thousand Oaks, CA: SAGE Publications.

Zamani, M., et al., 2023. Leveraging Artificial Intelligence for Enhanced Supply Chain Resilience. International Journal of Management and Engineering Research. [online] Available at: [Accessed 24 May 2025].

Zhou, Y., Kundu, T., Goh, M. and Sheu, J.-B., 2021. Multimodal transportation network centrality analysis for Belt and Road Initiative. Transportation Research Part E: Logistics and Transportation Review, 149, p.102292. [online] Available at: [Accessed 24 May 2025].

Ziadah, R., 2017. Transport infrastructure and logistics policy in the Gulf: The case of Dubai. Geoforum, 81, pp.232–240. https://doi.org/10.1016/j.geoforum.2017.02.001

Ziadah, R., 2018. Transport infrastructure and logistics in the making of Dubai Inc. International Journal of Urban and Regional Research, 42(2), pp.182–197.

Ziadah, R., 2018. Transport Infrastructure and Logistics in the Making of Dubai Inc. International Journal of Urban and Regional Research, 42(2), pp.182–197. [online] Available at: [Accessed 24 May 2025].

Ziadah, R., 2018. Transport infrastructure and logistics in the making of Dubai Inc. International Journal of Urban and Regional Research, 42(2), pp.182–197. [online] Available at: https://doi.org/10.1111/1468-2427.12570 [Accessed 24 May 2025].

Appendices

Appendixes list:

1. **LR Matrix**
2. **Survey questions**

3. **Interviews questions**
4. **Email sent to participants**
5. **Consent form**
6. **Interviewees initial list**
7. **Interviews respondents list**
8. **Manual Thematic analysis- interviews**
9. **Thesis diagram**
10. **Glossary**
11. **Interviews quotes**

Appendix 1: Literature Review Matrix

Author(s), Year	**Country / Context**	**Focus / Topic**	**Methodology**	**Key Findings**	**Relevance to Research Objectives**	**Theoretical Contribution**
IATA, 2023	Global	Role of air cargo in high-value, time-sensitive trade; sustainability; e-commerce	Industry report	Air cargo is vital for transporting high-value goods; 22% of volumes in 2022 were e-commerce; strong push for greener practices	Supports Objective 1: Understanding challenges and trends in global air cargo	Empirical evidence base; context-setting for global trends
Serfontein &	Global	Digital logistics innovations	Academic analysis	Digitalization and global supply	Supports Objective 1 and 3:	Links innovation

Govender, 2021		and global supply chain integration		chain integration drive air cargo growth	Enablers of competitiveness and digital transformation	to logistics efficiency
Sun et al., 2022	Global / COVID-19 context	Impact of pandemic on air cargo operations	Case study / empirical research	Cargo demand surged during pandemic; airlines adapted with cargo-only flights	Objective 1: Illustrates industry resilience and adaptability	Crisis response and adaptive logistics
IATA, 2022	Global	Digital tools in air cargo operations	Industry data and report	Increased adoption of e-AWB and automated systems post-pandemic	Objective 3: Digital transformation in logistics	Technology adoption
Florido-Benítez, 2023	Global	E-commerce and express logistics	Theoretical and empirical review	E-commerce drives demand for fast logistics; rising role of automation and tracking	Objective 1 and 3: Impacts of demand and tech innovation	Market trends and innovation link
Gavalas et al., 2022	Global	Real-time tracking, automation, blockchain in logistics	Technical review / empirical data	AI and blockchain improve logistics performance and	Objective 3: Enabling mechanisms for	Tech-enabled logistics transparency

				transparency	performance	
Amicarelli et al., 2021	Global	Sustainable practices in air cargo	Sustainability case studies	Push for SAF, biofuels, carbon offsetting in air cargo	Objective 1: Environmental challenges and responses	Sustainability in logistics
Caldara et al., 2022	Global / Geopolitical	Geopolitical disruptions in air cargo	Empirical geopolitical analysis	Conflicts and trade tensions disrupt routes, raise costs, demand resilience	Objective 1: Industry challenges and resilience	Risk and resilience in logistics
Min, 2023	Global	Autonomous cargo technologies (UAVs, drones)	Technology review / case studies	UAVs and cargo drones enhance last-mile delivery efficiency and reduce costs	Objective 3: Innovative strategies for cargo efficiency	Emerging tech in air logistics
Zamani et al., 2023	Global	AI and predictive analytics in air cargo	Empirical and technical analysis	AI improves forecasting, load optimization, and routing efficiency	Objective 3: AI-enabled logistics transformation	Data-driven logistics management
Chen et al., 2017	Dubai, Singapore, Hong Kong	Multimodal logistics integration (sea-air-rail)	Case study analysis	Integrated logistics hubs improve flexibility	Objective 1 and 3: Benchmarking and	Multimodal transport efficiency

				and resilience	global best practices	
Bombelli et al., 2020	Global	Regulatory complexity and customs procedures	Policy and regulatory review	Complex and varied regulations slow cargo movement and raise costs	Objective 1: Identifying operational challenges	Regulatory burden in international logistics
Pereira et al., 2021	Singapore, EU	Single-window clearance systems for trade	Comparative case study	Single-window systems improve trade efficiency and reduce delays	Objective 3: Policy solutions and benchmarking	Trade facilitation through digital governance
Taderera et al., 2023	Emerging markets	Infrastructure limitations in cargo handling	Infrastructure analysis	Cold chain and terminal gaps restrict growth in air cargo	Objective 1: Infrastructure as a barrier to growth	Cold chain logistics and capacity constraints
Wang et al., 2023	Global / Emerging Markets	Cold chain infrastructure and blockchain applications	Technical analysis and case study	Need for better temp-controlled facilities and blockchain can support transparency	Objective 1 & 3: Tech and infra modernization	Blockchain and perishable logistics
Smith et al., 2020	Global	Airport infrastructure & modal competition	Comparative transport study	Airports in developing regions lack integration; rail and sea	Objective 1: Competition and infrastructure gaps	Mode competition in freight

				pose competition		
Zhao & Zhou, 2021	China / Belt and Road Initiative	Rail freight expansion as air cargo competitor	Policy and market trend analysis	Rail networks like BRI reduce reliance on air for some lanes	Objective 1: Alternatives to air cargo	Multimodal competition
Rejeb et al., 2021	Global	Strategic alliances in air cargo	Alliance case studies	Alliances improve market access and resource efficiency	Objective 3: Strategic collaboration in logistics	Collaborative business models
IATA, 2022	Global	Digital transformation and e-AWB	Industry report	Digital platforms improve cost efficiency and visibility	Objective 3: Digital tools for competitiveness	Technology-driven efficiency
Gavalas et al., 2022	Global	AI-based forecasting in cargo	Tech-based empirical study	AI improves flight planning and reduces empty legs	Objective 3: Optimizing cargo operations	Predictive analytics in logistics
Oman Airports, 2023	Oman	Pharmaceutical and cold chain logistics	Industry report	GDP-compliant handling and cold chain investment are critical for pharma logistics	Objective 1 and 3: Sectoral specialization and competitive growth	Sector-specific logistics innovation

Chen et al., 2017	Singapore, Dubai	Multimodal logistics corridors	Case study analysis	Multimodal hubs enhance service reliability and reduce logistics costs	Objective 3: Benchmarking best practices for Oman	Integrated logistics infrastructure
Amicarelli et al., 2021	Global	Sustainable aviation and green logistics	Sustainability analysis	Fuel-efficient aircraft and SAF adoption are key to eco-alignment and cost reduction	Objective 3: Environmental strategies for competitiveness	Green logistics strategies
IATA, 2023	Global	Net-zero carbon target and sustainability in air cargo	Industry framework	Net-zero by 2050 goal drives sustainability transformation	Objective 3: Regulatory alignment and strategic planning	Environmental governance in logistics
Oman Vision 2040, 2020	Oman	Strategic infrastructure and policy investment	Government strategy document	Oman invests in air cargo modernization to support diversification goals	Objective 1 and 3: National development and sector readiness	Policy-led logistics transformation
Oman Airports, 2023	Oman	Cargo infrastructure capacity at Muscat and	Industry report	Muscat terminal capacity over 350,000 tons;	Objective 1: Infrastructure benchmarking	Infrastructure as competitive asset

		Salalah airports		Salalah critical for regional freight		
Taderera et al., 2023	Oman / Ports and airports	Multimodal gateways (Salalah, Sohar, Duqm)	Case study analysis	Ports support integration with air cargo and enhance multimodal potential	Objective 3: Enhancing integration for competitiveness	Multimodal synergy
Govindan & Jha, 2024	Oman	Stakeholder misalignment in air cargo	Organizational study	Fragmented coordination hinders logistics efficiency	Objective 2: Stakeholder alignment issues	Collaborative governance gaps
Herath & Herath, 2023	Singapore, Amsterdam vs. Oman	Digital transformation comparison	Comparative digital logistics study	Oman lags behind digital leaders in AI, automation, and blockchain	Objective 3: Enabling mechanisms for competitiveness	Digital maturity benchmarking
Pereira et al., 2021	Oman vs. Dubai, Hong Kong	Regulatory efficiency and trade facilitation	Comparative customs study	Regulatory delays and non-harmonized tariffs hinder Oman's logistics competitiveness	Objective 1 and 3: Institutional barriers and best practices	Regulatory harmonization

