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The impact of Covid19 on the air cargo industry from Finland's perspective

Case study with company X

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Abstract

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In November 2019 a coronavirus named SARS-CoV-2 was discovered in Wuhan, China. Not long after the discovery of the virus, it started to spread around the world. In the beginning of 2020, the virus led to the development of global pandemic, also known as the Covid19 pandemic. The pandemic came as a major shock to the world economy, affecting almost every organization in the world; public, private, and non-profit. As a way to control the spread of the virus countries started to close their borders to reduce the amount of traffic to and from the country's borders. These travel and border restrictions affected negatively different transportation modes, especially air transportation, causing variety of different logistical challenges. The Covid19 caused a dramatic reduction in the number of operating passenger flights, which normally carries significant amounts of cargo as belly freight. This change in the cargo space availability led to variety of different challenges, such as capacity reduction and price increase. Despite the challenging times, the pandemic allowed the air cargo industry to become adaptive and creative, leaning on to digitalization and other alternative logistical solutions. This thesis will go more in depth of the impacts, which Covid19 had on the air cargo industry, addressing different sectors and future takeaways. This thesis will also discuss the importance of air cargo to Finland including the specific challenges and changes for Finland during Covid19 and post pandemic. This thesis consists of theoretical part combined with interviews carried out with the employees of company X. The research will focus on discussing the primary challenges faced by the air cargo industry caused by the Covid19, the future perspective and strategies of the industry, the specific effects it had on air cargo volumes, routes, and prices and the affects, which the pandemic had on the air cargo operations of company X.

Keywords: Air cargo, Aviation, Covid19, Pandemic, Supply Chain

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Contents

Glossary

DHL	Dalsey, Hillblom, Lynn
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization

1 Introduction

1.1 Background

The worldwide pandemic known as Covid19 was caused by a coronavirus called SARS-CoV-2. The pandemic started in 2019 when it was first discovered in November 2019 in Wuhan, China. (World Health Organization 2020)

The world economy faced a major shock due to Covid19 crisis. The pandemic affected almost every organization in the world; public, private, and non-profit (Bartle, Lutte & Leuenberger 2021: 1).

Covid19 forced governments around the world to add temporary restrictions. These restrictions were added to slow down the spread of the highly contagious virus. These restrictions included distance and contact restrictions, temporary closure of gastronomy, leisure facilities, hotel businesses as well as trade and service companies, non-essential travel restrictions and other travel restrictions within a country, and obligation to wear masks when using public transportation. In today's globalized world functioning supply chains plays a vital role in economic perspective. Functioning supply chains require functional freight transportation. Pandemics such as Covid19 oppose immediate and strong impact on supply chain networks on a structural level. (Loske 2020: 1)

1.2 Research questions

This study focuses on assessing the long-term impacts of Covid19 on the air cargo industry providing a comparative analysis of pre- and post- pandemic trends, challenges, and opportunities.

The chosen research questions, which this thesis aims to answer are:

1. What were the primary challenges faced by the air cargo industry as a result of the Covid-19 pandemic, and how do these challenges influence the future perspectives and strategies for the industry?

2. What were the specific effects of the Covid19 pandemic on air cargo volumes, routes, and pricing?

3. How did the Covid19 pandemic impact the air cargo operations of company X?

2 Air cargo

Air cargo is an efficient and fast transportation mode. Over 52 million metric tons of goods are transported by airlines every year. This number represents over “35% of global trade by value but less than 1% of world trade by volume.” This refers to same as 6.8 trillion $ worth of goods annually and 18.6 billion $ worth of goods daily. (Iata 2022)

There are two main factors, which help define if goods should be transported as air cargo. These are value and speed. For example, technological products which are high-value goods are usually shipped by air cargo. In addition, medical, and pharmaceutical products which are urgent materials are typically shipped by air cargo. Air transportation is also the optimal choice for certain food products such as exotic fruits, fresh fish and cut flowers. (Iata 2022)

Air freight has many benefits which include worldwide access, fastest transportation mode, reliable transportation, reduced risk of theft or damage, and lower insurance costs. (Iata 2021)

2.1 The content of air cargo

Generally, air cargo can be divided into two main sections. These are general cargo and special cargo. General cargo includes all goods that are not special

cargo. Special cargo includes goods that due to their weight, nature, value and/or dimensions, might have special requirements such as documentation, packaging, labelling, and handling within the transportation chain. (Iata 2022)

Special cargo items include time and temperature sensitive products such as dangerous goods, live animals, wet cargo, and perishable cargo. Figure 1 below illustrates the different special cargo classes.

Figure 1 Dangerous goods categories (Iata 2022)

Dangerous goods are divided into nine classes. These are Class1-Explosives, class 2-Gasses, class 3-Flammable liquids, class 4-Flammable Solids; Substance Liable to Spontaneous Combustion; Substances which, in Contact with Water, Emit Flammable Gases, class 5-Oxidizing Substances and Organic Peroxides, class 6-Toxic and Infectious Substances, class 7-Radioactive Material, class 8-Corrosives, class 9-Miscellaneous Dangerous Substances and Articles, Including Environmentally Hazardous Substances. (Iata 2022)

2.2 Supply Chain

To get the bigger picture of the air cargo industry it is important to understand the supply chain process. Figure 2 below illustrates the supply chain process of air cargo.

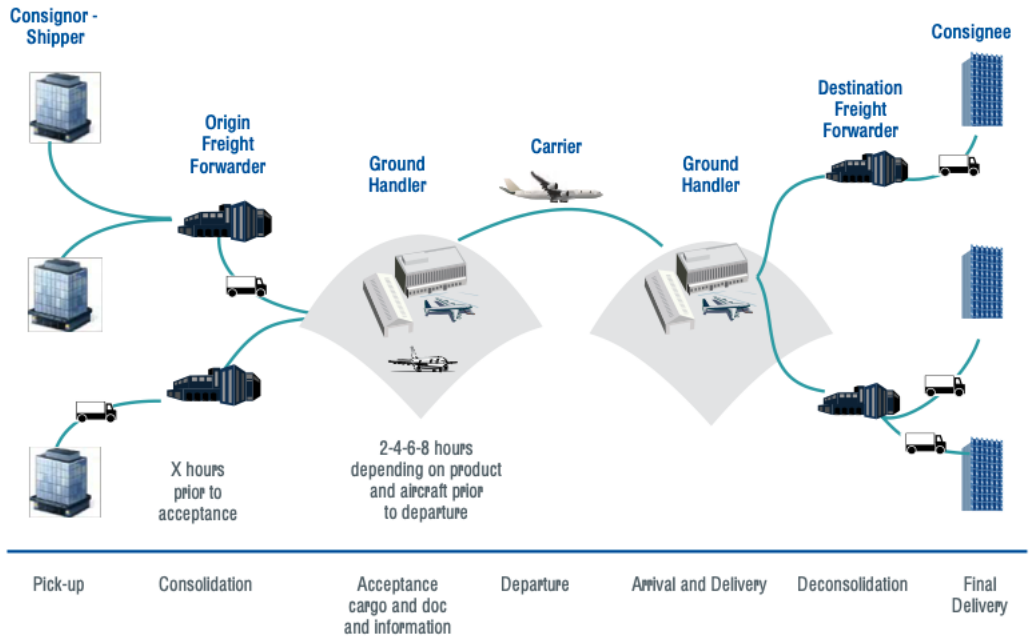

Figure 2 The supply chain process (Icao, n.d.)

The consignor / shipper is the party which initiates the transport or movement of the goods. The shipper will either arrange the movement of the goods to the origin freight forwarder or the freight forwarder will arrange a pick up from the shipper. The freight forwarders manage shipments in a way which ensures that they are ready to be transported by aircrafts. A freight forwarder can provide many services such as customs services, applicable documentary, facilitation formalities, storage, preparation, carriage, and final delivery of goods. The carrier of the goods is rarely the freight forwarder. Freight forwarders will take care of consolidation. The origin freight forwarder will arrange the movement of goods to the ground handler. Ground handlers are subcontractors who act on behalf of aircraft operators and freight forwarders. Ground handlers are needed when the aircraft operator or freight forwarder does not have neseccary facilities. Ground handlers offers for example warehousing, preparation,

tagging, unloading/loading, and transit services. Ground handlers operate based on freight forwarders and aicraft operators instructions. The freight forwarder will guide the ground handler to deliver the shipment to aircraft operator, once a consignment is ready to be shipped. Aircraft operators / airlines will take care of the air transportation of goods. Safety and security for transportation of cargo is ensured through air waybill. Air waybill bines both aircraft operator and the relevant parties contracted. The air cargo can be transported with either all-cargo aircraft or passenger aircraft. For short distances airlines may also transport air cargo by road. This part will have its designated flight number and it is considered to be a flight. There might be several flights before the cargo will reach its final destination. Once in the final destination the goods will have similar process as in the beginning, but reversed. The goods will be first moved to the ground handler, which then moves the goods to the consignee in co-operation with the destination forwarder. The destination forwarder will do deconsolidation before the goods are transported to the consignee. Consignee is the end party of the transportation process who will receive the packing list or invoice. (Icao, n.d.)

2.3 Air cargo’s importance to Finland

The air cargo industry is significant as it creates tens of thousands of jobs, and it also helps Finland to connect with the rest of the world. This is an important factor because Finland is relatively isolated country and therefore the air cargo industry is economically important to Finland. The usage of air cargo allows Finland to ship goods within a reasonable time frame all over the world. Figure 3 below illustrates how air transport connects Finland with the rest of the world.

