IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF MANAGEMENT

MASTER THESIS

MITIGATION STRATEGIES FOR AVIATION LOGISTICS FIRMS' CHALLENGES DURING THE COVID-19 PANDEMIC: A CASE STUDY OF LION PARCEL

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THESIS SUPERVISOR
ASSOC. PROF. ALİ OSMAN KUŞAKCI

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by
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A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Arts in Management

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ASSOC. PROF. ALİ OSMAN KUŞAKCI

ISTANBUL, 2022

APPROVAL PAGE

This is to certify that we have read this thesis and that, in our opinion, it is fully adequate, in scope and quality, as a thesis for the degree of Master of Arts in Management.

Thesis Jury Members

Title - Name Surname	Opinion	Signature
_____	_____	_____
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_____	_____	_____

This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University:

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ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name Surname:

Signature:

ÖZ

HAVA LOJİSTİĞİ FİRMALARININ COVID-19 PANDEMİSİ SIRASINDA KARŞILAŞTIĞI SINAMALARI HAFİFLETME STRATEJİLERİ: LION PARCEL'DE BİR VAKA ÇALIŞMASI

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Endonezya hükümeti COVID-19 ile mücadele etmek için tüm Endonezya havayollarına hava yolculuğu kısıtlamaları getirmiştir. Büyük kısıtlamalar kargo taşımak için sivil uçakları kullanan lojistik şirketlerinde uçuş iptallerine, ambargolara, geç teslimatlara, müşteri şikayetlerine vb. neden olmuştur. Havacılık lojistiği şirketlerinde uçuş iptalleri ile mevcut talep arzın çok üzerine çıkmıştır. Bu arz-talep dengesizliği, lojistik firmalarının dağıtım merkezlerini ciddi şekilde etkilemiş, süreçte maliyetler artmış, müşteri şikâyetleri bunaltıcı hale gelmiş ve dağıtım merkezleri yetersiz hale gelmiştir. Bu etki, Endonezya'nın en önemli düşük maliyetli havayolu şirketi olan Lion Group Havayaolları'na ait bir havacılık lojistik şirketi olan Lion Parcel'de de gözlemlenmektedir. Literatürde ticari uçak (yarı yolcu, yarı kargo uçakları) kullanan havacılık lojistik şirketleri için bu sınamaları hafifletici stratejileri değerlendiren hiçbir çalışma yoktur. Bu boşluğu doldurmak için bu çalışma bahse konu sınamaları tespit etmeyi ve bunlara çözüm yolları sunmayı amaçlamaktadır. Çalışmada iki aşamalı bir metodoloji uygulanmıştır. İlk aşamada bu sınamaların birbirleriyle nasıl etkileşime girdiğini belirlemek için Fuzzy-DEMATEL temelli nicel bir analiz; ikinci aşamada hafifletme stratejilerini tespit etmek için yapılandırılmış görüşmeler temelli nitel bir analiz kullanılmıştır.Tez, COVID-19'dan etkilenen firmalar ve kuruluşların tedarik zincirlerini gelecekteki aksaklıklara dayanacak şekilde nasıl uyarlayabileceklerini açıklamaktadır. Çalışmaya göre Hasarlı Kargo, Gönderi

Tonaj Tutarsızlığı, Kısmi Kargo Varışı, İptal Edilen Uçuş, 3LC Ambargosu ve Müşteri Şikayetleri öne çıkan zorluklardır. Operasyonel Maliyet ve Sevkiyat Tonaj Tutarsızlığı etkileyen faktörlerdir. Kısmen Gelen Kargolar, İptal Edilen Uçuşlar ve Hasarlı Kargolar en önemli etkilerdir. Azaltma stratejilerine ilişkin bu çalışmanın bulguları ve tartışmaları, tedarik zinciri esnekliğini geliştirmek için ayrıntılı şekilde detaylandırılmıştır.

Anahtar Kelimeler: Dayanıklılık, Havacılık Lojistiği, Operasyonel Risk Yönetimi, Pandemi Sonrası Kesintiler, Risk Azaltma Stratejileri,

ABSTRACT

MITIGATION STRATEGIES FOR AVIATION LOGISTICS FIRMS CHALLENGES DURING THE COVID-19 PANDEMIC: A CASE STUDY OF LION PARCEL

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June 2022, 77 Pages

To combat COVID-19, the Indonesian government has imposed air travel restrictions on all Indonesian airlines. During government restrictions, e-commerce and logistics surged. Meanwhile, massive air travel restrictions caused flight cancellations, embargoes, late deliveries, customer complaints, etc., for air cargo companies. Flight cancellations are so frequent for aviation logistics companies that use commercial planes to transport cargo that demand for available flights outnumbers supply. This supply-demand imbalance affects logistics firms' hubs and distribution centers. Costs are rising, customer complaints are overwhelming, destinations are embargoed, and distribution centers are suboptimal. This effect can also be observed at Lion Parcel, an aviation logistics company owned by Lion Group Airlines, the largest low-cost airline in the country. No studies have evaluated the recovery path for aviation logistics companies that use commercial aircraft (half passenger, half cargo planes); meanwhile, this should be investigated as well. This study uses a two-phase methodology consisting of a quantitative analysis using Fuzzy-DEMATEL to rank and determine interrelationships and how the challenges interact, and a qualitative analysis using structured interviews to present mitigation strategies for aviation logistics firms impacted by COVID-19 and describe how organizations can adapt their supply chains to withstand future disruptions. Damaged Cargo, Shipment Tonnage Inconsistency, Partial Cargo Arrival, Canceled Flight, 3LC (Three Letter Code) Embargo, and

Customer Complaints are the most prominent challenges. Operational Cost and Shipment Tonnage Inconsistency are influencing factors, whereas Cargos Arrived Partially, Canceled Flight, and Damaged Cargo is the most considerable effects. This study's findings and discussions on mitigation strategies are elaborated and detailed to strengthen supply chain resilience.

Keywords: Aviation Logistics, Operational Risk Management, Post-pandemic Disruptions

DEDICATION

Praise and gratitude the author prays to Allah SWT, who has given mercy and grace so that I can finally finish this thesis on time.

This thesis is dedicated to my parents, who have provided me with unending love, support, and encouragement throughout my life. Thank you for giving me the courage to reach for the stars and pursue my ambitions. My sister, friends, and cousin all deserve my heartfelt appreciation. My supervisor, Assoc. Prof. Ali Osman Kuşakcı deserves special recognition for all of his assistance and support throughout my thesis, as well as for serving as my advisor and guide throughout my studies. I am grateful to the Lion Parcel team for the discussion and understanding of some of the outcomes reported in this thesis. Thank you to all of my pals for your patience and encouragement over my many, many crises. I can not remember everyone's names, but you are always on my mind. This thesis is merely the start of my journey.
Thank you very much, in perpetuity.

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CHAPTER I

INTRODUCTION

1.1. Significance of Research

The long-term logistical ramifications of the COVID-19 outbreak are emerging. Since early 2020, national governments have implemented lockdowns, secured national borders, and taken other precautions to ensure the safety of their citizens. Due to airport and passenger service closures, international air cargo capacity has been drastically reduced. The spread of COVID-19 has had repercussions, and countermeasures are necessary, including the Indonesian government's large-scale social enforcement of air travel restrictions across all Indonesian airlines to intensify COVID-19 management; or, as the Indonesian government refers to it, PPKM policy; a follow-up to Article 5 paragraph 12 of the Republic of Indonesia's 1945 Constitution. In times such as these, the logistics industry is regarded as a vital industry, and the government does not prohibit or restrict aviation logistics operations during the pandemic. Regarding the COVID-19 Emergency PPKM Policy, Minister of Internal Affairs (Imendagri) Instruction No. 15 of 2021 grants this exemption to the transportation and logistics services industry, therefore efforts to protect consumers from delays in the delivery of goods by courier service via transportation caused by the policy of implementing restrictions on community activities cannot be used to impose force majeure because the transportation and logistics service sector is exempt from the policy. Nonetheless, during the pandemic, the government has imposed numerous restrictions on air travel, which has had a negative impact on logistics companies that rely on commercial aircraft for air freight. This effect may also manifest at Lion Parcel, a logistics company owned by Lion Group.

The Lion Group is Indonesia's largest aviation company, currently comprised of numerous Southeast Asian airlines, including Lion Air, Wings Air, Batik Air, Malindo Air, and Thai Lion Air. It possesses a formidable network, service, and air fleet with more than 300 aircraft, the most extensive coverage, and the highest frequency of daily flights per day in the country. In order to maximize aircraft utilization, Lion Group established its logistics subsidiary Lion Parcel in 2013. As a member of the Lion Group, the company gains significant flexibility by utilizing the group's aircraft fleet and scheduled service, allowing it to deliver packages across the country more quickly. In contrast to other Indonesian logistics firms that rent planes from other airlines, Lion Parcel utilizes the group's fleet infrastructure, which may imply that it owns its own aircraft. Despite the fact that the Lion Group's aircraft are commercial planes (passenger planes), some of them are designed for cargo delivery for Lion Parcel; the plane is divided into two sections, one for cargo and one for passengers. Due to the separation of cargo and passenger sections, Lion Parcel's cargo is already on board before passengers take their seats, ensuring that the cargo is always given priority and that the company's Service Level Agreement (SLA) is always for maximum, safe, and on-time delivery. In addition, Lion Parcel's land fleets are continuously expanding to meet customers' needs from the first to the last mile. According to company records, Lion Parcel has always delivered on time. It had achieved a 98% on-time delivery rate, a 94% on-time next-day delivery rate, and a 0.04% claim rate by 2021.

Throughout the pandemic, Lion Parcel encountered multiple obstacles. The government implemented the Emergency Community Activity Restrictions (PPKM) policy, which discourages travel unless absolutely necessary, over the course of many months in 2021. For instance, only workers with a Worker Registration Certificate (STRP), Assignment Orders from the Heads of Institutions at Echelon II, or other certificates issued by the regional government are permitted to fly. Lion Parcel utilizes the commercial aircraft of Lion Group, which are used to transport passengers and cargo. Reduced passenger numbers at Lion Group's airline have a direct impact on Lion Parcel's SLA performance, as the passenger side of the aircraft must be at least 50% full to cover transportation costs, indicating that shipment arrival is uncertain due to the lack of passenger quota. Unexpected flight cancellations of Lion Parcel's aircraft are a result of the decline in passenger numbers and the requirement to operate at a

minimum of 50% of passenger capacity. If Lion Parcel only operated cargo planes during the pandemic, there would be significantly fewer issues.

According to IATA's Air Passenger Market Analysis (2020), industry-wide revenue of passenger kilometers decreased by 94.3% year-on-year in April and remained unchanged at 75.0%, representing the largest decline in recent history as a result of widespread lockdowns caused by COVID-19. The deterioration was widespread throughout all regions. As a result of the deterioration of airline passenger flights due to COVID-19 travel restrictions, freight capacity decreased drastically, causing chaos in the global supply chain. According to Azka (2020), air freight agents estimated that costs were up to three times higher, and transit times were extended owing to the temporary suspension of flights by the government to prevent the spread of COVID-19. The cost of operations is rising, and long-term supply chain management needs low-cost transportation.

During the government's restrictions, the demand for e-commerce was exploding, and the logistics industry was thriving. Hence logistics companies must be prepared. However, in reality, massive air travel restrictions led to flight cancellations, flight embargoes, late deliveries, customer complaints, etc., for logistical companies. The level of flight cancellations at an aviation logistics company that sends cargo via commercial flights is so high that the current demand for available flights significantly exceeds the current supply (firms' capacity). This supply-demand imbalance affects logistics firms' hubs and distribution centers. Cargo accumulates in distribution centers and airport hubs, leading to suboptimal hub management and possibly higher operational costs. Accumulation of cargo can also damage shipments. Worker productivity needed to be extended during the pandemic, but operational hours were limited. During the unavailability of flights, most of the cargo was delayed, and shipments that were normally delivered by plane on the day and received the next day became unreliable. Customers were so dissatisfied and overburdened by the unreliable SLA for shipments that they decided to withdraw their shipments from the company's hubs and had them sent by other logistic companies. These are some of the problems pandemic-affected aviation logistics companies faced during the COVID-19 travel ban, and many others should also be examined.

As a logistics provider, service should always be of the highest standard, particularly when delivering first-in, first-out cargo such as vaccines, pharmaceuticals, and emergency supplies. Even during peak season, SLA must remain consistent. Logistics is one of those industries that can last if it gains public trust. Business processes are not always seamless; unforeseen obstacles persist, each incident manifests risk differently, and the company's management is challenged by the issue's complexity and unpredictability; therefore, risk agents and managers must be identified immediately so that mitigation strategies must respond swiftly and with assurance. It is essential to evaluate and reevaluate the current supply chain and develop sustainable solutions to help managers and practitioners prepare for future supply chain disruptions. From the perspective of dynamic capabilities, the objective is to develop a resilient, sustainable supply chain that can quickly adapt to and recover from disruptions. Additionally, the economic effect of international supply chain logistics should be evaluated since air cargo is crucial for the efficient functioning of global supply chains.

Based on the analysis and review of the relevant literature, the author concludes that government restrictions or pandemic outbreaks have an impact on aviation logistics businesses and that recovery is possible through strategic risk mitigation planning. The crisis resilience of supply chain networks is garnering a growing amount of scholarly attention. Due to the COVID-19 pandemic, however, no studies have been conducted to evaluate the performance of aviation logistics companies that use commercial aircraft (half passenger, half cargo planes). The recovery path for logistical companies that rely on commercial aircraft with a particular focus on passenger and cargo planes should also be examined. In light of the aforementioned conditions, the author's study is unique, possibly the first of its kind. Using a dynamic capability perspective, the author presents mitigation options for COVID-19-affected aviation logistics companies. Additionally, the author also discusses how organizations can adapt their supply chains to withstand future disruptions.

1.2. Research Questions

This study employs a two-phase methodology comprised of quantitative analysis with Fuzzy-DEMATEL and qualitative analysis with structured interviews. In the first

phase, the author will conduct a literature review on logistical disruptions in logistical organizations, compile a list of all logistical company issues, and validate the list with Lion Parcel, an aviation logistics company that operates under the COVID-19 Pandemic Government Travel Restrictions. Second, a comprehensive questionnaire will be created and analyzed with Fuzzy-DEMATEL to determine how these challenges interact with one another and rank the importance of these challenges faced by aviation logistics companies. In the final phase, the author will conduct structured, in-depth interviews with aviation logistics experts from Lion Parcel to collect information on the implementation of mitigation strategies utilizing dynamic capabilities and the conceptual framework for supply chain resilience. In order to fill this void, this paper will examine the following research questions:

i. What are the key challenges that aviation logistic companies face as a result of the COVID-19 travel restrictions?

ii. How do these challenges interact with one another?

iii. What mitigation strategies are appropriate for addressing these challenges in Lion Parcel during the COVID-19 pandemic government travel restriction?

CHAPTER II

LITERATURE REVIEW

This literature study is organized into three subsections to facilitate comprehension of the core concepts behind the challenges logistic companies experienced during the COVID-19 pandemic. The first part consists of the author's assessments of current COVID-19-related research on logistics supply chain concerns, while the second part discusses the challenges logistic firms encountered as a result of the COVID-19 pandemic. In the third part, research-relevant concepts and the position of Lion Parcel as an Indonesian logistics company are defined.

2.1. Review of COVID-19-Related Logistics Supply Chain Research

Challenges related to the COVID-19 pandemic continue to impact the global supply chain, including delays and disruptions. Manufacturing, distribution, and transportation delays have affected the whole economy, producing supply chain disruptions and interrupting the usual operations of enterprises (Sudan and Taggar, 2021). According to Sudan and Taggar (2021), the pandemic wreaked havoc on transportation and logistics services, including flight cancellations, which affected passenger satisfaction, air freight capacity, global circulation, labor shortages, temporary airport closures, and slowed customs clearance. As a result, manufacturing goods and consignments in transit were rerouted or discharged prior to reaching their final destinations (Sudan and Taggar, 2021). Meanwhile, the COVID-19 pandemic demonstrated that supply chain networks are the foundation of substantial economic activity (Ivanov, 2020).

