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Analyzing the Effects of e-Freight within the Air Cargo Industry

A cross-sectional case study focusing on air carriers and freight forwarders in the U.S. and China

Master Thesis in Business Administration (15 ECTS)

International Logistics and Supply Chain Management

Authors: Oana Alexandra Danciu
Theresa Franz

Tutor: Leif-Magnus Jensen

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Theresa Franz

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Authors: Oana Alexandra Danciu & Theresa Franz

Tutors: Leif-Magnus Jensen

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Subject Terms: actor, air cargo, air cargo industry, air freight, airline, carrier, China, cost, distribution, documentation, e-AWB, e-freight, freight forwarder, IATA, industry, international, logistics, market, paperless, performance, power, security, supply chain management, supply chain network, transportation, sustainability, transportation mode, U.S., visibility.

Abstract

This study aims to analyze the effects (e.g. changes of power and processes) of the e-freight initiative introduced by IATA on the air freight supply chain network by focusing on two specific cases within the U.S. and Chinese market.

After identifying two representative cases (cross sectional), data was gathered using semi-structured interviews, additional data provided by the participants, as well as secondary data, such as annual reports and case studies. The findings are analyzed using key words and suitable categories.

A power model based on the current situation of the air freight supply chain is developed by analyzing the circumstances while implementing e-AWB/e-freight. This model can be used to add to the existing gap within the present literature framework. Further, changes regarding the supply chain network, especially processes and information flow were identified. Lastly, mainly positive (e.g. increased sustainability of the transportation process) as well as some negative effects (e.g. investments of the dual process) are mentioned in a detailed manner.

Limitations of the study include a research population of two major actors of the air freight supply chain network, as well as a theoretical framework primarily based on literature and the fact that the study focuses on a cross sectional time period.

Future research would include an analysis of all involved actors, while including IATA as the trade association, of the air freight supply chain, and especially issues related to customs procedures. Also, a longitudinal study, a more in depth analysis of the power distribution and any related changes should be of interest.

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Abbreviations

*	See *Glossary* for further information
AWB	Air Waybill
CEO	Chief Executive Officer
DG	Dangerous Goods
e-AWB	electronic Air Waybill
e-commerce	electronic commerce
e-CSD	electronic Cargo Security Declaration
EDI	Electronic Data Interchange
e-Doc	electronic Data
e-freight	electronic freight
EU	European Union
FF	Freight Forwarder
FTK	Freight Tonne Kilometer
GDP	Growth Domestic Product
GHA	Ground Handling Agent
IATA	International Air Transport Association
IKA	Ikarus Airways Ltd.
PF	Phoenix Forwarding Ltd.
PXA	Pegasus Xpress Airways
SC	Supply Chain
StB	Simplifying the Business
U.S.	United States
3PL	Third (3rd) Party Logistics

1 Introduction

This chapter provides a brief overview of the key elements of the research subject. Starting off with the background of the study, the research problem and contributions will be defined, followed by the purpose and the research questions. The chapter will be concluded with the delimitations of this thesis.

1.1 Background

The modern airline industry is now more globalized than ever and requires the heavy use of electronic communication and messaging to ensure that every operation can run smoothly.

'Electronic messages have existed since the 1980s but the air cargo industry still relies on paper.'
(IATA, 2015c).

The air cargo industry however continues to depend on paper-based documents when it comes to processing the movement of freight. This concept does not only fail to reflect the cost-effective nature of modern transportation, but also fails to fully serve the key requirements of air freight: quality, security, and speed. (IATA, 2015c)

Main actors, such as carriers and freight forwarders (FFs) within the supply chain (SC) have to process 7,800 tonnes of paper across the entire air freight industry each year - a quantity equal to 80 fully loaded Boeing 777 (Internal Source, 2015b), especially when it comes to handling air freight. This sums up to nearly 24 millions of paper air waybills (AWBs) per year in different languages and versions all over the world. (Internal Source, 2015b)

That however, should soon be part of the history according to the IATA's e-freight initiative!

