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PROBLEMS WITH AIR CARGO DELIVERIES TO AUSTRALIA: THE MOST
COMMON REASONS FOR DELAYS IN THE SUPPLY CHAIN AND WAYS TO
SOLVE THEM

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LENTORAHDIN ONGELMAT AUSTRALIAAN: TOIMITUSKETJUN YLEISIMMÄT SYYT MYÖHÄSTYMISILLE JA KUINKA RATKAISTA NE

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Lentorahdin kuljetus on monimutkainen sekä haastava prosessi ja opinnäytetyö keskittyy löytämään tämän prosessin yleisimmät ongelmakohdat, jotka yleensä aiheuttava viivästymisiä lähetyksille.

Tämän opinnäytetyön tavoitteena on antaa yrityksille ymmärrys prosessista ja haasteista joihin heidän tulee varautua, mikäli he aikovat laajentaa toimintaansa Australiaan lentorahtilähetyksiä käyttäen. Yritykset jotka käyttävät jo lentorahtitoimituksia Australiaan voivat löytää parannuskeinoja heidän toimintaansa. Tämä opinnäytetyö tehtiin ilman toimeksiantoa henkilökohtaisena tutkimusprojektina.

Teoriaosuudessa käydään läpi tavarankulun ja informaation kulku lähettäjältä halutulle Australian lentokentälle. Myös toimitusketjussa yleisimmät mukana olevat yritykset, tarvittavat dokumentit ja yleisimmät syyt myöhästymisille ovat myös käsitelty.

Lentorahtialalla toimiva yritys vastasi lyhyeen kyselyyn, jonka kysymykset keskittyivät heidän kokemuksiinsa liittyen opinnäytetyön aiheeseen. Teoriaosuuden ja kyselyn pohjalta rakennettiin aiheesta tiivistelmä ja ehdotuksia kohde yrityksille.

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Delivering air cargo shipments is a complex and challenging process and the thesis aims to find the most common points in the process causing delays.

The aim of this thesis is to help companies understand the process and challenges to which they must prepare, if they want to expand their operations to Australia by using air cargo shipments. Companies who are already using air cargo deliveries to Australia may find some improvement ideas for their operations. This thesis was done without a commission by a company, which makes it a personal research project.

In the theory part the thesis goes through the flow of goods and information from the sender to the desired Australian airport. Also the most common companies involved, the needed documents and the most common reasons for delays are covered.

A company operating in the air cargo industry answered to a short survey questionnaire based on their experience related to the topic of the thesis. Based on the theory part and the survey a summary was built and some suggestions were created for the target companies.

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1 INTRODUCTION

This thesis focused on the most common problems in the supply chain of air cargo shipments from Europe to Australia. The main objective was to find the most common reasons for delays in the supply chain and ways to solve them. In this thesis, the supply chain starts with the finished products that are scheduled to be shipped to Australia.

The thesis is not commissioned by a company, making it a personal research project. The thesis is done for companies who are planning to start air cargo shipments to Australia and to help them better understand the supply chain process and possible problems that may occur. Companies who already have operations to Australia may find some improvement ideas to implement to their existing operations.

A survey was done for a company that operates in the air cargo shipment industry and information was gathered from several sources. The thesis was done based on the information gained from these sources and a comparison was done to find out if the issues the company is facing are common in the industry. Based on the results, companies who are planning to start using air cargo deliveries to export goods to Australia can better understand what the risks and common problem points in the supply chain process are.

A small comparison was made between two airports in Europe and two airports in Asia. This was done in order to support the study, by helping to understand and visualize their performance and possible problems they are facing.

The thesis is narrowed down to the most common reasons for delays. The focus is also on shipments to Australia, as reaching the destination requires generally multiple flights making the supply chain more complex than straight flight shipments. The thesis focuses on only air cargo deliveries, as the author has experience from the industry and a company available to provide more insight.

2 PROBLEM SETTING AND CONCEPTUAL FRAME OF REFERENCE

2.1 Purpose of the study

As the air cargo industry is complex and operates in a worldwide scale, companies may have difficult time finding the needed information to understand the process. This thesis aims to help companies understand Australia as a destination and the process that goes to the air cargo shipments from the sender to the desired airport in Australia.

The main focus of the thesis is describing Australia as a destination and the air cargo flow process of goods and information needed to reach the destination. The thesis also focuses on important aspects of the supply chain, such as incoterms, plane types and the shipment packing.

2.2 Author's insight

The author has experience with air cargo shipments to Australia from his second practical training with a GSA (General Sales Agent) company that handles air cargo shipments for various freight forwarding companies to different parts of the world. This has allowed the author to experience the delays and some problems that come with them. The same company helped the author with the thesis by answering to a survey related to the topic and by providing insight of the industry.

The thesis is narrowed down to the most common reasons for delays based on the experience of the company and other sources. Australia was chosen as the destination for this thesis because of the distance and geography. Australia is a continent where goods can be delivered only by air or sea freight, as it is separated from other continents. Air cargo shipments to Australia need generally more than one flight from Europe, making the supply chain more complicated and prone to problems.

The thesis focuses on only air cargo deliveries, as the author has experience from the

industry. It also helps as there are a lot of information available of the topic from different sources and a company as a support to provide more insight.

2.3 Delays for companies

Delays can be harmful for the company's reputation and cause extra work in order to arrange the delayed shipment to the final destination as soon as possible. Sometimes a project (such as a ship or a building) is on hold as they are waiting for the shipment that has the goods needed to continue the project to arrive.

If the shipment is at a transit terminal longer than the allowed time, there might face Demurrage. This means that the terminal will charge for storage based on the size of the shipment and duration. (Website of Shapiro)

Studies have shown that keeping existing customers is around 10% of the cost it would take to get new ones. Making a promise that the company can't keep, the customers may end up looking for the competitor's services. (Website of Marketing Donut)

2.4 Research questions

The thesis aims to answer the following questions and the research was based on them.

- Are the issues the company is facing common in the industry?
 - Have other companies found solutions for similar problems or are they facing different problems?
- Have the issues been the same during the past years?
- How does the time of the year affect the delays?
 - Are the delays more common during a certain time of the year?
- Australia as a destination?
 - What are the common regulations and limitations when exporting to Australia?

3 THE AIR CARGO INDUSTRY

3.1 Industry

Air cargo transportation is one of the most common ways of delivering goods. It is generally the fastest and most expensive transportation mode, but it does not always operate without problems. The supply chain of air cargo shipments has usually several different stages, companies, and regulations it needs to comply with, before it reaches its final destination. During this process, there are several things that can cause delays, which can be problems and be costly for the company waiting for the shipment.

Air freight is best suited for low density and/or high value goods. These goods can be for example gemstones, valuable metals and perishable/short-lived products. (Australian Government 2014, 6)

There are different types, sizes and destinations, which all bring their own problems with the deliveries that need to be taken into consideration.