The restrictions caused by the COVID-19 pandemic have disabled economic operations and impacted transportation networks in the maritime, rail, air, and trucking industries (de Vos, 2020). Temporary restrictions on human mobility and

transportation have placed a tremendous strain on maritime and road freight, creating substantial barriers to international trade. Transportation and logistics system interruptions have had a substantial effect on supply chain operations (Tan et al., 2020). Transportation disruptions have impacted the entire supply chain, disrupting operations, and resulting in lost sales, delayed deliveries, and a tarnished reputation. According to Amankwah-Amoah (2020), the COVID-19 threat appears to be the most severe condition facing the airline industry. In other words, COVID-19 exemplifies how society has evolved to the point where past events are no longer a reliable predictor of future events.

A disruption such as the COVID-19 pandemic, on the other hand, poses a significant risk and creates meta-uncertainty in the logistics industry, according to Bode et al. (2011). Supply chain disruption risks have significantly impacted firms' operational and financial performance, which plays a significant role in building resilience against supply chain disruptions. According to de Sousa Jabbour et al. (2020), firms face numerous obstacles due to their geographic location and supply chains' varying levels of preparedness and resilience. System disruptions caused by transportation and logistics have become a significant source of concern for supply chains, highlighting the importance of risk-based strategic boardroom discussions that emphasize resilience. During the COVID-19 pandemic outbreak, supply chains demonstrated a lack of preparedness, flaws in their response strategies, and a need for improved supply chain resilience, as described by Golan et al. (2020).

In order to improve supply chain resilience, Dolgui et al. (2020) state that risk mitigation inventory, subcontracting, backup supply and transportation equipment, and digital monitoring and visibility systems may all be helpful. Raj et al. (2022) argue that in order for organizations to effectively handle disruptions, they must be able to dynamically synergize their competencies, resources, and overall capabilities. Research has demonstrated that resilience is an important dynamic quality that might aid businesses in coping with challenging times (Mishra et al., 2021). Maintaining and improving operational and competitive market positions may be achieved via the application of this capability (Birkie and Trucco, 2020). The dynamic capabilities method has grown in popularity over the last two decades, and this framework is a valuable tool that helps managers to consider the future of their businesses

strategically. According to Teece (2007), there are three sorts of management actions that may make a capability dynamic: sensing, seizing, and transforming. Sensing entails recognizing and evaluating possibilities outside your organization, while seizing motivates company resources to grab the value from those chances and transform (continuous renewal). This motivates the author to evaluate the dynamic capabilities technique as a framework for dealing with disruptions, as well as corporate moral responsibilities for addressing environmental, social, and governance issues. Adaptable businesses can maximize their value creation potential and competitive advantage by leveraging dynamic capabilities. Clients can be served more efficiently if the supply chain is responsive and transportation is flexible (Ghavamifar et al., 2018). There is still a lack of understanding about how theoretical concepts such as dynamic capability and others interact with strategic management in logistics operations. In addition, this publication suggests additional research.

Details regarding the literature review presented as part of this study are provided below in Table 2.1. During the COVID-19 pandemic, there has been a notable lack of research into freight delivery delay mitigation strategies in the context of using commercial airline transportation. To address this gap, the author conducted research on (a) the supply chain challenges logistic companies to face, (b) how companies can prioritize their strategies to meet these challenges, (c) how these challenges interact with one another, and (d) how logistic companies should explore mitigation methods to improve supply chain resilience.

Table 2.1. State of the Art of Literature Review

Authors	Title of the Study	The focus of the study	Method ology	The outcome of the Study
Queiroz et al. (2020)	Impacts of epidemic outbreaks on supply chains: mapping a research agenda amid the COVID-19 pandemic through a structured literature review	Systematic literature review of pandemics and epidemic outbreaks in the past	Literature Review	Reinforcing that adaptability, ripple effect, recovery, digitization, readiness, and sustainability are crucial during a pandemic outburst.
Chowdhury & Paul (2020)	A production recovery plan in manufacturing supply chains for a high-demand item during COVID-19	Despite a scarcity of raw resources and manufacturing restrictions, demand for essentials surged during the COVID-19 pandemic.	Mathematical Modelling	Developing a model for production recovery for essential items having high demand and low supply
Sarkis et al. (2020)	A brave new world: Lessons from the COVID-19 pandemic for transitioning to sustainable supply and production.	Sustainable supply and production in response to the COVID-19 pandemic	Literature Review; Perspective Article	Behavioral changes and localization will constitute major changes after the COVID-19 era.
Ivanov (2020)	Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak	To theorize regarding the concept of a viable supply chain under the context of COVID-19.	Simulation-based analysis	Enable decision-makers to estimate the operational and long-term implications of a pandemic occurrence on the supply chain.

2.1. (cont.)

Table 2.1. (cont.)

Ivanov & Dolgui (2020)	Viable supply chain model: Integrating agility, resilience and sustainability perspectives—lessons from and thinking beyond the COVID-19 pandemic	Determine the feasibility of linked supply networks during the COVID-19 pandemic	Game Theory	The creation of a revolutionary decision-making environment for Intertwined Supply Network (ISN) viability
Ivanov & Das (2020)	Coronavirus (COVID-19/SARS-CoV-2) and supply chain resilience: A research note	Analyze pandemic supply chain ripple effects	Simulation Modelling	Using case studies, the authors show that the velocity of epidemic spread is one of the most critical aspects in predicting the influence of epidemic outbreaks on supply networks.
Govindan et al. (2020)	A decision support system for demand management in healthcare supply chains considering the epidemic outbreaks: A case study of coronavirus disease 2019 (COVID-19)	Demand management throughout the Coronavirus pandemic	Fuzzy Inference System (FIS)	Creating a decision-support system to manage demand in the healthcare supply chain to control COVID-19.
Remko (2020)	Research opportunities for a more resilient post-COVID-19 supply chain–closing the gap between research findings and industry practice	Identifying and bridging the gap between supply chain resilience research and real industry initiatives to establish a more robust supply chain	Qualitative interviews, publicly available data, and Literature Review	During the COVID-19 pandemic, the supply chain network lacked preparation and reaction measures, emphasizing the need for more robust supply chains

Table 2.1. (cont.)

Craighead et al. (2020)	Research at the intersection of entrepreneurship, supply chain management, and strategic management: Opportunities highlighted by COVID-19	To examine how key supply chain theories relate to COVID-19 problems	Literature Review	Discuss how various theories might assist with COVID19 difficulties and solutions. Managers must comprehend the pandemic's effect on supply networks
Agrawal et al. (2020)	Effect of COVID-19 on the Indian Economy and Supply Chain	COVID-19's impact on India's supply chain	Literature Review, Publicly available data	Identification of supply chain obstacles and a proposal to extend this research using various MCDM methods
de Sousa Jabbour et al. (2020)	Sustainability of supply chains in the wake of the coronavirus (COVID-19/SARS-CoV-2) pandemic: Lessons and trends	How managers may handle supply chain issues following the COVID-19 pandemic	Literature Review, Publicly available data	The authors provide detailed guidelines to supply chain managers on better supply chain management.
Biswas & Das (2020).	Selection of the barriers to supply chain management in Indian manufacturing sectors due to COVID-19 impacts	Impacts of COVID-19 on supply chain	Multiple criteria decision-making (MCDM) tools	The paper has provided the five essential barriers to supply chain

Table 2.1. (cont.)

Okorie et al. (2020)	Manufacturing in the time of COVID-19: An assessment of barriers and enablers	Analysis of manufacturing resilience barriers and enablers during the COVID-19 pandemic	Quantitative Survey	14 major barriers are identified
Raj et al., (2021)	Supply chain management during and post-COVID-19 pandemic: Mitigation strategies and practical lessons learned	COVID-19 outbreak affects industrial supply chains	Multiple criteria decisions making (MCDM) tools	Post-COVID-19 pandemic supply chain guidance for practitioners and academics
Kitchen & Craighead (2020).	Research at the intersection of entrepreneurship, supply chain management, and strategic management: Opportunities highlighted by COVID-19	COVID-19 prospects for research on entrepreneurship, supply chain, and strategic management	Commentary paper	Different research questions have been identified
Belhadia et al. (2020)	Manufacturing and service supply chain resilience to the COVID-19 outbreak: Lessons learned from the automobile and airline industries	Supply chain resilience during COVID-19 outbreaks	Mixed method approach	COVID-19 issues may be overcome by Big Data Analytics (BDA) and supply chain stakeholder collaboration
Singh et al. (2020)	Impact of COVID-19 on logistics systems and disruptions in the food supply chain	The Pandemic of COVID-19 and logistics, including last-mile delivery	Simulation Modelling	A model that facilitates the development of a resilient supply chain with improved decision-making.

Table 2.1. (cont.)

Birkie and Trucco, 2020	Do not expect others to do what you should! Supply chain complexity and mitigation of the ripple effect of disruptions	Supply chain complexity's impact on the two phenomena and their interaction, from a company's viewpoint	Encoding and aggregation of secondary data	The ripple effect of disruption is lessened by a complex supply chain. The more complicated a supply chain is, the more important it is to be resilient.
Dolgui et al. 2020	Exploring supply chain structural dynamics: New disruptive technologies and disruption risks	Recent developments in exploring supply chain structural dynamics	Literature Review, Publicly available data	Supply chain triggers include new disruptive technology and disruption concerns.
Kumar et al. (2021)	Managing the supply chain during disruptions: Developing a framework for decision-making.	Authors have analyzed supply chains risk due to COVID-19 disruptions	Multiple criteria decisions making (MCDM) tools	Significant risks have emerged from supply risks, demand risks, and financial risks.

2.2. Operational Challenges in Aviation Logistics Firms During COVID-19 Government Travel Restriction

In this investigation of operational challenges, a two-step procedure was utilized. In the initial phase, relevant papers were examined and found using Google Scholar, Science Direct, Research Gate, and other search engines and the terms Logistic Challenges or Logistic Mitigation Strategies. Few studies investigate the operational problems experienced by logistics firms during the COVID-19 pandemic and government travel restrictions; therefore, other relevant articles on the logistic mitigation approach from business journals, logistic and supply chain-related journals, and various reports were also examined. In these studies, a number of difficulties were frequently mentioned.

The authors then provided these operational difficulties to Lion Parcel's operations team to check if the author's list of challenges was correct and analyze their relevance

and originality. The experts contacted have been in the industry for at least five years, with one having spent more than 23 years in the field. Several challenges were also identified in the previously cited works, and ten distinct challenges were identified by analyzing and compiling these issues with the assistance of experts. All of the experts agreed that the mentioned operational issues are significant and pertinent to the environment of aviation logistic enterprises. However, they suggested a few minor modifications to the way the discovered notions were defined and referred to. The final questionnaire was created by the authors based on the advice of these experts. A number of writers used similar methodologies to discover and classify unique challenges in a number of other disciplines (Chetty et al., 2020). The entire list and details of the identified challenges are provided in Table 2.1, and more explanations are provided below.

These challenges are classified into three categories: customers side, operations side, and delivery side. As was discussed in the previous literature review studies, logistic firms will need to build competencies to deal with these difficulties in the future. Figure 2.1. depicts a model for studying supply chain obstacles within the framework of a focused logistics organization, resulting in supply chain resilience. According to Mishra et al. (2021), in the event of supply chain interruptions, supply chain resilience may assist firms in maintaining operational excellence. According to Birkie et al. (2020), competencies that allow firms to maintain and strengthen their operational and competitive market positions are the foundation of supply chain resilience. The new pandemic necessitates that firms adapt, react, and proactively reduce disruptions by dynamically integrating, synergizing, and rebuilding their competencies, resources, and overall capabilities, according to Raj et al. (2020). Accenture and the World Economic Forum (2022) completed thorough research that demonstrates the relevance of supply chain resilience and estimates that over 80% of the world's top corporations are presently addressing it in their supply chain network. Recent COVID-19-related studies have indicated that strengthening supply chain resilience is essential for dealing with challenges linked to the logistics supply chain (Belhadia et al., 2020).

The concept of dynamic capabilities emerged in the realm of strategy and was firstly described in the seminal study by Teece et al. (1997). Dynamic capabilities are the firm's ability to integrate, build, and reconfigure internal and external

resources/competencies to address and shape rapidly changing business environments, according to Teece et al. (2008). Teece et al. (2008) concluded that an organization's capacity to quickly alter and reconfigure its resources and capabilities, both internal and external, is highlighted by the dynamic capability perspective. According to prior research, resilience is acknowledged as a critical dynamic attribute that can assist an organization in navigating through challenging circumstances (Mishra et al., 2021). This encourages the author to investigate the dynamic capabilities perspective, the concept of which has transcended previous management ideas.

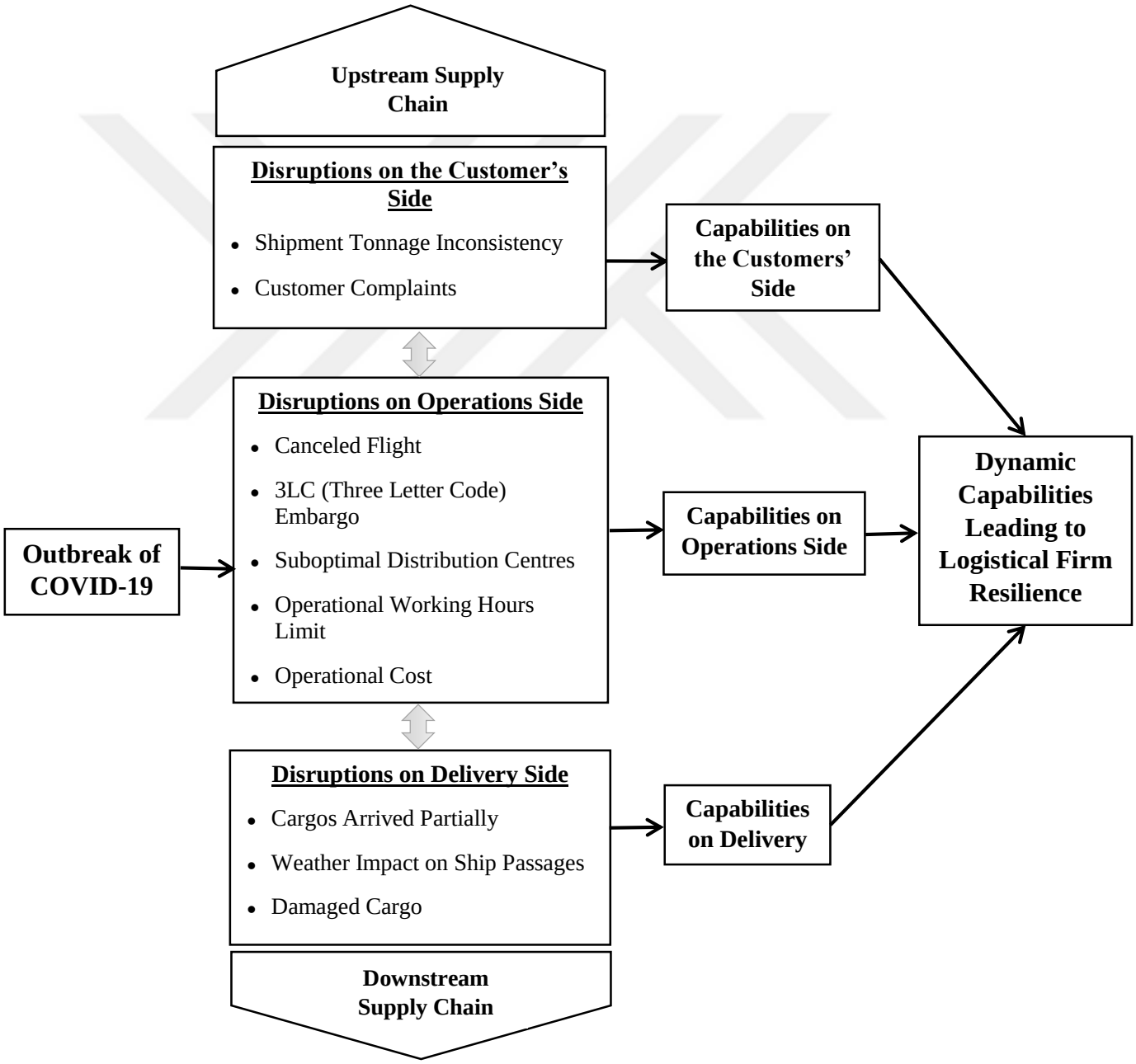


Figure 2.1. Framework to Study Logistical Firm Challenges

Table 2.2. Operational Challenges in Aviation Logistics Firms During COVID-19 Government Travel Restriction

Challenges	Implied Meaning
Shipment Tonnage Inconsistency	Corporate client shipments are shrinking in some sectors while increasing in others. A difference in manufacturing and production capacity has caused sales and production to fluctuate.
Customer Complaints	Customers were so dissatisfied and overburdened by the unreliable SLA for shipments that they even decided to withdraw their shipments from the company's hubs and have them delivered by other logistic firms.
Canceled Flight	During the pandemic, government regulations affect the number of passengers, resulting in flight cancellations. Aside from that, Lion Group's commercial aircraft used to transport cargo must have at least 50% passengers; if the percentage of passengers falls below 50%, the Flight will be canceled.
3LC (Three Letter Code) Embargo	Some destinations are unable to receive or complete operational cargo deliveries due to operational issues or closed flights at the destination airport.
Suboptimal Distribution Centres	Air cargo is in high demand during pandemics, but there aren't enough flights to meet demand. As a result, cargo accumulates, and goods become stranded in distribution centers and airport hubs, making cargo management in distribution centers suboptimal and a first-in-first-out (FILO) system unavoidable.
Operational Working Hours Limit	Worker productivity needed to be extended throughout the day to boost productivity and asset utilization during the pandemic's cargo surge; however, operational working hours were limited.
Operational Cost	The disruptions to daily activities caused by the pandemic are raising operational costs. Transportation costs account for two-thirds of logistics costs, and it has an impact on the entire logistics, operations process, and sales.
Cargos Arrived Partially	Cargos that were supposed to arrive in one bulk or receipt might arrive in parts due to suboptimal distribution centers, stranded goods gathered at the airport and distribution centers, and an unavoidable first-in-last-out system.
Weather Impact on Ship Passages	Poor weather conditions hampered the operation of transportation systems.
Damaged Cargo	Shipments are exposed to various environmental factors, some of which are beyond human control, and accidents can occur at any time and anywhere, resulting in damaged cargo.