The electronic-freight (e-freight) project, an industry-wide initiative, invoked by the International Air Transport Association (IATA) in cooperation with several major airlines (carriers) and freight forwarders has the aim to take paper out of the air freight supply chain, and therefore to facilitate the movement of freight and to eliminate the need to produce and transport paper for all stakeholders (Internal Source, 2015b).

Keeping in mind that back in the 90's electronic commerce (e-commerce) not only opened up a vast variety of new possibilities to do business, but also created several impacts on the world of logistics businesses and supply chains, this study will additionally highlight several issues that might occur while implementing the e-freight initiative.

A future challenging transportation environment defined by economic deregulations, increased safety and social regulations, escalating customer expectations, increased globalization, improved technologies, and regularly changing appearances of the transportation service industry not only emphasizes the need for competitiveness, but also presents a wide spectrum of opportunities for managers within the air freight industry (Stank & Goldsby, 2000).

By focusing on the background of this study the following sections will highlight the theoretical gaps, while underlining the contributions and purpose of the research, and finally leading to a statement of the study's delimitations.

1.2 Problem Definition and Contribution

The problem definition is based on two major theoretical gaps. The first one describes the lack of literature analyzing the outcomes of the e-freight*[1] initiative which focuses on whether the project really achieves the intended goals. The second gap relates to the lack of literature which fails to evaluate how the distribution of power is set up within the air freight industry.

There are several reasons to characterize the importance of this research and thereby underline the necessity for addressing this topic. The main reason, however, is to prepare '[…] air cargo for future challenges in organizational as well as in technological aspects for the market.' (Clausen, ten Hompel & Klumpp, 2013, p.49). Nowadays, all processes related to logistics need to be done in a much more rapid and accurate manner. Also, the 24/7 access to data, which have to be processed, needs to be granted in order to provide additional development within the air cargo logistics (Clausen et al., 2013). A further problem within the air cargo industry relates to the lack of coordination and communication among the actors involved in the supply chain. This leads to an increasingly complex and inefficient air freight sector (Clausen & ten Hompel, 2010) caused by the '[...] individuality of their processes and missing information [...]' (Clausen et al. 2013, p. 63).

Based on the problem definition and the identified gaps, this research contributes to both theory and practice in two ways. First of all, the study will provide a clear perspective on how the implementation of e-freight can contribute to fill the theoretical gaps identified. This will take place by mainly focusing on the changes related to the processes of transporting goods via air and the distribution of power related to the air cargo supply chain.

Second of all, several actors within the air cargo supply chain can benefit from the new insights gathered. Clausen et al. (2013) also suggest that new methods, such as paperless documentation, but also common procedures need to be developed in order to ease the handling of goods between all actors of the air cargo supply chain. All actors involved will therefore benefit from the overall improvement of the air cargo supply chain Clausen et al. (2013). In 2013, nearly 85% of the air cargo processed at the 30 main airports worldwide was handled by the 21 leading airports – including the two cases of this study, which are ranked first and twenty-first (Airport Council International, 2014). This trend describing how a few of the main airports handling the biggest amount of cargo worldwide will continue to increase leading to an elevated centralization of already established airport hubs (Frye, 2006). Not only will the existing available capacities of these airport hubs be exceeded, but also create bottlenecks due to contemporary '[…] restricted policies for new constructions and extensions […]' (Winkelmann, 2008 and Frye, 2007, both cited by Clausen et al., 2013) that prevent the hubs from expanding. According to the survey of the Speditions- und Logistikverbands Hessen/Rheinland-Pfalz e.V. processes involving the

[1] further information is provided in Sub-section 4.1.1 'E-Freight Initiative'.

cargo handling and time are the most sensitive and create the biggest problems (cited by Maruhn, 2010).

One way to avoid the creation of cargo overload and bottlenecks within the airport hubs would be to optimize the resources and increase the level of innovation of all actors involved, such as implementing e-freight and therefore reducing the handling time of cargo (Grandjot, 2002; Frye, 2007).