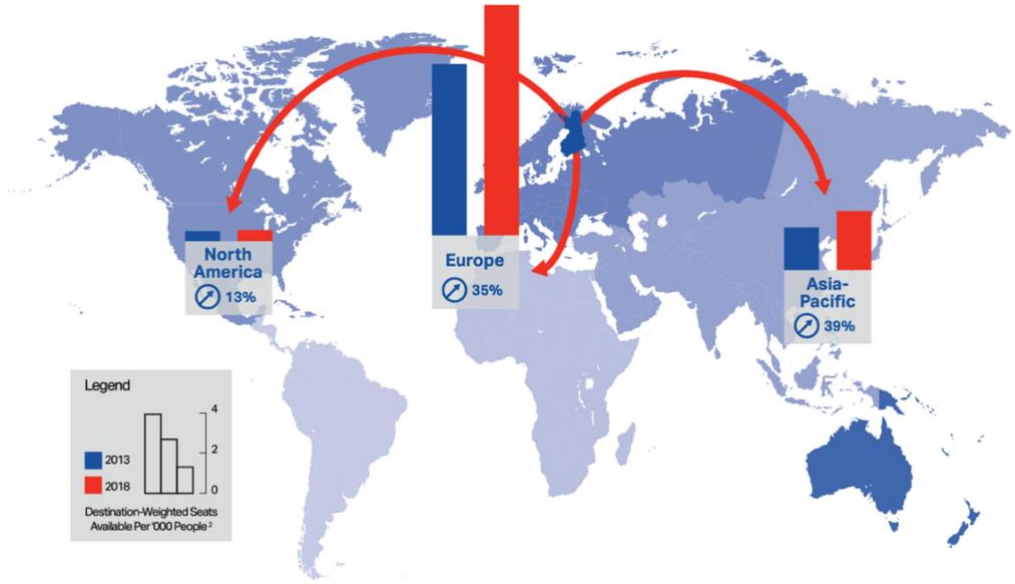

Figure 3 Destination weighted seats available per 1000 people starting from Finland (Iata 2018)

The most important connection is to Asia-Pacific (39 %), followed by Europe (35 %) and North America (13 %). The blue color shows data from 2013 and the red color shows data from 2018. (Iata 2018)

Finland's economy structure is a small open economy, which is strongly dependent on global value chains. As much as 40 % of Finland's export is represented by foreign value-added content. Around three quarters of Finland's imported goods represent goods which are investments in capital goods or for intermediate consumption, some of these are critical for Finnish production lines. (OECD/Statistics Finland 2021)

Air cargo also allows Finland to import products from abroad. In 2019 Finland imported 30,1 thousand tons and exported 49,6 thousand tons. In 2019 the value of imports were 3725,5 million euros and exports were 5929,5 million euros. These results have some error marginal as these statistics do not include for example air cargo moved by flight trucks. Figure 4 below illustrates the division of Finland's imports and exports per continent.

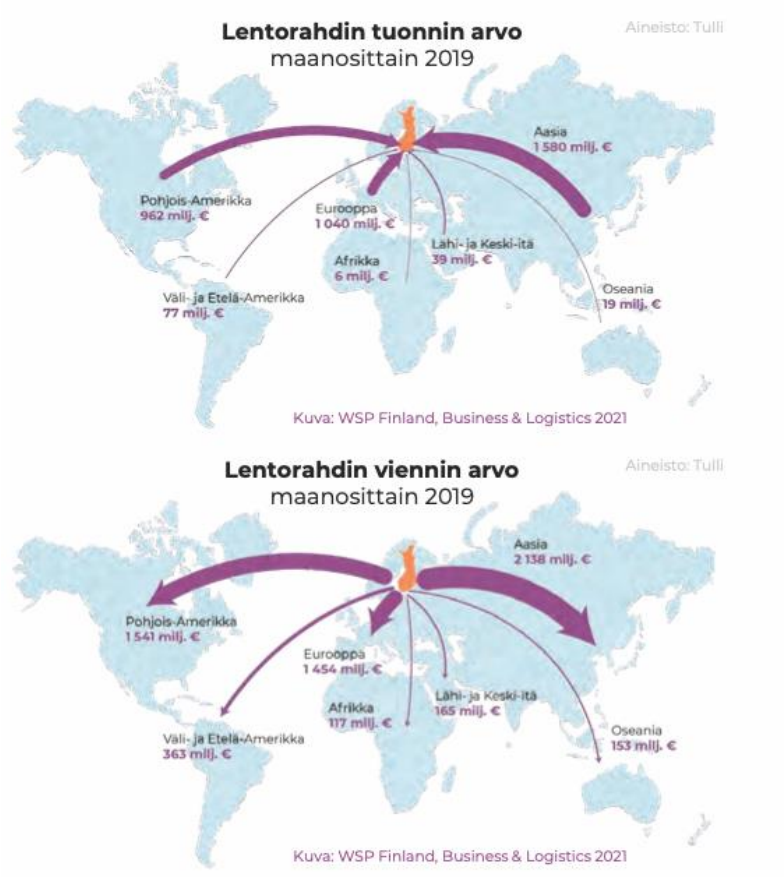

Figure 4 Value of Finland's air cargo imports and exports (Huoltovarmuuskeskus 2022)

In 2019 the air cargo imports were divided as following: Asia 1580 million euros, Europe 1040 million euros, North America 962 million euros, Middle and South America 77 million euros, Middle East 39 million euros, Oceania 19 million euros, and Africa 6 million euros. In 2019 the air cargo exports were divided as following: Asia 2138 million euros, North America 1541 million euros, Europe 1454 million euros, Middle and South America 363 million euros, Oceania 153 million euros, and Africa 117 million euros. (Huoltovarmuuskeskus 2022)

3 Air cargo and Covid19

3.1 Background, challenges, and adaptation

The air cargo industry plays a central role in supporting the supply of critical goods. For example, during Covid19 air cargo was used to transport personal

protective equipment and covid vaccinations. From the export perspective of airfreight, the most important goods transported are for example technical machines, components, and medical devices. For DHL the demand for air cargo was so strong that the prices for air cargo went up by 86 % between September 2019 and September 2021. This change illustrates the importance of air cargo industry in general and in this case especially during the pandemic. The passenger planes are important for air cargo as large amount of cargo is transported as belly freight in the passenger planes. The pandemic caused almost 79 % decrease in number of passengers between 2019 and 2020. This change forced the airline companies to become creative to adapt to the change, yet still support the capacity airfreight required. Airline companies started to modify their already existing passenger planes to meet demand. Figure 5 below illustrates Finnair´s passenger plane modified into cargo plane during the pandemic.

Figure 5 Passenger plane modified into cargo plane (Finnair cargo, n.d.)

The modified Finnair plane is Airbus A330. (Huoltovarmuuskeskus 2022)

The pandemic brought many different challenges to airline companies. Some major challenges were imbalance between supply and demand, border restrictions, overflying regulations and charges, and operational curfews. Border restrictions varied from country to country, which challenged the crew availability. If the crew landed in a destination with strict restrictions the whole grew was tested and put in to 14-day quarantine. In such cases the airline

companies risked losing the whole crew and the cargo for 14-days. Such instances also added additional operational charges. The pandemic revealed an issue in the global marketplace as the environment was not flexible enough for the rapidly changing world. This caused bottle necks in supply versus demand. (World economic forum 2020)

The pandemic forced airlines to include safety measures as part of their daily operations. These changes included for example obligation to use face masks, mandatory temperature checks, social distancing during flights, deep cleaning of airplanes before take-off, and withdrawal of services. (Amankwah-Amoah 2020)

Covid19 challenged the dynamic pricing model used by the airlines. Dynamic pricing is a tool, which adjusts prices based on consumer demand in real-time. The software behind this pricing model is contemplated to lower prices to raise demand, which is a cycle that occurs naturally. Despite the decrease in prices the demand did not increase, even the tool is designed to maximize profit regardless of demand. This addressed the importance of airlines demand control and forecasting. (Singh 2022)

3.2 Supply Chain disruptions

The pandemic caused supply chain disruptions all around the world. The disruptions were caused by wide range of different elements affecting the global supply chains. The key parts affecting were “difficulties in the logistics and transportation sector, semiconductor shortages, pandemic-related restrictions on economic activity, and labour shortages.” Rapid recovery of the global economy, consumption shift from services to goods, container misplacement and backlog, port closures, and high import volumes led to a severe disruption on the global shipping of merchandise goods. As a result, semiconductor shortages emerged in latter part of 2020. Another outcome was the skyrocketed shipping cost, which emerged in the end of 2020. The shipping costs increased

specially in routes from Asian main ports to Europe and the United States. (Attinasi, Balatti, Mancini & Metelli 2021)

The supply chain disruptions elevated multiple challenges. These challenges were uncertainty of demand, inconsistent supply, scarcity of material, delivery delays, suboptimal substitute adoption, scarcity of labor, suboptimal manufacturing, capacity constraint, vehicle delays and unavailability, and last-mile delivery challenges. (Raj, Mukherjee, Lopes de Sousa Jabbour & Srivastava 2022)