Taderera et al., 2023	Oman	Trade imbalance and load inefficiencies	Economic analysis	Import-export imbalance limits cargo load optimization and profitability	Objective 1: Structural market challenges	Trade asymmetry in logistics
Rejeb et al., 2021	Netherlands, Singapore, Oman	Niche cargo markets and digital transformation	Benchmarking and case study analysis	Niche segments and digitalization improve competitiveness and exports	Objective 3: Sectoral specialization and digital transformation	Market-driven logistics innovation
Oman Airports, 2023	Oman	Cold chain infrastructure limitations	Industry report	Lack of GDP-compliant storage hampers pharma and perishable logistics	Objective 1 & 3: Infrastructure investment for strategic cargo types	Infrastructure and cold chain capacity
Wang et al., 2023	Frankfurt, Doha vs. Oman	Pharmaceutical cold storage and compliance	Comparative study	Investment in cold chain positions hubs for medical logistics dominance	Objective 3: Benchmarking and strategic planning	Health-sector logistics readiness
IATA, 2023	Global	AI and blockchain for logistics	Industry innovation framework	Digital tools enhance transparency and efficiency in	Objective 3: Enabling mechanisms for	Digital logistics enablers

				cargo operations	modernization	
Herath & Herath, 2023	Singapore, Amsterdam, Oman	Digitalization and customs integration	Comparative technology study	Digital customs and cargo visibility improve hub efficiency	Objective 3: Digital readiness and benchmarking	Customs automation
Florido-Benítez, 2023	Oman, Dubai, Qatar	Free zones and multimodal connectivity	Policy and investment strategy analysis	Free zones with air-sea-land integration improve investment appeal	Objective 3: Infrastructure and investment strategies	Multimodal integration in logistics zones
Govindan & Jha, 2024	Oman	Specialized cargo and stakeholder collaboration	Stakeholder strategy analysis	Specialization and coordination improve logistics outcomes and diversification	Objective 2 & 3: Collaboration and sector-specific strategy	Stakeholder integration
Pereira et al., 2021	Dubai, Singapore vs. Oman	Customs procedures and trade facilitation	Comparative regulatory analysis	Single Window Systems reduce bottlenecks and support efficiency	Objective 3: Governance and procedural reform	Regulatory streamlining
Oman Vision 2040, 2020	Oman	Logistics governance and	National strategy document	Cross-sector coordination supports	Objective 2 & 3: Governance alignment with	Policy-guided stakeholder

		strategic alignment		Vision 2040 goals	national development	collaboration
Taderera et al., 2023	Oman / Global	Synthesis of best practices for Oman	Literature synthesis	Strategic areas: digitalization, multimodalism, regulation, specialization, collaboration	Objective 3: Strategic roadmap for Oman	Integrated competitiveness framework
Ziadah, 2018	Dubai	Integration of Jebel Ali Port and Dubai Airport	Case study	Multimodal connectivity reduces transit time and improves efficiency	Objective 3: Benchmarking for Oman's logistics corridor	Multimodal logistics networks
Rejeb et al., 2021	Dubai, Singapore	Best practices in logistics hubs	Comparative logistics study	Digital transformation and multimodalism drive logistics hub efficiency	Objective 3: Global benchmarks for Oman	Operational excellence in logistics
Romero-Silva & Mota, 2022	Amsterdam Schiphol	Collaborative Decision-Making (CDM) framework	Governance and stakeholder collaboration analysis	CDM and data platforms enhance stakeholder coordination and cargo throughput	Objective 2: Stakeholder governance model for Oman	Collaborative logistics governance

Govindan & Jha, 2024	Amsterdam / Oman	Schiphol stakeholder collaboration benchmarking	Case comparison	Customs, carriers, and forwarders collaborate via data-sharing platforms to enhance efficiency	Objective 2: Stakeholder integration and logistics performance	Community-based logistics systems
Wang et al., 2023	Qatar Airways Cargo	Fleet expansion and digital freight systems	Case study	Investments in modern aircraft and digital management enhance cargo capabilities	Objective 3: Strategy for competitive cargo expansion	Freighter modernization and digital logistics
Herath & Herath, 2023	Frankfurt	Public-private partnerships in cargo terminals	PPP logistics infrastructure analysis	PPP enhances cargo capacity, security and modernization	Objective 3: Governance models for infrastructure investment	Collaborative logistics investment
Taderera et al., 2023	Global	Multimodal integration and digital efficiency	Comparative and technical analysis	AI, blockchain, and automated tracking boost performance of top cargo hubs	Objective 3: Enabling technologies and integration	Multimodal digital logistics
Govindan & Jha, 2024	Global	Public-private collaboratio	Policy and stakeholder analysis	Partnerships align cargo policies, improve handling	Objective 2 and 3: Stakeholder	Collaborative governance and

		n in logistics		and governance	alignment and PPPs	infrastructure
Taderera et al., 2023	Global / Oman	Benchmarking and strategic comparison of hubs	Comparative logistics benchmarking	Top hubs offer insights into regulatory harmonization, digitalization, and logistics strategy	Objective 3: Benchmark-based strategy formation for Oman	Policy and operational benchmarking
Freeman, 1984	Theoretical / Global	Foundational stakeholder theory	Theoretical framework	Firms should consider multiple stakeholder interests to enhance sustainability and decision-making	Objective 2: Foundation for stakeholder alignment	Stakeholder theory origin
Donaldson & Preston, 1995	Theoretical / Global	Three stakeholder theory perspectives: descriptive, instrumental, normative	Theoretical categorization	Stakeholder theory improves firm performance and aligns with ethical obligations	Objective 2: Understanding stakeholder value	Multi-dimensional stakeholder model
Freeman, Phillips, & Sisodia, 2020	Theoretical / Global	CSR and sustainability integration into	Theory expansion	CSR and stakeholder engagement enhance global	Objective 2: Sustainability through stakeholder management	Stakeholder theory evolution

		stakeholder theory		business relevance		
Govindan & Jha, 2024	Air cargo / Oman	Stakeholder coordination in air cargo	Applied stakeholder analysis	Collaboration among logistics players enhances service reliability and reduces delays	Objective 2: Stakeholder alignment for cargo efficiency	Stakeholder engagement in practice
Pereira et al., 2021	Air cargo / Global	Benefits of stakeholder engagement in air cargo	Sector-specific case studies	Stakeholder engagement improves compliance and operational reliability	Objective 2: Practical benefits of collaboration	Empirical validation of theory
Mitchell, Agle & Wood, 1997	Theoretical / Global	Power-interest matrix for stakeholder analysis	Analytical framework	Stakeholder salience depends on power, legitimacy, and urgency	Objective 2: Stakeholder prioritization tools	Stakeholder salience model
Jones, Harrison & Felps, 2018	Theoretical / Regulated sectors	Balancing stakeholder interests in high-regulation industries	Theoretical and empirical synthesis	Inclusive stakeholder governance improves firm performance	Objective 2: Governance structure and stakeholder mapping	Performance-driven stakeholder inclusion
Herath & Herath, 2023	Logistics / Global	Digital stakeholder collaboration tools (AI, blockchain)	Technology integration case studies	Digital tools enhance transparency, compliance, and	Objective 2 & 3: Tech-enabled stakeholder engagement	Digital evolution of stakeholder theory

				coordination		
Taderera et al., 2023	Air cargo hubs / Global	Stakeholder-driven models in logistics	Comparative benchmarking	Stakeholder engagement crucial to regulatory alignment and hub performance	Objective 2: Application of theory to sectoral strategy	Stakeholder integration in logistics benchmarking
Govindan & Jha, 2024	Oman	Stakeholder misalignment in air cargo	Sectoral stakeholder analysis	Fragmented governance leads to inefficiencies, duplicated efforts, and poor coordination	Objective 2: Need for centralized stakeholder governance in Oman	Stakeholder misalignment and inefficiency
Herath & Herath, 2023	Amsterdam Schiphol	Collaborative Decision-Making (CDM) for stakeholder governance	Comparative stakeholder framework analysis	CDM model enhances real-time coordination, regulatory compliance, and cargo throughput	Objective 2: Best practices in stakeholder collaboration	Collaborative governance for logistics efficiency
Rejeb et al., 2021	Dubai	Multimodal stakeholder collaboration at Dubai International Airport	Multimodal logistics benchmarking	Integrated airport-port collaboration improves cargo handling and customs processing	Objective 2: Lessons for Oman's stakeholder integration	Multimodal governance coordination

Taderera et al., 2023	Oman vs. Dubai	Multimodal logistics gap in Oman	Comparative infrastructure study	Oman lacks integrated airport-port systems, limiting competitiveness and throughput	Objective 2 & 3: Infrastructure and coordination challenges	Multimodal efficiency gaps
Pereira et al., 2021	Oman vs. Global	Regulatory misalignment in Oman	Comparative policy analysis	Overlapping mandates and inconsistent customs rules delay air cargo efficiency	Objective 2: Regulatory barriers to stakeholder alignment	Fragmented regulatory governance
Wang et al., 2023	Singapore vs. Oman	Integrated regulatory approaches	Best practice benchmarking	Unified regulatory platforms improve coordination and efficiency	Objective 2 & 3: Lessons for governance reform in Oman	Harmonized logistics regulation
Herath & Herath, 2023	Oman vs. Singapore, Hong Kong	Digitalization gap in stakeholder coordination	Comparative tech analysis	Lack of AI, blockchain, and automation hinders collaboration and efficiency	Objective 2: Technology-driven stakeholder coordination	Digital stakeholder integration
Govindan & Jha, 2024	Global vs. Oman	Digital stakeholder models in logistics	Sectoral comparison	AI and blockchain boost communication and data sharing in	Objective 2: Stakeholder communication and decision-making	Digital engagement models

				cargo ecosystems		
Taderera et al., 2023	Oman	Stakeholder framework solutions and infrastructure gaps	Benchmarking and operational review	Proposes National Logistics Council and multimodal integration; highlights runway/apron limitations	Objective 2 & 3: Strategic solutions for governance and infrastructure	Holistic air cargo governance
Rejeb et al., 2021	Frankfurt, Doha vs. Oman	Cold chain logistics benchmarking	Comparative infrastructure analysis	Integrated cold chain hubs dominate pharma markets; Oman lacks compliant infrastructure	Objective 3: Cold chain readiness for high-value cargo	Cold chain specialization and infrastructure investment
Motyka & Njoya, 2020	Frankfurt	Collaborative governance models in logistics	Case study	Centralized stakeholder governance improves decision-making and logistics performance	Objective 2: Best practices in stakeholder alignment	Collaborative governance in logistics
Rejeb et al., 2021	Singapore	Blockchain-enabled digital freight corridors	Technology implementation study	Digital freight corridors improve compliance, transparency, and	Objective 3: Digital tools for stakeholder coordination	Digital integration for collaboration