The air cargo market can be divided into two categories:

1. Traditional flight companies, who deliver cargo by using passenger and freighter flights.
2. Express companies who deliver small courier or postal shipments with a fast schedule. They combine several entities from the supply chain which forms a single company or group. They are generally used for high value and time-sensitive deliveries. (Karhunen & Hokkanen 2007, 159) (World Customs 2016)

3.2 The company

As previously mentioned, the author did his 2nd practical training with a GSA company and the same company provided insight for this thesis. The company provides services

for several airline companies who wish to outsource part of their operations. Their operations focus on arranging air cargo shipments for their customer, by reserving and selling cargo space from the airline companies they represent. The customers are freight forwarding companies who need the company's services to get their customers' goods to the desired location. The case company does also co-operation with other companies, such as terminals and trucking companies, who play their role in the supply chain. Effective communication is required with all parties to avoid problems that can lead to delays.

3.3 Plane types

Two different plane types are mostly used when delivering air cargo, passenger planes where the plane has room for passengers as well as cargo and luggage and freighter planes that are used only to deliver cargo and sometimes they are modified versions of the passenger planes, where the passenger side has been removed and the doors have been widened. (Karhunen & Hokkanen 2007, 164)

Passenger and cargo planes can look similar from a distance, as with a few exceptions the passenger planes and freighters are of the same model. Sometimes the old passenger planes are put into a conversion process from a passenger plane to a freighter. The cost of the conversion is around third of the cost of buying a new plane. Recently the trend has been to produce both variants of the same model. (Hoke 2015)

3.3.1 Passenger planes

When transporting goods with a passenger plane, the amount of luggage needs to be taken into consideration, as the luggage goes always ahead of the cargo and this can cause delays for the shipment. Several factors are taken into account, when defining how much cargo and luggage a passenger airplane can fit on board. The type of aircraft, its tonnage capacity and the available hold space of the flight plays a part in the capacity. Different airlines generally use the square footage in the limited cabin space differently based on their marketing strategy and business model. This can affect the amount of luggage stored in the same place as the cargo is being transported.

(Gracia 2014)

There are two types of passenger planes, narrow and wide body.

Narrow body planes are used mostly on domestic or short flights and the capacity is usually measured in hundreds of Kilos, depending on the passenger amount, route and weather. The cargo is stored in the bottom of the plane with the luggage.

Wide body planes are used for intercontinental flights and they offer a higher capacity for the air cargo. The cargo capacity is generally around 10-20 tonnes depending on the passenger amount, route and weather. The cargo is also stored the same way as with the narrow body planes. (Website of Logistiikan Maailma)

3.3.2 Freighter planes

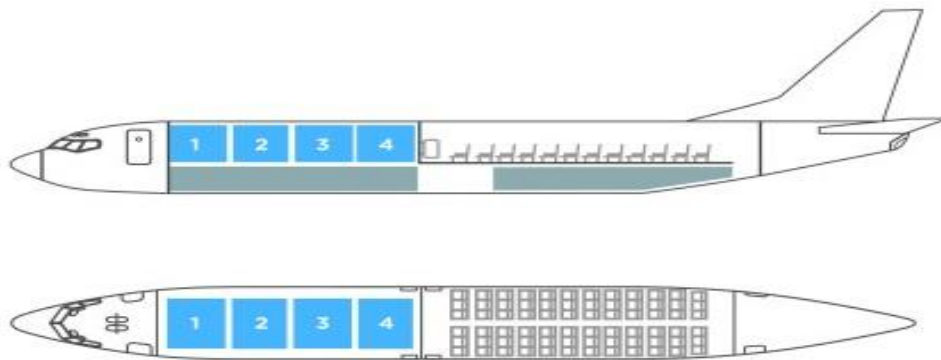
What separates the freighter planes from its passenger jet counterpart, is the large cargo door on the side of the plane. This enables cargo to be loaded and unloaded quickly from the main deck of the plane. The main deck area of the cargo plane is the area where the passengers would normally be seated. There are no seats, no windows and no storage for the hand luggage. Instead there is an empty space with rollers on the floor to help the pallets and containers to be moved around. The capacity for a freighter plane is around 10-100 Tonnes. (Website of Logistiikan Maailma.)

The Boeing 747 freighter has the option to raise the nose of the plane, which enables large items to be loaded, such as trucks and cars. (Website of Aerosavvy 2013). Due to the recent security concerns, the aircraft industry is moving towards all-freighter aircraft rather than passenger aircraft. (Rushton, Croucher, Baker 2010, 341)

All cargo aircraft can be specially built or converted from a passenger aircraft after 15-20 years of service. This conversion requires extensive work to resize the door, install rollers to help move the cargo etc, but this increases the economic life of the airplane. (IATA Supply Chain & Transport Modes 2012, 124)

3.3.3 Combi Aircraft

A combi plane is a mixture of a passenger and a freighter plane. Both passengers and cargo are carried on the main deck of the plane and they are separated by a special wall between them. While the passengers have seats, in the cargo section they are removed, and they have been replaced by special equipment and room for cargo transportations. (IATA Supply Chain & Transport Modes 2012, 124) This air cargo option is illustrated in the Picture 1.



Picture. 1. 737-400 Combi. Website of pemcoair.

3.4 Unit loading devises (ULDs)

Unit Load Devises are used in air cargo transportations and their main goal is to transport the cargo safely, quickly and cost-effectively. The ULDs makes it possible to assemble pieces of cargo, luggage or mail into a single unit, which makes the loading and unloading easier. They also maximize the usage of space in the plane's cargo area and protect the cargo by preventing them to move around during the flight.

There are two main categories of ULDs. The first category is the aircraft containers, resembles a can or a pod with a lightweight structure with side and roof panels and a fabric or solid door. There are several variations of the containers for different shipments differing in size and features, for example refrigerated and ventilated containers.

The second category is pallets, where the cargo is loaded on top of the pallet and the cargo load is secured with a net attached to the pallet in order to prevent the movement of the goods. They are cheaper to use than containers and they can be used to carry oversized cargo that won't fit into a container. (Website of VRR-Aviation)

3.5 Incoterms

There are always several risks when shipping goods from a country to another. The goods may disappear, get damaged or get delayed. There might be dispute regarding the responsibility, risks and costs in the supply chain even though all entities handle their job well as there are different trade terms in each country.

In order to remove these issues, common terms were created by the International Trade Commerce (ICC) and these terms are known as Incoterms (International Commercial Terms). (Huolinta-alan käsikirja 2010)

The incoterms help the sender and the receiver to better understand who owns the good, who is responsible for the risks and who is responsible of the cost at each stage. The newest incoterms (Incoterms 2010) are available in 31 different languages.

To better help to understand the incoterms, they are described as 3-letter acronyms. The aim of this is for them to be understood anywhere and in most languages. There are 11 terms in the latest edition and 7 of them are applied to any form of transportation, while 4 are used only for sea and waterway transportations.