The uncertainty of demand was caused by changes in buying behavior and changes in customers consumption patterns. For example, some essential items such as toilet paper experienced excessively high demand, whereas high-value items suffered from lack of demand. The inconsistent supply was caused by price volatility, necessary raw material unavailability as well as limitations and uncertainty caused by the vendors. The scarcity of material was caused by unreliable supplier operations, panic buying and unavailability of imported goods due to national lockdowns. Delivery delays were caused by local transport and import limitations, routing detours of restricted areas, increased lead times, and slower movement of goods. Suboptimal substitute adoption was caused by the shutdown of current critical suppliers, combined with the usability of suboptimal alternatives leading to change of suppliers and causing quality issues and reworking. Scarcity of labor was caused by sustenance problems, increased unemployment and lockdown restrictions which induced wage reductions. Ultimately this led to the relocation of skilled workforce causing scarcity of labor. The suboptimal manufacturing was caused by unpredictable demand combined with unreliable supply. The capacity constraint was caused by diminishing consumer confidence and insufficient consumer demand towards non-essential commodities of high value. This led to increased stock levels in warehouses and distribution hubs causing liquidity and labor issues. The vehicle delays and unavailability were caused by limited movement of commercial trucks along crucial routes, strict export and local transportation restrictions, and the impact which restricted zones had on delivery routes,

ultimately leading to delivery delays and vehicle unavailability. The last-mile delivery challenges were caused by restriction zones in most urban areas leading to rerouting issues to avoid these areas and transit time delays. (Raj et al., 2022)

3.3 Demand-Supply imbalance

The combination of government-imposed restrictions, mobility level changes and personal decisions has affected both demand and supply settings. These changes in the economy have affected consumers ability to consume and companies' ability to produce, causing imbalance between demand and supply. The demand side was affected by high insecurity from both health and economic conditions. The supply side was affected by personal resolutions and government-imposed restrictions. The pandemic decreased the consumption of both goods and services. However, the service sector took a greater hit compared to the goods consumption due to containment policies. In the beginning of the pandemic goods consumption was reduced but saw a strong recovery afterwards. Industrial production experienced a more drastic reduction in the beginning of the pandemic. This reduction in production combined with slow recovery caused discrepancy between demand and supply. The gap between demand and supply was likely to cause depletion of inventories finally leading to price tension. Figure 6 below illustrates the real consumption and industrial production during the pandemic.

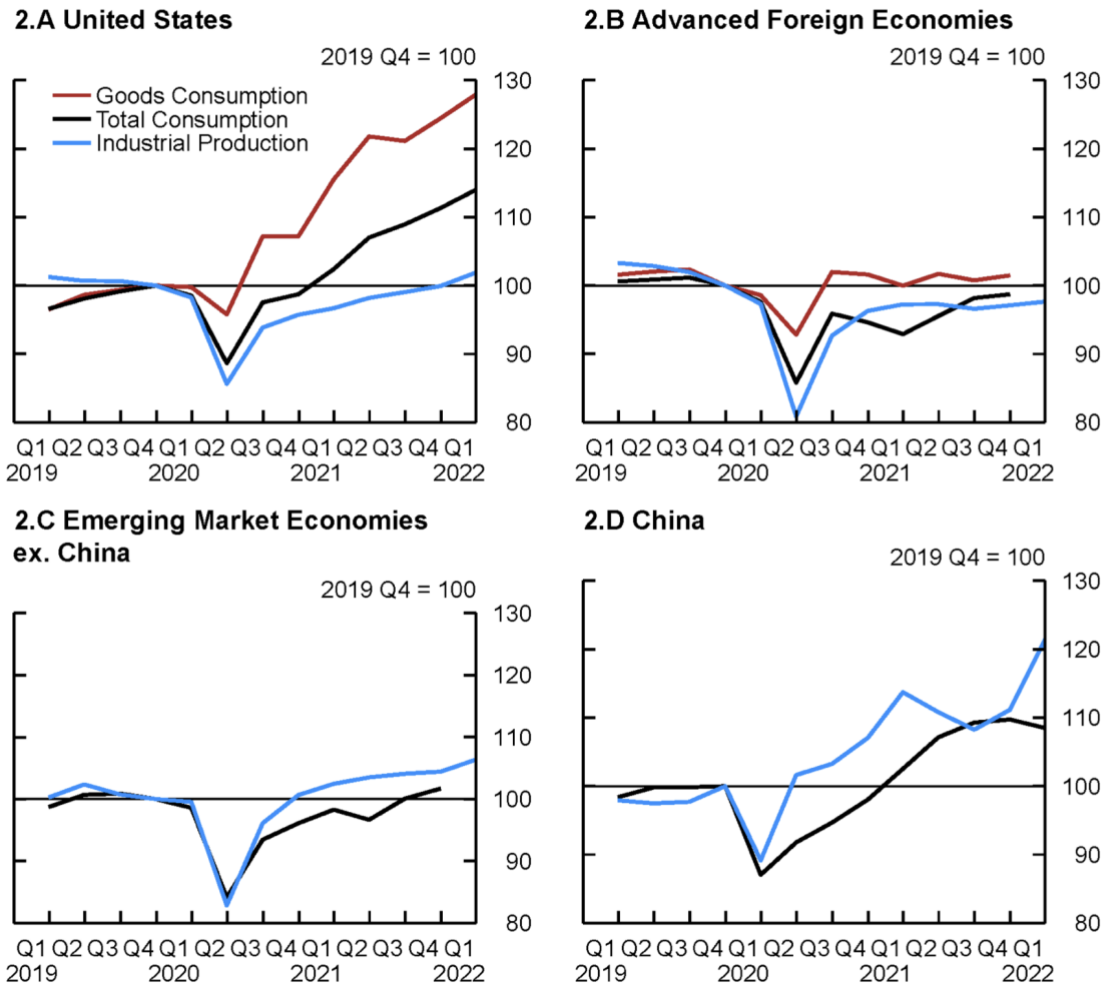

Figure 6 Real consumption and industrial production during the pandemic (Google Community Mobility Reports, n.d.)

Figure 2 A shows goods consumption, total consumption, and industrial consumption in The United States between Q1 2019 and Q1 2022. Figure 2 B shows goods consumption, total consumption, and industrial consumption in Advanced Foreign Economies between Q1 2019 and Q4 2021, only industrial production has data up till Q1 2022.

In The United States in Q2 2020 industrial production dropped to approximately 86 GDP, total consumption dropped to approximately 91 GDP, and goods consumption dropped to approximately 97 GDP from 100 GDP in Q4 2019. In Q3 2020 industrial production increased approximately 9 GDP, total consumption increased approximately 7 GDP, and goods consumption increased approximately 8 GDP compared to Q2 2020. In Q4 2021 industrial

production had increased approximately 0 GDP, total consumption had increased approximately 12 GDP, and goods consumption had increased approximately 25 GDP compared to pre pandemic levels in Q4 2019.

In Advanced Foreign Economies in Q2 2020 industrial production dropped to approximately 80 GDP, total consumption dropped to approximately 85 GDP, and goods consumption dropped to approximately 93 GDP from 100 GDP in Q4 2019. In Q3 2020 industrial production increased approximately 12 GDP, total consumption increased approximately 11 GDP, and goods consumption increased approximately 9 GDP compared to Q2 2020. In Q4 2021 industrial production had decreased approximately 3 GDP, total consumption had decreased approximately 1 GDP, and goods consumption had increased approximately 1 GDP compared to pre pandemic levels in Q4 2019.

Figure 2 C shows total consumption, and industrial consumption in Emerging Market Economies ex. China between Q1 2019 and Q4 2021, only industrial production has data up till Q1 2022. Figure 2 D shows total consumption, and industrial consumption in China between Q1 2019 and Q1 2022.

In Emerging Market Economies ex. China in Q2 2020 industrial production had decreased to approximately 85 GDP, and total consumption had decreased to approximately 83 GDP from 100 GDP in Q4 2019. In Q3 2020 both industrial production and total consumption had increased approximately 12 GDP compared to Q2 2020. In Q4 2021 industrial production had increased approximately 5 GDP and total consumption had increased approximately 2 GDP compared to pre pandemic levels in Q4 2019.

In China in Q1 2020 industrial production had decreased to approximately 90 GDP, and total consumption had decreased to approximately 88 GDP from 100 GDP in Q4 2019. In Q2 2020 industrial production had increased approximately 12 GDP and total consumption had increased approximately 4 GDP compared to Q1 2020. In Q4 2021 industrial production had increased approximately 10

GDP and total consumption had increased approximately 11 GDP compared to pre pandemic levels in Q4 2019.

The United States experienced the biggest imbalance between demand and supply, caused by higher consumption than production was able to provide. Advanced Foreign Economies also had higher consumption rate compared to production rate, but the imbalance was a lot less severe than in The United States. In the beginning of the pandemic Emerging Market Economies excluding China had a good balance between demand and supply. At the end of the pandemic the production rate was slightly stronger than the consumption rate. In the beginning of the pandemic China had a good balance between demand and supply. From Q2 2020 the production rate increased a lot faster than the consumption rate, this imbalance between supply and demand lasted up till Q2 2021. Between Q3 and Q4 2021 the demand and supply were in balance again, but in Q1 2022 the production increased quicker than consumption again. (de Soyres, Santacreu & Young 2022)

3.4 Changes in prices and tons

During the worst Covid years (2020-2022) the amount of air cargo as per thousand tons varied greatly. The statistics represent well how Covid impacted the air cargo industry. The following numbers represent the amount of goods transported as air cargo in Finland. In 2020 the amount of goods transported as air cargo was 161 thousand tons. In 2021 air cargo represented 166 thousand tons. In 2022 the amount of goods transported as air cargo was 236 thousand tons. In 2019 the air cargo represented 317 thousand tons. When Covid hit in 2020 the reduction was already 75 thousand tons less compared to 2019. In 2022 when world started to open again the air cargo went up by 70 thousand tons compared to 2021. (Tulli 2020-2023)

The pandemic had a major impact to the prices per kilogram for airfreight. Variety of factors impacted the air cargo prices. The key factors were capacity issues, lack of passenger planes and the changes in supply versus demand

setting. (United States International Trade Commission, n.d.) Figure 7 below illustrates the global air freight rates between December 2019 to March 2022.