				processing speed		
Ziadah, 2018	Dubai	Dubai Logistics City public-private integration	Case study	PPP integration fosters innovation and efficiency in cargo operations	Objective 3: Private-public collaboration models	PPP governance in air cargo
Lægreid & Rykkja, 2022	Theoretical / Inter-sectoral systems	Governance structures and KPIs in complex systems	Public administration theory	Central governance and KPIs align diverse actors toward shared goals	Objective 2: Governance reform for Oman	Leadership and coordination in multi-agency systems
Freeman, 1984	Theoretical	Stakeholder Theory – foundational framework	Theoretical development	Organizations thrive through engagement with diverse stakeholders; shared value creation enhances performance	Theoretical basis for stakeholder engagement and governance	Stakeholder Theory foundation
Donaldson & Preston, 1995	Theoretical	Three stakeholder theory perspectives	Theory refinement	Descriptive, instrumental, and normative dimensions define stakeholder relations	Clarifies ethical and performance implications of	Stakeholder theory typology

				and responsibilities	stakeholder alignment	
Freeman et al., 2020	Global	CSR and sustainability in stakeholder theory	Theory expansion	Sustainability and CSR enhance long-term relevance of stakeholder engagement	Stakeholder alignment and sustainable logistics planning	Modern application of stakeholder theory
Phillips et al., 2003	Cross-sector collaboration	Value creation via inter-sectoral collaboration	Conceptual analysis	Cross-sector alliances enhance resource optimization and innovation	Basis for inter-sectoral collaboration construct	Stakeholder and sector integration
Florido-Benítez, 2023	Global logistics	Technological drivers of competitiveness	Sector benchmarking	IoT, blockchain, and analytics improve throughput and performance	Tech-enabled competitiveness in Oman's cargo sector	Digital transformation as enabler
Rejeb et al., 2021	Amsterdam	CDM for regulatory efficiency and collaboration	Benchmark case study	Collaborative governance enhances cargo throughput and regulatory compliance	Global best practice informing Oman	Collaborative stakeholder model

Taderera et al., 2023	Singapore	Blockchain-enabled supply chain and customs optimization	Comparative logistics benchmarking	Blockchain and analytics reduce delays and enhance transparency	Digital strategy and customs improvement in Oman	Tech-enabled compliance
Ziadah, 2018	Dubai	Centralized governance in cargo logistics	Case study	Unified governance aligns multi-agency efforts and boosts throughput	Institutional governance reform in Oman	Centralized logistics management

Appendix 2: Survey Questions

"Exploring Strategies for Revitalizing the Air Cargo Sector in the Sultanate of Oman"

Dear Participant,

I am Sumaiya Al Nabhani, a 4th Year Doctor of Business Administration (DBA) student at the University of Strathclyde in Glasgow. I am conducting a research study titled "Exploring Strategies for Revitalizing the Air Cargo Sector in the Sultanate of Oman." This project aims to identify effective strategies for enhancing and revitalizing this critical industry.

Your participation in this survey is vital. We are seeking insights from professionals in the aviation and air cargo sectors, officials from the government, and others with knowledge or interest in this field. Your responses will provide valuable data for analyzing the current state of Oman's air cargo sector and for developing strategic recommendations for its improvement.

This survey, which is expected to take approximately 7 to 10 minutes to complete, is part of the data collection process for my thesis. It will be complemented by in-depth interviews with sector experts, allowing for a comprehensive understanding of the industry.

Please rest assured that all responses will be kept confidential and used solely for academic purposes. Your contribution is not only greatly appreciated but also essential in contributing to the economic development of Oman and the betterment of its air cargo industry.

Thank you in advance for your time and valuable insights. Your expertise is crucial to the success of my research and to the future of Oman's air cargo sector.

Warm regards,

Sumaiya Al Nabhani

Dear Participant,

I am Sumaiya Al Nabhani, a Doctor of Business Administration (DBA) student in my final year at the University of Strathclyde, Glasgow. I am conducting a study titled "Exploring Strategies for Revitalizing the Air Cargo Sector in the Sultanate of Oman." The aim is to discover strategies to boost this vital industry.

Your input is crucial. We seek perspectives from aviation and air cargo professionals, government officials, and others with interest in this area. Your feedback will help analyze Oman’s air cargo sector and suggest improvements.

This survey will take about 7-10 minutes and is part of my thesis data collection, alongside in-depth expert interviews, to deeply understand the industry.

All responses will remain confidential and are for academic use only. Your participation will significantly aid Oman’s economic growth and its air cargo sector’s progress.

Thank you for your time and insights, which are vital to my research and the future of Oman's air cargo industry.

Warm regards,

Sumaiya Al Nabhani Sumaiya.al-nabhani@strath.ac.uk

Section 1: Background and Involvement

1. **What is your involvement with the air cargo or aviation sector?**
    - Direct involvement in air cargo
    - Involved in aviation
    - Part of government or policy-making
    - General awareness
    - No direct involvement
2. **How many years have you been associated with or aware of the air cargo sector?**
    - <1 year
    - 1-5 years
    - 6-10 years
    - 10 years and above
3. **Which describes your role best in relation to the air cargo sector?**
    - Operational
    - Strategic Planning
    - Policy Making
    - Research/Academic
    - Other
4. **In which geographic region of Oman do you primarily operate or focus in terms of air cargo activities?**
    - Muscat

- Dhofar
- Batinah
- Dakhiliyah
- Other
- Not applicable

Section 2: Sector Performance and Challenges

5. **How would you rate the overall performance of Oman's air cargo sector?**
    - Very Poor
    - Poor
    - Average
    - Good
    - Excellent
6. **Identify the biggest challenge facing Oman's air cargo sector.**
    - Infrastructure
    - Policy and Regulation
    - Market Demand
    - Technology
    - Collaboration
    - Other
7. **Are you aware of the development plans like free zones around airports?**
    - Yes, fully aware
    - Somewhat aware
    - Not aware

8. **How has the global economic climate affected Oman’s air cargo sector?**

    - Significantly Negatively
    - Somewhat Negatively
    - No Impact
    - Somewhat Positively
    - Significantly Positively

Section 3: Strategies and Opportunities

9. **In your view, what is the most effective strategy to enhance Oman's air cargo sector?**

    - Infrastructure Development
    - Policy Reforms
    - Market Expansion
    - Technology Integration
    - Stakeholder Collaboration
    - Other

10. **Rate the importance of inter-sectoral collaboration for the air cargo sector.**

    - Not Important
    - Somewhat Important
    - Important
    - Very Important
    - Essential

11. **What potential impact do you foresee from the development of free zones around airports?**

    - No Impact

- Minor Impact
- Moderate Impact
- Major Impact
- Transformational Impact

12. **How can technological advancements specifically benefit Oman's air cargo sector?**

- Efficiency Improvement
- Cost Reduction
- Expanding Reach
- Enhancing Safety
- Other

Section 4: Future Directions and Sustainability

13. **What is the key opportunity for Oman's air cargo sector in the next 5 years?**

- Expanding Global Reach
- Embracing Technological Innovations
- Enhancing Policy Framework
- Collaborative Ventures
- Other

14. **How do you feel about the future prospects of Oman's air cargo sector?**

- Very Pessimistic
- Pessimistic
- Neutral
- Optimistic
- Very Optimistic

15. **What role will environmental sustainability play in the future of Oman's air cargo sector?**
    - No Role
    - Minor Role
    - Moderate Role
    - Major Role
    - Essential Role
16. **What impact do you think increased regional collaboration in the Middle East will have on Oman's air cargo sector?**
    - No Impact
    - Minor Impact
    - Moderate Impact
    - Major Impact
    - Transformational Impact

Open-Ended Questions

1. Please share any additional thoughts on improving Oman's air cargo sector.
2. What are your views on the current state of Oman's air cargo sector and its impact on the national economy?
3. Can you suggest any global best practices or examples that Oman’s air cargo sector could emulate?
4. Do you have any further comments or insights that could aid this research on Oman's air cargo sector?

Appendix 3: Email to participants for interview participation

Subject: Request for Participation in Research on Oman's Air Cargo Sector

Dear ,

I hope this message finds you well.

My name is Sumaiya Al Nabhani, a DBA student at the University of Strathclyde. I am conducting research on revitalizing the air cargo sector in Oman, with a focus on stakeholder alignment and inter-sectoral collaboration.

I kindly request your participation in this research by completing a structured interview. Your expertise and insights are crucial to this study. The interview should take approximately 30-45 minutes to complete.

Confidentiality

Please be assured that all information you provide will be treated confidentially and used solely for academic purposes. Identifying information will be anonymized.

Instructions

1. **Review the attached interview questions and consent form.**
2. **Answer the questions in as much detail as possible.**
3. **Return your responses and the signed consent form to me via email.**

Your participation will greatly contribute to understanding and enhancing the air cargo sector in Oman.

Thank you for your time and valuable input. I look forward to your response.

Best regards,

Sumaiya Al Nabhani
DBA Student, University of Strathclyde

Email: sumaiya.al-nabhnai@strath.ac.uk
Phone: +968 94035531

Appendix 4: Interviews Questions

"Exploring Strategies for Revitalizing Air Cargo Sector in The Sultanate of Oman: The Impact of Stakeholder Alignment and Inter-sectoral Collaboration on the Development of Oman's Air Cargo Sector."

Interview

Purpose of the Interview

Thank you for agreeing to participate in this interview. My name is Sumaiya Al Nabhani, and I am a DBA student at the University of Strathclyde. This interview is part of the data collection process for my thesis, which focuses on exploring strategies for revitalizing the air cargo sector in the Sultanate of Oman. Specifically, the thesis is titled **"Exploring Strategies for Revitalizing Air Cargo Sector in The Sultanate of Oman: The Impact of Stakeholder Alignment and Inter-sectoral Collaboration on the Development of Oman's Air Cargo Sector."**

The purpose of this discussion is to gather detailed insights on the current state and future prospects of Oman's air cargo sector. Your valuable experience and expertise will contribute significantly to this research, providing a comprehensive understanding of the various factors affecting the performance and growth of the air cargo sector in Oman. The insights gained from this interview will help inform recommendations and strategies for revitalizing the sector, ensuring its sustainable development and global competitiveness.

Confidentiality

Please be assured that all information provided during this interview will be treated with strict confidentiality. The data collected will be used solely for academic purposes, and any identifying information will be anonymized to protect your privacy.

Interview Structure

The interview is structured around three main objectives:

1. Identifying and analyzing the key factors affecting the performance of Oman's air cargo sector.
2. Evaluating the impact of stakeholder alignment and inter-sectoral collaboration on the Efficiency and Growth of Oman's Air Cargo Sector.
3. Proposing actionable strategies for enhancing the sector's competitiveness, with a focus on best practices and stakeholder and inter- sectoral collaboration.