It should be noted that the first letter has a meaning.

C terms mean that the seller pays for the shipping.

D Terms tell that the responsibility of the seller or shipper ends at a certain point and that they with who will pay the pier, docking and clearance charges.

E Terms mean that the seller's responsibility ends when the good leave their premises. (Website of Freight Filter 2013)

It is important to know the Incoterms, as it could potentially add costs for the company. It should be also noted that any International sales or buying contract without the incoterms is incomplete and some cases dangerous. (Website of Novotrans)

The Picture 2. displays the responsibilities in different stages depending on the incoterms. It should be noted, that the list does not include the Sea and Inland waterway transportation only incoterms, as they are not relevant for the topic.

Incoterm 2010	Export- Customs declaration	Carriage to port of export	Unloading of truck in port of export	Loading charges in port of export	Carriage (Sea Freight/Air Freight) to port of import	Unloading charges in port of import	Loading on truck in port of import	Carriage to place of destination	Insurance	Import customs clearance	Import taxes
EXW	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
FCA	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
CPT	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
CIP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer
DAT	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
DAP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
DDP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Seller	Seller

Picture 2. Incoterms for any mode of transport. Website of Freight Filter.

It should be noted, that from Picture 2, the CIP (Carriage and Insurance Paid) term is the only one that requires the seller to take and pay for an insurance for the shipment. In the other terms, each party makes a decision to either insure or not the shipment when it is on their responsibility area. (Website of IncotermsExplained)

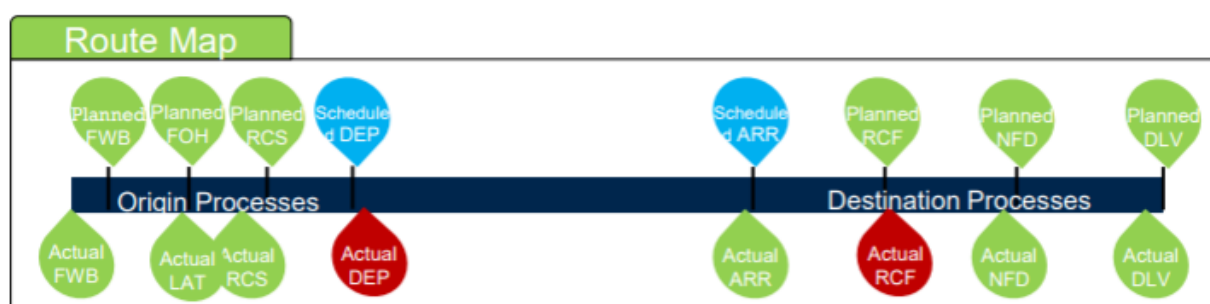
3.6 Cargo iQ

Cargo iQ is an IATA interest group and their mission is creating and implementing a quality standard for the worldwide cargo industry. It currently consists of around 80 major companies operating in the air cargo supply chain, such as airline companies, freight forwarders and trucking companies.

The members have developed a system for shipment planning and performance monitoring and these systems are based on common milestones and business processes of air cargo transportation. The goal of these processes is to continuously improve the

value and reliability of the airfreight. (Website of IATA 2017)

Each shipment has a plan called a "route map" based on the shipments Master Operating Plan (MOP) and each plan has milestones or targets that act as quality standards. Members of the supply chain will be informed with an alert if the milestones are not being met. This improves the ability to re-plan and recover from the error. Detailed records are available, which enables process analysis and improvement measures in the future. Cargo iQ was developed to support the paperless cargo process. (Website of IATA 2017)



Picture 3. Cargo iQ Road map example. IATA. Cargo iQ: Building the Future of Air Cargo.

Cargo iQ launched an online self-service in 2017, which allows the members to access its data. This gives them real-time information on their performance and how they compare against the Cargo iQ standards and the overall Cargo iQ community

The Master Operating plan was developed by the Cargo iQ members to support the quality management processes and metrics by using standard measures. It describes the main and sub processes of the air cargo journey from the shipper to the consignee.

The MOP includes information related to the implementation of the quality management systems offered by the Cargo iQ. This allows an industry wide process control and reporting, which in turn drives towards constant improvement and corrective action systems. (Website of IATA 2017)

The quality management system also includes monthly publications of the performance figures provided by the participants. This is done to show to what degree the participants have been able to meet the transport agreements they have agreed upon (delivered as promised). (Website of CargoLux 2018)

By gathering data generated by these measures, the parties involved in the supply chain can better work with the customers and suppliers in order to improve performance and quality of the air cargo industry. (Website of AviationPros.com 2017)

4 SUPPLY CHAIN TO AUSTRALIA

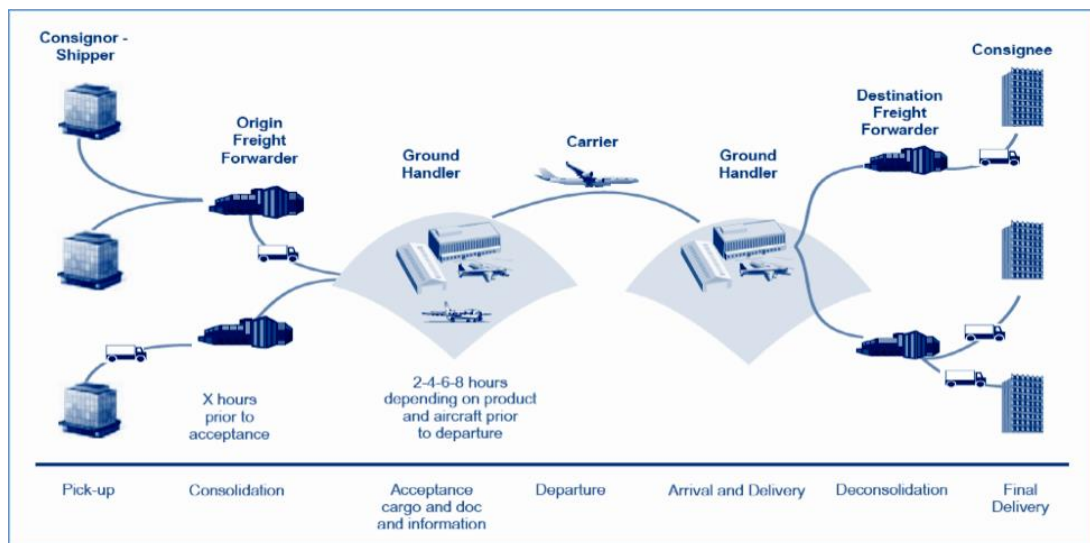
4.1 Global Supply Chain

When goods are being sent from a seller to a buyer on a global scale, the supply chain is generally complex and subject to various regulations. The shipments are handled by different entities who have more or less responsibility when it comes to the shipment.