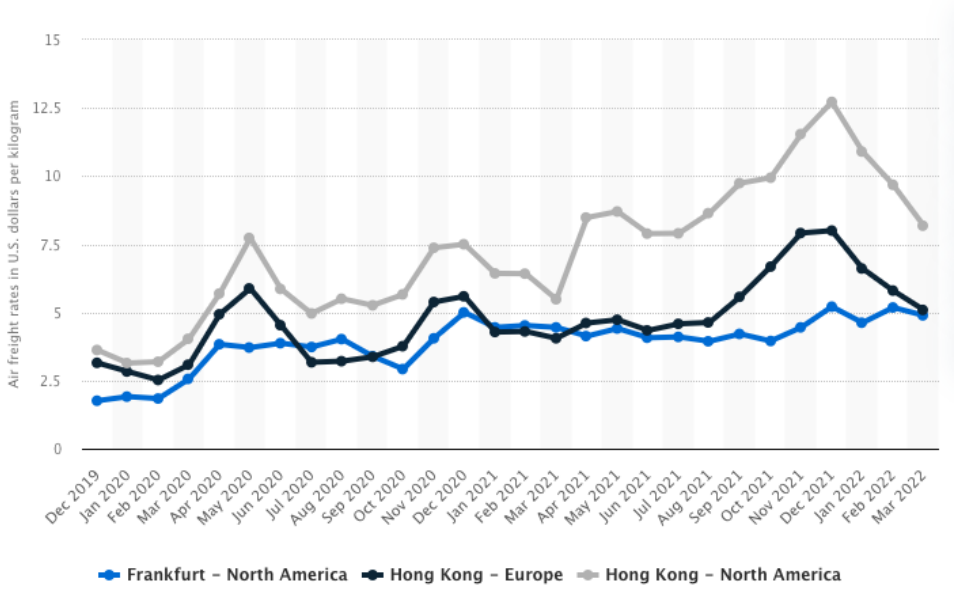

Figure 7 Airfreight rates for major lanes (Statista 2023)

The lowest rate for Frankfurt – North America was 1,76 dollars per kilogram and the highest was 5,21 dollars. The lowest rate for Hong Kong – Europe was 3,15 dollars per kilogram and the highest was 8 dollars. The lowest rate for Hong Kong – North America was 3,62 dollars per kilogram and the highest was 12,72 dollars. The lowest rate for all the lanes was in December 2019 and the highest was in December 2021. This huge change in the prices per kilogram for major lanes illustrates the vast impact that the pandemic had. (Statista 2023).

The pandemic caused major profit losses for several different parties related to the air cargo industry. In 2020 the total loss for all parties affected were 230,1 billion US dollars. Figure 8 below shows the profit or loss per subsector in 2020.

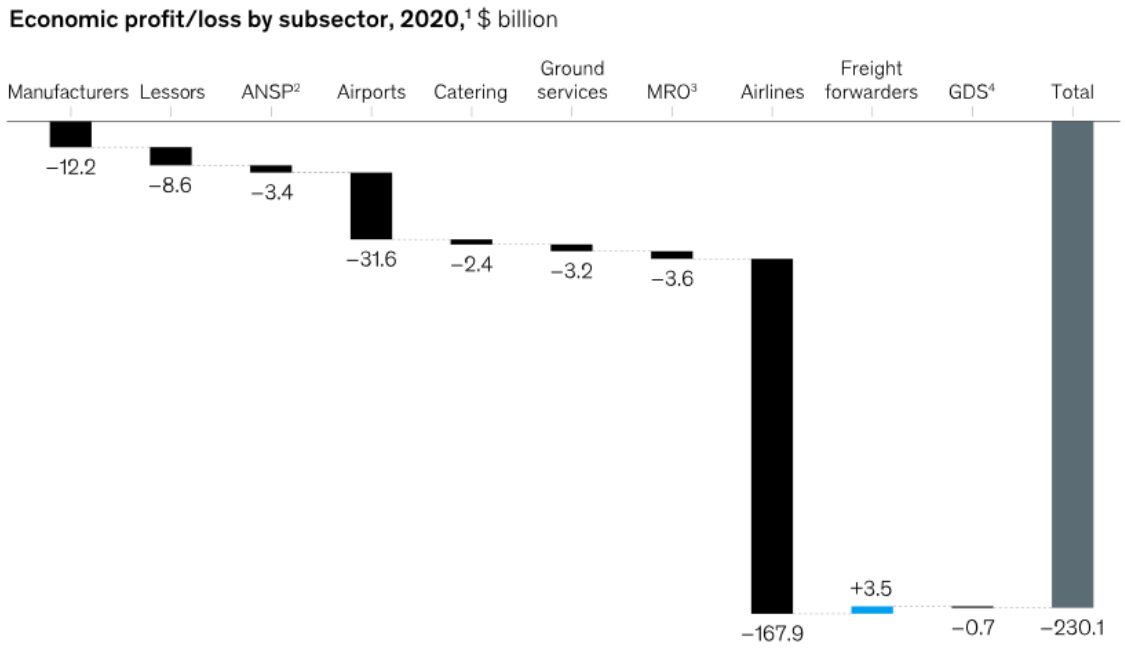

Figure 8 Air cargo industry's profit and loss in 2020 (Bouwer, Krishnan, Saxon & Tufft 2022)

Air navigation service providers (ANSP) made 3,4 billion US dollar loss. Airports lost 31,6 billion US dollars and Airlines lost 167,9 billion US dollars. Freight forwarders made 3,5 billion US dollar profit in 2020. However, Freight forwarders were the only subsector to make profit. Figure 9 below shows the impact of Covid19 in different subsectors.

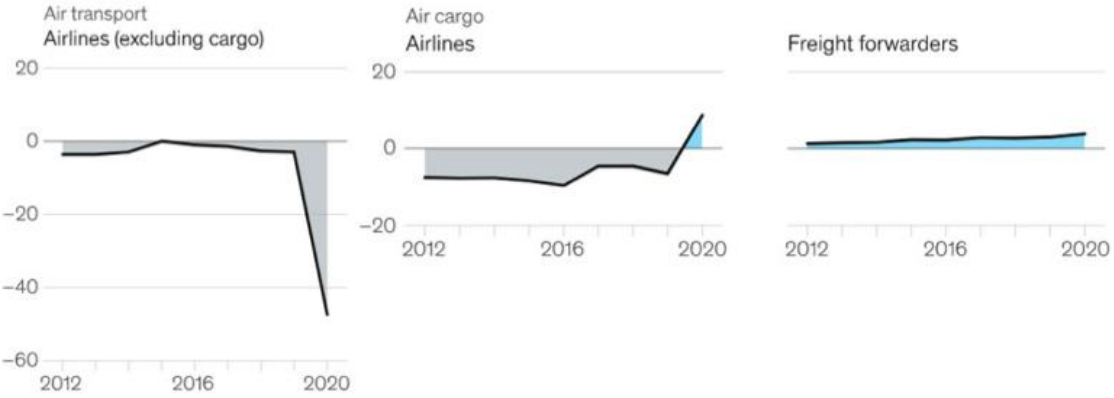

Figure 9 Impact of Covid19 in different subsectors between 2012-2020. Airlines excluding cargo (left), Airlines with cargo (middle), Freight forwarders (right) (Bouwer, Krishnan, Saxon & Tufft 2022)

In 2020 Airlines without cargo took the biggest hit in their economic profit as the profit went down almost 50 % compared to 2019. Airlines with cargo went up in profit around 18 % in 2020 compared to 2019. For Freight forwarders the profit development has been slow and steady over the years. Despite being the only subsector to make profit in 2020 (see figure 8) their profit went up only around 1 % in 2020 compared to 2019. (Bouwer, Krishnan, Saxon & Tufft 2022)

The most significant operational cost component for airlines is jet fuel. During Covid19 the jet fuel price experienced a considerable volatility. During 2020 the jet fuel price decreased approximately 40 %, during 2021 the jet fuel price increased approximately 70 % and during 2022 the jet fuel prices increased approximately 43 % leading to cost pressure caused by the price volatility. (Iata 2022)

3.5 Changes in flights

The pandemic had a major impact on the airplane traffic and especially on passenger plane traffic. In 2020 the overall reduction was 50 % of seats offered by airlines compared to 2019. The reduction equals to 60 % and 2,703 million in the number of passengers. In 2021 the overall reduction was 40 % of seats offered by airlines compared to 2019. The reduction equals to 49 % and 2,201 million in the number of passengers. In 2022 the overall reduction was 25 % of seats offered by airlines compared to 2019. The reduction equals to 29 % and 1,280 million in the number of passengers. The passenger reduction was a global phenomenon, which affected all the regions around the world. Figure 10 below illustrates the total seat capacity reduction by region.