Each section contains specific questions designed to elicit detailed responses. Feel free to elaborate on your answers and provide examples where applicable. Your comprehensive responses are highly appreciated.

Duration

The interview is expected to take approximately 30-45 minutes. However, please feel free to take your time to ensure thorough and thoughtful responses.

Interview Questions

Objective 1: Identify and analyze the key factors affecting the performance of Oman's air cargo sector.

Research Questions:

- What are the main challenges currently facing Oman's air cargo sector?
- What opportunities exist for improving the sector's performance?

Interview Questions:

1. **Challenges**:
    - What do you consider to be the primary challenges facing Oman's air cargo sector today?
    - How do regulatory barriers impact the sector's performance?

- Can you describe any operational inefficiencies that you have observed within the sector?
- What role does infrastructure play in the current performance of Oman's air cargo sector?

2. **Opportunities**:
    - What opportunities do you see for enhancing the performance of Oman's air cargo sector?
    - How can the sector leverage Oman’s geographic location to improve its global reach?
    - What technological advancements do you believe could benefit the air cargo sector in Oman?
    - Are there any specific market segments or industries that Oman should target to boost air cargo volumes?

Objective 2: Evaluate the impact on stakeholder alignment and inter-sectoral collaboration in Oman's air cargo sector.

Research Questions:

- How aligned are the stakeholders within the Omani air cargo sector?
- What role does inter-sectoral collaboration play in the sector’s performance?
- How can better alignment and collaboration be fostered among stakeholders?

Interview Questions:

1. **Stakeholder Alignment**:
    - Who are the key stakeholders in Oman's air cargo sector? Please define them.
    - How would you describe the current level of alignment among stakeholders in the Omani air cargo sector?
    - What are the key areas of agreement and disagreement among stakeholders?

- How do you think misalignment among stakeholders affects the sector's performance?

2. **Inter-sectoral Collaboration**:
    - Can you provide examples of successful inter-sectoral collaboration in the Omani air cargo sector?
    - What are the main barriers to effective collaboration between different sectors involved in air cargo?
    - How important is inter-sectoral collaboration for the success of Oman's air cargo sector?
3. **Improving Alignment and Collaboration**:
    - What strategies do you suggest to improve alignment among stakeholders in the air cargo sector?
    - How can different sectors (e.g., government, private, logistics) better collaborate to enhance the air cargo sector's performance?
    - What role can the government play in fostering better collaboration and alignment among stakeholders?

Objective 3: Propose actionable strategies for enhancing the sector's competitiveness.

Research Questions:

- What global best practices can be adopted by Oman to enhance its air cargo sector?
- What specific strategies can be implemented to increase the sector's competitiveness?
- How can stakeholder alignment and inter-sectoral collaboration contribute to enhancing the sector's competitiveness?

Interview Questions:

1. **Global Best Practices**:

- Which global air cargo hubs do you consider to be the best examples of efficiency and effectiveness?
- What specific practices from these hubs do you believe could be successfully implemented in Oman?
- How have other countries addressed similar challenges faced by Oman's air cargo sector?

2. **Strategic Implementation**:
    - What specific strategies would you recommend to enhance the competitiveness of Oman's air cargo sector?
    - How can Oman improve its infrastructure to support the growth of the air cargo sector?
    - What role should technology play in enhancing the sector's competitiveness?
    - How can Oman attract more international cargo traffic and partnerships?
3. **Stakeholder Alignment and Inter-sectoral Collaboration**:
    - How can improved alignment and collaboration among stakeholders enhance the sector's competitiveness?
    - What strategies would you suggest to foster better alignment and collaboration among stakeholders and sectors?

Thank you again for your participation. Your insights are invaluable to this research and will contribute significantly to understanding and enhancing Oman's air cargo sector.

Appendix 5 : interviews Consent Form

Participant Consent Form

Research Project Title: Exploring Strategies for Revitalizing the Air Cargo Sector in the Sultanate of Oman

Researcher: Sumaiya Al Nabhani, 4th Year Doctor of Business Administration (DBA) Student, University of Strathclyde, Glasgow

Purpose of the Study: This research aims to identify and analyze strategies for revitalizing the air cargo sector in the Sultanate of Oman. Through in-depth interviews with industry experts, this study seeks to understand the challenges, opportunities, and strategic approaches within the sector.

What Participation Involves: If you agree to participate in this study, you will be asked to engage in an in-depth interview covering a range of topics relevant to the air cargo sector in Oman. The interview is expected to take approximately 30-45 minutes. With your permission, the interview will be recorded to ensure accuracy in capturing your insights.

Confidentiality: Your responses will be kept confidential. All data collected during this study will be anonymized before analysis, ensuring that your identity is not disclosed in any reports or publications resulting from this research.

Voluntary Participation: Your participation in this study is entirely voluntary. You are free to withdraw at any time without any penalty or loss of benefits to which you are otherwise entitled.

Data Use: The information you provide will be used solely for academic purposes, including analysis, discussion in my DBA thesis, and potential publication in academic journals. Recordings and transcripts will be stored securely and will only be accessible by the research team.

Consent to Record: By signing this consent form, you are agreeing that the interview may be recorded for the purposes of accuracy in transcription and analysis. You understand that all precautions will be taken to maintain your confidentiality.

Contact Information: If you have any questions or concerns about the research, please feel free to contact me at sumaiya.al-nabhani@strath.ac.uk.

Agreement:

I have read the information provided above and have had the opportunity to ask questions about the study. I understand what is being asked of me as a participant in this study. I hereby consent to participate in this research project and agree to the conditions laid out in this consent form.

Participant's Name: _____

Participant's Signature: _____

Date: _____

Researcher's Signature (optional): _____

Date: _____

Appendix 6: Initial interviewees list

	Organization	**Sector**	**Sent**	**Respond**
1	TRANSOM	Ground Handling	Sent	
2	Ministry of Transport	Logistics	Sent	
3	Port of Salalah	Logistics	Sent	
4	FDO	Fisheries	Sent	
5	SATS OMAN	Cargo Handling	Sent	
6	Visit Oman	Tourism	Sent	
7	Oman Airports	Airport	Sent	
8	Oman Airports	Airport	Sent	
9	Oman Airports	Airport	Sent	
10	CAA	Regulatory	Sent	
11	CAA	Regulatory	Sent	
12	M of Transport	Logistics	Sent	
13	Asyad	Logistics/ industrial freezones	Sent	

14	Khazaen dry port	Industrial	Sent	
15	Oman Air sats	Cargo handling	Sent	
16	Tamkeen	Agriculture	Sent	
17	Omran Agri	Agriculture	Sent	
18	Oman Vision	Oman vision 2040	Sent	
19	Oman Airports	Airport	Sent	
20	Oman Aviation group	Aviation	Sent	Apologized
21	OPAZ	Freezones	Sent	
22	EthKaa	Technology	Sent	

Appendix 7: Interviews Respondents list

	Organization	**Sector**	**Sent**	**Respond**
1	TRANSOM	Ground Handling	Sent	
2	Ministry of Transport	Logistics	Sent	
3	FDO	Fisheries	Sent	
4	Visit Oman	Tourism	Sent	
5	Oman Airports	Airport	Sent	
6	Oman Airports	Airport	Sent	
7	CAA	Regulatory	Sent	
8	CAA	Regulatory	Sent	
9	Asyad	Logistics/ industrial freezones	Sent	
10	Oman Air sats	Cargo handling	Sent	

11	Omran Agri	Agriculture	Sent	
12	Oman Vision	Oman vision 2040	Sent	
13	Oman Airports	Airport	Sent	
14	OPAZ	freezones	Sent	
15	EthKaa	Technology	Sent	

Appendix 8: Sorted Thematic Interview Matrix (Organized by Themes)

Theme	Sub-theme	Participant ID	Comment
Key Factors Affecting Performance	Connectivity and Limited Carrier Options	P3	"Oman is mostly connected via one carrier, limiting access to transit volumes compared to recognized regional hubs."
Key Factors Affecting Performance	Connectivity and Limited Carrier Options	P5	"Limited air cargo connectivity due to the downsizing of Oman Air network."
Key Factors Affecting Performance	Connectivity and Limited Carrier Options	P14	"Oman is connected mostly via one national carrier; better connectivity is available through regional hubs."

Key Factors Affecting Performance	Connectivity and Limited Carrier Options	P12	"The East African market needs to be focused on for air cargo connectivity between Africa and Europe."
Key Factors Affecting Performance	Connectivity and Limited Carrier Options	P1	"We are at a disadvantage compared to our neighboring hubs due to limited air cargo routes."
Key Factors Affecting Performance	Customs and Clearance Delays	P14	High cargo inspection rates and complex clearance processes make Omani terminals less attractive.
Key Factors Affecting Performance	Customs and Clearance Delays	P14	"High inspection rates on air cargo are a bottleneck, affecting attractiveness of Omani terminals."
Key Factors Affecting Performance	Customs and Clearance Delays	P5	"While I don't see major regulatory barriers, the clearance process

			could be more streamlined."
Key Factors Affecting Performance	Customs and Clearance Delays	P13	"Outdated export regulations create inefficiencies and increase costs for exporters."
Key Factors Affecting Performance	Infrastructure Gaps	P6	Despite good facilities, cold storage and dedicated terminals are lacking, limiting capacity for perishable goods.
Key Factors Affecting Performance	Limited Market Demand	P14	Insufficient local demand makes it hard to justify carrier investment in Oman.
Key Factors Affecting Performance	Operational Inefficiencies	P13	Traditional fishing methods and logistics delays increase costs and reduce competitiveness in fish exports.