Trucking is a part of the overall supply chain of air cargo shipments, as the goods need to be delivered from the airport to the end user. In Europe, trucking is often needed to deliver the cargo to major airports, where they are shipped to the desired destination. (IATA Supply Chain & Transport Modes 2012, 212)

The flight might require multiple flights before reaching the final destination. Also several documents are required for legal, security and commercial purposes. (World Customs Organization 2016, 7)

The general supply chain of an air cargo shipment is described in picture 4. This is done to help companies better help to visualize the supply chain process. This is a general supply chain and the real supply chain may be different, depending on the nature of the shipment. (Oversized cargo, medicines that have a temperature requirement etc.)



Picture 4. Air Cargo Movement overview. World Customs Organization 2016, 4.

Below are shortly listed the different entities, who have an important role in the air cargo supply chain process. There might be additional entities operating in the supply chain, but these are the most common ones. All of these roles share the responsibility for ensuring that the cargo is delivered according to the law when it comes to safety and security. (World Customs Organization 2016, 5)

Each firm in the supply chain is usually referred as a partner. This is because each entity/firm in the supply chain is responsible providing a process that adds value to the product. (Harrison & Van Hoek 2008, 7)

Consignor/Sender

A consignor is an entity or an individual who begins the movement of goods.

Consignee/Receiver

A consignee is an entity or person, who is listed as the receiver of the goods in the shipment's invoice or packing list.

Freight forwarder

A freight forwarder is a company that provides logistical services. The main task of the freight forwarders is to arrange the shipments to be ready to be transported by airplanes or other transportation methods requested by the consignor/sender.

The freight forwarder may also provide other services, such as storage, transportation of goods, customs declarations and fill the needed documents. When the freight operators are arranging deliveries for air cargo shipments, they need to book and contact an aircraft operator or a representative of an airline company. (World Customs Organization 2016, 5)

In some cases, the freight forwarders can consolidate small shipments from several shippers into a large shipment, which is being shipped to the same region at a lower rate. Thanks to the consolidation option, the freight forwarders can offer lower rates than the shipper would get directly from the carrier. (IATA Supply Chain & Transport Modes 2012, 66)

GSA (General Sales Agent)

General sales agents represent airline companies in a specific country or region and they represent usually more than one airline company. Besides sales, they also represent, market and does market reports for the airline companies. The GSA has access to the airline companies booking systems that are needed to reserve space from different flights, which means that the freight forwarders have to contact them if they want to use the flights of the airline companies that the GSA company is representing. They also follow the shipments and communicate with the terminals, airline companies and freight forwarders. (Demerkov 2016, 14)

Ground handlers

Ground handlers operate for the freight forwards and sometimes for the aircraft operators. Ground handlers usually handle the loading/unloading as well as handling, preparing, and tagging the cargo shipments. They are often located near the airport premises.

Cargo Handling operations may include performing security checks, consolidating and deconsolidating the cargo, building up pallets and containers, inspecting the cargo and documentation. (World Customs Organization 2016, 6)

With trans-shipments, the operation often consists of unloading, reconsolidating, and reloading the cargo. Sometimes the process is just a direct transfer between aircars, which is also called a "tail-to-tail transfer". (IATA Supply Chain & Transport Modes Course 2012, 125)

Aircraft operator.

Aircraft operators are also known as airlines and air carriers, providing air transportation services for goods. The cargo can be transported via passenger aircraft or an air-cargo aircraft depending on the volume available or the nature of the shipment. (World Customs Organization 2016, 7)

4.2 Required documents

When importing air freight to Australia, a freight forwarding company will require some needed documents. To speed up the movement of the shipment and to avoid any delays in the supply chain, certain documents should be ready. Errors in the documents can also lead to storage charges until the documents have been fixed. The industry is moving the documentation flow towards a paperless process. This will be covered later in the thesis.

Below are mentioned some of the most common ones, which may differ depending on the nature of the shipment. (Swan 2015)

Air Waybill (AWB)

Air waybills are non-negotiable Bills of Lading used as a receipt for the cargo and as a transportation contract between the shippers and air carriers. The airway bills have a standardized format and numbering system in order to allow computerization. (IATA Supply Chain & Transport Modes 2012, 76)

With air cargo transportation deliveries, the Air waybill or AWB is the most important document. It is a transportation contract and it is issued by a cargo agent or airline. The conditions of the contract are printed on the back of the AWB. (Website of Finnair)

Commercial invoice.

Description of each item of the shipment, the value of each item and the total value of the shipment. The commercial invoice should also include information about the transaction, meaning the shippers and sellers address and names. The delivery and payment terms should also be mentioned in the commercial invoice. This document can be used by the buyer to prove ownership and certain governments use the commercial invoice to assess custom duties.

Certificate of origin.

This document is used to declare the origin country of the shipment. This information is very important for the customs as each location carries distinct rules and regulations based on the origin of the goods. The certificate of origin may be required even if the same information is contained in the commercial invoice.

Export packing list.

The export packing list is generally used by the shipper to verify the weight and volume of the goods.

Inspection certification.

In some cases, the purchaser or country may require an inspection certificate. The certification is usually obtained from an independent testing organization.

Certificate of Handling (Fumigation Certificate)

If the shipment is packed or contains items that need to be fumigated.

(Swan 2015)

Packing Declaration

This document details the packaging that has been used for the shipment. For exam-

ple, a wooden package may be fumigated if it does not meet the Australian Quarantine requirements. Also each part of the consignment containing wood or plant matter must be fumigated. (Magellan Logistics 2015, 3)

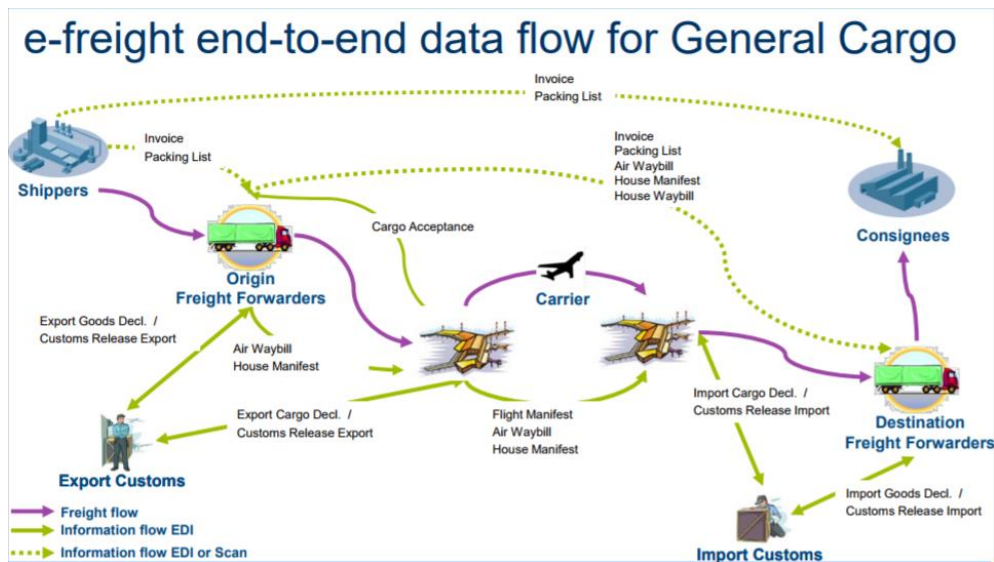
4.3 Information flow

Information flow is an important part of the supply chain, as it provides the opportunity for the management to plan and organize their logistics and operations. It also helps companies to communicate with business partners, perform managerial control of the goods and information exchange with the Supply Chain partners. (Waters 2010, 229)