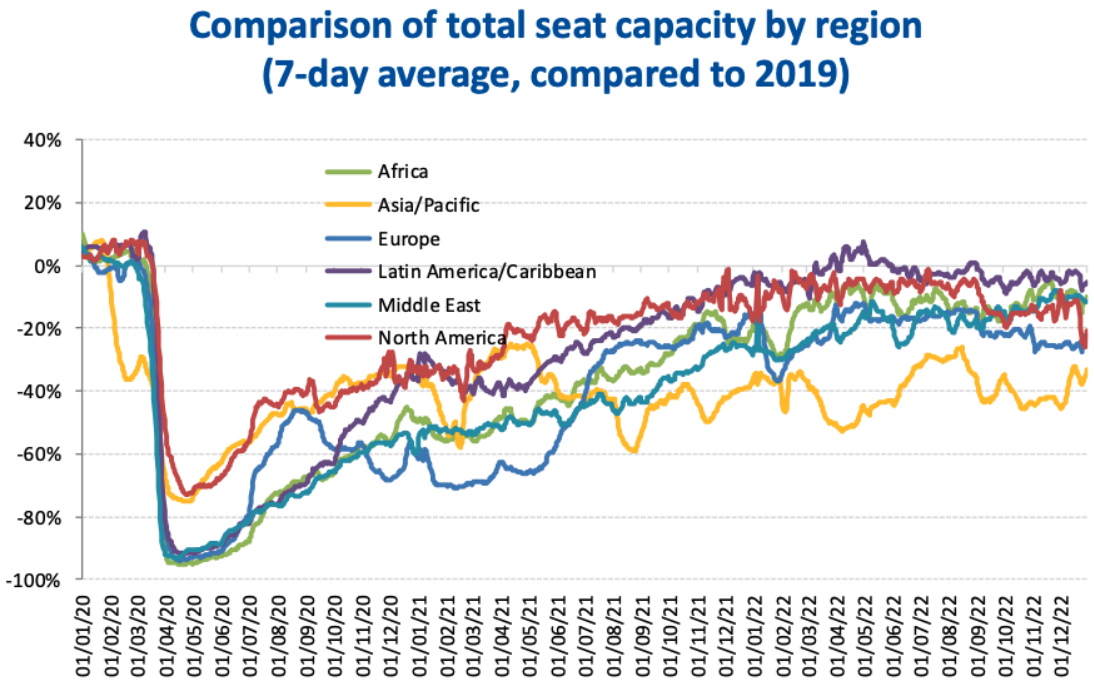

Figure 10 Total seat capacity by region between 2020 - 2022 (ICAO 2023)

The steepest drop in the total seat capacity was seen in around April 2020. Regions affected the most were Africa, Europe, Middle East, and Latin America/Caribbean. For these regions the drop was around -100 % compared to March 2020. Asia/Pacific and North America experienced a less steep drop of around -75 % in April 2020 compared to March 2020. In December 2022 many regions had recovered from the pandemic, but none of the regions had returned to pre pandemic levels. Latin America/Caribbean had the best recovery rate having approximately 5 % lower seat capacity in December 2022 compared to the beginning of 2020. Africa, Middle East, and North America had approximately 15 % lower seat capacity in December 2022 compared to the beginning of 2020. Europe and Asia/Pacific had approximately 35 % lower seat capacity in December 2022 compared to the beginning of 2020. Europe had slightly better recovery compared to Asia/Pacific, but in the beginning of 2020 Asia/Pacific had slightly better seat capacity compared to Europe. In general, the pandemic affected less on the domestic flights than to the international flights. Figure 11 below shows the difference in seat capacity reduction per region between international and domestic flights.

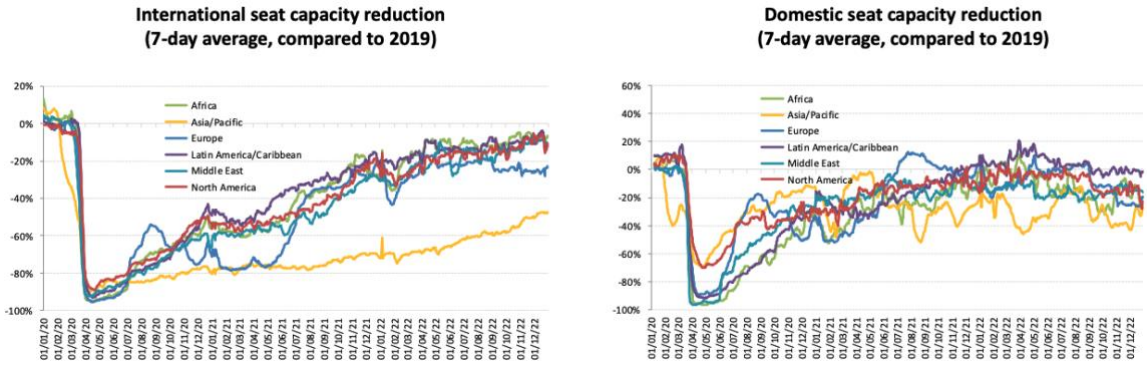

Figure 11 International and domestic seat capacity reduction between 2020-2022 (ICAO 2023)

In April 2020 both International and domestic flights experienced a steep drop in seat capacity compared to the beginning of 2020. This major reduction affected all the regions around the world Africa, Asia/Pacific, Europe, Latin America/Caribbean, Middle East, and North America. The comparison of the figures shows that the reduction and the recovery were quite similar between international and domestic flights seat capacity. However, for Asia/Pacific region that is not the case. In Asia/Pacific region the seat capacity reduction on international flights in April 2020 was approximately -100 % in total compared to the beginning of 2020. On international flights the available seat capacity was quite stuck with approximately 10 % recovery rate up until autumn 2021 compared to the beginning of 2020. In September 2021 the seat capacity started to recover faster and in December 2022 the seat capacity availability was approximately -60 % compared to the beginning of 2020. On domestic flights the seat capacity reduction in Asia/Pacific was not as radical at first as in February 2020 the overall reduction was approximately -40 % compared to January 2020. However, in April 2020 the reduction was already approximately -70 % compared to January 2020. Throughout the pandemic the seat capacity on domestic flights in Asia/Pacific varied greatly with around 20 % increases and decreases. In December 2022 the seat capacity was over 20 % less compared to January 2020. In Asia/Pacific the seat capacity recovery was a lot better in domestic flights than in international flights. (ICAO 2023)

3.6 Changes in Finland

From Finland's perspective the air cargo industry took a major hit during the pandemic. In 2020 the amount of air cargo was reduced around 40 % compared to 2019. In tons this difference was around 90 000 tons from approximately 216 000 tons (2019) to approximately 126 000 tons (2020). Covid19 caused major changes in air cargo routing structure. Figure 12 below illustrates the change in tons for the most popular air cargo lanes between 2019 and 2020.

Sija 2020	Sija 2019	Kohde	Maa	Määrä 2020 t	Määrä 2019 t
1	2	*Leipzig Halle*	*Saksa*	16 455	14 704
2	5	Narita Intl (Tokio)	Japani	11 081	13 897
3	11	Hamad Intl (Doha)	Qatar	8 815	8 973
4	8	Incheon Intl (Soul)	Etelä-Korea	8 778	11 183
5	14	Tukholma Arlanda	Ruotsi	8 737	6 449
6	6	Bangkok Suvarnabhumi	Thaimaa	8 675	13 065
7	1	Hong Kong Intl	Hong Kong	6 902	17 701
8	4	Shanghai Pudong	Kiina	6 259	14 145
9	15	*Malmö*	*Ruotsi*	5 248	5 888
10	7	Kansai Intl (Osaka)	Japani	4 710	11 916
11	13	New York JFK Intl	USA	4 495	6 826
12	35	*Istanbul Atatürk*	*Turkki*	4 230	1 034
13	10	Singapore Changi	Singapore	4 141	9 463
14	3	Lontoo Heathrow	Iso-Britannia	3 621	14 279
15	22	Kööpenhamina	Tanska	2 078	2 184
16	9	Peking Capital	Kiina	2 006	10 754
17	19	Pariisi CDG	Ranska	1 686	3 138
18	28	Pietari Pulkovo	Venäjä	1 660	1 251
19	26	*Jönköping*	*Ruotsi*	1 479	1 456
20	18	Guangzhou Baiyun	Kiina	1 350	3 266
		vuoden 2019 top 20 -listalta:			
21	12	Chubu (Nagoya)	Japani	1 301	7 475
24	16	Delhi IGI	Intia	1 261	5 225
30	20	Bryssel	Belgia	598	2 750
--	17	Chicago O'Hare	USA	0	3 435

Figure 12 Changes in air cargo routings from Helsinki-Vantaa airport to different destinations (Eurostat 2021)

The air cargo tons to Hong Kong and mainland China were reduced over half between 2019 and 2020. The tons to Paris and Kansai (Osaka) were also reduced over half between 2019 and 2020. Tons to London were reduced ¾ between 2019 and 2020. However, some routings experienced an increase in the number of tons between 2019 and 2020. These lanes were for example Leipzig, Narita (Tokyo), Istanbul and Stockholm. Possible explanation for changes towards Hon Kong and mainland China was the unavailability of sea containers. Possible explanation for changes towards London is Brexit. (Huoltovarmuuskeskus 2022)