2.2.1. Shipment Tonnage Inconsistency

During the pandemic, shipments from corporate clients are decreasing in some industries while increasing in others. Due to differences in manufacturing and production capacity during the pandemic, some companies' sales and production have decreased while others have increased. The pandemic has also impacted their sales and production in a number of customer sectors, resulting in shipment volume fluctuations for their logistics partner. According to a KPMG report confirmed by Rodriguez (2020), automotive was the most affected industry in terms of production in the first quarter of the year following COVID-19 by -32%, transportation equipment -by 28%, textiles -by 27%, metals -by 27%, electrical machinery -27%, and other industries. Although all indicators showed significant declines, company recovery rates have increased, and production and operational activities have resumed, though some have not resumed rapidly.

Meanwhile, the digital and e-commerce sectors have thrived amid the COVID-19 crisis. The most recent Statista analysis places Indonesia as the tenth biggest eCommerce market in the world, with anticipated sales of USD $59 billion in 2022 (Statista, 2022). The Wall Street Journal (2021) reports that logistics companies whose businesses grew during the COVID-19 online-ordering boom are maintaining their investments and are optimistic about the future. The surge in e-commerce significantly expands the logistics market by increasing the revenues of logistics companies. The logistics industry is expected to thrive in the coming years and have a bright future. Faced with increased customer expectations and the significant and rapid growth of the e-commerce industry, logistics companies must expand while meeting consumers' ever-changing expectations.

2.2.2. Customer Complaints

Locus (2021) defines late delivery as a provider's delay from the agreed-upon time. Governmental restrictions, contingency plans, and other business obstacles prolong and delay shipment SLAs (service-level agreements). The delivery date of shipments sent on D day and typically received the next day was unreliable. Customers' patience and tempers are wearing thin; they want their items immediately, but logistics

companies cannot guarantee shipping time arrival. Customers were so dissatisfied and overburdened that many of them chose to withdraw their shipments from the company's hubs and send them via alternative carriers.

Regardless of a poor delivery experience, how businesses respond to customers afterward and focus on long-term business with them impacts client retention. Customers are less likely to continue doing business with companies that fail to address delivery problems, and the vast majority of customers are responsive to their needs. Clients are likely to lose faith if delivery delays occur more than once or twice, putting the firm's reputation at risk. According to Boyer (2005), the timeliness of logistics impacts customer happiness, customer loyalty, and repurchasing behavior. Diaz (2002) confirmed that customer waiting time increases customer dissatisfaction and decreases customer purchase intent. On the other hand, timely delivery is not always entirely within the company's control.

2.2.3. Canceled Flights

Due to government regulations that affect the reduction of passenger numbers and Lion Group's commercial aircraft used for Lion Parcel's cargo shipping, flight cancellations are particularly unexpected. As fewer people fly due to government restrictions, flight frequency will likely decrease. Lion Group's aircraft has a provision that the passenger percentage must be at least 50% for the plane to take off, so if a scheduled flight does not meet this requirement, it will be canceled. As fewer people fly due to government restrictions, flight frequency will likely decrease. To maintain customer loyalty, airlines must respond promptly and accurately in the event of a flight delay. During pandemics, air cargo is in high demand, but there are not enough aircraft capable of prompt delivery to meet demand.

According to the OECD (2020), the change in passenger behavior caused by the COVID-19 issue, travel restrictions, and the accompanying economic crisis have resulted in a significant drop in demand for aviation services. Sobieralski (2020) confirmed that the transportation industry had been devastated by flight cancellations and capacity cuts. Unpredictable bad weather and flight delays caused by external factors are two additional issues that frequently arise due to external variables.

2.2.4. 3LC (Three Letter Code) Embargo

The Three Letter Code, abbreviated to 3LC, represents the location of a city or airport. For example, in the province of Southeast Sulawesi, all airports are open, but the airport in the city of Kendari within South Sulawesi is closed; thus, Kendari is subject to the 3LC embargo. According to Damron (2021), an embargo is any event that prohibits the acceptance or handling of freight, mostly within restricted zones. When a natural disaster or other obstacle occurs, such as floods, tornadoes, or blocked highways, an embargo may be imposed. Frequently, embargos are imposed as a result of international conflicts or restrictions placed on a particular region or group of people. Depending on the severity of the issue, these embargoes could last days, weeks, or months.

According to King Solutions Global (2021), freight embargoes also result in higher freight rates. Until the embargo is lifted, freight prices will almost certainly rise as capacity tightens and carrier demand remains stable or increases (generally when capacity is no longer at or less than the number of loads that need to be transported). When freight embargoes prevent carriers from operating, alternative resources must be identified immediately.

2.2.5. Suboptimal Distribution Centres

During pandemics, air cargo is in high demand, but there are not enough flights to meet demand. As a result, cargo accumulates, and goods become stranded in distribution centers and airport hubs, yielding distribution center cargo management suboptimal and a first-in, last-out (FILO) system unavoidable. According to Logiwa (2021), the First-In-First-Out strategy is an inventory control system in which the first cargo to enter a warehouse is also the first cargo to leave, and it must be implemented by ideal logistics warehousing management. It is the most prevalent and fundamental method of warehouse management that ensures the SLA for the delivery queue is met on time. However, cargo accumulation and stranded items at hubs made distribution center management suboptimal and necessitated the use of the First-In-Last-Out system when the First-In-First-Out system should have been implemented.

According to Frazelle (2002), distribution centers are facilities that "accumulate and consolidate items from various locations of manufacture within a single company or several companies for combined shipping to typical clients." The distribution structures, locations, and management of distribution centers are crucial for logistics organizations seeking to reduce logistical costs and enhance service levels. The principal functions of warehousing are receiving, quality control, storage, picking, sorting, packaging, and shipping (Tompkins et al., 2010). Because the flow of goods through the warehouse is crucial, warehouse management is also the logistical backbone.

Figure 2.2. Suboptimal Distibution Centres

2.2.6. Operational Working Hours Limit

According to Carnevale and Hatak (2020), logistics and supply chain services rely heavily on their workforce. As demand for air cargo increases during the pandemic, so does the capacity of air cargo companies and airport facilities to deliver goods within the 48-hour delivery window (or shorter). During the cargo surge brought on by the pandemic, it was necessary to boost worker productivity and asset utilization, but operational working hours were limited. Assessing the extent to which operational efficiency can be accommodated efficiently requires close coordination with logistic

personnel. Limited operational working hours pose a significant challenge to the company's daily operations, necessitating meticulous strategies because logistics operations never stop and always run continuously.

2.2.7. Operational Cost

The disruptions to daily operations caused by the pandemic are increasing operational costs. According to Srinivas (2019), between one-third and two-thirds of enterprise logistics costs, a significant portion of logistics chain management costs, are attributable to transportation. The transportation system facilitates the transport of goods while adhering to the principle of least cost. According to R.M. Azka (2020), air freight agents estimated that due to the temporary suspension of flights by the government to prevent the spread of COVID-19, costs were up to three times higher, and transit times were extended. The cost of operations is increasing, and supply chain management over the long term requires low-cost transportation.

2.2.8. Cargos Arrived Partially

Due to suboptimal distribution centers, shipments that were intended to arrive in a single shipment bulk or receipt may instead arrive in multiple parts or partially. As cargo accumulates and becomes stranded in distribution centers and airport hubs, distribution center cargo management becomes suboptimal, and this can lead to additional complications, such as the partial delivery of cargos that were intended to arrive in one bulk if Client A ships 1,000 kilograms of product in a single shipment, the entire shipment should arrive on the same day. However, this did not occur, and the shipment was sent in partial, with 600 kg arriving on Monday and 400 kg arriving on Thursday. This issue could affect customer complaints as well.

2.2.9. Weather Impact on Ship Passages

Weather extremes and climate change will have a significant impact on transportation operations. Various causes and sub-factors have recently caused supply network transportation disruptions; for example, poor weather and natural disasters disrupted transportation and significantly impacted supply chains (Sheffi, 2015). According to

the World Meteorological Organization (2015), heavy precipitation can significantly disrupt the entire surface transportation system, including the transport of goods by train, truck, ship, and barge. Wet roads impede cars, high winds delay trucks, and ice and snow stop trains, according to the World Meteorological Organization (2015).

According to Foerster (2019), weather delays may increase the cost of transporting these items to their final destinations. Bad weather requires careful freight handling and security, and tank-leaked products must be stored and safeguarded. When making daily transportation decisions, such as how much cargo an airplane or ship can transport safely, weather conditions must be considered. World Meteorological Organization (2015) concluded that weather-related operational information would be critical to minimizing delivery delays and improving transportation safety, reliability and efficiency.

Figure 2.3. A Tidal Flood Blocks the Plane's Path To the Airport

Frequently, severe weather conditions make it difficult to reach eastern Indonesia. In the east, it frequently rains and thunders, preventing planes from taking off; in the sea, the waves above are thunderous and turbulent; in addition, strong winds affect the stability of planes. With heavy rain, the potential for dense clouds to become turbulent cannot be reached, and there is a minimum height limit for the plane. Obviously, the Flight will be canceled under these circumstances, and this may also result in the

accumulation of cargo at hubs and suboptimal distribution centers as additional challenges.

2.2.10. Damaged Cargo

Shipments are subjected to a variety of environmental conditions, some of which are beyond human control, and accidents can occur at any time and from any location, resulting in damaged cargo. The pandemic and nationwide lockdown led to flight cancellations and cargo accumulation in distribution centers and airport hubs, making cargo management in distribution centers suboptimal and increasing cargo damage risk during delivery. If the shipment is insured, the company must contact the insurer immediately and report the damage. Longer routes, shipments requiring more handling due to liability issues, or deliveries to underutilized lanes increase the risk of package damage; goods may need to be moved to another truck or multiple trucks to reach their final destination, according to Flock Freight (2018). While carriers and manufacturers try to minimize damage, it is unavoidable in the shipping industry due to human error. According to Bodenheimer (2019), industry surveys and data suggest that up to 11% of shipments arrive damaged. AJOT (2017) researched that an average of 1,582 shipping containers are lost in transit, 568 of which are not due to "catastrophic events" at sea.

CHAPTER III

THE LION PARCEL CASE AND THE USED METHODOLOGY

This chapter introduces the Lion Parcel case and the pandemic-related government restrictions on aviation logic. This chapter also provides a brief theoretical context for the methodology, which will be approached in two stages.

3.1. Lion Parcel as a Logistics Company in Indonesia

Lion Parcel, or PT Lion Express, is an Indonesian logistics firm that operates as a subsidiary of the Lion Group, the largest aviation company in Indonesia and the country's largest low-cost airline. The company was established in 2013 as Lion Express and later rebranded as Lion Parcel in 2016 and offers door-to-door or first-mile to last-mile delivery services throughout Indonesia and internationally. Being a part of the Lion Group gives the company a significant advantage as it has more flexibility through using the group's fleet of aircraft and scheduled service, enabling it to deliver packages faster nationwide. Currently, the company teams up with 7.000 active agents and can deliver to all 34 provinces, 476 cities, 7000 sub-districts, and 81.269 districts in Indonesia, employing 10,000+ courier deliveries and 700+ fleet deliveries distributed around the archipelago. The network of Lion Parcel, which includes 92 Consolidators, 78 Sub-Agents, and 39 Sub-Consolidators, covers up to 98 % of Indonesia's sub-districts.

At the age of eight, Lion Parcel had 7000 partners dispersed throughout Indonesia, allowing the community to connect regardless of time or distance. Lion Parcel utilizes the Lion Group's network and infrastructure to provide service for local and international deliveries from the first mile to the last. Lion Parcel's Interpack (international delivery package) service now serves nine countries, with plans to

expand to more in the near future by leveraging the Lion Group's global aircraft network. Only because a pandemic still exists will the process of exporting the product abroad be influenced by each state's unique pandemic policy.

Figure 3.1. Sub Consolidators of Lion Parcel All Around the Country

Source: Lion Parcel's Company Profile, 2020

Figure 3.2. Lion Parcel's International Package Service (Interpack)

Source: Lion Parcel's Company Profile, 2020

Lion Parcel provides a comprehensive range of solutions to fulfill the diverse needs of its clients. Some of their products are as follows:

- Regpack: Package delivery with an SLA of 2-3 days for a regular charge and service.
- One pack: One-day delivery service (ship today, delivered tomorrow) with a money-back guarantee if the package is not delivered the following day.
- Jagopack: Regpack delivery with a more economical price
- Interpack: Package and document delivery from Indonesia to overseas
- Docupack: Special delivery service for document commodities across Indonesia for a single flat fee per shipment destination
- Big pack: Delivery of large packages starting at 10 kg with a more cost-effective price
- Landpack: Packages can be delivered throughout Java Island at a very low cost by using the railway mode

More than 100,000 corporate clients and an even greater number of retail clients rely on Lion Parcel to deliver their products because the company provides a comprehensive transportation solution for nearly every industry, including numerous logistics organizations, heavy machinery, electronics, spare parts, vaccines, pharmaceuticals, food and beverages, emergency supplies and others. Lion Parcel's clientele includes BCA, Honda, IKEA, Samsung, Toyota, Tokopedia, FedEx, DHL, Xiaomi, United Tractors, CGV, and others. In addition, Lion Parcel is capable of managing and serving emergency shipments, including vaccines, pharmaceuticals, chemicals, and other items that require precise handling and prompt delivery. The following capabilities are required to provide a comprehensive transportation solution:

- Integrated service: Lion Parcel combines its air, land (trucking), automobile, and motorcycle fleets to provide comprehensive delivery services throughout the archipelago on a daily or recurring basis. Among the additional services available is cash on delivery, shipment return, and signed documents.
- Affordable prices with strict time supervision: Lion Parcel utilizes dependable transporters for all types of deliveries, including documents, packages, truck leasing, large bulking, etc., to ensure effective on-time delivery and low prices.
- Real-time delivery status in one dashboard: An integrated API link between Lion Parcel transporters enables the monitoring of services, the real-time viewing of delivery statuses, and the availability of a simple tracking dashboard.