E-freight is moving the industry towards a paperless future, where the paper documents are being replaced by electronic data. It aims to create an end-to-end paperless transportation process for air cargo shipments. This is made possible with framework regularities, modern electronic messages and high-quality data. This is done to eliminate costs coming from paper handling, transportation and processing. It also saves time and is sustainable for the environment. (Website of IATA 2017)

This can be achieved with EDI (Electronic Data Interchange), which means transferring data from a computer system to another with the usage of standardized message formatting and it allows multiple companies, even in different countries to exchange documents electronically and it can eliminate the need for human intervention. (Website of Search Data Center 2014)

The picture 5 displays one possible paperless data flow scenario. The scenario might change, depending on the location, the nature of the shipment or the terms arranged between the parties.



Picture 5. E-freight end-to-end data flow of General Cargo. IATA 2015, 18.

Freight forwarding companies who use electronic air freight services are often able to perform small changes to the details of the shipment ahead of schedule. Part of the business is that sometimes the shipment details may require last minute alterations, which can be disastrous if the documents are manually processed. With digital operations, the information can be altered in minutes. (Website of BCR 2016)

Adaptability to the paperless environment may lead to challenges, as some people/companies may find it difficult to keep up with the advancing modern technology. Companies need to either hire new skilled employees or try to train the old ones. (Website of DGAir 2013)

4.4 Australia as a destination

As Australia is located far away from Europe, it generally requires several flights to reach the destination. From closer business centers like Singapore or Hong Kong, air freight is used to deliver goods, as Australia is not connected to other continents by land. This means that goods need to be shipped or flown there, as road or trains transportations are not an option. (Hamal 2011, s.1)

The safest, fastest and easiest option for air cargo deliveries is a straight flight, meaning that the shipment is delivered with the same plane straight from the origin country to the final destination. This eliminates the need to move the shipment and the possibility of an offload from the connecting flight due to various reasons. In bigger airports, the transit time for the shipment from a plane to another can change from couple of hours to even a full day. Poor planning can increase the delivery time in some cases for several days. (Huolinta-alan käsikirja, 2010, 292)

Multiple transit points affect the time and safety of the shipment. Despite this, the managers often skip these factors and only concentrate on the loading and unloading points. (Website of BCR. 2017)

This can bring new problems, as there are more things to consider and more steps needed. Australia, like other destinations have their own rules and regulations. As the supply chain often involves many parties, it is important that everyone understand the regulations and possible permissions needed. As there are only limited flights to Australia, the peak seasons can be difficult when it comes to air transportations.

When it comes to the to the total freight movement, the air freight shipments account only a fraction of the total movements. For example, the international freight is less than 0,1 percent of the total trade of Australia in volume. However, when looking at the trade by value, the air cargo movement was over 17 percent of the total exports and 26 percent of total imports in 2011-2012. (Australian Government 2012 s.6)

4.5 Australia's Airports

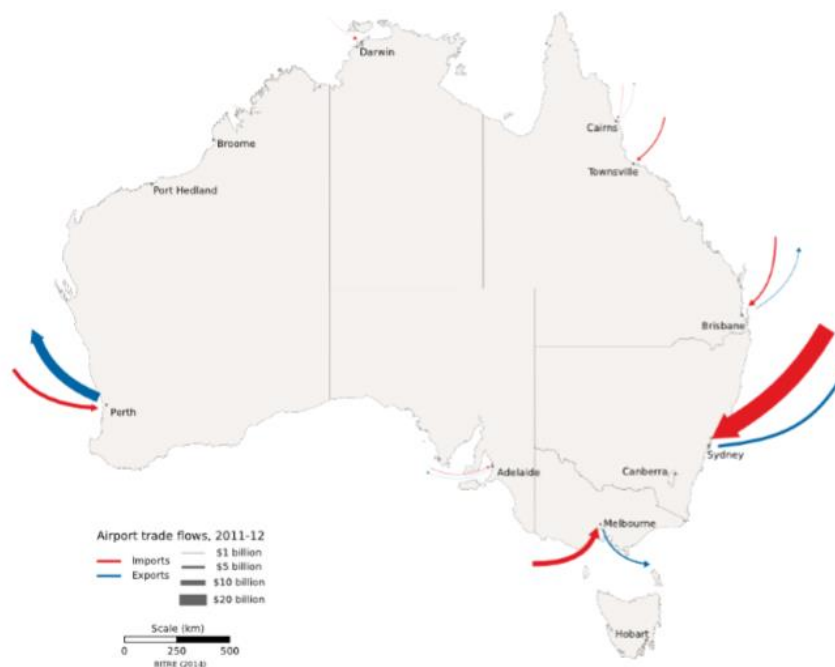
Australia has over 600 airports and the busies airports operate in the biggest cities in Australia. These major airports are connected to a wide range of different transport networks, which makes it easy to deliver the goods from the airport to the desired location.

The four busiest airports are Sydney Mascot Airport/Kingsford Smith Airport, Melbourne airport (sometimes referred as Tullamarine airport), Brisbane Airport and

Perth Airport. (Website of World Atlas 2017)

Sydney is Australia's largest import airport, when measured in trade value and it accounts more than half of the total merchandise air imports of Australia. Pharmaceuticals, mobile phones, and computer equipment account for over 30 percent of the total air imports thus making them the three largest commodity groups. Melbourne is the second biggest import airport and the same three commodities accounts for the largest value of the total imports.

Perth is the largest export airport when measured in trade value. When measured by value, gold is the largest export commodity. When measured by mass, fish and meat products are the largest export commodities. Picture 6. displays a map of Australia and visual help to better understand the destinations by export and import flows. (Australian Government 2014, 6-7)



Picture 6. Australian port-related freight by Value. Australian Government 2014, 7.

4.6 Australia's Restrictions

The Australian Quarantine and Inspections Service (AQIS) protects Australia's agriculture export industry, Australia's environment, the country's tourism and lifestyle by aiming to minimize the risks of exotic pests and diseases entering and spreading to Australia.