4 Post pandemic changes

4.1 Changes in the Supply Chains

Because of Covid19 a supply shock started in China in February 2020. The further consequence of this was the demand shock that followed as the global economy started to shut down. Temporary trade restrictions and shortages of critical medical supplies, pharmaceuticals and other products revealed the vulnerabilities in supply chains and production strategies in companies around the world. Manufacturers worldwide are going to be under increased competitive and political pressure to grow domestic production and employment, reduce their dependence on sources that are evaluated risky, and to think of ways to minimize the amount of inventory held in global supply chains through lean manufacturing strategies. However, these changes will be challenging to adopt as consumers are attracted to low prices and the necessary changes requires increased usage of capital. The key challenge for companies is how to make their supply chains more persistent without weakening their competitiveness. To achieve this, companies need to start by identifying their vulnerabilities. The identification process might require a lot of digging, which on the other hand requires time and money. The cost and time investments are the reasons why many companies have not conducted proper supply chain assessment in the past. To properly identify the vulnerabilities, companies need to map their full supply chains, including transportation hubs and distribution facilities. The mapping process will be conducted by categorizing suppliers into low-, medium- or high-risk categories. The factors that should be investigated are certain supplier’s time to recover from disruption, the impact on revenues in case of certain lost source, and the availability of alternative sources. Once the risk evaluation has been completed companies can either increase their stocks or diversify their supplier base. If a company is dependent on specialized items which are hard to backup with alternative suppliers, companies should consider adding safety stocks or increase their inventories. Increased stock will increase operational security in case of supply issues. However, this method will also increase the risk of

obsolescence as it will tie up cash. The balance is to find proper amount of stock to reduce the risk of revue losses, increased prices of materials which become short in supply as well as other disruption costs. The diversification of supplier should be considered if the company wants to reduce single region, supplier, or factory dependence on these medium- or high-risk sources. If a company chooses to diversify their supply base, they should focus on adding sources to locations that are not exposed to same risks. (Shih 2020)

To build sustainable future business in terms of growth and continuity, businesses now need to reassess and manage their supply chains better than before. Corporate CEO's have identified supply chain chaos as the most significant threat to their countries' economies and to their companies as well. Before Covid19 investments, digitalization, and improvements of supply chain were driven by cost reduction and productivity enhancement. As those drivers remain necessary companies now need to investigate other factors as well. Companies have now shifted the focus of restructuring and innovation to flexibility and resilience. As stated earlier in this section companies need to investigate their supply chains and understand them in a deeper level. Supply chain visibility requires knowledge of different tiers related to the supply chain. Figure 13 below shows the lack of knowledge companies possibly have regarding their supply chain tiers.

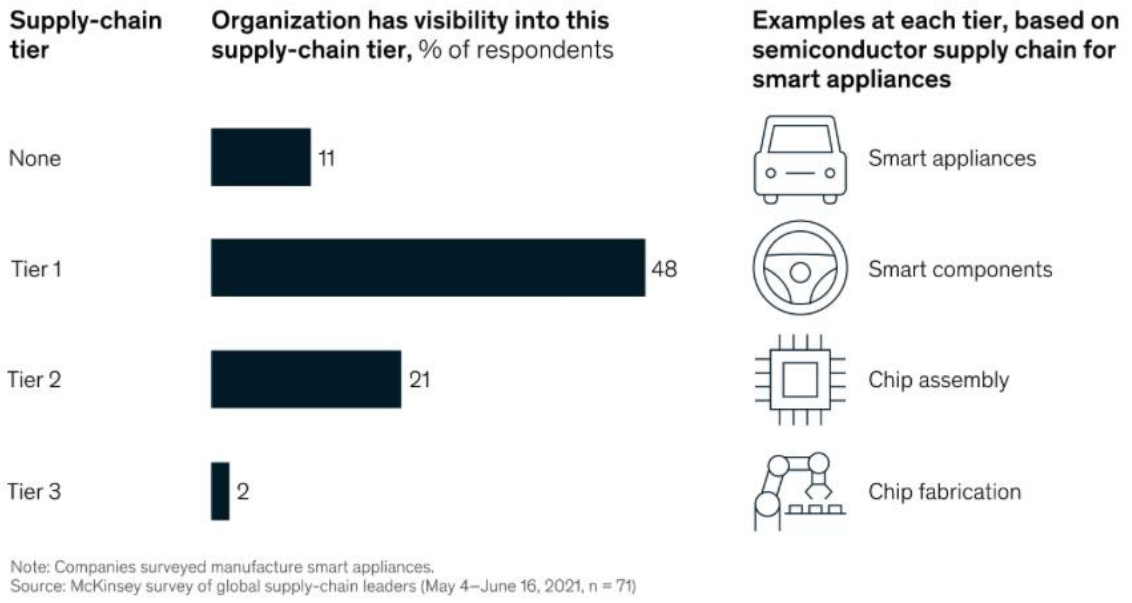

Figure 13 Organizations visibility to different supply chain tier levels (McKinsey & Company 2021)

McKinsey & Company conducted a survey for companies that manufacture smart appliances. In this supply chain there are three different tiers, and the sample size were 71. 11 % of responders had no visibility into their supply-chain tiers, 48 % of responders had visibility to tier1, 21 % of responders had visibility to tier2, 2 % of responders had visibility to tier3. In this survey only 2 % of the companies had visibility in their supply chain beyond the second tier. This finding shows that many companies should possibly improve the visibility of their supply chains to increase resilience and flexibility as mentioned earlier. Another key factor in increasing resilience is to alter buyer-supplier relations. Willingness to share data and to collaborate between suppliers, buyers and other parties within a value chain is crucial to resilience. One suggestion for this has been the creation of so-called cleanrooms. Cleanrooms would act as a platform were companies could share sensitive data with partners without the fear of leaking competitive information. The challenge lies in the creation of mutual trust. “Organizations will need to move closer to their suppliers and build relationships and trust” to address the concern of mistrust. (Sultan 2022)

4.2 From Finland's perspective

Due to Finland's remote location, it is important to increase the flexibility and resilience of the supply chains. However, it is also important to ensure the security of maintenance as a post pandemic measure. Devices (especially medical) and components increases the importance of functioning supply chains and security of maintenance. Finland should concentrate on keeping Helsinki-Vantaa airport attractive as it acts as Finland's gateway station. The Helsinki-Vantaa airport's location to Asia's, Europe's and America's markets is a strong geopolitical advantage. Finland should focus on making Helsinki-Vantaa airport as a nodal point to the international markets, this could be done by active marketing towards international air cargo operators. For all the companies around the world it is important to develop new technological solutions to improve the cost structure. For Finland it would be logical to focus on building a remote flight control system. As flights within Finland are short distance and usually carries small volume of cargo Finland could also start to use electrical flying as a way to reduce carbon emissions and costs. (Huoltovarmuuskeskus 2022)

5 Research methodology

Research methodologies are used to test theories and hypotheses in academic research. There are many different research methods available. Typically, the two main types of conducting research are quantitative research and qualitative research. When choosing the correct research method, one should consider which method is the most suitable for the problem in question, what is the accuracy of the results and how efficient the chosen method is. (Goundar 2012)

5.1 The chosen methods

Qualitative research method was chosen for the thesis. The qualitative research method was chosen as the aim of this thesis is to examine the impact of Covid19 on the air cargo industry. This thesis will include three interviews given

by logistics professionals working for company X. All three employees work in different departments. Qualitative research is used to assess for example opinions, knowledges, and behaviours. Qualitative research is used to gain new insight from forms of knowledge that might otherwise be unavailable. As Covid19 pandemic is relatively new phenomenon the impacts are not fully understood. (Goundar 2012)

A thematic analysis was used for the interviews. Thematic analysis is a method which allows systematical organising, identifying, and offers insight into meaningful patterns across a dataset. Thematic analysis provides the researcher a tool to make sense and see collective or shared meanings, and experiences. The benefit of this research method is its flexibility. It allows the researcher to produce answers to a question even without specific questions. The focus of the analysis can be across the entire dataset or in-depth examination of one particular aspect. Thematic analysis can be divided into two approaches: inductive and deductive. Inductive approach as known as bottom-up approach originates from the content of the data. This approach is more flexible and requires less understanding of the data beforehand. Deductive approach as known as top-down approach originates from the topics, ideas, and series of concepts of the researcher. This approach is stricter as it requires broader understanding of the data, and it is more limited. The thematic analysis is suitable for the interviews of this thesis as it allows the researcher to make sense of shared meanings and experiences. As Covid19 is relatively new pandemic the interviews will be based on the experiences of the interviewed persons. Furthermore, the inductive approach was chosen for the interviews. This approach was chosen as it requires less research beforehand. By the time when the interviews will be conducted, the theoretical part of this thesis has not been written in full. Therefore, there is still room for knowledge gain and the more flexible approach is justified. It is also worth pointing out the limitation of the thesis to understand all the effects of Covid19 related to air cargo. This limitation supports the choice of the inductive approach. (Braun & Clarke 2012)

5.2 Limitations

The weaknesses of qualitative research are expectation to produce definitive conclusions and assumption of projectable results. The researcher will not get definitive conclusions, but qualitative research will create a firm basis for decision making. Projectability is impossible as this research method is subjective and has a certain sample size. (Goundar 2012)

6 Results

This section consists of the analysis of my interviews done with company X. There was a total of three interviewees and the interview was carried out as a group interview. All the interviewees worked for different department within the same company. The titles of the interviewees were Gateway Specialist, Pricing Specialist and Airfreight Export Specialist. There was a total of 12 questions and 4 themes included in the interviews. Each theme had three questions related to the theme. The themes were Changes in air cargo during Covid19, Changes in flights during Covid19, Post pandemic, and The future. The full list of the interview questions and themes can be found in appendices.

6.1 The interviews

In this section I am going to write down the answers I got from the interviewees during the interview.

6.1.1 Changes in air cargo during Covid19

Question 1. How did Covid19 affect the prices of air cargo? The prices multiplied to many destinations. When Covid started passenger flights stopped and only cargo flights operated. As airlines realised the change, the prices for many destinations multiplied 4 to 5 times higher compared to pre pandemic. At the highest the prices were over 34 euros per kilogram, this were for special

cargo shipments to Shanghai. The prices lasted in a high level for a long period of time.