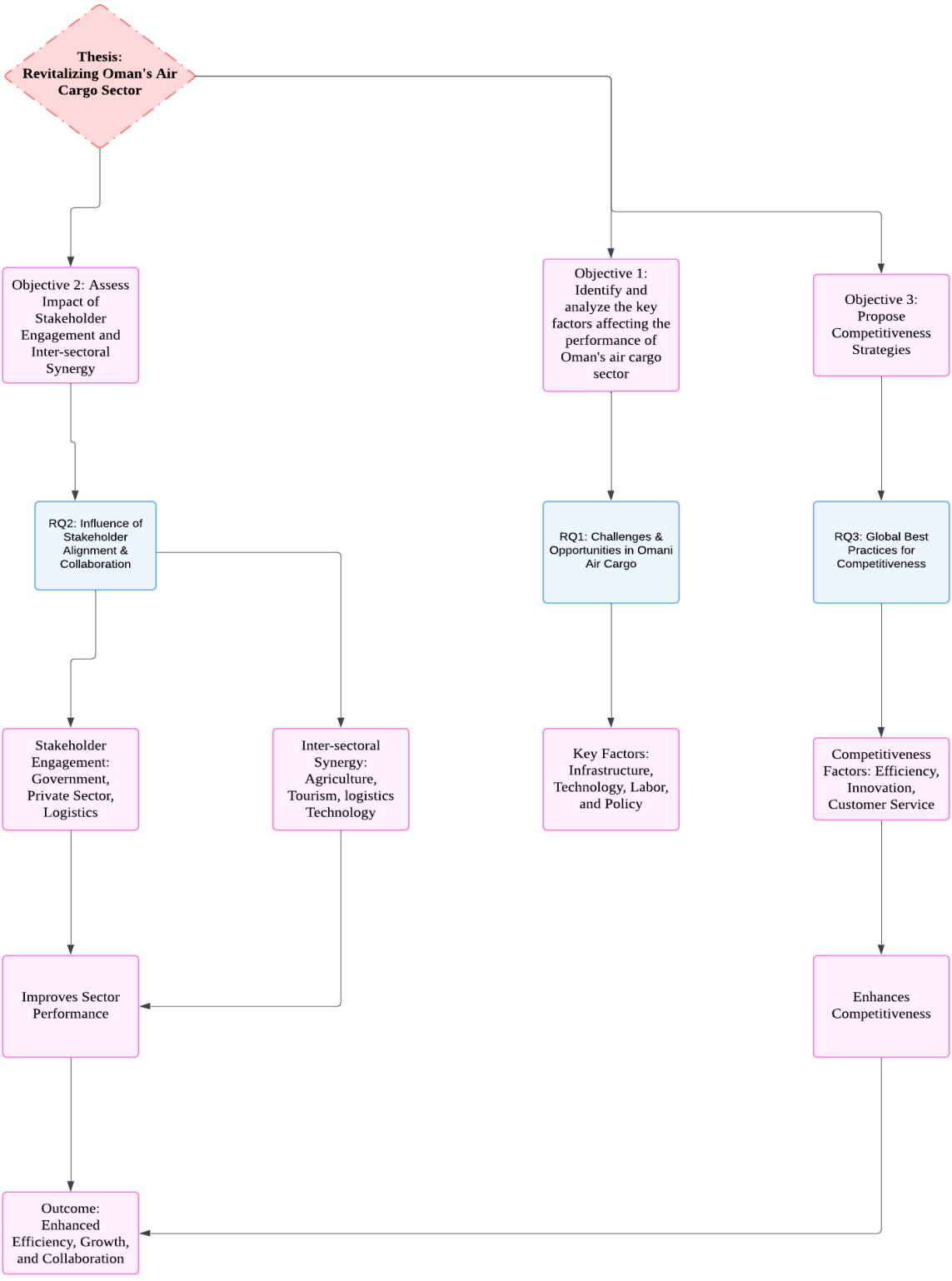
Stakeholder Alignment and Collaboration	Areas of Agreement	P9	Stakeholders generally agree on infrastructure upgrades and the potential of e-commerce.
Stakeholder Alignment and Collaboration	Areas of Disagreement	P9	Disagreements occur over regulatory responsibilities, investment priorities, and cost sharing.
Stakeholder Alignment and Collaboration	Barriers to Collaboration	P6	Silo mentality, conflicting goals, and lack of data integration prevent effective collaboration.
Stakeholder Alignment and Collaboration	Barriers to Collaboration	P6	“Silo thinking and conflicting objectives hinder sector collaboration.”
Stakeholder Alignment and Collaboration	Barriers to Collaboration	P13	“Diverse priorities and regulatory inconsistencies obstruct collaboration.”

Stakeholder Alignment and Collaboration	Current Level of Alignment	P12	There is alignment in vision but not in shared KPIs or goals— collaboration lacks governance and consistency.
Stakeholder Alignment and Collaboration	Current Level of Alignment	P7	"Not aligned at all. No committee is responsible for boosting air cargo business."
Stakeholder Alignment and Collaboration	Current Level of Alignment	P12	"Alignment exists in vision but shared KPIs and execution mechanisms are lacking."
Stakeholder Alignment and Collaboration	Improvement Strategies	P15	Formal governance, shared KPIs, and consistent follow-up are needed for effective stakeholder collaboration.
Strategies and Global Best Practices	Cold Chain and Sector-Specific Infrastructure	P13	Investing in modern processing plants and cold chain infrastructure is key

			for quality assurance.
Strategies and Global Best Practices	Digital Logistics Platforms	P14	Integrated digital portals for cargo booking and tracking can enhance efficiency and transparency.
Strategies and Global Best Practices	Export Market Focus	P11	Fisheries and agriculture should be prioritized with targeted air cargo strategies and export KPIs.
Strategies and Global Best Practices	Export Market Focus	P11	“Fisheries and agriculture have the potential to be high-yield export sectors if supported by air cargo.”
Strategies and Global Best Practices	Export Market Focus	P13	“Premium fish products can compete globally if logistics and handling infrastructure are strengthened.”

Strategies and Global Best Practices	Learning from Global Hubs	P12	We should learn from hubs like Singapore and Dubai—adopt their models for connectivity and transshipment.
Strategies and Global Best Practices	Learning from Global Hubs	P6	"Hubs like Schiphol, Singapore, and Dubai offer lessons in integrated cold chains and customs efficiency."
Strategies and Global Best Practices	Learning from Global Hubs	P15	"We should study how Singapore and Dubai became hubs and adapt similar strategies for Oman."
Strategies and Global Best Practices	Multimodal Transport	P6	Connecting ports with air logistics via bonded corridors can position Oman as a regional hub.

Appendix 9: Thesis diagram


Thesis: Revitalizing Oman's Air Cargo Sector
Objective 2: Assess Impact of Stakeholder Engagement and Inter-sectoral Synergy
Objective 1: Identify and analyze the key factors affecting the performance of Oman's air cargo sector
Objective 3: Propose Competitiveness Strategies
RQ2: Influence of Stakeholder Alignment & Collaboration
RQ1: Challenges & Opportunities in Omani Air Cargo
RQ3: Global Best Practices for Competitiveness
Stakeholder Engagement: Government, Private Sector, Logistics
Inter-sectoral Synergy: Agriculture, Tourism, logistics Technology
Key Factors: Infrastructure, Technology, Labor, and Policy
Competitiveness Factors: Efficiency, Innovation, Customer Service
Improves Sector Performance
Enhances Competitiveness
Outcome: Enhanced Efficiency, Growth, and Collaboration

Appendix 10: Glossary of Key Terms

Air Cargo:

The transportation of goods by aircraft, typically used for time-sensitive and high-value shipments.

Bayan System:

Oman's national customs clearance platform designed to facilitate and streamline import-export processes.

CDM (Collaborative Decision Making):

A governance model that involves all relevant stakeholders in the decision-making process to improve logistics efficiency.

Cold Chain Logistics:

A temperature-controlled supply chain essential for transporting perishables and pharmaceuticals.

Digital Transformation:

The integration of digital technologies such as blockchain, IoT, and AI into cargo operations to enhance efficiency and transparency.

Free Zone:

A designated area within a country where goods can be imported, stored, and exported with preferential regulatory and tax treatment.

Freight Forwarder:

A company that organizes shipments for individuals or corporations to get goods from the manufacturer to a market or final point of distribution.

GDP-compliant (Good Distribution Practice):

Standards ensuring that pharmaceutical products are consistently stored, transported, and handled under suitable conditions.

IATA (International Air Transport Association):

A trade association representing the world's airlines, responsible for supporting aviation standards and advocacy.

Inter-sectoral Collaboration:

Coordination between different industries, such as aviation, logistics, agriculture, and technology, to improve air cargo performance.

IoT (Internet of Things):

A network of physical devices embedded with sensors and software to collect and exchange data, used in smart cargo tracking.

Multimodal Logistics:

The use of more than one mode of transport—such as sea, air, and road—in a coordinated supply chain.

Oman Vision 2040:

The Sultanate of Oman's long-term strategic plan focused on economic diversification, sustainability, and innovation.

Regulatory Efficiency:

The streamlining of legal and procedural frameworks to facilitate faster and more predictable cargo handling.

SAF (Sustainable Aviation Fuel):

A cleaner substitute for conventional jet fuel derived from sustainable resources, used to reduce the carbon footprint of aviation.

Stakeholder Engagement:

The process of involving individuals, groups, or organizations that may affect or be affected by decisions within the air cargo sector.

Appendix 11: Quotes from Participants Categorized by Theme

P1:

◆ Theme 1: Challenges in Oman's Air Cargo Sector

- "Oman's air cargo sector faces several significant challenges, including intense market competition from regional hubs like Dubai and Doha, which have advanced infrastructure and services."
- "Regulatory barriers significantly impact the performance... complex customs procedures... could benefit from improvements to become more flexible and efficient."
- "Bureaucratic red tape remains a challenge, particularly in the procedural aspects, which require further development."
- "Operational inefficiencies include lack of effective coordination and communication among stakeholders, reliance on outdated technology, and limited adoption of automation."

◆ Theme 2: Opportunities for Growth

- "Opportunities for enhancing Oman's air cargo sector include several interconnected strategies… forming strategic partnerships with global logistics companies… developing free trade zones… embracing digital solutions… investing in training and development."
- "Oman's strategic location at the crossroads of East and West offers significant potential for establishing a strategic air cargo hub."
- "Expanding and enhancing free zones near major airports can provide incentives for businesses to use Oman's facilities."
- "Oman should target the rapidly growing e-commerce sector, the pharmaceutical and healthcare products industry, perishables and fresh produce."

◆ Theme 3: Stakeholder Alignment

- "The current level of alignment is moderate... better harmonization of policies and procedures is required."