1.3 Purpose

The overall purpose of the study is to analyze to which extent the introduction of electronic Air Waybill (e-AWB)*[2]/e-freight as a service provided by both carrier and freight forwarder changes the air freight supply chain network and whether it is advisable to implement this initiative or not. The focus relies on two specific cases within the U.S. and Chinese market, which will be further described in the Sub-section 3.4.2 'Case Selection Process'. Based on the preexisting power distribution within the air freight supply chain network, crucial drivers that support or prevent this concept and possible positive as well as negative changes will be presented. Also, with regards to the characteristics of the two cases it is applicable to reflect the findings onto the whole air freight industry.

In addition to this, new insights into the phenomenon of e-freight will be given based on primary data gathered while analyzing two cases. In order to do so the study will address not only problems, but also focus on positive and negative outcomes related to the main actors within the supply chain network of the air cargo industry.

Finally, referring to the supply chain network aspect, the potential changes in combination with the distribution of power within the air freight industry will be portrayed with focus on cost, time, visibility, quality, and sustainability.

1.4 Research Questions

The timeframe analyzed within this study refers to immediate changes that might take place within the air freight industry after the implementation of e-freight. Given the characteristics of the research time horizon that will be presented in the Section 3.4 'Research Strategy and Time Horizon' this sustains the chosen methodology of the authors.

Additionally, based on the e-freight goals set up by the main actors of the air freight industry and presented within the Section 4.1 'IATA' the study will analyze the e-freight initiative outcomes while mainly focusing on the air carriers and freight forwarders.

Also several performance measurement indicators highlighted within the Sub-section 2.2.2 'Performance Measurements of the Air Freight Supply Chain' will give certainty as to what extent the e-freight initiative has been successful or not.

[2] further information is provided in Sub-section 4.1.2 'Electronic Air Waybill (e-AWB)'.

For the fulfillment of the research purpose and with regards to the above mentioned research perspectives, the study is based on three major research questions:

Research Question 1: *What main drivers - that derive from the power distribution within the air freight industry - determine the carrier (airline) and the freight forwarder to include e-AWB as well as e-freight into their service portfolio?*

Research Question 2: *How does the existing supply chain network change with the implementation of the e-freight initiative with regards to cost, time, visibility, quality, and sustainability?*

Research Question 3: *To which extent have the given e-freight initiative goals been successful and on which level have these failed?*

In order to narrow down the terminology of the terms mentioned within research question two - costs, time, visibility, quality, and sustainability - the following paragraphs provide a short description of each:

Costs relate to possible savings that apply to the total cost of ownership aspect that might improve a firm's overall revenue and efficiency. Depending on the outcome of the research these savings can either be positive or negative.

Time describes the lead time needed to handle the goods before and after implementing the e-freight concept.

Visibility stands for the ability to share information between the actors within the supply chain in the most effective way. The focus relies on the level of communication and transparency provided by each actor involved.

Quality reflects the level of security, accuracy, and customer service that transportation via air in combination with the e-freight concept can provide.

Sustainability highlights the need to reduce paper and fuel consumption within the air freight supply chain.

A more detailed description and the reasons for why those performance parameters were chosen for this study can be found in Sub-sections 2.2.2 'Performance Measurements of the Air Freight Industry', 3.6.2 'Relevant Measures', and 4.1.1 'E-Freight Initiative'.

1.5 Delimitations

The following section presents several delimitations of this study. Based on three aspects the authors aim to highlight the purpose of the study and delimit it from a possible large setting.

Firstly, the purpose of this study is to present a practical and theoretical proposition as to whether or not to introduce the e-freight concept as part of the service portfolio of a carrier or of a freight forwarder by analyzing crucial drivers that support this concept and highlighting consequently changes to the supply chain of the air freight industry.

Secondly, the research population of the study focuses mainly on two groups of actors involved in the air freight supply chain, namely the carriers and the freight forwarders. The reason behind this approach relates to the new changes within the air freight industry, such as the distribution of power lacking of guidance, the increasing importance of sustainability, and lastly the IATA initiative playing a major role.