Failing to comply with Australia's strict Customs and Quarantine requirements can cause the goods to suffer from delays or cause the goods to waste away in a storage while the necessary paperwork is being done and handled. (Magellan Logistics 2015, 3)

4.6.1 Restricted goods

There are three major cargo categories: General cargo, perishable cargo and hazardous goods. General cargo can be shipped without problems, but perishable cargo and hazardous goods are subjected to different regulations. Perishable goods, such as fruits, meat and fish need to be refrigerated and some airline companies may not offer this possibility. Hazardous goods have to pass through different inspections and need to meet numerous requirements if they are even allowed on a plane. (Website of BCR 2014)

4.6.2 Country restrictions

There are prohibitions imposed on air cargo that has originated or transited through Syria, Egypt, Yemen and Somalia set by the Australian Government. Bangladesh was previously on the same prohibition category as the previously mentioned countries, but it was changed in 2016. Since then, the air cargo from Bangladesh can enter Australia, if it goes through security screenings in specific airports immediately before leaving to Australia.

Since 2017, there are also prohibitions on cargo originating or transiting through Turkey, but this applies only to electromechanical devices that weigh over 1 kilogram. (Website of Australian Government 2017)

5 METHODOLOGY

5.1 The chosen research method

The main method for the thesis was the qualitative research method, as data related to the topic was gathered from various sources and analyzed. A survey was also sent where the questions were conducted in an interview style, meaning asking open ended questions rather than a survey where the participants are asked to rate a question on a certain scale.

Quantitative research method was used in the Chapter 6, when numerical data was gathered for statistics related to a comparison between airports and the delays they have faced in the past months,

5.2 The research Process

A survey was done with three employees of the company with a series of questions related to the supply chain and Australia as a destination for air cargo shipments. The survey supported the thesis by providing answers to specific questions related to the topic by a company that is working in the air cargo industry and has insight of the problems the thesis is focusing on.

The survey was done to find out the most common reasons and how has the situation developed since they started their operations. The theoretical framework of the thesis was done by researching literature related to the problems with the supply chain of

air cargo shipments. The empirical part is based on analyzing the information gained from the literature used for the theoretical research.

5.3 Implementation

The information gained from reliable sources such as books, Internet, annual reports etc. was compared to the issues the company is facing. This was done to better understand the problems, to see if other companies are facing similar issues and if other companies have solutions for the problems the case company is facing.

6 RESEARCH FINDINGS

6.1 Focus points of the research

The research findings focused on three different sources of information. The problems the company is facing according to the survey. The other source was the information found from other sources (Internet, books and annual reports). Airport delay rates were also analyzed, and further research was done regarding the spikes on the delay percentages.

6.2 The issues of the company

A survey was sent to the company regarding their views on the problems related to the air cargo shipments to Australia. The survey questions can be found in APPENDIX 1.

Based on the company's perspective, the common problem points are high demand and limited capacity for especially main deck cargo. Passenger luggage limits the capacity on passenger aircrafts.

The company arranges trucking services for the air cargo to bigger airports in Europe, as these airports offer more frequent and better selection of flights to Asia, from where they fly to Australia. The company reported that these trucking services can cause delays in the supply chain.

When asked about the differences between the problems with Australia and other continents, the company reported that there isn't much difference compared to other continents, except Asia is an easier continent, as there is generally more capacity available. Another exception are the Europe-South America routes, as they suffer from difficult capacity issues, especially SCL (Santiago). The issues have been the same during the past years.

When asked about the time of the year and its affect on the delays, the company reported that from November to December the peak season occurs to Australia. The reason for the peak season is according to the company that the manufacturers wish to send out cargo by the end of the year. Another issue is that companies buy capacity for the high-volume packages sent before the holidays. The cargo volumes are high as the industrial/fiscal year is ending and companies aim to get their products delivered before the holidays. During the spring months from April to June are high-volume months, as this time is "Winter" in Australia.

The company believes that there will be more airlines starting to operate to Australia, if the global air travelling will continue to grow at the same pace.

The delays cause the company to better monitor the shipment, which results to more work. Also during the peak seasons, the company feels the need to extend the lead times.

The company suggest companies who are planning to start using the air cargo shipments to Australia to think about how the shipment will be packed, as large oversized cargo is more expensive to send than dense pallets. They also advise to reserve enough transit time on the planning phase of the supply chain process.

6.3 Statistics

Statistics were gathered to support and to better help visualize the Air Cargo industry. A small comparison between airports in Europe and Asia were done to see the delay spikes in flights during different months and to further research what caused these spikes.

6.3.1 Most common export cities to Australia

Most of the air cargo to Australia comes from Singapore. When pairing up the top 10 cities on terms of air freight tonnes to Australia, Singapore is 4 times on the list. Other major cities in Asia are Hong Kong and Guangzhou. This shows that the Asian air freight markets play an important role in the supply chain to Australia.

Table II International Freight (tonnes) by Uplift/Discharge City Pairs

Foreign Port	Australian Port	Year ended June 2015	Year ended June 2016	Year ended June 2017	% of Total	% Change 2017/16
Singapore	Sydney	62 737	70 142	70 708	6.8%	0.8%
Singapore	Melbourne	65 201	73 717	70 420	6.7%	-4.5%
Auckland	Sydney	53 457	51 189	51 564	4.9%	0.7%
Hong Kong	Sydney	39 995	50 771	49 496	4.7%	-2.5%
Los Angeles	Sydney	26 044	32 058	37 007	3.5%	15.4%
Singapore	Brisbane	36 049	36 692	36 936	3.5%	0.7%
Singapore	Perth	29 929	30 174	32 958	3.2%	9.2%
Auckland	Melbourne	27 818	27 797	31 104	3.0%	11.9%
Guangzhou	Sydney	14 604	25 004	27 803	2.7%	11.2%
Dubai	Melbourne	30 440	30 246	25 255	2.4%	-16.5%
Top 10 City Pairs		386 272	427 790	433 251	41.5%	1.3%
Other City Pairs		553 552	568 860	611 554	58.5%	7.5%
ALL CITY PAIRS		939 825	996 650	1 044 806	100.0%	4.8%

Picture 7. International Freight (Tonnes) by Uplift/Discharge City Pairs. Australian Government 2017, 11.