- “Stakeholders generally agree on the importance of strengthening the entire supply chain, particularly the cold chain.”
- “Disagreements exist regarding the pace of modernization, cost-sharing for investments, regulatory requirements, resource allocation, and strategic priorities.”
- “Misalignment among stakeholders… leads to operational inefficiencies, increased costs, customer dissatisfaction, and limited growth.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Barriers include the lack of a unified strategic vision… regulatory and policy differences… technological disparities… entities often work in isolation even when they share a common vision.”
- “Inter-sectoral collaboration is crucial for enhanced efficiency, productivity, service quality, innovation, regulatory compliance and economic growth.”
- “Strategies include establishing a central coordinating body… improving communication channels… aligning with Oman Vision 2040.”
- “Establishing PPP frameworks… leveraging international best practices… streamlining processes and documentation.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Examples include Hong Kong, Memphis, Incheon, Dubai, Changi, and Frankfurt.”
- “Frankfurt… integrated logistics solutions that connect air, sea, and land.”
- “Dubai… state-of-the-art cargo facilities with advanced automation… Jebel Ali Free Zone offers tax incentives and streamlined regulatory processes.”
- “To enhance competitiveness… adopt advanced technologies like automated handling systems… develop logistics parks and free zones… simplify customs procedures… foster PPPs.”
- “Technology should play a pivotal role… automation and robotics… real-time tracking… green technologies for sustainability.”

Quotes from P2 Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- "Lack freight capacity: limited air freighters connectivity and aircraft belly capacity."
- "Limited coordination between ecosystem players."
- "Limited goods available for air cargo exports."
- "Limited incentives for global players to establish regional distribution centers… making Oman less competitive."
- "Some facilities are underutilized due to low demand (e.g., SLL cargo facility)."

◆ **Theme 2: Opportunities for Growth**

- "Better coordination through establishing a clear ecosystem governance."
- "Air cargo demand stimulation through freezones, attracting regional distribution centers, promoting eCommerce for Omani businesses, and incentivizing agricultural and fisheries export."
- "Develop a clear value proposition for regional distribution centers based on Oman's proximity not only to GCC markets but with East Africa and Yemen."
- "Activate airport free zone and develop a competitive value proposition."
- "Promote eCommerce locally to grow air cargo exports."
- "Grow agricultural and fisheries exports."
- "Target oil and gas spare parts, fisheries, fruit and vegetables, and pharma."

◆ **Theme 3: Stakeholder Alignment**

- "Scattered / limited alignment."
- "Current alignment among stakeholders is ad-hoc, unstructured, limited."
- "Agreement: low demand is the key challenge facing the sector."

- “Disagreement: who should take the lead on the effort to develop and stimulate the sector.”
- “Misalignment leads to underutilized capacity and low demand.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Inter-sectoral collaboration is crucial to ensure generating demand and promoting the sector while ensuring operational efficiency.”
- “Sea-air pilot in SLL was successful operationally. However the volumes are still low.”
- “Collaboration to move medical supplies from China and other countries during the pandemic.”
- “Lack of structured approach and unified strategy to stimulate demand.”
- “Crucial as the demand is generated mostly from adjacent sectors and rarely from aviation sector.”
- “Ensure clear sector governance, unified strategy, continuous communication.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Digitize the sector and connect Omani suppliers to the targeted markets’ marketplaces.”
- “Boost fisheries and agricultural exports.”
- “Promote eCommerce to Omani businesses to increase air cargo volumes.”
- “Aligning efforts to attract regional distribution centers and boost air cargo exports.”
- “Dubai International Airport – integration with sea port and free zones.”
- “Infrastructure is sufficient for the short and medium term.”
- “Technology should connect local suppliers with international markets.”
- “Established freezones and attract international partners.”

 Quotes from P3 Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- "Diversification of industries."
- "Availability of economical volumes."
- "Connectivity."
- "Partnership and alliances."
- "Competition and pricing."
- "It might impact the market access." *(regulatory barriers)*
- "Create delays in releasing goods."
- "Impact FDI."
- "Reduce investors' appetite."
- "Limited direct route."
- "Handling inefficiencies especially by the governmental sectors (i.e. agricultural, fisheries, etc..)"
- "Coordination between customs and operator might create a bottleneck."
- "Lack of adequate space."
- "Coordination between other governmental authorities (i.e. Municipality, Ministry of health) and operator."

◆ **Theme 2: Opportunities for Growth**

- "State of art facilities requires technology and accommodating regulation."
- "Sustainability approaches that focus on reducing the carbon footprint of cargo operations."
- "Diversification in operation: cold chain logistics, perishables, pharmaceutical, gold and jewellery."

- “Promote Oman as a transshipment hub.”
- “Focus on tourism, manufacturing, agriculture and fisheries, and e-commerce industries.”
- “R&D.”
- “Strategic location and political stability.”
- “Infrastructure and free zones.”
- “Become a regional hub for transshipments.”
- “Link with free zones; promote intermodal connectivity (roads, rail, sea).”
- “AI, Automation, Smart contracting, Drones.”
- “Target healthcare and pharmaceutical, e-commerce, perishables, gold and jewellery.”

◆ **Theme 3: Stakeholder Alignment**

- “Key stakeholders are: Omani government, Oman Airports, Oman Air, logistics companies, freight forwarders, international shipping partners.”
- “Stakeholders work towards Vision 2040, expanding capacity, aligning with growth and connectivity.”
- “Their alignment depends on the level of support from government policies.”
- “Agreements: availability of infrastructure, technology and cybersecurity, skilled workforce, training and automation, green initiatives.”
- “Disagreements: regulatory/customs flexibility, connectivity/trade policy, sustainability cost-benefit, facilities cost.”
- “Misalignment will create a wide-ranging of negative impacts on operational efficiency, costs, infrastructure development, regulatory compliance, technological advancement, market competitiveness, customer satisfaction, environmental sustainability, and long-term strategic planning.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “The inter-sectoral collaboration helps in achieving significant improvements in efficiency, capacity, and competitiveness.”
- “Barriers: regulatory reforms, infrastructure investment, communication gaps, trust, misalignment of strategic goals.”
- “Strategies: create a focal point for coordination, harmonize regulations, partnerships and alliances, tech integration, human capital, legal frameworks.”
- “Foster a platform for proper communication.”
- “Unify the vision and facilitate the mission.”
- “Incentive programs, trade facilitation.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Best practices: multimodal connectivity, market diversification, automation and digitalization, alliances, green initiatives.”
- “Regulatory harmonization.”
- “Create a hub for transshipment.”
- “Operation diversification (e-commerce, value-added services).”
- “Capitalize on existing opportunities (free zones, ports, transport).”
- “Automation and Robotics, AI, automated surveillance, digital platforms, IoT, cloud computing.”
- “E-learning platforms.”
- “Enhance connectivity.”
- “Industrial diversification to increase exports.”
- “Adopt multimodal connectivity.”
- “Strategic planning, consistent policy, coordinated investment, integrated systems and standardized procedures.”

□ Quotes from P4 Categorized by Theme

◆ Theme 1: Challenges in Oman's Air Cargo Sector

- "Infrastructure limitations are a significant concern… facilities, including warehousing and logistics infrastructure, are not sufficient to meet potential demands."
- "Operational limitations… lack of advanced technology, standardized procedures, and effective coordination among stakeholders."
- "The sector suffers from a lack of Foreign Direct Investment (FDI)… hampers the sector's ability to grow."
- "Absence of clear incentives to attract investment and innovation."
- "Regulatory barriers… stringent customs procedures, complex compliance requirements, and inconsistent regulations."
- "Salalah Airport's state-of-the-art cargo terminal remains underutilized."
- "Fragmented and inefficient cargo data handling… absence of advanced tracking and management systems."
- "Inconsistent standard operating procedures across facilities."
- "Underutilized infrastructure despite state-of-the-art facilities."

◆ Theme 2: Opportunities for Growth

- "Strategic partnerships with leading international airlines… increase cargo traffic."
- "Regional collaboration with neighboring countries… create a regional air cargo hub."
- "Specialized services for perishable goods, pharmaceuticals, and high-value items."
- "Integrating ports, free zones, and air cargo facilities… creating a seamless logistics network."
- "Utilize Oman's strategic location as a gateway between Asia, Africa, and Europe."
- "Developing integrated logistics centers… attract international businesses."

- “Exporting fish to Japan and Saudi Arabia… fruits and vegetables to Europe during winter.”
- “Significant opportunity to supply fresh produce to European markets.”

◆ **Theme 3: Stakeholder Alignment**

- “Current level of alignment… characterized by insufficient communication and a tendency for different parties to blame each other.”
- “Lack of cohesive strategy and coordination among airlines, airports, government agencies, customs authorities, freight forwarders.”
- “Shared recognition of Oman’s strategic geographic location.”
- “Consensus on modernizing and expanding air cargo facilities.”
- “Agreement on adopting technological solutions: automation, AI, blockchain.”
- “Disputes over financial responsibility… delay essential upgrades.”
- “Disagreement over whether to prioritize infrastructure, technology, or market development.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Oman Sea-to-Air project… successful example of collaboration.”
- “Integration of Port of Salalah, Maersk, and Oman Airports/Transom.”
- “Barriers: ineffective communication, siloed operations, insufficient cargo volumes.”
- “High operational costs and disagreements over who should bear them.”
- “Collaboration facilitates efficient communication, streamlined operations, and optimal resource allocation.”
- “Inter-sectoral collaboration ensures stakeholders work together towards common goals.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Incheon International Airport… efficiency, automation, and temperature-controlled storage.”
- “Dubai International Airport and Al Maktoum International Airport… infrastructure investment, logistics technology, and seamless connectivity.”
- “Singapore… Changi Airfreight Centre, streamlined customs, PPPs.”
- “Netherlands… ‘Smart Cargo Mainport Program’, digital innovation.”
- “Recommendations: expand flight networks, develop integrated hubs, foster PPPs.”
- “Provide financial incentives (e.g. subsidies, tax breaks), invest in workforce training.”
- “Implement advanced tracking, data-sharing, integrated platforms.”
- “Use drones and IoT for last-mile and surveillance.”
- “Establish central coordinating body or task force… implement standardized communication protocols.”
- “Encourage cross-sector innovation projects and shared performance metrics.”