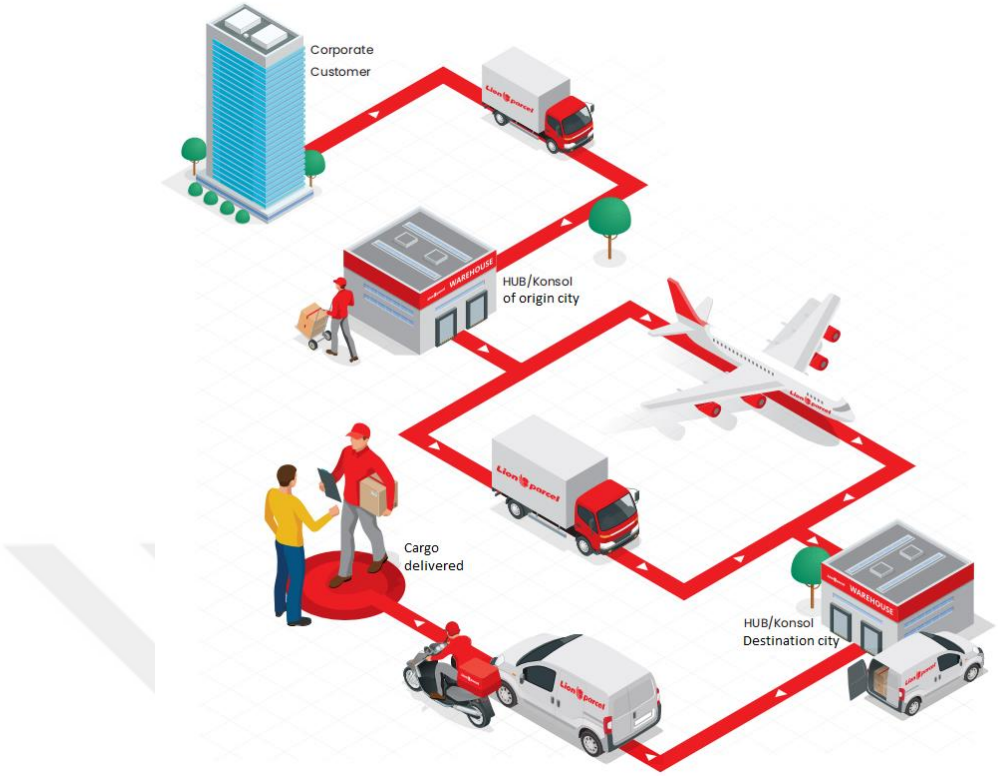


Figure 3.3. Integrated Flow Process for Securely Delivering Packages to Corporate Clients' Shipping Addresses

There are numerous advantages to using Lion Parcel, as well as unique selling propositions (USPs) that include the following:

Competitive Price: According to the "RajaOngkir" app, which compares shipping prices from all Indonesian logistics providers, Lion Parcel has the lowest prices in its industry.

- Lion Group Network: There are over 10,000 courier deliveries and 700 fleet deliveries across the archipelago that are dependable and never stops delivering, even on holidays, and are available 24 hours a day, seven days a week.
- Integrated system and tracking visibility: Any customer can track their shipment and obtain detailed, real-time information regarding their cargo delivery, including their flight number, flight schedule, and any changes or delays.
- Reliable service level agreement (SLA): Has a high rate of on-time delivery. By 2021, the company will have achieved a 98 % on-time delivery rate, a 94

% on-time next-day delivery service, and a 0.04 % claim rate, according to the company's data.

- Money-Back Guarantee: If a customer's pack (one-day delivery service) shipment does not arrive on time, they will receive a full refund.
- Customer service: Non-corporate customers have access to customer support 24 hours a day, seven days a week, on the website and in the app. Corporate customers have dedicated salespeople available at all times.
- Delivery Insurance: Shipments that are insured will be replaced in full if they are damaged during delivery.
- Free pickup: Corporate and non-corporate clients can request a free pickup from any location in Indonesia using any motorcycle, blind van, or truck 24 hours a day, seven days a week.
- Powerful App: All clients can use the Lion Parcel app to request pickup, check tariffs, pay shipping fees, contact customer service, and track shipments in real time.

Lion Parcel aims to continuously improve everything to provide the most seamless experience and reliability possible. Internally, as a team, and externally, as a service to the customer, Lion Parcel defined the beliefs, qualities, and behavioral norms that, according to management, should guide the company's vision and mission. There are four guiding business principles that govern the company's operations:

- Rise to every challenge: Being open to being challenged affords the opportunity to be more inventive.
- Show honest results: Honesty increases receptivity to empowerment and enables the enhancement of work quality.
- Innovation through collaboration: As a result of shared ownership, collaboration fosters the development of more innovative ideas and inventive solutions.
- Trust the team: Trust is the foundation of an effective team. Trusting the team, which includes not only believing someone is capable of performing their dutie but also trusting in their integrity and strength.

3.2. Government Travel Restrictions in Indonesia Due to COVID-19 Pandemic

The World Health Organization (WHO) declared COVID-19 a "global health emergency" on January 30, 2020. It proposed avoiding travel or trade restrictions related to COVID-19 in February 2020. International travel was restricted, and by the start of the year 2020, it was effectively banned. Efforts to improve public health are intensifying as disease transmission rates soar. To slow the spread of the virus, the majority of nations have implemented human containment, border restrictions, and quarantines. Numerous nations have implemented lockdowns, travel bans, border closures, school and office closures, and restrictions on mass gatherings during this time. Fifty-nine nations have total travel bans and closed borders, while 85 have only partial closures. In approximately 160 countries, schools have been closed to prevent the spread of COVID-19. Regarding the implementation of mobility restrictions, restrictions, and even lockdowns, there is no standardized model that all nations use.
In response to COVID-19, Indonesia has implemented its own travel restrictions and quarantine measures. In accordance with World Health Organization's evaluation standards based on transmission rate indicators and response capabilities, the federal government has agreed to implement the Emergency Community Activity Restrictions (PPKM) policy at level 4 in 2020-2022, repeating the policy at multiple intervals. Although business entities were affected by the policy, this was an unavoidable circumstance. The Minister of Internal Affairs evaluated the situation and issued an Instruction of the Minister of Internal Affairs for Emergency PPKM No. 15 of 2021 Concerning the Enforcement of COVID-19 Restrictions on Emergency Community Activities, the legal basis for this crisis.

This circular letter modifies the Minister of Transportation's Circular Letter SE 45 of 2021 regarding domestic air travel during the COVID-19 pandemic in order to implement the Task Force's Circular Letter 15 of 2021 concerning community activity restrictions. This amendment incorporates the Aviation Law No. 1 of 2009 and the Government Regulation No. 21 of 2020 on Large-Scale Social Restrictions in COVID-19 Acceleration. The sections of the PPKM policy for domestic air travel in Indonesia during the COVID-19 pandemic are as follows:

- Passengers traveling for work in essential and critical sectors are required to present a Worker Registration Certificate (STRP) or Assignment Orders from the Heads of Institutions at the Echelon II level or other certificates issued by the local Regional Government.
- A travel certificate containing a referral letter from the hospital, cover letter from the local or regional apparatus, Death Certificate, or other certificate is required for persons/passengers with urgent needs, as referenced in point (3) letter (b).
- Extend the Circular Letter's validity period according to the needs and/or the newest advances in the sector.
- Vaccination cards and a certificate of negative RT-PCR test results are required 2x24 hours prior to departure.
- Before departure, passengers must present a negative RT-PCR or antigen rapid test result within 2x24 hours or a negative antigen rapid test result within 1x24 hours. The requirement to present a vaccination card is waived for: Travelers with special medical interests who are not/have not been vaccinated for medical reasons based on a statement from a specialist doctor; Patients with serious illness; or pregnant women whom 1 (one) family member accompanies.
- Passengers under the age of 18 are not permitted to travel during the Eid al-Adha 1442 Hijr period from July 19 to July 25, 2021. Except: Passengers requiring essential sector labor with a Worker Registration Certificate (STRP) or Assignment Orders from the Heads of Institutions at Echelon II level or other certificates issued by the local Regional Government.

The international flight restrictions that apply to flights to or from Indonesia are as follows:

- To enter Indonesian territory, all international visitors must use the Peduli Lindungi application. Foreign passengers must also have health/travel insurance in Indonesia that includes quarantine and COVID-19 treatment.
- Negative PCR test results (D-3 departure) and submission of the Indonesian International e-HAC via the PeduliLindungi application.
- Passengers will be retested for RT-PCR and placed in quarantine for an additional eight days. On the seventh day of the quarantine, retest RT-PCR. If the test is negative, you will be able to travel after the ninth day. If positive, hospitalization is required.

- Diplomatic and service visas are excluded from the quarantine requirement (for official/state visits by foreign ministers).

In addition, Minister of Internal Affairs Number 24 of 2021 governs the execution of PPKM level 4 in terms of community activities, which include:

- Non-critical work can be performed at home (WFH). Non-essential sector: 0% work from office; essential sector: 25% to 50% work from office depending on the nature of service; crucial sector: 100% work from the office.
- The market may open at 25% capacity and close at 15:00. If they operate at fifty percent capacity, the closing time for stores and markets that sell necessities is 8 o'clock at night. Malls are closed with the exception of pharmacies and drugstores.
- The maximum capacity of street vendors, food booths, street vendors, hawker stalls, and establishments of a similar nature is three people, and they are open until 20:00. The duration of dining in a restaurant is limited to 30 minutes. The indoor restaurant serves only takeout and delivery.
- All teaching and learning are conducted exclusively online.
- Congregational activities are not permitted in places of worship. There are no open public facilities. Social, cultural, and sporting events, as well as wedding receptions, are prohibited. Public transportation limits 70% capacity.

Nevertheless, social restrictions and lockdowns are less severe than they were in March-April 2020; they are more targeted and limited. This is achieved by evaluating the economic impact and the likelihood of social unrest, such as lockdown protests. Movement and interaction restrictions are detrimental to the economy. Restricting economic activity via lockdowns, physical separation, travel restrictions, and other policies have enormous consequences. Mobility and transit were hindered by order constraints in airlines, which burdened international trade.

The number of passengers in the aviation industry decreased significantly as a result of these regulations, resulting in severe effects on the transportation of aviation companies. According to Orinaldi (2021), the total number of international tourists visiting Indonesia between January and September 2020 was only 3.56 million, a 70% decrease from the previous year. Between January and September 2020, total domestic

travel by plane, train, and ship fell by 53.8 %. Domestic airline passengers totaled only 23.5 million between January and September 2020, a 58 % decrease from the previous year. Travel restrictions, the government's policy of reducing collective leave on religious holidays, and the general public's fear of pandemic risks significantly decreased international visitor visits.

Despite losing between 7 and 13 percent of its workforce, Sobieralski (2020) forecasts that the aviation industry will recover in six years. Larger airlines have been hardest hit by job losses, while smaller airlines have fared better. Because of border restrictions, fears of infection, and lengthy quarantine periods, airlines must suspend parts of their flight operations. According to Martin et al. (2020), the airline industry has a significant impact on a number of other industries, such as aircraft manufacturing, the production of goods (air freight), the sale of vehicles, and tourism (air travel). Analyzing the aviation industry's COVID-19 pandemic preparedness procedures will improve the sustainability of the supply chain.

3.3. Used Methodology

From a literature review on logistical disruptions in logistical organizations that yields a list of all logistical company issues validated by Lion Parcel, which operates within the COVID-19 Pandemic Government Travel Restrictions, the author can quantitatively collect the data. The quantitative and qualitative methodologies employed in this study fall into two distinct categories. Quantitatively, the author employs Fuzzy-DEMATEL, while qualitatively, a semi-structured interview is used.

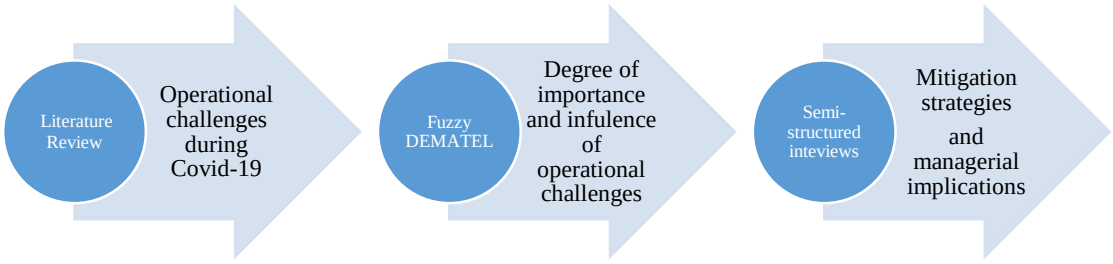


Figure 3.4. Used Methodology

Building a strategy timeline is a unified group decision-making procedure from the standpoint of strategic decision-making in an organization. DEMATEL may be used as a structural modeling approach framework if we see the strategy timeline process as a structural modeling framework for identifying cause-and-effect links among strategic goals. The DEMATEL technique identifies the causal connections between all of the challenges identified. In general, the author argues that understanding which ones are most prominent, their causes, and their impacts when constructing a schedule for strategic mitigation is essential for addressing the ambiguity inherent in these types of boardroom discussion assessments.

The objective of the structured interview is to describe how aviation logistics companies can adapt their supply chains to withstand future disruptions, and the Fuzzy-DEMATEL provides input for the interviews because, prior to addressing challenges and implementing strategic mitigation strategies in aviation logistics companies, it is necessary to acquire additional knowledge about the list of significance and influence of operational challenges, as depicted in Figure 3.4.
Consequently, the use of a mixed method model is justified by the fact that both methods complement each other and thus justify the use of a mixed method model. In addition, the author aims to provide more evidence, more applicable results, and future recommendations for operational management contributors.

3.3.1. The Fuzzy-DEMATEL

During the COVID-19 Pandemic, logistical firms are constantly striving to meet their goals but are frequently hampered by numerous obstacles; thus, ahead of discussing the mitigation strategy, it is necessary to study factors that assess the interplay of the challenges and determine the effectiveness of these factors through the study of their influence power on other factors. Two of the project's core research questions are a) What are the major supply chain problems during the COVID-19 pandemic? and b) how do these significant problems interact causally? For evaluating this sort of difficulty, a multi-criteria decision-making (MCDM) approach is optimal (Raj et al., 2022).

The MCDM approach depicts the causal linkages between components through an impact relationship map and demonstrates how elements affect one another (Kabak et al., 2016). According to Jahan et al. (2013), MCDM offers a framework for choosing, sorting, and prioritizing resources and assists in the overall evaluation. It may also refer to the process of identifying the best possible solution based on set criteria and daily situations. As a result, the author made the decision to conduct the analysis using MCDM. Methods that fall under the MCDM umbrella include AHP, ISM, ANP, and the Decision-Making Trial & Evaluatory Laboratory (DEMATEL).

As elaborated by Raj et al. (2022), AHP may be used to identify the rank of an element, whereas ISM can be used to examine the logical relationships between elements. ANP examines rankings, identifies component interdependencies, and solves the consistency issue; yet, ANP has limited application owing to the technique's complexity. DEMATEL beats prior techniques by exhibiting the correlations between numerous components (Cause and Effect), ordering the elements according to the sorts of connections, and stressing the significance of one factor over another. DEMATEL is a prominent approach for making judgments using many criteria, according to Raj et al. (2022)

According to Tsai et al. (2014), the DEMATEL method, which employs matrices or digraphs, facilitates the visualization of complex interdependent relationships. According to Hsu et al. (2013), the DEMATEL approach is currently widely used in green supply chain management, sustainable supply chain management, sustainable consumption and production, risk analysis, and other subjects. As elaborated by Ayhan et al. (2014), in the DEMATEL technique, determining the initial direct relation matrix generally requires group multi-expert knowledge aggregation. It is an effective technique for obtaining group knowledge in order to capture the causal link between criteria and properly define the cause-effect relationship of criteria when assessing an issue.