Thirdly, when referring to the theoretical and methodological approach used in this study the following aspects have been selected. The theoretical framework of the study is based on literature, while solely including journal articles, monographs, books and encyclopedias. A cross-sectional time period is applied based on practicality reasons. Further, the authors have chosen to use semi-structured rather than open questions as part of the data collection method in order to indirectly motivate the interviewees to take and complete the interview.

2 Framework

The theoretical framework relevant for this study consists of four major and one concluding section. Firstly, the supply chain of the traditional air freight industry (Section 2.1) is presented followed by a detailed description of the air freight industry, its main actors, and performance measurements within this industry (Section 2.2). Secondly, the next two sections refer to power distribution models (Section 2.3) and sustainability (Section 2.4) within the air freight industry. Lastly, Section 2.5 combines all findings of the theoretical framework into one concluding overview.

2.1 Supply Chain of the Traditional Air Freight Industry

In general a 'Supply Chain' can be described as a connection of integrated parties, such as supplier, wholesaler, manufacturer, and retailers, sharing information, execute the physical flow of products and services, and commit in financial exchanges in order to fully satisfy the end customer (Langley, 2009). As defined by Beamon (1998) the 'Integrated Supply Chain' reflects '[...] a number of various business entities [...]' that '[...] work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products, and (3) deliver these final products to retailers.' (Appendix 1). Depending on the industry where these actions take place further customization - regarding the involved actors - can be applied. The focus of the thesis relies on the last part of the supply chain, which focuses on the delivery of final products to retailers or end customers.

A more contemporary way to describe the supply chain of the air freight industry has been presented by Neiberger in 2008, who introduces the concept of 'Global Production Networks'. This concept is described as '[...] the globally organized nexus of interconnected functions and operations by firms and non-firm institutions through which goods and services are produced and distributed.' (Coe, Hess, Yeung, Dicken & Henderson, 2004) and applied to the air cargo industry. By doing so the author manages to illustrate the importance of logistics service providers and mostly air freight carriers within the network (Leinbach & Bowen, 2004; Neiberger, 2008).

Traditional air freight operates in a forwarder-airline-forwarder modus (Figure 2.1), where the carrier (airline) takes over the airport-to-airport transport and the freight forwarder handles all logistics services related to the transport before and after the airport.

Before 1990, the air freight industry consisted of agents, whose primary role was to offer point-to-point transportation, customs clearance, and storage services, while using assets such as aircraft, trucks, and warehouses.

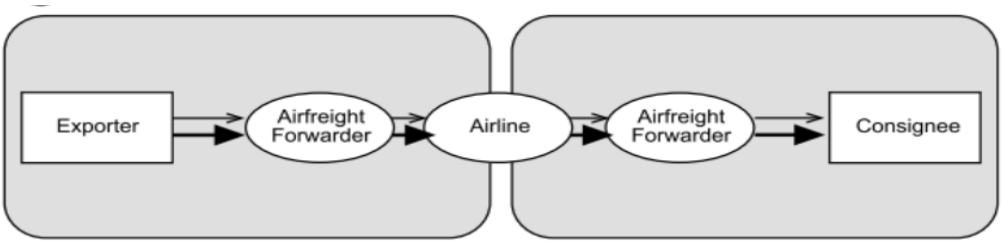

Figure 2.1 – The Traditional Air Freight Supply Chain (Adapted from Neuberger, 2008)

The best characteristic for this time period consisted of serving a segment of total transportation process. There was a lack of process focus by independent forwarders and airlines '[...] traditional industry was influenced heavily by the passenger industry.' (Zhang, Lang, Hui & Leung, 2007), since few agents possessed the information and technology necessary to provide an integrated service. (Zhang et al., 2007)

After 1990, the era when the Internet, e-commerce and the practice of supply chain management were implemented, a '[...] new business of integrated logistics activities and alliances with suppliers and customers.' began (Lee & Billington, 1995).