□ Quotes from P5 Categorized by Theme

◆ Theme 1: Challenges in Oman's Air Cargo Sector

- “Limited air cargo connectivity due to the downsizing of Oman Air’s network.”
- “The captive market in Oman for air cargo is still relatively small.”
- “No major player in e-commerce has established a hub in Oman so far.”
- “Our infrastructure (Muscat and Salalah) is state of art and it’s underutilized to great extent.”
- “An example: the air cargo terminal utilized capacity is around 50%.”

◆ Theme 2: Opportunities for Growth

- “Reconsider the downsizing plan of Oman Air… improving air cargo capacity and network.”

- “Anchor some players in e-commerce to set up distribution hubs in Oman.”
- “Get more full-freighter operators to add Oman to their network.”
- “More connections and competitive freight charges will be available.”
- “Location factor is leveraged when we have a decent number of airlines having daily flights from our airports.”
- “Enhance network to capture a bigger share from the direct/transit passenger volumes.”
- “Using the latest technology to speed up the process and use AI tools to improve the sector.”
- “Target e-commerce (Shein, Noon, Amazon) and pharmaceutical distribution centers.”

◆ **Theme 3: Stakeholder Alignment**

- “Stakeholders: CAA, Oman Airports, Oman Air, Salam Air, ROP (security, immigration, customs), Ministries, Oman SATS, Transom, DHL, Aramex, Asyad Express, Ministry of Transport.”
- “Current level of alignment: reasonable.”
- “Misalignment… could create ambiguity for customers, cause delay in process and impact overall competitiveness.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Example: Oman SATS and the One Stop Shop of government entities involved in cargo clearance.”
- “Barriers: outdated procedures that some stakeholders insist on keeping; silo thinking; absence of common vision.”
- “All stakeholders need to understand and realize the target of the sector and how it’s linked to Oman Vision 2040.”
- “Collaboration should focus on streamlining the process, digitizing, and offering agile processes… not less than what is offered in the main air cargo airports in the region.”

- “Government shall ensure all stakeholders share the same vision and benchmark procedures in line with best practices.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Benchmark hubs: Emirates, Hong Kong, Shanghai, Amsterdam, Frankfurt.”
- “Practices to implement: advanced tracking systems and streamlined cargo handling and clearance.”
- “Use Air Cargo Community System.”
- “Strategies: streamline cargo clearance and customs; build more local capacities to boost air export.”
- “Ensure airport infrastructure is modern… robust inland connectivity and terminals.”
- “Technology shall be benchmarked against international best practices.”
- “Foster partnerships with major airlines and logistics companies.”
- “Set up shared annual KPIs to measure collaboration performance.

 Quotes from P6 Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- “Limited cargo volume: Compared to other regional hubs, Oman handles relatively low cargo volumes, limiting economies of scale.”
- “Complex customs procedures: Lengthy clearance times and cumbersome documentation requirements can lead to delays and increased costs.”
- “Ambiguous or outdated regulations can create uncertainty and hinder business operations.”
- “Real-time cargo tracking and visibility... potential capacity constraints in warehousing and storage... areas where technology could be more optimally applied.”
- “Infrastructure optimization: potential for further optimization of cargo handling facilities, cold storage, and related infrastructure.”

- “Lack of skilled manpower… impacting operational efficiency.”

◆ **Theme 2: Opportunities for Growth**

- “E-commerce growth: Leveraging the increasing popularity of online shopping can boost cargo volumes.”
- “Specialized cargo: pharmaceuticals, perishables, and high-value goods.”
- “Regional hub development: Positioning Oman as a regional air cargo hub can attract transit traffic.”
- “Accelerating Free Zone projects and activities… stimulating cargo flows.”
- “Enhancing logistic gates and attracting major logistics couriers.”
- “Targeting high-value goods, perishables (seafood, meat, fresh produce), and e-commerce-related products.”

◆ **Theme 3: Stakeholder Alignment**

- “There is a general consensus on the importance of developing Oman's air cargo sector, but the level of alignment among stakeholders varies.”
- “Government agencies… growing recognition of the sector's potential, but coordination and collaboration among departments could be strengthened.”
- “Competition among various stakeholders can sometimes hinder collaboration.”
- “Disagreements: prioritization of different market segments; appropriate level of government intervention; cost vs service quality; distribution of benefits.”
- “Misalignment among stakeholders can lead to policy inconsistencies, inefficient resource allocation, delayed decision-making, reduced investor confidence, and suboptimal performance.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Development of the National Aviation Strategy 2040… exemplifies successful inter-sectoral collaboration.”

- “Silo mentality… limited information sharing and coordination.”
- “Competing priorities… conflicting objectives and priorities.”
- “Inter-sectoral collaboration can optimize resources, reduce costs, enhance competitiveness, improve service quality, and accelerate growth.”
- “Government plays a pivotal role… clear policy, incentives, capacity building, data sharing, dispute resolution, strategic vision.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Hong Kong, Singapore, Dubai, Amsterdam, Memphis… best practices in efficiency, infrastructure, and operations.”
- “Recommendations: invest in terminals, cold storage, efficient ground systems; adopt advanced handling systems, automation, data analytics.”
- “Customer-centricity, PPPs, skilled workforce development, regulatory reform.”
- “Oman should expand air connectivity, offer specialized logistics services, promote internationally.”
- “Adopt blockchain, AI, IoT, and digital tracking systems to enhance transparency and performance.”
- “Airport city development, incentive packages for logistics players, integration with global trade routes.”
- “Establish a Strategy Management Office (SMO) and joint stakeholder task forces.”

 Participant 7 (P7) – Categorized by Theme

◆ **Theme 1: Challenges**

- “The main challenge is absence of good outbound volume.”
- “Absence of good network to attract transit business.”
- “Not enough business volume.”

- “A look is required to make bayan clearance quicker, simpler and efficient.”
- “I don’t see a significant role [for infrastructure] except for cold chain products.”

◆ **Theme 2: Opportunities**

- “Only building some local business like agriculture and fisheries.”
- “Attracting neighboring business that have some restriction like Iran or Pakistan.”

◆ **Theme 3: Stakeholder Alignment**

- “Not aligned at all. No committee till date responsible for boosting air cargo business.”
- “Zero alignment.”
- “A lot [of negative impact], as no one taking initiative and step to build air cargo business.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “A significant role as each entity should avoid anything that might impact the business.”
- “Barriers will be resolved as long as a clear responsibility is handed over.”
- “Establishing an ownership for boosting air cargo business.”

◆ **Theme 5: Strategic Recommendations**

- “Establish ownership of air cargo business.”
- “Establish committees.”
- “Establish product-wise KPIs for industries like fish, agriculture.”
- “HKG and SIN are best examples… need to understand their products.”
- “Infra is not a key challenge… can be resolved in short time.”

 Participant 8 (P8) – Categorized by Theme

◆ **Theme 1: Challenges**

- “Cost, lack of strategic partnership, and intense competition.”
- “Cargo handling and warehousing infrastructure in Oman.”
- “Local market is very small.”
- “No clear law for cargo sector.”
- “Unclear roles between different entities like Asyad and Oman Airports.”

◆ **Theme 2: Opportunities**

- “Strategic partnerships will allow operators to bring cargo lines.”
- “Oman’s relaxed investment law will boost investment.”
- “Activate bounded corridors between airport areas and free zones.”
- “Fishery sector can lead the air cargo industry.”

◆ **Theme 3: Stakeholder Alignment**

- “Oman Airport company, Asyad, CAA, MOTC, Ministry of Justice.”
- “Need sector strategy, framework, and governance.”
- “Agreement on activating the sector.”
- “Disagreement on incentives, protection of local businesses, infrastructure priority.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “E-commerce and medicine sector products are good examples.”
- “Jewelry industry is heavily dependent on air cargo.”
- “Need designated air cargo hub and specialized free zones.”
- “Form a steering committee for implementing the logistics strategy.”

◆ **Theme 5: Strategic Recommendations**

- “Free zones with relaxed customs and duties.”

- “Align logistics and industrial strategies.”
- “Develop railways and provide ready real estate solutions.”
- “Use warehousing tech, automation, and supplier-inventory integrations.”
- “Announce air cargo as a national goal.”

□ Participant 9 (P9) – Categorized by Theme

◆ Theme 1: Challenges

- “Limited infrastructure, regulatory barriers, operational inefficiencies.”
- “Competition from neighboring countries.”
- “Outdated tech, insufficient training, and fragmented operations.”

◆ Theme 2: Opportunities

- “Invest in infrastructure, adopt tech, streamline regulation.”
- “Enhance staff training.”
- “Leverage Oman’s geographic location for regional connectivity.”
- “Target e-commerce, pharma, and perishables.”

◆ Theme 3: Stakeholder Alignment

- “Current alignment is moderate.”
- “Agreement: improve infrastructure and adopt technology.”
- “Disagreements on policies and resource allocation.”

◆ Theme 4: Inter-sectoral Collaboration

- “Collaborative initiatives like cargo villages and customs reform.”
- “Barriers include bureaucratic red tape and poor communication.”
- “Create coordinating body, regular meetings, and shared goals.”

◆ **Theme 5: Strategic Recommendations**

- "Singapore, Dubai, and Hong Kong are top benchmarks."
- "Adopt customs tech, PPPs, and smart infrastructure."
- "Real-time tracking, automation, and data-driven decisions."
- "Competitive tariffs and marketing Oman's location to global players."

Participant 10 (P10) – Thematic Breakdown

◆ **Theme 1: Challenges**

- "Political, market competition, logistics synergy/coordination where stakeholders do not work under one clear objective."
- "Lack of experienced leadership that can orchestrate the unified symphony."
- "Customs procedures and regulatory compliance… can be challenging to comprehend/adopt and costly."
- "Labor law… makes it difficult to hire experienced workforce with international exposure."
- "Operational costs remain high… service quality should be improved."
- "Air cargo warehouses in Duqm and Salalah… not fully utilized due to absence of a comprehensive logistics plan."

◆ **Theme 2: Opportunities**

- "Projects in pipeline… manufacturing relevant goods (i.e. fisheries, free zones)."
- "Improve airport connectivity to avoid shipments being trucked by road."
- "Develop national carriers to increase transshipments."
- "Oman has a great location… develop supply chain if stakeholders work together."
- "Valuables, perishables, pharma, electronics, even animals and luxury cars."

- "Automation, cargo tracking, sustainability technologies… most important is integration to support decision making."