Question 2. How did Covid19 affect the capacity of air cargo? As passenger planes withdrew from the market the capacity declined dramatically. As only cargo planes operated, the capacity was just a friction of earlier around 10 %. Many countries had shut their borders and there were only occasional passenger flights operating. Finnair started to operate passenger flights by removing benches to use passenger space to carry out cargo. The cargo was tied up to the floor with nets. Finnair operated these flights as charter flights.

Question 3. How did Covid19 affect the demand for air cargo? There was a clear spike in the demand for import air cargo from China to Finland. The high demand was especially towards personal protective equipment, such as masks, gloves, and visors. However, the demand for certain goods from China to Finland dropped as the borders and production facilities were closed and China was unable to produce goods in the same pace. There was a trend of several Finnish wholesalers asking quotations for same shipment, which included hundreds of tons of face masks. Iata increased the allowed amount of dry ice per flight due to high demand to move covid vaccinations using air cargo. The demand for general air cargo did not increase due to Covid19.

6.1.2 Changes in flights during Covid19

Question 4. Did Covid19 affect the routing of air cargo? If yes, was there any additional charges? The company X created cargo craft routings to many locations. Almost all cargo was first moved by trucks to Europe before loading to airplanes towards the destination, instead of using only airplanes without trucks in between. Covid was prime time for airlines usually operating cargo flights. There were no additional charges for the usage of trucks, but as the market prices were high in general it increased the prices.

Question 5. Did Covid19 affect the increase/decrease in demand for certain destinations? The imports from China to Finland were increased significantly.

There was also an increased demand to exports from Finland to China regarding reagents which are used in covid vaccinations. Otherwise, there were no significant changes for certain destinations.

Question 6. How much did Covid19 affect the use of passenger airplanes? Covid19 had a shocking impact on the usage of passenger airplanes. The employees did not even see airplanes leaving daily, despite working near the airport. Airlines started to operate their passenger planes as cargo planes. The prices went sky high and there was a lot of volatility in the prices on a daily level.

6.1.3 Post pandemic

Question 7. Has air cargo capacity and prices returned to pre-pandemic levels? Year 2024 has been forecasted to be a record high passenger flight year. The capacity has recovered globally. From Finland there is still no flights to Beijing. To Shanghai there is flights only couple of times a week from Finland. Finnair's capacity has not yet recovered to East Asia. Finnair is now flying to North America. Passengers demand from China to Finland has not recovered. Flights to Japan are slowly recovering. The prices to Australia and New Zealand are still slightly higher than pre pandemic.

Question 8. What other post-pandemic changes have you noticed? Airlines pricing structure has been changed to more dynamic pricing based on available capacity. Listed prices have become unreliable. Making quotation has become more difficult as the booking price may not match with the final price, due to the changing prices. Quotations and bookings must be made more in advance to secure a certain price. Before the pandemic list prices were reliable and the most used ones.

Question 9. Has the company introduced new technology or other changes since Covid19? The pandemic changed the company's daily working culture. The most significant change was the shift towards remote working. In the beginning of the pandemic there was daily routing meetings. Before Covid19

there were only random remote working days, which required an approval from the supervisor. The company X was already planning to implement the usage of new software, but the pandemic rushed the introduction of the software.

6.1.4 The future

Question 10. How would you asses the future prospects of the air cargo industry? Passenger quantities are going to reach a record high number based on recent forecast and news. Climate change is a much talked about topic. The demand for air cargo from China to the rest of the world has been exploded due to the increase interest for e-commerce. The interest towards fast fashion has greatly increased especially in Southern China. Covid19 has greatly affected the spread of online shopping as people were unable to buy in-store during the pandemic. Global supply chain challenges might cause the production to move from East Asia to Europe, which makes logistics easier.

Question 11. Will there be investments in the future towards sustainability in air cargo? There has been an increase interest toward sustainable aviation fuel for quotations. In the future a lot will be invested in sustainable aviation fuel. Cost is the most limiting factor for usage of sustainable aviation fuel.

Question 12. Do you have anything else to add to this interview? In the aviation industry the usage of electric vehicles has been increased. It is hard to implement new technology to aviation as it is so strictly regulated. When the pandemic started airlines list pricings become inoperative. Due to this change every single air cargo shipment required individual spot quotation, which caused a lot of extra work for all departments. The need for spot quotations has been increased post pandemic.

6.2 Analysis

6.2.1 Summary of the interviews

Based on my group interview the pandemic had many different impacts on the air cargo industry. The freight prices multiplied to many destinations. The increase in price was remarkable, as the prices rose even 4 to 5 times higher compared to pre pandemic levels. The price level remained high for a long period of time. Majority of the passenger planes stopped flying when the pandemic started, leading to dramatical change in cargo capacity availability and price increase. Many countries closed their borders leading to the almost solely operation of cargo planes. This change in the operations reduced the capacity of air freight to only around 10 % compared to pre pandemic levels. After a while from the beginning of the pandemic, airlines such as Finnair started to operate cargo only flights using their passenger planes as cargo planes. Covid19 affected especially import operations to Finland as the demand towards personal protective equipment, such as masks, gloves, and visors rose significantly. These goods were imported from China to Finland. Dry ice allowance per flight was increased by Iata due to high demand to move covid vaccinations using air cargo. The demand for general air cargo did not increase due to the virus.

Majority of the cargo was first loaded to trucks, which were routed to Europe. Once arrived the cargo was loaded to airplanes and flown towards its final destination. There was less airplane only air cargo transport during the pandemic. The increased usage of trucks did not cause additional operational charges. There were no significant changes in demand for certain destinations, except for import cargo from China to Finland. As stated in the above section Covid19 had a huge impact on the usage of the passenger airplanes causing sky high prices and a lot of volatility in the prices on a daily level.

Year 2024 has been forecasted to be a record-breaking year in terms of passenger flights. The air cargo capacity has recovered globally. Flights to

China, East Asia, and Japan from Finland have not recovered to pre pandemic levels. The prices to Australia and New Zealand have remained slightly higher than pre pandemic. The pandemic changed the pricing structure towards more dynamic pricing, which follows the demand of the market. Pre pandemic airlines used mainly list pricing and the prices were reliable. Covid19 broke the reliability of the list pricing system and caused this pricing method to become temporarily unavailable. Post pandemic the list pricing has returned to some airlines, but the reliability has not recovered to pre pandemic levels. The pandemic changed the working culture of company X, as the company adopted the habit of doing remote work. The pandemic accelerated the implementation of already planned new software system usage within the company X.

The Covid19 had a major impact on the increased interest of online shopping and faster development of e-commerce. As stated earlier the number of passengers using passenger planes will increase to record-high numbers based on news and forecasts. Climate change has become a widely discussed topic within the aviation industry. Global supply chain challenges caused by the pandemic might lead the production to move from East Asia to Europe, which would ease the logistics operations. There has been an increase interest toward the usage of sustainable aviation fuel. Currently the cost of it, is the most limiting factor to the increased usage of sustainable aviation fuel.

6.2.2 Comparison of the findings and results

The interview concluded the finding that Covid19 caused drastic price changes in the airfreight rates. In the section 3.4 Changes in prices and tons one can find that figure 7 illustrates the airfreight rate changes for major lanes. The figure shows that the airfreight rate for Frankfurt – North America was almost 3 times higher in December 2021 compared to December 2021. The airfreight rate for Hong Kong – Europe was over 2,5 times higher in December 2021 compared to December 2019. The airfreight rate for Hong Kong – North America was over 3,5 times higher in December 2021 compared to December 2019. Based on my findings the airfreight rate increased 2,5 to over 3,5 times higher rates during

the pandemic compared to pre pandemic. The interviewees estimated the price increase to be 4 to 5 times higher during the pandemic compared to pre pandemic. In my findings the price increase was 0,5 to 1,5 times lower than in the interview results. However, the airfreight prices in figure 7 only illustrates certain destinations and the figure does not specify the nature of the cargo, for example general cargo versus dangerous goods as the type of cargo affects rates. The figure does not illustrate the airfreight rates from China to Finland, which based on my interviews was the most significant lane for company X during the pandemic. The interviewees pointed out that the prices remained on a high level for a long period of time, in figure 7 the time between the lowest and highest rates are two years so this also supports my theoretical findings.

According to my interviewees Covid19 caused a dramatical change in cargo capacity availability caused by the lack of operating passenger planes. Section 3.5 Changes in flights handles the changes in passenger plane traffic. The following numbers are going to show the overall reduction of seats offered by airlines compared to 2019. In 2020 the reduction was 50 %, in 2021 the reduction was 40 %, and in 2022 the reduction was 25 % compared to pre pandemic levels. Figure 10 shows that the passenger reduction was a global phenomenon affecting all the regions around the world. The theoretical findings of this thesis support the statement of significant cargo capacity reduction caused by the lack of operating passenger planes. During the interview it was stated that once the capacity issues were noted, airlines started to use their passenger planes to transport cargo instead of passengers. Figure 5 in section 3.1 Background, challenges, and adaptation shows the modified Finnair passenger plane used to carry cargo instead of passengers during the pandemic. In the same section it is stated that “The pandemic caused almost 79 % decrease in number of passengers between 2019 and 2020.” The interviewees told that the cargo availability was reduced to as low as 10 %. This is only 11 % more than in my theoretical findings and the findings do not consider cargo planes, making the theoretical findings quite similar with the interview results.

The interviewees pointed out the increased usage of truck flight combinations instead of transporting air cargo only using airplanes in every milestone. This was a new finding in the thesis, which is not included in the theoretical part. They also pointed out the increased demand of online shopping and e-commerce, these were not included in the theoretical part, but were important points to consider in the overall affects Covid19 had on the air cargo industry.