Freight forwarders in this traditional concept are mainly known for acting as a Third Party Logistics (3PL) broker/operator which has contracts with the shippers and manages the cargo shipment (Clancy & Hoppin, 2001). The aim behind a forwarder-airline partnerships is to '[…] provide fully integrated door-to-door service […]' (Zhang et al., 2007), to focus more on the end customers, and therefore improve competitiveness. This approach should also embrace the express service offered by shipping companies. (Zhang et al., 2007)

Before the alliances between forwarders and airlines, the movement of goods in the air took place fast pace, compared to ground transportation, where the movement of goods was slower. The reason behind this was due to the fact that each party in the multimodal transportation system needed to optimize its own mode of transportation which eventually led to inefficiencies within the entire supply chain. The alliances nowadays lead to improvements of the interface between forwarders and airlines, both in physical links and information flows. (Zhang et al., 2007)

The driving force behind these alliances seems to be the cutting of operational costs, as outlined by the IATA Cargo 2000 initiative: 'As an example, Cargo 2000, which brings together some 80 major freight forwarders, airlines and ground handling agents (GHA), has been considered a device to improve efficiency of air cargo and reduce operational costs, as well as to improve intermodal connectivity of the different agents.' (Zhang et al., 2007).

2.2 Development of the Air Freight Industry

The 'Air Freight Industry' is an excellent choice when it comes to rapid deliveries caused by shortenings within the inventory replenishment plan, especially in the garment industry, in order to keep up with unplanned and urgent demand. It portrays the 'best speed' option for short shelf lives of perishable and cold chain goods, since it guarantees the shortest transportation times. The downside of this transportation mode is high costs, that are associated with choosing the time sensitive option. Air carriers charge twelve to sixteen times more in costs compared to ocean cargo and four to five times higher costs compared to road transport. (Shacklett, 2014)

The air freight industry is characterized by the increasing value of air cargo, but at the same time by the decreasing revenue carriers earn per tonne. According to the Council of Supply Chain Management Professionals' 23rd Annual State of Logistics Report, released in June 2012, this seems to apply for both domestic and international flights (Cited by Dutton, 2012).

A retrospective view is outlined in the following paragraphs (Table 2.1) in order to provide an overview over the happenings in recent years within the air freight industry (Boeing, 2014):

Table 2.1 – The Air Freight Industry Developments in Recent Years (Boeing, 2014)

Year	Air Freight Industry Developments
2009	depressed level of air cargo traffic
2010	rebound worth 19% above the level of 2009
mid 2011 - early 2013	stagnated traffic of world air cargo
2014	rebound after three years of stagnation

There are several factors that contribute to these occurrences along with economic activity, general niche increases, aircraft emissions, capacity, volatile fuel prices, freight forwarders, automation, and regulations. The main reasons behind the stagnation phase seem to be referring to the weak world economy and the slow trade growth. (Boeing, 2014)

The historical background of the 'Economy' is marked by influencing impacts such as the EU banking crisis, the U.S.' national debt, and the Iranian fuel embargo that have led to a weakened consumer confidence and weakened manufacturing. The general U.S. economy is rated as 'poor', forcing air carriers to focus more and more on efficiency and cost reduction, while shippers re-evaluate their transportation options. Furthermore, investments in air freight for replenishment have been shortened. (Dutton, 2012)

'Niche Forwarders', mostly handling the section of perishable good (including food and pharmaceuticals), increasingly gain market share at the expense of some of the larger freight forwarders (Shacklett, 2014).

Within the technology sector of the air freight supply chain several changes have been made in the last couple of years. Among this, 'Automation' has been a big topic. Automation refers to the acceptance of electronic documentation that grown internationally and it is a concept that seems to have become standard within the U.S.. Contrarily, there are still many other countries which only accept paper documents. The big issue behind this alludes to shippers who need to provide both paper documents and electronic data at the same time. (Shacklett, 2014)