6.3.2 Europe Airport Delays

A comparison was made between two airports in Europe and two airports in Asia. The European airports, Amsterdam and Copenhagen were selected as both airports offer frequent flights to Asia. Amsterdam is one of the busiest airports in Europe and Copenhagen is experiencing growing cargo volumes to China and other countries (Website of Cph.dk)

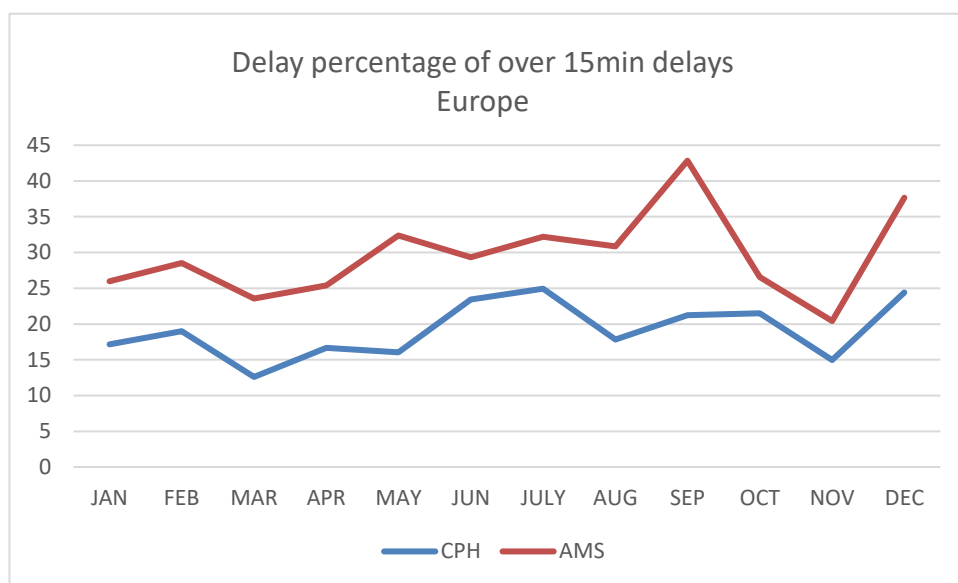


Figure 1. Monthly delay percentage of over 15min by AMS and CPH airports in 2017. Website of Flightstats 2017.

The Amsterdam's September delay spike can be partly explained by fog and stormy weathers, which caused the airport to delay the departures or cancel the flights. (Website of vcktravel.nl 2017) In September, KLM Royal Dutch Airlines suffered technical issues at the Schiphol airport, which caused delays for the flights. (*KLM delays at Schiphol...* 2017)

6.3.3 Asia Airport Delays

As the cargo from Europe to Australia generally transits in Asia, two Asian airports were chosen. Hong Kong and Singapore were chosen for this comparison as they the biggest transit points based on cargo volume according to the previous list.

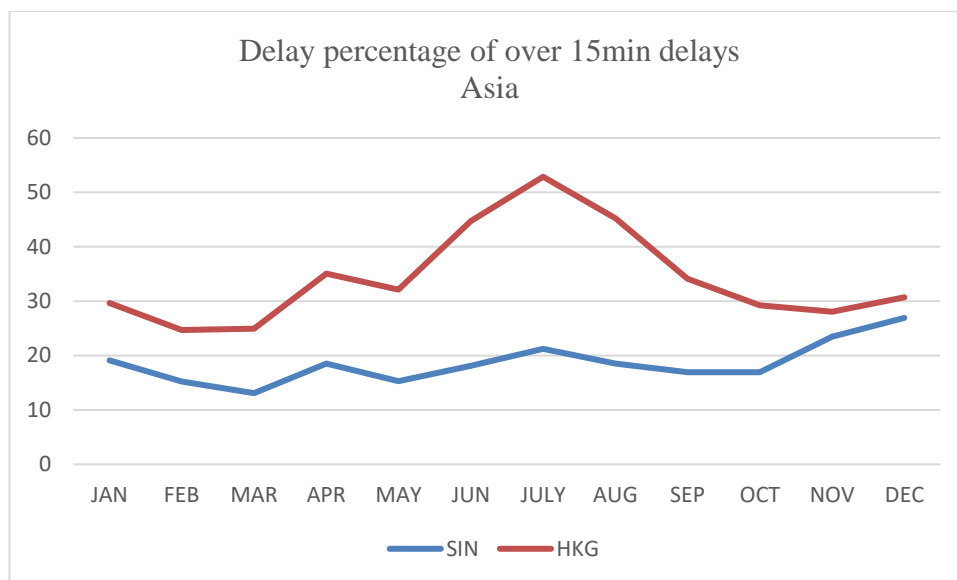


Figure 2. Monthly delay percentage of over 15min by HKG and SIN airports in 2017. Website of Flightstats 2017.

The higher delay percentage HKG can be partly explained by worse weather conditions in Hong Kong than in Singapore. June to August are the rainy season in the whole country according to the China Administration of Civil Aviation (CAAC). This can explain the spike in the delay percentage during these months. China has also been criticized for using poor weather conditions as an excuse for bad management and services. (Website of SCMP.com 2017)

6.4 Common issues according to other sources

Despite air freight being regarded as the fastest international delivery option for the goods, there might be some occasions when this advantage over other transportation methods is diminished due to airport congestion, shipment handling problems, paperwork and custom delays. (Rushton, Croucher, Baker 2010)

The following challenges were found concerning the air cargo shipments to Australia from books and online sources.

6.4.1 Geographical and Environmental issues

Distance causes problems as Australia is over 20 hours away from most part of Europe with a plane. This makes the shipping process more expensive and causes a time difference, as Australia is between seven and eleven hours ahead of UK time. The time difference makes communication more difficult, which may cause delays. (Website of Gov UK 2017)

As air transport is the least fuel-efficient transportation mode, the rise and fall of oil price affects its economic feasibility. Also the demand is highly sensitive to the changes in economic growth. There is less demand during recessions for passenger traffic thus resulting to reduced scheduled cargo capacity on the passenger planes for the air cargo shipments. (IATA Supply Chain & Transport Modes 2012, 212)

When considering the weather conditions, the airline companies need to consider how much fuel is needed for the flight. This affects the capacity for the flight as more fuel is needed in case of re-routes and strong head winds. (Website of Shapiro)

In some cases, the weather can be so bad that takeoff is too risky. The airlines don't take unnecessary risks, so there will be delays if the air might be too foggy or there might be a storm, which will force the airline to delay the takeoff until the weather situation improves.

6.4.2 Mislabeling

As the security measures for the shipments increases, poorly packed or mislabeled cargo can put people along the supply chain to risk.

The shipments need to be clearly marked with business details, such as company name, contact details as well as the information of the receiver/final destination. It should also be essential to include some labels showing how the goods should be transported or if any sensitive measures are required.

If the package is not labeled correctly, it may stop at a certain point in the supply chain until the labeling is corrected. This can cause the shipment to miss its connection and it can take a while to get it arranged to the next available flight. (Website of BCR 2016)

Dwell times at the airports can cause unwanted issues on an industry, where speed of the delivery is a key factor when choosing a mode of transportation. These issues are commonly caused by customs services and other trans-border regulations. (IATA Supply Chain & Transport Modes 2012, 212)

6.4.3 Capacity issues

The difficulties planning ahead the luggage amount affects the cargo flying with passenger planes, as the actual cubic measures and weight of the personal luggage can exceed the airline company's expectations. As there are limitations of how much the plane is able to lift, the space is often taken from the cargo. During winter months, the amount of luggage generally increases as more clothes are needed. This means that cargo traveling in a passenger flight to or from a country where it is currently winter, may suffer from lack of space.