Based on the interview the air cargo industry seems to be heading to the right direction in terms of technological adaptation and sustainability aspects. Main section 4 Post pandemic changes discusses the importance of the development of new technological solutions and sustainability developments. However, we did not discuss this topic in depth during the interview, so it is not appropriate to make major conclusions.

7 Conclusion

7.1 Summary

The Covid19 pandemic was caused by rapidly spreading coronavirus called SARS-CoV-2, which first emerged in late 2019. The pandemic lead to profound shock to the world economy affecting all kinds of organizations around the world. Governments across the world responded with wide range of measures to stop the spread of the coronavirus. These measures included for example social distancing, closures of business and leisure facilities, travel limitations, and border restrictions. Covid19 caused disruptions in freight transportation significantly affecting the global supply chain networks, which functionality plays a vital role in the world economy.

Air cargo stands out as a fast and efficient mode of transportation, providing the movement of goods for over 52 million metric tons annually. The number of tons compares to same as 6.8 trillion $ worth of goods annually. The decision to choose air cargo as means of transport is primarily determined by two key factors: speed and value. Furthermore, air cargo can be divided into two main

categories: general cargo and special cargo. General cargo covers goods that cannot be categorised as special cargo. Special cargo covers goods with special characteristics, such as high value, specific nature, or unusual dimensions or weight.

The air cargo industry plays a crucial role to the geographically isolated Finland's economy, providing connections to and from Finland to the rest of the world within a reasonable timeframe. The usage of air cargo allows Finland to export its own products across the globe and to import vital product from overseas. The most significant trade volumes can be seen between Finland, Asia, Europe, and North America. Nevertheless, the air cargo industry does not only provide tens of thousands of jobs in Finland, but also ensures the flow of critical goods needed in Finland.

The central role which air cargo industry has in supporting the supply of critical goods was highlighted during Covid19 in terms of the transportation of personal protective equipment and covid vaccinations. The pandemic underlined the industry's importance as the demand and prices of air cargo increased dramatically during 2020 and 2021.

The key factors impacting the air cargo prices were capacity issues, lack of operating passenger planes, and supply-demand imbalance. For three different major lanes (Frankfurt - North America, Hong Kong - Europe, Hong Kong - North America) the lowest rate for airfreight per kilogram was in December 2019 and the highest rate for airfreight per kilogram was in December 2021. For these lanes the airfreight rate increased 2,5 to over 3,5 times higher rates during the pandemic compared to pre pandemic. The most significant operational cost component for airlines is jet fuel. Between 2020 and 2022 the jet fuel pices experienced approximately 40 % decrease up till approximately 73 % total increase leading to cost pressure caused by the price volatility. The pandemic caused major profit losses for several different subsectors related to the air cargo industry. In 2020 the total loss for all subsectors affected were 230,1 billion US dollars. Airports lost 31,6 billion US dollars and Airlines lost

167,9 billion US dollars. Freight forwarders made 3,5 billion US dollar profit in 2020, being the only profitable subsector in the industry.

The main reason to the increased demand was the significant reduction of available capacity. Passenger planes, traditionally vital for belly freight, faced unpredictable challenges as the pandemic significantly decreased the number of passengers mainly due to border- and travel restrictions. To adapt, airlines started to operate passenger planes as cargo only planes by modifying their passenger space to be suitable for cargo transportation. The pandemic had a major impact on the airplane traffic and especially on passenger plane traffic. The overall reduction of seats offered by airlines in 2020 – 2022 compared to 2019 was between 25 % to 50 %, the lowest percentage being in 2022 and the highest in 2020. In the number of passengers these changes ranged between 1,280 million to 2,703 million. The pandemic affected all regions around the world (Africa, Europe, Middle East, and Latin America/Caribbean, Asia/Pacific and North America). The steepest drop in the total seat capacity was seen in around April 2020. The reduction in the total seat capacity within different regions varied between minus 100-75 % compared to March 2020. In December 2022 many regions had recovered from the pandemic, but none of the regions had returned to pre pandemic levels. In December 2022 the regions had approximately 5-35 % lower seat capacity compared to the beginning of 2020. In general, the pandemic affected less on the domestic flights than to the international flights.

The pandemic caused an imbalance between demand and supply. The demand and supply dynamics were driven by a combination of government-imposed restrictions, mobility level changes and personal decisions. These economical level changes affected the consumers ability to consume and companies' ability to produce. During the pandemic The United States faced a significant disparity between demand and supply, caused by higher consumption than production was able to provide. Advanced Foreign Economies also had higher consumption rates compared to production but to a lesser extent than the US. Emerging Market Economies, excluding China, maintained a good balance

between demand and supply up till the end of the pandemic, which is when the production started to exceed consumption slightly. In the beginning of the pandemic China had a balanced demand versus supply setting. Starting from Q2 in 2020 China experienced a significant increase in production compared to consumption, which lasted for over a year. The demand-supply scenario was in balance again during the second half of 2021.

The pandemic revealed vulnerabilities in the global supply chains highlighting the importance of great flexibility, adaptation, diversification, and resilience. The global supply chain disruptions were mainly caused by difficulties in the logistics and transportation sector, semiconductor shortages, pandemic-related restrictions on economic activity, and labor shortages. The supply chain disruptions elevated multiple challenges such as uncertainty of demand, inconsistent supply, delivery delays and scarcity of material. Moving forward it is essential for businesses and policymakers to take actions towards the exposed vulnerabilities in the global supply chains. To build sustainable future combined with growth and continuity, businesses now need to reassess their supply chains by mapping those in full to identify the underlying weaknesses and threats. These are for example certain supplier’s time to recover from disruption, the impact on revenues in case of certain lost source, and the availability of alternative sources and visibility of supply chain tiers. Once the risk evaluation has been completed companies can either increase their stocks or diversify their supplier base. The major challenge for businesses in the future is how to be persistent without weakening their competitiveness. By addressing the emerged weaknesses with the implementation of proactive measures, economies can better withstand future disruptions and ensure the stability and efficiency of global trade networks.

7.2 Conclusion

In conclusion, the Covid19 pandemic had a profound impact on the global economy, disrupting supply chains and highlighting vulnerabilities across the air cargo industry. Governments worldwide responded with spectrum of measures

to contain the coronavirus, leading to widespread closures, travel restrictions, and economic turmoil. The air cargo industry appeared as a lifeline during the pandemic disturbances, allowing the prompt movement of essential goods, such as personal protective equipment and covid vaccinations.

However, the pandemic also exposed significant challenges within the air cargo industry, such as supply-demand imbalances, increased airfreight prices, capacity issues, and fluctuating operational costs.

The pandemic caused skyrocketing airfreight prices, leading to up to five times higher freight prices compared to pre pandemic levels. The key factors driving up air freight prices were lack of operating passenger planes, capacity issues, and supply-demand imbalances.

From the beginning of the pandemic the number of operating passenger planes collapsed to unforeseen levels. Passenger planes plays a vital role in air cargo capacity as significant amount of cargo is transported as belly freight. Starting from April 2020 the total seat capacity across different regions experienced a steep reduction up till 100 % compared to pre pandemic levels. These changes in the operations reduced the capacity of air cargo to as low as 10 % compared to pre pandemic levels. Despite the dramatical reduction in the capacity all regions across the world had recovered towards the end of the pandemic as the total seat capacity reduction was even as low as minus 5 % compared to the beginning of the pandemic. The Covid19 pandemic had less severe impact on domestic flights compared to international flights, due to travel- and border restrictions.

The Covid19 pandemic caused a significant imbalance between supply and demand, driven by multiple factors, such as government restrictions, individual decisions, and changes in mobility levels. These economic disruptions profoundly affected both consumer behaviour and companies’ production capabilities.

The key driver for fluctuating operational cost were the high volatility of jet fuel, leading to cost pressures.

Furthermore, the pandemic exposed the vulnerabilities of global supply chains, steering businesses to re-evaluate their logistical strategies. These vulnerabilities emphasized the importance of supply chain resilience, diversification, and adaptation. By mapping supply chains comprehensively, identifying risks, and building closer collaboration with partners and suppliers, businesses can better withstand shocks, and ensure the continuity during future disruptions.

Looking forward, the challenge lies in balancing resilience with competitiveness. By implementing proactive measures and mitigating weaknesses, businesses can enhance efficiency and stability of global trade networks.

Ultimately, the path to success lies in embracing change, fostering innovation, and maintaining resilience amidst uncertainty. By doing so, the air cargo industry can navigate the complexities of post pandemic world and contribute to the ongoing recovery of global supply chains. What promising initiatives does the air cargo industry have on the horizon as it tackles the challenges and seizes the opportunities of the ever-changing post pandemic world?

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Appendices

Interview questions and themes

Interview questions and themes

Changes in air cargo during Covid19

1. How did Covid19 affect the prices of air cargo?
2. How did Covid19 affect the capacity of air cargo?
3. How did Covid19 affect the demand for air cargo?

Changes in flights during Covid19

4. Did Covid19 affect the routing of air cargo? If yes, was there any additional charges?
5. Did Covid19 affect the increase/decrease in demand for certain destinations?
6. How much did Covid19 affect the use of passenger airplanes?

Post pandemic

7. Has air cargo capacity and prices returned to pre-pandemic levels?
8. What other post-pandemic changes have you noticed?
9. Has the company introduced new technology or other changes since Covid19?

The future

10. How would you asses the future prospects of the air cargo industry?
11. Will there be investments in the future towards sustainability in air cargo?
12. Do you have anything else to add to this interview?