Furthermore, air cargo's shifting business models describe how many freight forwarders (over 80%) consider moving away from air cargo and over to ocean freight instead. The main cause behind this initiative seems to be costs related to air transportation. Air carriers therefore become more agile when it comes to coordinating or allocating their capacity with actual demand for a better control of costs. While doing this they can also focus on partnership improvement and deeper collaboration with freight forwarders. Additionally, there is a movement towards a more integrated supply chain which '[...] is cloud-based in order for many different transportation providers across multiple transport modes to utilize and expedite the integration of air cargo with the overall supply chain and with intermodal shipping.' (Shacklett, 2014) and gives several involved parties end-to-end visibility of the entire supply chain network. (Shacklett, 2014)

On the other hand, Shacklett (2014) states that the air cargo industry shows performance improvement by becoming more fuel-efficient and having more outstanding flexibility when it comes to reacting to spikes in the market demand. Air transportation can yet make a difference when it comes to shipping to new and emerging countries (e.g. Asia and Africa) where the road and rail infrastructure is quite poor (IATA, 2014). The Chief of Executive (CEO) of Cargo Service Center in India, Radharamanan Panicker pointed out that '[...] air cargo is the catalyst for fast economic growth and sustainable development.' (Cited by Shacklett, 2014).

Recent information, published on the IATA (IATA, 2014) website, shows that the airline industry is slightly picking up due to lower oil prices and stronger worldwide Gross Domestic Product (GDP) growth leading to improved profitability. The air cargo volume in 2015 is expected to be 4.5% above the level of the previous year. Also, the real cost of transporting good in 2015 is expected to fall by 5.8% compared to 2014. The total of 53.5 million tonnes of air cargo is forecasted to be shipped in 2015. These positive aspects not only being beneficial for the parties involved in the transportation process but also for the end-customers, since the monetary benefits are being passed on. Even though the industry awaits a total cargo revenue of $63 billion, this number is still below the achieved revenue level back in 2010 by 5%. (IATA, 2014)

2.2.1 Main Actors within the Air Freight Industry

Moving goods from the point of origin to the point of destination within the supply chain of the air freight industry not only involves shippers, but also several other parties such as origin and destination freight forwarders, ground handling agents, customs agents for export and import, carriers, and consignees (Sales, 2013; Coyle, Langley, Novack & Gibson, 2013). Figure 2.2 shows all the key stakeholders that are part of the air freight industry.

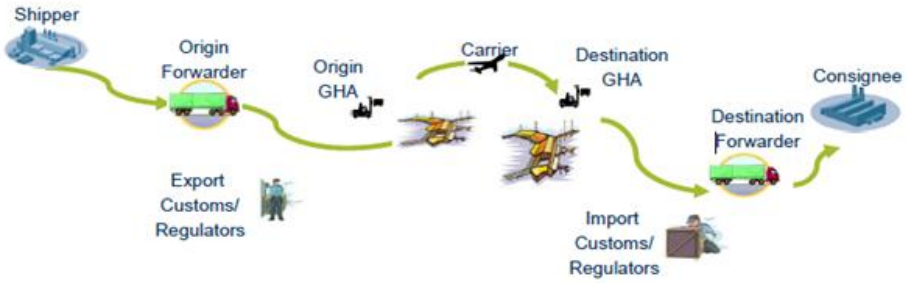

Figure 2.2 – Main Actors Within the Air Freight Industry (IATA, 2013)

Shipper - also known as consignor or exporter - is the party whose name appears on the shipping documents and who requires the movement of goods (Sales, 2013).

*Origin and/or destination freight forwarder** organizes the transportation of goods - including all relevant formalities, such as preparing the necessary paperwork - in support of the shipper (Sales, 2013).

Customs agent is in charge of overseeing '[…] the movement of the goods through customs […]' (Coyle et al, 2013, p.100) while ensuring the complete and accurate documentation of

the shipment. This actor usually operates '[…] under the power of attorney from the shipper to pay all import duties due on the shipment.' (Coyle et al, 2013, p.100).

Ground handler agent is the agent located at the airport '[…] that receives and consolidates outbound freight, stores and transfers it to the aircraft, and unloads and retrieves the shipments at their destination.' (Sales, 2013, p.3).