The passengers can bring more baggage than was expected, and passenger baggage always has priority on the plane. The capacity cannot be scaled up to meet the extra demand for space. (Website of Shapiro)

The rising popularity of e-commerce is a good business for airline companies but causes difficulties for shippers and freight forwarders as securing space on planes out of Asia is and hub airports are suffering from bottlenecks. (Knowler 2017)

The cargo may be split, meaning that a cargo consisting of multiple pieces under a single Airway bill is on more than one aircraft. Not only will it cause a delay for part of the cargo, but it will increase the chance of losing part of the cargo. Some destinations have limited flights per week, so it can take several days to deliver the remaining pieces of the split cargo to the final destination. (Website of Shapiro)

6.4.4 Seasonal Problems

As the air cargo shipments from Europe go through hub airports in Asia, the national Asian Holidays can affect the delivery. There are several holidays in Asian countries, but the long and common holiday is the Chinese New Year, which can last up to 3 weeks in total. This is often the only break during the whole year and people travel long distances to spend it with their families. Because of this, the space for cargo is low on passenger flights.

Booking space for the shipment is difficult in January as everyone wants their goods to depart before the new year. The rates are also generally relatively high. The holiday operates based on the lunar calendar, which means that the starting day changes from year to year. Generally, it is on the end of January or early February (Website of Cargo From China 2015)

Each year from October to December, Australia faces peak season in sea and air freight. This is because the demand is higher both in Export and Import freight due to Christmas and end of the year. This causes the shipment prices to increase and cause extreme delays for shippers and freight forwarding companies.

Many companies, who have relied on sea freight may think that air freight could be an alternative for the decreased capacity, but the holidays affect the air cargo industry just as much. Planning ahead if possible helps to obtain the space needed for the shipments and prebooking space is recommended. (Website of BCR. 2014)

7 SUMMARY AND CONCLUSION

Air cargo industry remains the best option for low volume cargo with high value shipments. It offers the fastest mode of transportation on long distances and can reach almost any destination.

The supply chain of air cargo deliveries requires several entities to get the shipments delivered to the desired locations. Besides the physical flow of goods in the supply chain, the information flow is as important. Effective communication through the information flow channels helps to prevent losing the cargo and it helps to minimize the possible delays.

The delays can be difficult for companies who are waiting for the shipment, as a project could be on hold if the shipment included necessary components to continue the project. The shipper or freight forwarder may lose clients if they are not able to keep their promises. Sometimes these delays are caused by uncontrollable forces, such as storms, technical issues by the airline or over exceeding amount of luggage on the planned flight.

The cargo shipment supply chain requires several different documents, which need to be filled correctly. The industry is moving towards a paperless environment, where the paper is being replaced by electronic data. This saves money, time and is more environmental friendly option.

Australia is located far away from Europe, making shipping goods difficult. The journey generally requires several flights, often transiting in Asia and these transit points can cause delays to the already complex process. As the transit happens often in Asia, the local situation should be also taken into consideration. This means that the flight to Australia may suffer from storms in Asia or national holidays such Chinese New year.

Despite the delays, air freight is generally extremely reliable transportation options, as the continuous flow of flights to several destinations. The cargo can be often transported by passenger or freighter planes and the flights have been schedules and planned months or even a year ahead. This helps planning both in short and long terms and even if the goods don't make it to the planned flight, there is often a new flight leaving soon.

Air cargo deliveries also provide a high level of security for the cargo, as the security controls in the airports are really high. The air cargo deliveries don't generally experience a lot of changes in the transport temperature. It also protects from humidity, wetness, and other influences as they are stored in lightweight containers. (Website of BCR. 2017)

8 RECOMMENDATIONS

The companies who are planning to start using air cargo deliveries to Australia should contact a freight forwarding company with a good reputation. They can help with the necessary documents and provide other services, such as warehousing and security screening the cargo.

By paying more for the shipment, it is more likely that the shipment will fly as booked. This is because the cargo is rated with different priorities and the more is paid for the shipment, the higher it is on the ranking. To avoid the cargo being split, it is advised to pack the shipment differently (Packing more into one carton) or by paying for higher service level. (Website of Shiparo) The freight forwarders can help with this, by consolidating the shipment, which can also reduce the cost of the shipment.

The shipper should also understand Australia as a destination and understand the supply chain process needed to reach the destination. Also shipments from Europe to Australia transit in Asia, meaning that the issues in Asia may affect the supply chain

process.

It should also be clear that there may be uncontrollable issues during the supply chain, which can cause delays even if everything is planned well, such as storms that delay the flight making the shipment to miss its original connection flight.

There are certain peak times and national holidays to avoid, as the cargo capacity is tight during these times. If the shipper knows that he needs to send shipments during these peak season, they should reserve space from the flights with prebooks.

Freight forwarders should communicate with the airlines and customers to avoid delays and customer dissatisfaction. They should together with the whole supply chain involed focus on the new Cargo iQ system, which will bring value and help to decrease problems with the industry in the future.

9 FINAL WORDS

Writing the thesis was an interesting process and turned out to be more difficult than expected in the beginning. Even tough the author has some experience working in the industry, the research helped to better understand the industry and Australia as a destination.

The industry is extremely complex and it is evolving all the time. Finding relevant information proved to be a difficult process as finding new information among several different old sources was time consuming and confusing time to time. After learning about a topic, it was difficult to select the necessary information without making it too complicated.

The thesis succeeds in explaining the basics of the industry for people who are not familiar with the industry. The thesis can be used to gain basic understanding regarding

the air cargo shipments to Australia, the process involved and possible problems on the way. If a company is interested with sending shipments to Australia, this thesis provides a good starting point. Each topic could have been covered with more detail and the thesis has good sources where more information can be found.

Despite the delays, air cargo shipments are a reliable transportation mode and the delays are often short due to the amount of flights each day. Also the cargo industry is evolving all the time with the Cargo iQ, which aims to add value to the shipments, reduce the delays and add transparency to the process. The transition towards a paperless supply chain may cause problems in the beginning but in the long run it will improve the information flow. The rising popularity of the E-commerce industry currently causes problems for several parties in the supply chain, but this will make them adapt to the situation by finding solutions and improving their operations.

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Survey questions:

1. Can you point out the most common problem points in the supply chain causing delays, when arranging air cargo deliveries to Australia?
2. How do these challenges differ from shipments to other continents?
3. Have the issues been the same during the past years?
4. Have there been any improvements compared to the past years?
5. How does the time of the year affect the delays? (Are the delays more common during a certain time of the year?) If yes, what are the reasons?
6. Can you think any challenges that might arise in the coming years?
7. How do the delays affect your work?
8. What recommendations would you give to companies who are planning to start using air cargo shipments to deliver goods to Australia?