◆ **Theme 3: Stakeholder Alignment**

- "3 out of 10: some initiatives exist, but no structured progress."
- "Each stakeholder takes care of its own interest/deliverables."
- "Failure to work together… profound impact on the sector."

◆ **Theme 4: Inter-sectoral Collaboration**

- "Collaboration is instrumental… without it, inefficiencies, resource waste."
- "Structure exists (a unit for follow-up), but lacks KPI and empowered leadership."
- "Each stakeholder has own KPIs and business plan… this creates fragmentation."
- "With OIA, more synergy and alignment have started."

◆ **Theme 5: Strategic Recommendations**

- "High-level, empowered leader reporting directly to Ministers Council or HM."
- "Public-private partnerships needed to bring plans to life."
- "Joint fund to increase sector competitiveness."
- "Benchmark: Hong Kong, Singapore, UAE."
- "Define what value Oman brings and what value partners bring."
- "Technology streamlines business and enhances competitiveness."

 Participant 11 (P11)

◆ **Theme 1: Challenges**

- "Connectivity and the cost associated with it."
- "Due to high prices of direct flights we had to switch to cheaper but longer options."

- “Many bureaucracies associated with each shipment.”
- “High number of papers and authority requests per shipment.”
- “Strong cold chain is important… we use 4kg of ice per air shipment vs 2kg for land cargo.”

◆ **Theme 2: Opportunities**

- “We have good products for export but choose land over air due to lack of connectivity.”
- “Connectivity to major markets with minimal time from production to consumer is crucial.”
- “Traceability and temperature control are vital.”
- “Agriculture and fisheries can yield high results.”
- “Sea-to-air shipments also have potential.”

◆ **Theme 3: Stakeholder Alignment**

- “Stakeholders: ROP, SATS, MOTIC, Oman Airports, freight forwarders, land logistics, airlines.”
- “Alignment can be improved.”
- “Taxes, pricing, and process need to be aligned.”
- “Misalignment increases inefficiencies and delays movement of goods.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Mislignment creates inefficiencies… increases cost to end consumer.”
- “Important to map processes and assign responsibilities.”
- “End-user involvement is very important.”
- “Unified taskforce or committee with all stakeholders and private sector.”
- “Government should lead and offer incentives.”

◆ **Theme 5: Strategic Recommendations**

- “Not acquainted with global benchmarking.”
- “Key is reducing the time from production to consumer.”
- “Technology in traceability and cold chain monitoring is critical.”

 Participant 12 (P12) – Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- “Limited Air Cargo Connectivity… focus on East African market for cargo connectivity between East Africa and Europe.”
- “Export business needs to be elevated… fish market, agricultural exports, airport free zones.”
- “We have the right infrastructure, but we need the right tools, equipment, and connectivity with our national carriers.”
- “There’s been no sustainability or consistency in past initiatives… no single goal.”

◆ **Theme 2: Opportunities for Growth**

- “The connection between East and West is a competitive advantage for Oman and that needs to be leveraged.”
- “The export business needs to be elevated, especially in the fish markets, agriculture, and other exports.”
- “Free zones and airports are key to transshipment operations and that will help elevate the air cargo business.”

◆ **Theme 3: Stakeholder Alignment**

- “The alignment is there, but the shared KPIs are not. There needs to be single goals that everyone works toward.”

- “We need a national aviation strategy with the right governance and KPIs… monitored and followed up.”
- “Penalize or incentivize stakeholders based on shared KPIs.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “There have been some initiatives in the past, like sea-air trials… but there was no sustainability or single goal.”
- “We need the right governance for collaboration.”
- “Governance should include formal strategy, monitoring, and accountability mechanisms.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Singapore… a hub in Asia. Dubai… a big hub. Lufthansa… a leader in Europe.”
- “What matters is having the right tools, equipment, and carriers in terms of connectivity and network.”
- “Transshipment and repackaging like Dubai does – something Oman can learn from.”
- “To attract cargo carriers, Oman must build strong export partnerships with fisheries, agriculture, etc.

 Participant 13 (P13) – Categorized by Theme

(Sector Focus: Fisheries at Salalah Airport)

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- “Limited cold chain infrastructure, inadequate storage facilities at Salalah Airport, and inefficient customs processing delay the export of fresh fish.”
- “Outdated export regulations and quality standards hinder compliance with international markets.”

- “Traditional fishing methods, outdated processing facilities, and inefficient logistics management contribute to inconsistencies in fish quality.”
- “Inadequate infrastructure… significantly affects the quality and volume of fish exports.”

◆ **Theme 2: Opportunities for Growth**

- “Investments in modern processing facilities and advanced cold chain logistics can enhance shelf-life and competitiveness.”
- “Salalah’s strategic location offers a unique opportunity to become a major hub for fish exports to the Middle East, Europe, and beyond.”
- “Technological advancements such as automated sorting and logistics tools can enhance product quality.”
- “Targeting premium markets (Europe and North America) increases export volumes and profitability.”

◆ **Theme 3: Stakeholder Alignment**

- “Key stakeholders include the Ministry of Agriculture, Oman Airports, fish traders, logistics providers, and Oman Air.”
- “There is a need for improved coordination among stakeholders to align their objectives and streamline operations.”
- “Disagreements arise over prioritization of investments and responsibilities.”
- “Misalignment leads to inefficiencies and reduced competitiveness in global markets.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Successful examples include PPPs in infrastructure development and training programs.”
- “Barriers include regulatory constraints, differing stakeholder goals, and logistical challenges.”
- “Collaboration is essential to reduce costs and ensure timely delivery.”

- “Government must set clear policies and provide incentives.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Dubai and Singapore: known for efficient customs, cold chain logistics, and strategic marketing.”
- “Adopt single-window customs clearance, integrated cold chain systems, and unified logistics platforms.”
- “Invest in processing facilities, direct flight routes, and advanced logistics systems.”
- “Use automated systems for sorting and packaging to ensure quality.”
- “Attract international cargo by promoting freshness and increasing flight frequency.”
- “Stakeholder engagement plans and collaborative projects are key for long-term competitiveness.”

 Participant 14 (P14) – Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- “Oman is mostly connected via one carrier, Oman Air… neighboring GCC countries are recognized hubs with more competitive pricing and better connectivity.”
- “Lack of available end-to-end logistics solutions, particularly in cost competitiveness and service visibility.”
- “Insufficient local demand to justify investment by cargo carriers and logistics providers.”
- “High inspection rates—up to 100%—create performance bottlenecks and deter use of Oman as a hub.”
- “Bonded corridors lack regulatory clarity and appear monopolized by specific providers.”
- “No shared bonded warehouses accessible to multiple freight forwarders.”
- “Lack of sector-specific infrastructure like cold chain for pharma and fisheries.”

- “General-purpose warehouses dominate, with little support for high-value goods.”
- “Cargo terminals use the same traffic routes as public transport, leading to congestion risks.”
- “Only Muscat and Salalah airports are used, limiting cargo distribution and scalability.”

◆ **Theme 2: Opportunities for Growth**

- “Treat cargo as a strategic cost center to support other sectors (e.g., manufacturing, tourism).”
- “Invest in routes and business models to support Oman-based carriers and exporters.”
- “Subsidize costs like landing fees and fuel to attract regional and international carriers.”
- “Use trial incentives (3–6 months of low-cost landings) to stimulate interest.”
- “Promote Oman as a transshipment and re-export hub, especially for e-commerce and specialized goods.”
- “Leverage multimodal capabilities—connect sea ports with air cargo via bonded corridors.”
- “Utilize new road links to Saudi Arabia for multimodal cargo flows.”

◆ **Theme 3: Stakeholder Alignment**

- “Lack of shared KPIs among stakeholders; misalignment reduces system efficiency.”
- “Need for formal strategy and governance structure to align airport operators, customs, logistics firms, and ministries.”
- “Bonded warehouse policies are unclear and fragmented; shared facilities could improve collaboration.”

◆ **Theme 4: Inter-sectoral Collaboration**

- “Sea-air potential remains underutilized; requires product and service development to bridge port and airport operations.”

- “Success depends on synchronized execution across sectors—aviation, logistics, customs, and export.”
- “Cold chain terminals should be tailored for agriculture, pharma, and seafood sectors.”
- “Requires unified coordination to create seamless multimodal solutions.”

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- “Benchmark hubs: Dubai, Singapore, Schiphol, Milan, Hong Kong, and Heathrow.”
- “Adopt traceability platforms for real-time tracking.”
- “Create user-friendly portals for shipment planning (speed vs. cost trade-offs).”
- “Automate terminals and build product-specific infrastructure.”
- “Introduce test shipments (e.g., fish) to assess demand over one year before scaling.”
- “Position Oman as a gateway to Saudi Arabia for air cargo via land transport.”

 Participant 15 (P15) – Categorized by Theme

◆ **Theme 1: Challenges in Oman's Air Cargo Sector**

- “Despite the advanced infrastructure, the sector continues to suffer from fragmented governance and the absence of a unified strategic direction.”
- “Our efforts, while sincere, remain largely ad hoc — there is no institutional mechanism to sustain or scale these initiatives.”
- “There is no single authority responsible for the integrated development of air cargo, which hampers long-term progress.”

◆ **Theme 2: Opportunities for Growth**

- “We see tremendous potential for Oman to become a logistics hub, but this requires structured coordination, not isolated actions.”
- “With targeted marketing and stakeholder alignment, Oman can position itself strongly in regional and international cargo networks.”

◆ **Theme 3: Stakeholder Alignment**

- "Oman Airports has initiated several workshops involving multiple stakeholders, including decision-makers, to align priorities and identify solutions."
- "Although these workshops yield useful insights, they are not part of a broader governance structure — which remains a gap."

◆ **Theme 4: Inter-sectoral Collaboration**

- "We actively brought together actors from across government, regulatory, and private sectors to discuss cargo-related issues — but without an overarching framework, collaboration remains limited."
- "Inter-sectoral engagement needs to move beyond consultation toward implementation and shared accountability."

◆ **Theme 5: Global Benchmarking and Strategic Recommendations**

- "Marketing is a critical element that remains underdeveloped in Oman's air cargo strategy — it must be elevated to a national priority."
- "To compete with major hubs like Dubai or Singapore, Oman must promote its strengths proactively and consistently to international markets."
- "We recommend establishing a permanent air cargo steering committee to oversee governance, promotion, and implementation efforts."