Carrier - also known as airline* - describes the airline whose routes are used for the transportation of products and the relevant documents via air including the first and last section of carriage. (Sales, 2013)

Consignee is the party whose name appears on the transportation documents as designated destination. The consignee is the organization who receives the cargo by the airline or its agent. (Wankel, 2009)

2.2.2 Performance Measurements of the Air Freight Industry

There are several methods on how to measure the level of performance of a specific supply chain. As defined by Coyle et al. (2013, p.145) a good measure is a measure that '[...] is quantitative, easy to understand, encourages appropriate behavior, is identified and mutually understood, encompasses both outputs and inputs, measures only what is important, and is multidimensional [...]'. Furthermore, Kallio, Saarinen, Tinnilä, and Vepsäläinen (2000) point out that there are four numerical categories that can be used in order to measure a process within the supply chain: Cost, Time, Quality, and Efficiency.

As described by Chelariu, Kwame Asare, and Brashear-Alejandro (2014) 'operational measures are becoming even more important in business-to-business environment […]' - a factor influencing the relationship between airline and freight forwarder within the air freight industry. Not only do the processes involved with handling and transporting goods '[…] demand high level of quality and precision […]' (Chelariu et al., 2014), but also focus on diminishing the failure of meeting process requirements that could lead to the interruption of the supply chain. In the process of and after implementing e-freight, airlines and freight forwarders would, as a result, be required to frequently measure operational performance. By doing so, both parties can determine as to which level the supply and distribution channels are meeting the operational standards and requirements. (Chelariu et al., 2014)

By analyzing different ways of how performance was measured in the past and by Chelariu et al. (2014) within their study, it can be suggested that some measures can be applied to the air freight industry. One performance indicator described several times is customer satisfaction. Customer satisfaction highlights whether the customer is satisfied with the service offered or not and is based on several quantitative measurements such as on time delivery performance, the price of the service offered, and the logistics effectiveness. (Chelariu et al., 2014)

Additional to these quantitative aspects, there are several qualitative performance measurements that Beamon (1998) has identified and are of important relevance to the air freight industry. These involve the following criteria: Customer Satisfaction, Flexibility, Information and Material Flow Integration, Effective Risk Management, and Supplier Performance. Customer Satisfaction, as stated previously, refers to how pleased the customers are with the product or service that is being offered (Beamon, 1998). Flexibility on the oth-

er hand describes how the supply chain is able to respond to unexpected changes in the demand structure (Beamon, 1998). Nicoll (1994) defines Information and Material Flow Integration as the ability of all functions within the supply chain to exchange information and transport materials. The Effective Risk Management, as described by Johnson and Randolph (1995) relates to the process of minimizing the effect or risks within the supply chain. Last but not least the Supplier Performance, shows how consistent the freight forwarder acts when it come to its service performance and delivering the goods on time and in a good condition (Beamon, 1998).

Adopted from the principles outlined in the journal 'Performance measurement of supplier relationship' written by Giannakis (2007) there are three different supplier relationships established within the supply chain of the air freight industry, namely:

(1) airline - freight forwarder,

(2) freight forwarder - end customer,

(3) and airline - end customer.

In all three scenarios, the first mentioned actor acts as a supplier of a specific service. To be able to analyze to which extent the implementation of e-freight influences the relationship between the airline, freight forwarders, and the end customer, there is need for further information regarding the supplier relationship. The characteristics of the supplier relationship model are considered to be the basic parts of any kind of business relationship. These characteristics are trust, power, involvement, and commitment. Firstly, trust is built upon contributions of calculative, cognitive, and normative attributes of both trading actors. Secondly, power refers to the ability of making decisions within the relationship. This ability is based on the level of authority, control, and influence each party can perform. Thirdly, involvement highlights the contribution to the supplier relationship. The involvement includes aspects such as complexity of the relationship, scope, and intensity of the interaction. Lastly, commitment describes the effort attached to, the loyalty to, and the length of the supplier relationship. (Giannakis, 2007)