On the other hand, the DEMATEL approach has its own limits. According to Raj et al. (2022), it is incapable of functioning in confusing or unclear circumstances when there is a lack of knowledge or while settling professional difficulties. Situations in the real world, like the COVID-19 epidemic, are hazy, complicated, and plagued with

ambiguous and obscure facts and information, resulting in poor human judgment and decision-making. According to Xia et al. (2015), the conventional DEMATEL method could be unable to control such ambiguity. Therefore the standard DEMATEL technique can be combined with a fuzzy approach to eliminate such ambiguity. According to Ayhan et al. (2014), the fuzzy systems theory focuses on the uncertainty issues caused by small samples and limited information. Information coverage and sequence operators' work reveals the natural laws of evolution and motion of events and materials; one of its characteristics is the ability to build models using small amounts of data. According to Rajesh & Ravi (2014), in order to overcome the above-described concerns, we employ Fuzzy System Theory and the DEMATEL technique to construct a systematic challenge assessment methodology.

According to Chang B et al. (2011), the fuzzy theory provides the idea of membership function in order to account for a variety of linguistic factors. The fuzzy hypothesis can be combined with DEMATEL approaches for solving relevant issues. Fuzzy set theory is concerned with unclear and non-statistical causes of uncertainty or imprecision (Zeng, 2001). Furthermore, according to Chang B et al. (2011), a typical set, for example, would include all of the tall persons in the classroom. As a result, all people taller than 180 cm are categorized as tall, whereas those less than 180 cm are not. Instead, the fuzzy set theory would give degrees of membership in the tall set. A person who is 173 cm tall is eligible for a 0.94 degree of membership. Fuzzy set theory gives a more meaningful set membership in this instance. The fuzzy set theory benefits from being closely related to classical logic; however, it is difficult to identify how to give membership in many cases.

The ultimate goal of this study is to investigate mitigation strategies for aviation logistics challenges, which can assist managers of aviation logistics firms in developing proper precautionary strategies for disruptions. According to Seker et al. (2017), Fuzzy-DEMATEL exposes the relationships between factors and ranks the criteria based on the type of relationships and the intensity of their effects on each criterion; the method outperforms conventional techniques. According to Seker et al. (2017), DEMATEL is used to show a better knowledge of the effects of the examination of cause and effect criteria and expand the application of the model. Thus, the suggested technique can capture the causal link between criteria and is appropriate

for collective decision-making in a fuzzy context. From Opricovic and Tzeng's (2003) work, the steps of this procedure are outlined in the results and discussion.

3.3.2. Semi-Structured Interviews

Mashuri et al. (2022) stated that the semi-structured interview is more effective than other forms of interviews for qualitative research because it enables researchers to collect in-depth information and evidence from respondents while considering the study's aim. According to Kaufmann (2014), semi-structured interviews are advantageous when dealing with complicated issues because we may use probes and spontaneous questions to explore, expand knowledge, and explain responses to questions. Ahlin (2019) stated that the research method is useful for understanding the perspectives of key stakeholders within an agency because it allows the respondent to participate in the process and discuss issues related to the research questions that are of the utmost importance to people working in that specific environment.

CHAPTER IV

RESULTS AND DISCUSSION

In this subsection, the author reports and analyzes the results of this study's methodologies in a discussion of both data collection techniques. First, on the quantitative side, the author used the Fuzzy-DEMATEL technique to a) rank the importance of these issues and b) determine their interrelationships and how they interact with one another in order to determine how one challenge will affect others. Second, from a qualitative point of view, the author conducted semi-structured interviews with Lion Parcel experts to discuss the short-term and long-term supply chain mitigation strategies developed from a dynamic capability perspective.

4.1. Results of Fuzzy-DEMATEL Method

The quantitative Fuzzy-DEMATEL section of the data analysis is separated into a few sections in which the author presents all of the results and discussion in detail. These sections consist of an explanation of how the questionnaire was designed for the Fuzzy-DEMATEL method, followed by an elaboration of the calculation method and analysis, which comprises of assessment of the prominent criteria evaluation, a degree of a central role and relationship analysis, and the construction of a strategy map and causal diagram.

4.1.1. Fuzzy-DEMATEL Questionnaire Design

The author used a purposive sampling strategy in the first phase to identify experts from academia and industry. According to Tongco (2006), purposive sampling is a non-probability sampling method that relies on a small number of respondents to provide relevant and usable information. Purposive sampling is a sort of non-

probability sampling that is best successful when one wants to investigate a specific cultural.

Subject with qualified specialists, according to Tongco (2006). This sampling strategy is appropriate for the Fuzzy-DEMATEL methodology, and it has been used in numerous articles in the past (Raj et al., 2020).

Between March and April 2022, a total of 20 professionals from aviation logistics firms operating during the COVID-19 epidemic were contacted through WhatsApp and email. There were a total of thirteen responses received, all of which were from industry professionals with at least a bachelor's degree. All of the logistics experts contacted are from organizations with over 1,500 full-time and contract employees whose primary activities are logistics management, supply chain management, and air cargo. In addition, each of the industry specialists had a minimum of five years of expertise in various domains in the logistics supply chain, including warehouse and logistic operations, performance management, network and development in air cargo, demand management, and so on. During the COVID-19 outbreak, each of these experts faced and had to address at least one of the identified supply chain problems. Therefore, these professionals are suitable for this investigation. The details of the experts are included in Tables A.1 and A.2 of Appendix A, and the questionnaire is listed in Table A.3 of Appendix A.

This study uses ten evaluation criteria and symbols as follows: Shipment Tonnage Inconsistency (A1), Customer Complaints (A2), Canceled Flight (A3), 3LC Embargo (A4), Suboptimal Distribution Centres (A5), Operational Working Hours Limit (A6), Operational Cost (A7), Cargos Arrived Partially (A8), Weather Impact on Ship Passages (A9), Damaged Cargo (A10). The Fuzzy-DEMATEL approach was used to evaluate data obtained from experts. The key nine stages and outcome were carried out in the following manner:

4.1.2. Calculation Steps and Analysis of Fuzzy-DEMATEL

Fuzzy-DEMATEL is conducted using an online tool, onlineoutput.com (Online Output, 2022). This enables the author to easily process the data collected from the

questionnaire. It employs the common steps and calculation method derived from the work of Opricovic and Tzeng (2003); the steps of this procedure are outlined in the following discussion.

Step 1: Generate the fuzzy direct relation matrix

In order to identify the model of the relations among the n criteria, an n × n matrix is first generated. Fuzzy numbers represent the influence of each matrix row on each column. If multiple experts' opinions are used, all experts must complete the matrix. The arithmetic mean of all of the experts' opinions is used to generate the direct relation matrix z. (Equation 4.1).

$$z = \begin{bmatrix} 0 & \cdots & \tilde{z}_{n1} \\ \vdots & \ddots & \vdots \\ \tilde{z}_{1n} & \cdots & 0 \end{bmatrix} \quad \textbf{(4.1)}$$

The table below indicates the direct relation matrix, which is the same as the pairwise comparison matrix of the experts.

Table 4.1. The Direct Relation Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	(0.000, 0.000,0 .000)	(0.615, 0.827,0. 885)	(0.654, 0.904,0. 981)	(0.615 ,0.865, 0.942)	(0.538 ,0.788, 0.923)	(0.481 ,0.731, 0.904)	(0.538 ,0.788, 0.923)	(0.615 ,0.846, 0.942)	(0.365 ,0.558, 0.692)	(0.635 ,0.865, 0.942)
A2	(0.596, 0.827,0 .904)	(0.000, 0.000,0. 000)	(0.577, 0.788,0. 885)	(0.596 ,0.827, 0.904)	(0.404 ,0.635, 0.827)	(0.327 ,0.558, 0.769)	(0.481 ,0.712, 0.885)	(0.596 ,0.827, 0.942)	(0.327 ,0.519, 0.712)	(0.596 ,0.827, 0.923)
A3	(0.558, 0.808,0 .962)	(0.500, 0.731,0. 923)	(0.000, 0.000,0. 000)	(0.462 ,0.692, 0.923)	(0.538 ,0.788, 0.962)	(0.385 ,0.615, 0.846)	(0.365 ,0.596, 0.827)	(0.519 ,0.769, 0.942)	(0.308 ,0.519, 0.731)	(0.615 ,0.846, 0.942)
A4	(0.577, 0.827,0 .923)	(0.596, 0.827,0. 942)	(0.500, 0.731,0. 923)	(0.000 ,0.000, 0.000)	(0.558 ,0.788, 0.923)	(0.308 ,0.538, 0.769)	(0.500 ,0.731, 0.885)	(0.500 ,0.712, 0.865)	(0.365 ,0.558, 0.750)	(0.538 ,0.750, 0.885)
A5	(0.462, 0.712,0 .923)	(0.442, 0.673,0. 885)	(0.500, 0.750,0. 942)	(0.500 ,0.731, 0.923)	(0.000 ,0.000, 0.000)	(0.308 ,0.500, 0.750)	(0.442 ,0.692, 0.923)	(0.538 ,0.769, 0.923)	(0.250 ,0.423, 0.654)	(0.519 ,0.769, 0.923)

Table 4.1. (cont.)

A6	(0.385, 0.635,0 .808)	(0.442, 0.673,0. 846)	(0.462, 0.673,0. 846)	(0.558 ,0.788, 0.904)	(0.346 ,0.577, 0.788)	(0.000 ,0.000, 0.000)	(0.462 ,0.692, 0.827)	(0.500 ,0.731, 0.904)	(0.192 ,0.327, 0.577)	(0.538 ,0.769, 0.942)
A7	(0.538, 0.788,0 .942)	(0.481, 0.692,0. 865)	(0.558, 0.788,0. 923)	(0.462 ,0.692, 0.885)	(0.462 ,0.712, 0.904)	(0.365 ,0.615, 0.827)	(0.000 ,0.000, 0.000)	(0.500 ,0.731, 0.885)	(0.250 ,0.423, 0.654)	(0.538 ,0.750, 0.865)
A8	(0.558, 0.788,0 .904)	(0.538, 0.750,0. 865)	(0.615, 0.865,1. 000)	(0.519 ,0.750, 0.942)	(0.442 ,0.673, 0.885)	(0.327 ,0.558, 0.769)	(0.404 ,0.635, 0.846)	(0.000 ,0.000, 0.000)	(0.404 ,0.615, 0.788)	(0.558 ,0.808, 0.962)
A9	(0.231, 0.423,0 .615)	(0.135, 0.365,0. 615)	(0.308, 0.538,0. 750)	(0.308 ,0.519, 0.750)	(0.308 ,0.538, 0.769)	(0.231 ,0.462, 0.692)	(0.404 ,0.635, 0.827)	(0.538 ,0.788, 0.923)	(0.000 ,0.000, 0.000)	(0.558 ,0.808, 0.923)
A10	(0.596, 0.827,0 .904)	(0.673, 0.904,0. 942)	(0.654, 0.885,0. 942)	(0.673 ,0.904, 0.942)	(0.442 ,0.673, 0.865)	(0.500 ,0.731, 0.865)	(0.481 ,0.712, 0.846)	(0.577 ,0.827, 0.962)	(0.308 ,0.500, 0.654)	(0.000 ,0.000, 0.000)

The following table shows the fuzzy scale used in the model.

Table 4.2. Fuzzy Scale

Code	Linguistic terms	L	M	U
1	No influence	0	0	0.25
2	Very low influence	0	0.25	0.5
3	Low influence	0.25	0.5	0.75
4	Strong influence	0.5	0.75	1
5	Very strong influence	0.75	1	1

Step 2: Normalize the fuzzy direct-relation matrix

The normalized fuzzy direct-relation matrix can be obtained using the following formula:

$$\tilde{x}_{ij} = \frac{\tilde{z}_{ij}}{r} = \left(\frac{l_{ij}}{r}, \frac{m_{ij}}{r}, \frac{u_{ij}}{r}\right) \quad \textbf{(4.2)}$$

where

$$r = \max_{i,j}\left\{\max_{i}\sum_{j=1}^{n} u_{ij}\,,\max_{j}\sum_{i=1}^{n} u_{ij}\right\} \qquad i,j \in \{1,2,3,\dots,n\}$$

(4.3)

Table 4.3. The Normalized Fuzzy Direct-Relation Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	(0.000, 0.000,0 .000)	(0.074, 0.100, 0.107)	(0.079 ,0.109, 0.118)	(0.074, 0.104, 0.113)	(0.065, 0.095, 0.111)	(0.058 ,0.088, 0.109)	(0.065, 0.095,0 .111)	(0.074, 0.102,0 .113)	(0.044, 0.067,0 .083)	(0.076, 0.104,0 .113)
A2	(0.072, 0.100,0 .109)	(0.000, 0.000, 0.000)	(0.069 ,0.095, 0.107)	(0.072, 0.100, 0.109)	(0.049, 0.076, 0.100)	(0.039 ,0.067, 0.093)	(0.058, 0.086,0 .107)	(0.072, 0.100,0 .113)	(0.039, 0.062,0 .086)	(0.072, 0.100,0 .111)
A3	(0.067, 0.097,0 .116)	(0.060, 0.088, 0.111)	(0.000 ,0.000, 0.000)	(0.056, 0.083, 0.111)	(0.065, 0.095, 0.116)	(0.046 ,0.074, 0.102)	(0.044, 0.072,0 .100)	(0.062, 0.093,0 .113)	(0.037, 0.062,0 .088)	(0.074, 0.102,0 .113)
A4	(0.069, 0.100,0 .111)	(0.072, 0.100, 0.113)	(0.060 ,0.088, 0.111)	(0.000, 0.000, 0.000)	(0.067, 0.095, 0.111)	(0.037 ,0.065, 0.093)	(0.060, 0.088,0 .107)	(0.060, 0.086,0 .104)	(0.044, 0.067,0 .090)	(0.065, 0.090,0 .107)
A5	(0.056, 0.086,0 .111)	(0.053, 0.081, 0.107)	(0.060 ,0.090, 0.113)	(0.060, 0.088, 0.111)	(0.000, 0.000, 0.000)	(0.037 ,0.060, 0.090)	(0.053, 0.083,0 .111)	(0.065, 0.093,0 .111)	(0.030, 0.051,0 .079)	(0.062, 0.093,0 .111)
A6	(0.046, 0.076,0 .097)	(0.053, 0.081, 0.102)	(0.056 ,0.081, 0.102)	(0.067, 0.095, 0.109)	(0.042, 0.069, 0.095)	(0.000 ,0.000, 0.000)	(0.056, 0.083,0 .100)	(0.060, 0.088,0 .109)	(0.023, 0.039,0 .069)	(0.065, 0.093,0 .113)
A7	(0.065, 0.095,0 .113)	(0.058, 0.083, 0.104)	(0.067 ,0.095, 0.111)	(0.056, 0.083, 0.107)	(0.056, 0.086, 0.109)	(0.044 ,0.074, 0.100)	(0.000, 0.000,0 .000)	(0.060, 0.088,0 .107)	(0.030, 0.051,0 .079)	(0.065, 0.090,0 .104)
A8	(0.067, 0.095,0 .109)	(0.065, 0.090, 0.104)	(0.074 ,0.104, 0.120)	(0.062, 0.090, 0.113)	(0.053, 0.081, 0.107)	(0.039 ,0.067, 0.093)	(0.049, 0.076,0 .102)	(0.000, 0.000,0 .000)	(0.049, 0.074,0 .095)	(0.067, 0.097,0 .116)
A9	(0.028, 0.051,0 .074)	(0.016, 0.044, 0.074)	(0.037 ,0.065, 0.090)	(0.037, 0.062, 0.090)	(0.037, 0.065, 0.093)	(0.028 ,0.056, 0.083)	(0.049, 0.076,0 .100)	(0.065, 0.095,0 .111)	(0.000, 0.000,0 .000)	(0.067, 0.097,0 .111)
A10	(0.072, 0.100,0 .109)	(0.081, 0.109, 0.113)	(0.079 ,0.107, 0.113)	(0.081, 0.109, 0.113)	(0.053, 0.081, 0.104)	(0.060 ,0.088, 0.104)	(0.058, 0.086,0 .102)	(0.069, 0.100,0 .116)	(0.037, 0.060,0 .079)	(0.000, 0.000,0 .000)

Step 3: Calculate the fuzzy total-relation matrix

In step 3, the fuzzy total-relation matrix can be calculated by the following formula:

$$\tilde{T} = \lim_{k \to +\infty} (\tilde{x}^1 \oplus \tilde{x}^2 \oplus \ldots \oplus \tilde{x}^k)$$

(4.4)

If each element of the fuzzy total-relation matrix is expressed as $\tilde{t}_{ij} = (l''_{ij}, m''_{ij}, u''_{ij})$, it can be calculated as follows:

$$[l''_{ij}] = x_l \times (I - x_l)^{-1}$$

$$[m''_{ij}] = x_m \times (I - x_m)^{-1}$$

(4.5)

$$[u''_{ij}] = x_u \times (I - x_u)^{-1}$$

In other words, the normalized matrix, the inverse, is first calculated, and then it is subtracted from matrix I, and finally, the normalized matrix is multiplied by the resulting matrix. The following table shows the fuzzy direct-relation matrix.

Table 4.4. The Fuzzy Total-Relation Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	(0.074, 0.303,1 .485)	(0.142, 0.386,1. 561)	(0.151, 0.412,1 .639)	(0.145 ,0.401, 1.621)	(0.127 ,0.368, 1.573)	(0.108 ,0.325, 1.458)	(0.126 ,0.367, 1.560)	(0.146 ,0.406, 1.645)	(0.088 ,0.270, 1.265)	(0.152 ,0.415, 1.647) 4.4.
A2	(0.134, 0.369,1 .520)	(0.066, 0.272,1. 402)	(0.135, 0.375,1 .564)	(0.135 ,0.372, 1.552)	(0.106 ,0.330, 1.501)	(0.086 ,0.288, 1.387)	(0.113 ,0.336, 1.493)	(0.137 ,0.378, 1.579)	(0.079 ,0.249, 1.216)	(0.139 ,0.386, 1.579)
A3	(0.126, 0.361,1 .576)	(0.119, 0.346,1. 552)	(0.067, 0.282,1 .520)	(0.117 ,0.352, 1.606)	(0.117 ,0.339, 1.564)	(0.090 ,0.288, 1.441)	(0.098 ,0.318, 1.538)	(0.125 ,0.366, 1.631)	(0.075 ,0.244, 1.259)	(0.138 ,0.381, 1.634)
A4	(0.130, 0.366,1 .540)	(0.131, 0.359,1. 522)	(0.126, 0.366,1 .587)	(0.067 ,0.279, 1.473)	(0.121 ,0.343, 1.528)	(0.083 ,0.283, 1.404)	(0.115 ,0.336, 1.511)	(0.125 ,0.364, 1.590)	(0.082 ,0.251, 1.235)	(0.132 ,0.375, 1.595)
A5	(0.112, 0.338,1 .539)	(0.109, 0.328,1. 515)	(0.119, 0.351,1 .588)	(0.117 ,0.343, 1.572)	(0.053 ,0.241, 1.428)	(0.078 ,0.266, 1.401)	(0.102 ,0.316, 1.514)	(0.122 ,0.352, 1.595)	(0.066 ,0.226, 1.224)	(0.123 ,0.359, 1.597)

Table 4.4. (cont.)

		(cont. 4.4)								
A6	(0.102, 0.324,1.460)	(0.108, 0.322,1.445)	(0.114, 0.337,1.508)	(0.122 ,0.343, 1.501)	(0.092 ,0.300, 1.447)	(0.042 ,0.204, 1.256)	(0.104 ,0.310, 1.438)	(0.117 ,0.342, 1.522)	(0.059 ,0.211, 1.162)	(0.124 ,0.352, 1.529)
A7	(0.122, 0.352,1.524)	(0.116, 0.336,1.497)	(0.128, 0.362,1.569)	(0.116 ,0.346, 1.551)	(0.108 ,0.326, 1.509)	(0.087 ,0.283, 1.393)	(0.054 ,0.245, 1.398)	(0.121 ,0.355, 1.574)	(0.067 ,0.230, 1.211)	(0.128 ,0.364, 1.575)
A8	(0.127, 0.361,1.554)	(0.124, 0.350,1.530)	(0.137, 0.379,1.611)	(0.124 ,0.360, 1.591)	(0.108 ,0.330, 1.541)	(0.084 ,0.285, 1.418)	(0.103 ,0.325, 1.523)	(0.067 ,0.284, 1.512)	(0.086 ,0.256, 1.251)	(0.133 ,0.380, 1.619)
A9	(0.072, 0.268,1.338)	(0.061, 0.256,1.321)	(0.083, 0.288,1.393)	(0.082 ,0.280, 1.381)	(0.076 ,0.264, 1.344)	(0.060 ,0.229, 1.239)	(0.086 ,0.273, 1.338)	(0.108 ,0.313, 1.419)	(0.028 ,0.150, 1.016)	(0.112 ,0.320, 1.421)
A10	(0.139, 0.386,1.549)	(0.146, 0.387,1.533)	(0.149, 0.402,1.600)	(0.149 ,0.397, 1.586)	(0.115 ,0.350, 1.534)	(0.108 ,0.319, 1.423)	(0.118 ,0.352, 1.518)	(0.140 ,0.396, 1.611)	(0.080 ,0.259, 1.234)	(0.078 ,0.313, 1.510)

Step 4: Defuzzify into crisp values

The CFCS method proposed by Opricovic and Tzeng (2003) has been used to obtain a crisp value of total-relation matrix. The steps of CFCS method are as follows:

$$l_{ij}^{n} = \frac{\left(l_{ij}^{t} - \min l_{ij}^{t}\right)}{\Delta_{min}^{max}}$$

(4.6)

$$m_{ij}^{n} = \frac{(m_{ij}^{t} - min\ l_{ij}^{t})}{\Delta_{min}^{max}}$$

$$u_{ij}^{n} = \frac{(u_{ij}^{t} - min\ l_{ij}^{t})}{\Delta_{min}^{max}}$$

So that

$$\Delta_{min}^{max} = \max u_{ij}^{t} - \min l_{ij}^{t}$$

Calculating the upper and lower bounds of normalized values:

$$l_{ij}^{s} = {m_{ij}^{n}}\Big/{(1 + m_{ij}^{n} - l_{ij}^{n})}$$

(4.7)

$$u_{ij}^{s} = {u_{ij}^{n}}/{(1 + u_{ij}^{n} - l_{ij}^{n})}$$

The output of the CFCS algorithm is crisp values. Calculating total normalized crisp values:

$$x_{ij} = \frac{[l_{ij}^{s}(1-l_{ij}^{s})+u_{ij}^{s}\times u_{ij}^{s}]}{[1-l_{ij}^{s}+u_{ij}^{s}]}$$

(4.8)

Table 4.5. The Crisp Total-Relation Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	0.496	0.57	0.603	0.591	0.558	0.505	0.554	0.599	0.429	0.607
A2	0.553	0.46	0.566	0.561	0.519	0.467	0.523	0.57	0.407	0.576
A3	0.554	0.539	0.487	0.553	0.536	0.475	0.515	0.568	0.409	0.58
A4	0.553	0.545	0.562	0.477	0.534	0.466	0.525	0.561	0.411	0.57
A5	0.532	0.52	0.551	0.542	0.44	0.452	0.511	0.553	0.39	0.558
A6	0.51	0.506	0.529	0.532	0.489	0.383	0.496	0.535	0.37	0.544
A7	0.54	0.524	0.556	0.541	0.518	0.465	0.438	0.552	0.391	0.559
A8	0.551	0.539	0.575	0.557	0.525	0.469	0.518	0.487	0.418	0.577
A9	0.447	0.435	0.473	0.465	0.446	0.4	0.452	0.497	0.299	0.504
A10	0.569	0.567	0.591	0.585	0.538	0.496	0.538	0.587	0.416	0.509

Step 5: Set the threshold value

It is necessary to obtain the threshold value to construct the internal relations matrix. Consequently, incomplete relationships are disregarded, and the Network Relationship Map (NRM) is created. The NRM depicts just those relations whose values in matrix T exceed the threshold value. Calculating the average values of the matrix T is adequate for calculating the threshold value for relations. After determining the threshold intensity, all values in matrix T that are less than the threshold value are set to zero, i.e., the previously described causal relationship is disregarded.

In this study, the threshold value is equal to 0.512. The calculation proposed by Opricovic and Tzeng (2003) has been used to set the threshold value, and Online Output has been used to compute the result.

All the values in matrix T, which are smaller than 0.5120.512, are set to zero; that is, the causal relation mentioned above is not considered. The model of significant relations is presented in the following table.

Table 4.6. The Crisp Total-Relationships Matrix by Considering the Threshold Value

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	0	0.57	0.603	0.591	0.558	0	0.554	0.599	0	0.607
A2	0.553	0	0.566	0.561	0.519	0	0.523	0.57	0	0.576
A3	0.554	0.539	0	0.553	0.536	0	0.515	0.568	0	0.58
A4	0.553	0.545	0.562	0	0.534	0	0.525	0.561	0	0.57
A5	0.532	0.52	0.551	0.542	0	0	0	0.553	0	0.558
A6	0	0	0.529	0.532	0	0	0	0.535	0	0.544
A7	0.54	0.524	0.556	0.541	0.518	0	0	0.552	0	0.559
A8	0.551	0.539	0.575	0.557	0.525	0	0.518	0	0	0.577
A9	0	0	0	0	0	0	0	0	0	0
A10	0.569	0.567	0.591	0.585	0.538	0	0.538	0.587	0	0

Step 6: Final output and create a causal relation diagram

The next step is to find out the sum of each row and each column of T (in step 4). The sum of rows (D) and columns (R) can be calculated as follows:

$$D = \sum_{j=1}^{n} T_{ij}$$

(4.9)

$$R = \sum_{i=1}^{n} T_{ij}$$

Then, the values of D+R and D-R can be calculated by D and R, where D+R represents the degree of importance of factor I in the entire system and D-R represent the net effects that factor I contributes to the system. The table below shows the final output.

Table 4.7. The Final Output

	R	D	D+R	D-R	Prominence Rank (as per D+R)	Net Influence Rank (as per D-R)
Damaged Cargo	5.585	5.395	10.98	-0.189	1	7
Shipment Tonnage Inconsistency	5.304	5.512	10.816	0.208	2	3
Cargos Arrived Partially	5.51	5.216	10.726	-0.293	3	10
Canceled Flight	5.491	5.217	10.708	-0.275	4	9
3LC Embargo	5.404	5.202	10.606	-0.201	5	8
Customer Complaints	5.203	5.201	10.404	-0.002	6	5
Operational Cost	5.07	5.084	10.153	0.014	7	4
Suboptimal Distribution Centres	5.103	5.048	10.15	-0.055	8	6
Operational Working Hours Limit	4.577	4.891	9.468	0.314	9	2
Weather Impact on Ship Passages	3.939	4.418	8.357	0.48	10	1

The following figure shows the model of significant relations. This model can be represented as a diagram in which the values of (D+R) are placed on the horizontal axis and the values of (D-R) on the vertical axis. The position and interaction of each factor with a point in the coordinates (D+R, D-R) are determined by the coordinate system. The causal diagram was built by the horizontal axis (D + R), which is the degree of a central role. The vertical axis (D - R) is the degree of relation. In addition, Fig. 4 illustrates the causal links between the assessment criteria using the data reported in Table 4.7. According to the diagram and table above, each factor can be assessed based on the following aspects:

- The horizontal vector (D+R) represents the degree of importance each factor plays in the entire system. In other words, (D + R) indicates both factors I's impact on the whole system and other system factors' impact on the factor.
- The vertical vector (D-R) represents the degree of a factor's influence on the system. In general, the positive value of D-R represents a causal variable, and the negative value of D-R represents an effect.

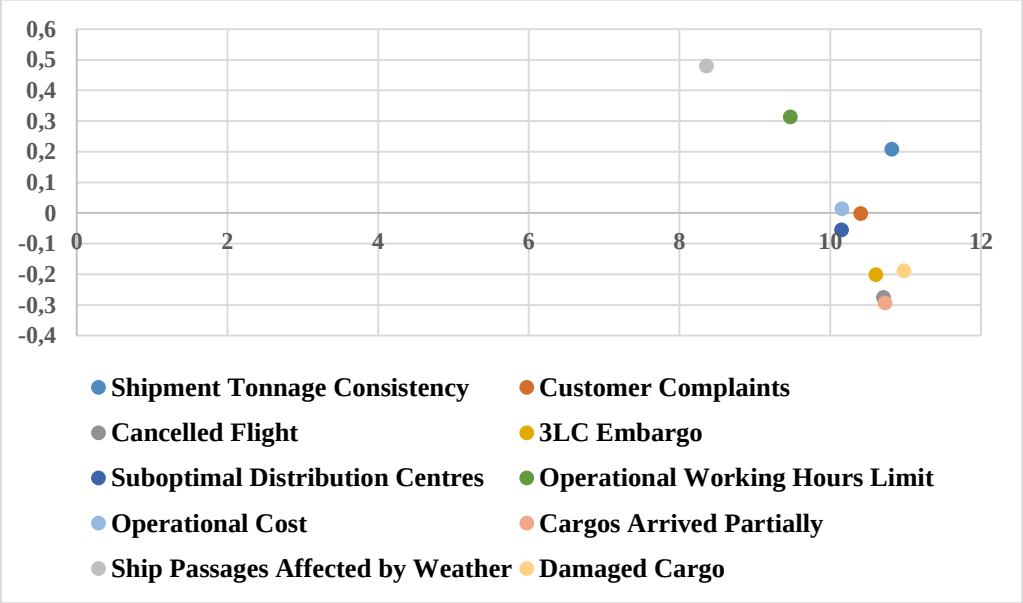
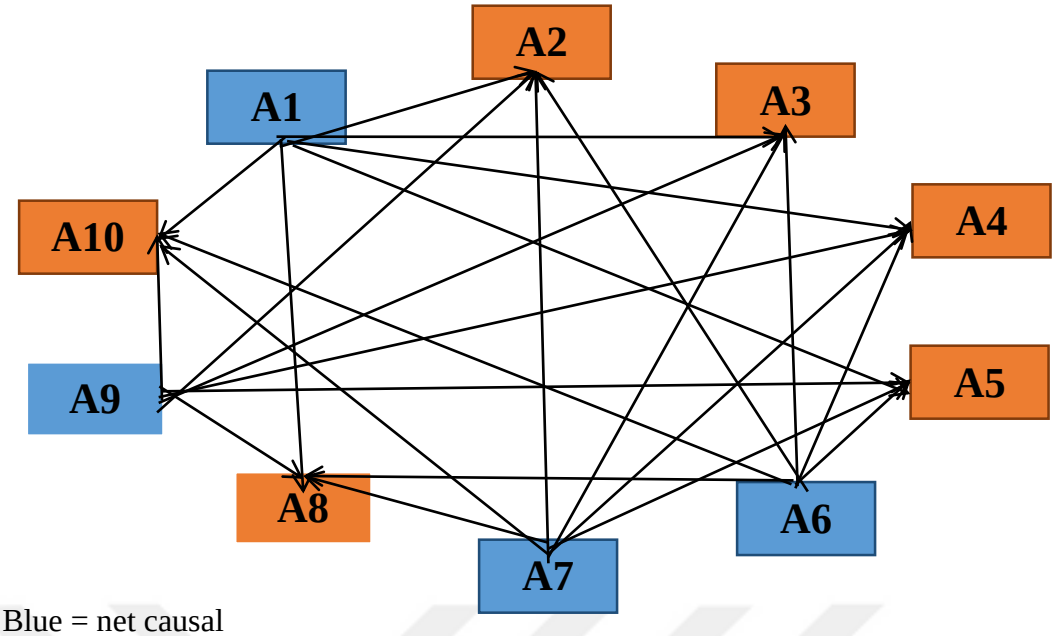


Figure 4.1. Cause-Effect Diagram

This work establishes a threshold value to shift critical evaluation criteria from the total-relation matrix M from Table 4.5 to analyze of a central role and relation. The degree of central role $(D_x + R_x)$ in DEMATEL represents the strength of influences both dispatched and received. On the other hand, if $(\mathbf{D}_x - \mathbf{R}_x) > 0$, then the evaluation criterion x dispatches the influence then evaluation criterion more than it receives. If $(\mathbf{D}_x - \mathbf{R}_x) > 0$, the evaluation criterion x receives the influence from other evaluation criteria more than it dispatched. The $(\mathbf{D}_x - \mathbf{R}_x)$ values are reported in Table 4.7.



Blue = net causal

Orange = net effect or receiver

Figure 4.2. The Impact Relationship Map for The Evaluation Criteria

4.2. Discussion of Fuzzy-DEMATEL

The prominent factors make up the first and most important group after calculating their relative importance to the system. On the contrary, the prominent factors contain both cause and effect aspects. According to the major cause analysis, these challenges need immediate attention. In addition, cause (influencing) and effect (resulting) aspects necessitate individual attention (Bai & Sarkis, 2013). For clarity, the author will explore each element independently and assess their relationships using expert opinions. The author then discusses supply chain mitigation strategies for COVID-19 and beyond.

4.2.1. Prominent Challenges

The prominence of the factors can be ordered as follows: Damaged Cargo > Shipment Tonnage Inconsistency > Cargos Arrived Partially > Canceled Flight > 3LC Embargo > Customer Complaints > Operational Cost > Suboptimal Distribution Centres > Operational Working Hours Limit > Weather Impact on Ship Passages. Damaged

Cargo, Shipment Tonnage Inconsistency, Cargos Arrived Partially, and Canceled Flight is therefore identified as the four most prominent challenges.

Damaged cargo has been determined to be the greatest obstacle. If a shipment is damaged, dissatisfied customers may lose trust and switch logistics providers. The author's conversations with logistics specialists confirmed that damaged cargo might also result in an increase in operational costs for companies to remain solvent. The greater a company's damage liability, the greater the impact on its operational cost viability if cargo damage liability is not charged to a cargo insurance provider. Damaged cargo is frequently the result of other supply chain problems and a significant impediment to other problems, such as customer complaints or shipment tonnage inconsistency.

Shipment Tonnage Inconsistency emerged as the second most significant challenge for aviation logistics companies in the COVID-19 scenario. This was confirmed by aviation logistic experts, who said the e-commerce boom, an increase in shipments during peak season, a decrease in shipments due to poor operations and delivery, and other factors might affect shipment tonnage inconsistency. The pandemic affects sales and production in several customer sectors, causing shipment tonnage fluctuations for their logistics partner. Some sectors' sales fell or rose steadily. As customers lose loyalty to logistic partners due to customer complaints, shipment tonnage decreases. Razdan & Kumar (2020) add that supply is likely to be inconsistent due to market volatility, supply-side constraints, and uncertain operations continuity by suppliers and transporters.

Cargos Arrived Partially is the third most prominent challenge. Customers are irritated when a bulk delivery is delivered in pieces because it delays the SLA. This incident is related to transportation and labor issues, as there are so many items piled up in the hubs that it is difficult for laborers to schedule and arrange shipments in an order, resulting in the first-in-last-out (FILO) system. The FILO system is a major cause of cargo delays and partial deliveries. Partial delivery of large shipments led to poor performance and customer complaints.

According to the author's study, the Canceled flight is the fourth most significant problem, caused by transportation and mobility constraints. Flight cancellations are also a direct result of the pandemic's drop in passenger numbers, as air cargo companies that use commercial aircraft to transport cargo must have at least 50% of their seats occupied. Industry experts reaffirmed this point and added that frequent flight cancellations lead to additional supply chain issues and an immediate cascade effect on delivery timelines, which led to distribution center and hub capacity issues, an increase in operational costs, and partial cargo deliveries, all of which result in customer complaints at the outbound end of the supply chain.

4.2.2. Causal or Iıfluencing Group

On the basis of D-R ratings, the most influential factors (causal factors) have been identified. According to Table 4.7, the author may rank the following causal factors: Operational Cost, Shipment Tonnage Inconsistency, Operational Working Hours Limit, and Weather Impact on Ship Passages.

The position of Operational Cost at the top of the list of four identified causal variables suggests that it is the most critical or causative element. Due to declining passenger aircraft capacity and high cargo aircraft expenses, air freight costs are likely to rise. According to CNBC (2021), logistics costs and related services increased across most organizations in an emerging economy after the pandemic. COVID-19 has changed the way air cargo logistics firms work. Supply chains and trade routes were disrupted, necessitating logistics firms to develop new mitigation strategies and contingency plans to manage the chaos. As Azka (2020) explains, air freight agents believed costs were up to three times higher and transit times were longer due to the government's temporary suspension of flights in anticipation of COVID-19 spread. According to Mackenzie (2020), Amazon's shipping costs increased 57% YoY in Q3 to $15 billion due to global supply chain issues and higher freight and shipping costs. This supports the prevailing notion that during the COVID-19 pandemic, increased operational expenses pose a significant challenge to the global supply chain and that effective strategies for reducing costs must be implemented.

Shipment Tonnage Inconsistency was identified as the second most significant challenge to the operations. The inconsistency of shipment tonnage is tricky for logistics companies because it is not very easy to quickly modify the scheduled comprehensive plan to send cargo, given the costs, labor force, and complexity of operations and capability. The preceding evidence and expert testimony demonstrate that shipment tonnage inconsistency is a significant factor in supply chain management.

Operational Working Hours Limit is the third significant causative difficulty. Despite the presence of numerous new obstacles such as excess shipment tonnage, suboptimal distribution centers, and airport hubs, a lack of available flights, and the accumulation of other obstacles, logistic firms must still ensure that the SLA for the delivery queue is met on time, necessitating that workers put in extra hours. According to industry experts, operations never cease and run continuously.

4.2.3. Effect or Resulting Group

In contrast, the ranking of the effect or resulting variables is as follows: Customer Complaints > Suboptimal Distribution Centres > Damaged Cargo > Cargos Arrived Partially > Canceled Flight > Damaged Cargo > 3LC Embargo > Canceled Flight > Cargos Arrived Partially. These factors are affected by the aforementioned causal factors that impede the efficient operation of supply chain logistics in operating businesses. This group of challenges is categorized as an effect or consequence, as it is primarily the result of other supply chain system difficulties and thus requires significant individual attention.

Customer Complaints are the most susceptible to the causal factors' effect because they are most closely associated with the causal group. According to the information gathered from the interview, this is because it is also the most critical factor, given that customer satisfaction and company retention are the purpose of the entire operation.

Suboptimal Distribution Centres ranked second in the effect group, indicating their proximity to the cause group. This belongs in the effect group since the actual cause

of this problem is the high number of canceled flights, but there are not enough flights to meet demand; therefore, this problem occurs.

Damaged cargo is the third supply chain issue categorized as an effect or consequence. This is because cargo damage was caused by exposure to various environmental factors, some of which are beyond human control, and cargo damage can occur at any time. According to interviewed experts, cargo damage is not caused by individuals who throw cargo around. During the takeoff of a commercial aircraft, if the stacking or stuffing arrangement is incorrect, the cargo in front of the cargo side will crush the cargo in the rear, and the lightweight cargo will be automatically damaged by heavy-weight cargo. Upon landing, goods are stacked atop one another and beaten twice, creating the appearance of goods colliding. Individual mitigation strategies should mitigate this occurrence as much as possible.

According to our findings, 3LC Embargo ranks fourth among the effect group. According to experts' interviews, the embargo results from weather conditions that make it impossible to transport cargo and government regulations prohibiting entry. Order restrictions, human mobility, and transit were suspended, imposing a substantial burden on sea and road freight and limiting commerce.

Canceled flights ranked fifth due to the nationwide lockdown, and restricted policies disrupted aviation logistics. When using a commercial aircraft to transport cargo, the flight will be canceled if the number of passengers falls below 50%. According to experts in the field, the canceled flight, along with other obstacles, is a significant contributor to logistical difficulties.

Cargos Arrived Partially ranked sixth among the effects and has the most negligible impact on the supply chain compared to the primary elements. According to experts interviewed, this is due to the lack of sufficient supervisors in hubs who can conduct a recap of incoming and outgoing shipments. Since the accumulated cargo is so massive and has led to suboptimal distribution centers, Cargos Arrived Partially is regarded in the effect/result group.

4.3. Results and Discussion on Semi-Structured Interviews

The author compiled her findings with two top-level industry practitioners at Lion Parcel to analyze the data and recommend a suitable course of action to mitigate the practical supply chain challenges. The author used purposive sampling to identify these experts and ensured that none of them had participated in the initial pairwise comparison, which is required for Fuzzy-DEMATEL analysis.

The author determined that these prominent respondents had at least 20 years of industry experience, with an average of 23 years of expertise in operations, sales, distribution, logistics, and consulting. To obtain a range of perspectives, the author includes key respondents with knowledge of both the customer, operations, and delivery sides of logistics. Based on these criteria, the author selected two senior industry professionals (designated R1 and R2) to analyze the data and recommend future mitigation strategies to address practical supply chain issues. All experts (R1 and R2) agreed that firms faced an exceptional situation during the outbreak and that short-term and long-term mitigation measures are necessary. R1 is the Head of First Mile & Last Mile for Lion Parcel and has 22 years of experience in Logistics, while R2 is the Regional Sales Manager for Lion Parcel and has 25 years of experience in Logistics.

Based on the dynamic capability theory, the author provides mitigation solutions for all three categories, namely the customer side, the operations side, and the delivery side, to increase the capability under the dynamic circumstances caused by the COVID-19 pandemic. The dynamic capabilities perspective emphasizes the significance of organizations' capabilities in identifying opportunities and threats, exploiting prospective opportunities, mitigating risks, and reconfiguring resources and capabilities to maintain a competitive advantage in a dynamic business environment. Consequently, it is the most influential theoretical tool for researching COVID-19 mitigation strategies. The author thinks the same ideas and solutions may be used for future comparable natural or man-made catastrophes, despite our mitigation approaches centered on the logistical supply chain issues identified during the COVID-19 epidemic.

These mitigation strategies have been analyzed in terms of the essential competencies and resources that the manufacturing company in question must identify and adopt from a supply, demand, and logistics perspective to make its supply chain more robust to future adversities. Furthermore, the literature proposes that supply chain managers develop short- and long-term pandemic mitigation strategies (Belhadia et al., 2020). The following section expands on the described mitigation solutions in terms of customer-side, operations-side, and delivery-side difficulties and subcategorizes each from a short-term and long-term viewpoint.

4.3.1. Capabilities on the Customers' Side

In this part, we cover strategies for mitigating customer-side issues to improve the capacity to cope with future disruptions. Inconsistent Shipment Tonnage and Customer Complaints are significant difficulties in this area.

4.3.1.1. Shipment Tonnage Inconsistency

As a short-term solution, Shipment Tonnage Inconsistency can be mitigated by the sale of airway bills. For example, if the sales division's tonnage volume is below the maximum, Lion Parcel will sell its airway bills to 3PLs. 3PLs collaborate with Lion Parcel by providing shipment tonnage to Lion Parcel, providing them with a special rate and a suitable aircraft space; thus, Lion Parcel acts as if it were an SMU agent despite not being one. The cooperation establishes more specific policies and contracts for the sale of Airway Bills to ensure that everything runs smoothly.

Besides the mitigation for lower than expected tonnage, if the tonnage is way more significant than Lion Parcel's capacity to onboard during PPKM, typically, the firm chartered cargo planes to transport accumulated cargo. To ensure that everything runs smoothly, Lion Parcel and the charter flight provider come to an agreement that is clear and concise. It is also possible to charter cargo-capable commercial aircraft with their seats removed.

Concerning the long-term contingency plan, the sales team must exert more effort to increase shipment tonnage, stabilize and improve the tonnage, and not decrease it.

From its core operations, the company strives to continuously improve everything to provide the most seamless and dependable experience possible and expedite the implementation of all operations.

4.3.1.2.Customer Complaints

Lion Parcel uses WhatsApp bot notifications as a short-term strategy for reducing customer complaints. A bot in the Lion Parcel system notifies customers directly via WhatsApp when there is a delay. For instance, to reduce customer complaints, if the SLA for a shipment is 2-3 days, indicating a maximum of 3 days, and the shipment's status has not changed for 8 hours on the second day, an automatic WhatsApp message will be sent. Within twenty-four hours, customers will receive two notifications with the following message: "we apologize for the delay, we will deliver your goods at this time, and we will immediately notify you of the delivery process at that time." If the customer's order is associated with their LionApps, Lion Parcel will automatically send a voucher for free delivery if the delivery fails.

As part of a long-term contingency plan, the sales and operations team will ensure that all shipments are as effective and of the highest quality as possible. One Account Executive from the sales division and one OCT (Operational Control Tower) staff from the operations division is assigned to each corporate customer to ensure that their shipments receive every convenience Lion Parcel offers, thereby maximizing the company's services and increasing customer satisfaction.

4.3.2. Capabilities on Operations Side

In this section, the author discusses strategies for mitigating challenges on the operations side to enhance the capability to deal with future disruptions. Challenges in this area include Canceled Flight, 3LC Embargo, Suboptimal Distribution Centres, Operational Working Hours Limit, and Operational Costs.

4.3.2.1. Canceled Flight

As a short-term and long-term strategy to respond and manage onboarding management side risks, such as flight cancellations, during the COVID-19 pandemic, Lion Parcel would be required to take the following mitigation measures:

- Amassing cargo prior to onboarding: Lion Parcel mitigated the risk associated with the short-term contingency plan by stockpiling cargo to meet the minimum quota required to cover transportation costs. Before the aircraft can take flight, cargo must be loaded to cover empty passenger seats and transportation costs. During the PPKM policy, Lion Parcel may also collect passengers before boarding to cover onboard expenses.
- Rent or chartering flights: Typically, cargo aircraft are chartered or rented to transport accumulated cargo. Lion Parcel and the charter flight provider reach a clear and concise agreement to guarantee that everything runs smoothly. It is also possible to charter commercial cargo aircraft with their seats removed.
- Collaboration with competitors to charter flights: Lion Parcel has also consolidated and partnered with competitors to lease or charter cargo aircraft jointly. Lion Parcel unifies with other 3PLs and competitors and forms a unified collaboration to share costs to keep charter flight rental costs at a reasonable level. The 3PLs collaborate with Lion Parcel by providing shipment tonnage; Lion Parcel then offers them a special rate and a suitable aircraft space, acting as an Airway Bill agent despite not being one. It is uncommon for Lion Parcel to join forces with rivals during PPKM. E-commerce is the party that benefits the most from this momentum, as their sales are robust while logistic firms struggle to transport shipments within their ecosystem.
- Alternative contingency plan with trucking: Trucking may be assigned routes that can be serviced contingently by trucks. For example, for regions located on the same island, such as Java Island.
- Removing seats: Seats on commercial aircraft are removed and replaced with cargo to compensate for lost revenue. As explained in section 4.3.3.3, cargo may be damaged because commercial aircraft are not experts at transporting goods. Therefore, a good stacking angle and a large quantity of bubble wrap and cargo nets are necessary.

Figure. 4.3. Cargo Replaces Seats on Commercial Airplanes

4.3.2.2. 3LC Embargo

As a short-term and long-term strategy to respond to and manage 3LC embargo risks, Lion Parcel's reconciliation with the government in terms of cooperation was one of the PPKM mitigation strategies it used. Reconciliation with government cooperation for authorization permits so that aircraft from the Lion Group can enter the restricted region. Due to PPKM, only essential items may enter certain restricted areas, and a portion of the 3LC embargo policy is also intended to protect airport personnel from COVID-19. Due to a lack of personnel, the government strictly adheres to WFH regulations, government regulations, reduced working hours, etc. In this instance, Lion Parcel collaborated with POS Indonesia (a state-owned air cargo company) to obtain authorization that these items are essentials or can be distributed to the general public. In contrast, Lion Parcel has no other explanation for why no aircraft are permitted to land due to a government embargo and can only apologize and inform customers in advance.

4.3.2.3. Suboptimal Distribution Centres

The accumulation of cargo and cargo piles in distribution centers and airport hubs, which rendered cargo management in distribution centers inefficient and a first-in, last-out (FILO) system unavoidable, was mitigated by implementing the following strategies:

- Full-time coordination and scheduling of cargo movements: Utilizing effective time coordination and scheduling techniques prior to and after the arrival of cargo at hubs. If the aircraft is unavailable, Lion Parcel will leave the cargo at the airport hub. As a result, there will be a lack of space at the airport hub, and managing cargo will be time-consuming. Furthermore, it is difficult to maintain control because Lion Parcel's goods are mixed with those of other agents in airport hubs. Due to the similarity between the flow of cargo to the flow of water, cargo continuously enters and must exit quickly. No cargo can be static at airport hubs; everything must be in constant motion. The movement of goods should be first-in, first-out, similar to the flow of water; Cargo cannot remain in airports or distribution centers. Occasionally, cargo may remain at the airport for up to two days, excluding PPKM, for which PPKM regulations limit conditions.
- Rents temporary warehouse: Lion Parcel amasses cargo and then rents a temporary warehouse adjacent to the previous one to ship the cargo with rented aircraft later then.
- As part of its long-term risk mitigation strategies, Lion Parcel has created a new brand called LILO, a warehouse fulfillment service that rents out warehouses for short-term cargo storage to clients. Lion Parcel has excellent potential with LILO warehouses because it can implement 4PL and increase its omnichannel customer base. Lion Parcel can easily manage and expeditiously ship packages from rented warehouses, which are available to corporate clients.

4.3.2.4. Operational Working Hours Limit

Because there are no limitations on the workload on the operations side, and the operations never stop and run continuously throughout the PPKM, Lion Parcel increased its workforce and implemented more efficient work schedules to address both long-term and short-term Operational Working Hours Limit mitigation strategies. Lion Parcel is currently reducing its workforce as the number of employees has increased due to past over-recruitment during PPKM.

4.3.2.5. Operational Cost

As opposed to airplanes, most of Lion Parcel's short- and long-term operational cost reductions were accomplished by using trucks in their contingency plan. Therefore, if Lion Parcel can transport the cargo by truck for the route, they will do so because it is considerably less expensive.

4.3.3. Capabilities on Delivery Side

In this section, the author discusses strategies for mitigating operations side challenges in order to enhance the organization's capacity to deal with future disruptions. Cargos Arrived Partially, Weather Impact on Ship Passages, and Damaged Cargo are the challenges in this area.

4.3.3.1. Cargos Arrived Partially

As an immediate and long-term solution to the issue of Cargos Arrived Partial, Lion Parcel added some supervisors to hubs with insufficient supervisors. Before implementing this strategy, Lion Parcel only received hub performance reports, which hub agents also managed. However, they now have coordinators or so-called "cleaners" who conduct a recap of incoming and outgoing shipments. If, for example, five shipments of bulk cargo from client A enter the facility, five must leave; if the numbers do not match, these supervisors will address the issue. Lion Parcel also requests personnel from the Lion Group. Lion Parcel requests personnel from Lion Cargo, who can handle ground handling, to supervise Lion Parcel. Consequently, Lion Cargo and Lion Parcel are jointly subsidized by a group.

4.3.3.2. Weather Impact on Ship Passages

Lion Parcel's primary strategy for addressing the short-term and long-term logistical challenges posed by weather-affected operations is to map periods of bad weather in Indonesia. Bad weather can also result in a safety-related embargo; logistics firms have no choice but to yield to nature at this point. As there are no cargo ships equipped with

anti-storm technology, it is essential to monitor the weather and develop a forecast map in order to guarantee the safety of cargo, passengers, ships, and aircraft.

4.3.3.3. Damaged Cargo

According to one of the experts interviewed, cargo damage is not caused by cargo being thrown around. The cargo will crush the cargo in the rear of a commercial airplane in the front during takeoff. If the stacking or packing arrangement is incorrect, lighter cargo will be damaged by heavier cargo. Upon landing, goods are stacked on top of one another, creating the appearance that they have been "beaten" twice. For damaged cargo, the following strategies are used to prevent both short-term and long-term damage:

- Good angle of stacking and Tons of bubble wraps: When shipping packages via commercial aircraft, Lion Parcel employs an optimal angle of stacking and excessive amounts of bubble wrap. The daily tonnage of Lion Parcel ranges from 60 to 100 tons, so that the firm may use up to 10 tons of bubble wrap per month. Additionally, Lion Parcel uses plastic wrapping and a cargo shape with rounded corners to prevent damage.
- ULD (unit load device): ULD (unit load device): When transporting cargo via cargo planes, there is a unit load device (ULD) comprised of containers that hold cargo to prevent damage; ULD has rails and boxes that make loading aircraft cargo pallets simple and secure; cargo nets are also included. This makes cargo handling on cargo planes easier and safer. Since all items are secured within the ULD, logistic companies are not required to use bubble wrap when employing ULD.

Figure 4.4. ULD (Unit Load Devices) in Cargo Planes

- External education: Educating customers or senders so they can send goods that have been securely packaged to reduce the risk of damage.
- Internal education: Training internal personnel in the correct arrangement, stuffing, and stacking of cargo, as well as its correct packaging.

4.3.4. Implications of This Study for Researchers and Managers

In this section, the author highlights significant implications for the literature and managers. The author presented mitigation strategies for aviation logistics firms impacted by COVID-19 and described how organizations could adapt their supply chains to withstand future disruptions. No studies have evaluated the recovery path for aviation logistics companies that use commercial aircraft (half passenger, half cargo planes); meanwhile, this should also be examined. Our study is unique, possibly the first of its kind, given the circumstances described above.

Managers may utilize this research to inform their COVID-19 strategy and operations decisions. When faced with a potentially catastrophic pandemic, executives and logistics managers can use these findings to understand their own strengths and weaknesses better, enabling them to prepare for any eventuality, whether natural or artificial, with the confidence that they will be better prepared than their competitors. This research may not only contribute to mitigating the current crisis but also to mitigating future disruptions.

The pandemic has enabled managers to advance greater preparedness and technological advances for future disruptions and natural disasters. According to experts, every manager is expected to be inventive; there must be a way; the only requirement is to determine when and where. The logistics industry continues to support everything from the most fundamental human needs to everything else humans require, wherever and whenever it is required. Logistics companies should continually strive to develop innovative and technologically savvy strategies that provide low-cost, high-quality operations and on-time delivery services based on their customers' needs and preferences currently and in the future. Everything will be replaced by technology, and the workforce will decrease. There are drones, robots, and sorting machines;

however, the lack of awareness in Indonesia makes it challenging to utilize technologies such as drones.

CHAPTER V

CONCLUSIONS

The disruptions have severely impacted cargo and strong logistics businesses, but those operating commercial aircraft worldwide have encountered far more obstacles. Since Lion Parcel is a subsidiary of the largest airline in Indonesia, it was selected for this study because it is anticipated to be one of the businesses most affected by the pandemic. In addition, it is essential to note that each logistics company faces unique supply chain challenges compared to its developed competitors. During the pandemic, a company's ability to manage risk and maintain resilience in its supply chains proved to be a crucial competency. Swift responses, innovative decision-making, and the capacity to reconfigure the resource base benefited businesses throughout the pandemic; despite all conditions, there must be a way to identify when and where is the only requirement. These skills are essential for surviving the pandemic or simply adapting to the circumstances, as the pandemic abruptly and unpreparedly disrupts everything.

In light of this momentum, customers will choose the logistics provider they trust most as a formidable organization; the disruptive leader. The disruptive leader is the firm constantly seeking better solutions and methods to implement new processes and wants to influence the enterprise as a whole significantly. The author and key interviewees concluded that upcoming technological advancements would be capable of resolving numerous consumer and design issues. However, there is much more work and shortcuts to be done because not all challenges are artificial. Efforts to protect consumers from delays in the delivery of goods by shipping service via transportation caused by the policy of implementing restrictions on community activities cannot be classified as force majeure because the transportation and logistics service sector is exempt from the policy. In the customer relations component, for instance, it is sometimes about the relationships, not the operations; through long-lasting client-

logistics provider partnerships, issues such as inconsistent shipping tonnage, customer complaints, and cargo damage can be gradually reduced.

Damaged Cargo, Shipment Tonnage Inconsistency, Partial Cargo Arrival, Canceled Flight, 3LC Embargo, and Customer Complaints are the most prominent challenges. Operational Cost and Shipment Tonnage Inconsistency are influencing factors. Cargos Arrived Partially, Canceled Flight, and Damaged Cargo is the most considerable effects. According to the analysis of primary causes, these obstacles require immediate attention. Moreover, cause (influencing) and effect (resulting) factors require individual attention. The findings and discussions of this study detailed and elaborated on supply chain resilience-improving mitigation strategies. As long as critical technologies continue to develop, it is possible to overcome the technological obstacles commercial aircraft face regarding cargo forwarding. A commercial aircraft that is both economically and environmentally viable is likely to stagnate without continued effort.

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APPENDIXES

APPENDIX A

Table A.1. The Affiliations And Qualifications Of The Experts/Practitioners Undertaking Fuzzy-DEMATEL Analysis

S. No	Area of Expertise in Supply Chain	Type	Qualification Level	Work Exp. (Years)
1	Aviation Supply Chain and Logistics - Operations (Onboarding)	Practitioner	Bachelor Degree	6
2	Aviation Supply Chain and Logistics - Network and Development	Practitioner	Bachelor Degree	6
3	Aviation Supply Chain and Logistics - Network and Development	Practitioner	Masters Degree	7
4	Aviation Supply Chain and Logistics - Operations	Practitioner	Masters Degree	12
5	Aviation Supply Chain and Logistics - Operations (Incoming)	Practitioner	Bachelor Degree	9
6	Aviation Supply Chain and Logistics - Network and Development	Practitioner	Bachelor Degree	5
7	Aviation Supply Chain and Logistics - Network and Development	Practitioner	Masters Degree	6
8	Aviation Supply Chain and Logistics - Network and Development	Practitioner	Bachelor Degree	6
9	Aviation Supply Chain and Logistics - Operations (Gateway)	Practitioner	Diploma III Degree	5
10	Aviation Supply Chain and Logistics - Operations (Incoming)	Practitioner	Bachelor Degree	5
11	Aviation Supply Chain and Logistics - Operations (Outgoing)	Practitioner	Bachelor Degree	5
12	Aviation Supply Chain and Logistics - Operations (Gateway)	Practitioner	Bachelor Degree	5
13	Aviation Supply Chain and Logistics - Operations (Gateway)	Practitioner	Bachelor Degree	6

Table A.2. The Affiliations And Qualifications Of The Experts/Practitioners Undertaking Structured Interviews:

S. No.	Area of Expertise in Supply Chain	Type	Qualification Level	Work Exp. (Years)
R1	Head Of First Mile & Last Mile	Practitioner	Bachelor Degree	22
R2	Regional Sales Manager	Practitioner	Bachelor Degree	25

Table A.3. The Questionnaire For Fuzzy-DEMATEL Method

INTRODUCTION: Mitigation Strategies of Cargo Delivery Delays During the Government Travel Restriction in COVID-19 Pandemic
We would like to thank you for your generous support to this study, which aims to identify major challenges in logistics firms during COVID-19. Your input will be used for the master's thesis titled "Mitigation Strategies of Aviation Logistics Firms Challenges During the Government Travel Restriction in COVID-19 Pandemic". To this end, we need your input as pairwise comparisons of each pair to determine their relative importance and influence powers on other factors. The ultimate aim is to investigate the mitigation strategies for these challenges. This thesis is dedicated to all pandemic-affected aviation logistics companies. Before proceeding to the questionnaire, we'd like to ask you five questions about your demographics. Your responses to the questions will be kept strictly confidential and used solely for research purposes. We are grateful for your time.

Demography example and answers:

Please indicate your gender:	Male
In terms of qualifications, do you consider yourself a practitioner or an academician?	Practicioner
Please specify your Supply Chain Area of Expertise	Demand planning, supply constraint optimization
Please tell us about your level of qualification.	PhD
Please provide us with your work experience in years.	35 years

DEMOGRAPHIC SURVEY: Affiliations and qualifications of the experts. Please fill in the blanks on the right side of the questions with your response.	
Please indicate your gender	.....
In terms of qualifications, do you consider yourself a practitioner or an academician?	.....
Please specify your Supply Chain Area of Expertise	.....
Please tell us about your level of qualification.	.....
Please provide us with your work experience in years.	.....

How to enter data?
According to your subjective judgment, you will only fill out all of the yellow-highlighted regions matrix in the worksheet titled "Challenges", we would like to ask your subjective opinion on the pairwise comparisons of each pair to determine their relative importance and influence powers on other factors. **For example, if "Canceled Flight" is highly influential to "Operational Cost" while evaluating major challenges that the logistic firms in aviation faced during the COVID-19 pandemic, we enter the key "H" (strong influence)" in cell "F47."** **The applicable scales or code are listed in the right table. Aside from the challenges matrix table, you should also assess the importance of these challenges by reviewing their influence power on other factors. Please fill out the "Yellow" highlighted cells on the right table with the applicable scales using only code.**

Challenges	Implied Meaning	Importance of Challenges (please fill with code)
Shipment Tonnage Inconsistency	Corporate client shipments are shrinking in some sectors while increasing in others. A difference in manufacturing and production capacity has caused sales and production to fluctuate.	...
Customer Complaints	Customers were so dissatisfied and overburdened by the unreliable SLA for shipments, they even decided to withdraw their shipments from the company's hubs and have them delivered by other logistic firms.	...
Canceled Flight	During the pandemic, government regulations affect the number of passengers, resulting in flight cancellations. Aside from that, Lion Group's commercial aircraft used to transport cargo must have at least 50% passengers; if the percentage of passengers falls below 50%, the flight will be canceled.	...
3LC Embargo	Some destinations are unable to receive or complete operational cargo deliveries due to operational issues or closed flights at the destination airport.	...
Suboptimal Distribution Centres	Air cargo is in high demand during pandemics, but there aren't enough flights to meet demand. As a result, cargo accumulates and goods become stranded in distribution centers and airport hubs, making cargo management in distribution centers suboptimal and a first-in-first-out (FILO) system unavoidable.	...
Operational Working Hours Limit	Worker productivity needed to be extended throughout the day to boost productivity and asset utilization during the pandemic's cargo surge; however, operational working hours are limited.	...
Operational Cost	The disruptions to daily activities caused by the pandemic are raising operational costs. Transportation costs account for two-thirds of logistics costs and it has an impact on the entire logistics, operations process and sales.	...
Cargos Arrived Partially	Cargos that were supposed to arrive in one bulk or receipt might arrive in parts due to suboptimal distribution centers, stranded goods gathered at the airport and distribution centers, and an unavoidable first-in-last-out system.	...
Ship Passages Affected by Weather	Poor weather conditions hampered the operation of transportation systems.	...
Damaged Cargo	Shipments are exposed to various environmental factors, some of which are beyond human control, and accidents can occur at any time and anywhere, resulting in damaged cargo.	...

Linguistic terms	Code to be used
No importance	**N**
Low importance	**VL**
High importance	**H**
Very high importance	**VH**

Please, fill up only "Yellow" highlighted cells with linguistic code

Challenges	Shipment Tonnage Inconsistency	Customer Complaints	Canceled Flight	3LC Embargo	Suboptimal Distribution Centres	Operational Working Hours Limit	Operational Cost	Cargos Arrived Partially	Ship Passages Affected by Weather	Damaged Cargo
Shipment Tonnage Inconsistency	N	...	...	...	...	...	...	...	...	...
Customer Complaints	...	N	...	...	...	...	...	...	...	...
Canceled Flight	...	...	N	...	...	...	...	...	...	...
3LC Embargo	...	...	...	N	...	...	...	...	...	...
Suboptimal Distribution Centres	...	...	...	...	N	...	...	...	...	...
Operational Working Hours Limit	...	...	...	...	...	N	...	...	...	...
Operational Cost	...	...	...	...	...	...	N	...	...	...
Cargos Arrived Partially	...	...	...	...	...	...	...	N	...	...

Linguistic terms	Code to be used
No influence (N)	**N**
Very low influence (VL)	**VL**
Low influence (L)	**L**
Strong influence (H)	**H**
Very strong influence (VH)	**VH**

CURRICULUM VITAE

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Education:

2016-2020 BA in Communication, Pembangunan Nasional “Veteran” Jakarta University, Indonesia

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1 Mar 2021 – 24 September 2021 Account Executive at Lion Parcel

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