Both quantitative and qualitative data can be collected and analyzed in order to assess the supplier relationship. Mainly '[…] the performances of the dyadic relationship between two actors […]' (Giannakis, 2007) is being assessed, such as freight forwarder and airline within the air freight industry. Different prioritizations of individual factors affecting the supplier relationship might be identified depending on the areas of the organization questioned. For instance there might be slight variations regarding '[...] the relative importance of several performance objectives of the organization such as quality, speed, flexibility, dependability, cost, and agility [...]' (Giannakis, 2007) of the supply chain. (Giannakis, 2007)

Based on previously outlined information the purpose of including performance measurement of the supply chain in this study relies on the fact that upcoming changes during and after the implementation of e-freight do not only have to be measured by using metrics but also have to clearly highlight the effects on the distribution of power within the air freight industry.

2.3 Power Distribution Models within the Air Freight Industry

One way to describe the distribution of power within the air freight industry can be derived from Porter's 'Five Competitive Forces That Shape Strategy' (2008). By using the five-forces model, Porter manages to describe all the factors, namely bargaining power of supplier (high), threat of substitute products or services (medium and rising), bargaining power of buyers (high), and threat of new entrants (high), that together lead to a rivalry among existing competitors within the supply chain of the air freight industry. Additionally, Porter illustrates that within the airfreight industry forces seem to be intense: a fact highlighted within Figure 2.3, where all forces reach a level between medium to high. (Porter, 2008)

The following paragraphs highlight the meaning of each force in a more detailed manner and describe how these forces reciprocally interact within the air freight industry.

The *threat of new entrants* (high) arises from the desire of new competitors to gain market share within the affected industry, a fact that eventually limits the potential profits. Taking the air freight industry for instance, it can be stated that integrators such as DHL and FedEx are a major threat for both traditional air carriers and freight forwarders. When the treat is high, acting competitors identify the need to reduce the prices of their products/services or to increase the investments in order to discourage the new entrants. The implementation of new service technologies, such as e-AWB/e-freight, could be one reason to increase the investments. The barriers to enter a certain market represent advantages that already operating competitors can use against new entrants. The level of barriers to enter is determined by several major sources. Some of them refer to limited advantages that market player already have, low switching costs, some demand-side benefits of scale, and easy access to distribution channels. (Porter, 2008)

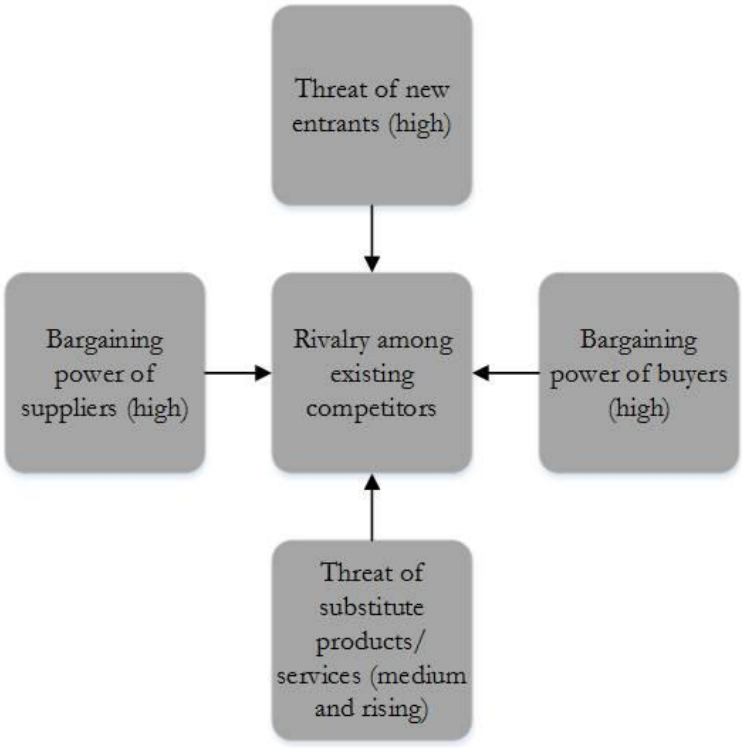

Figure 2.3 – Porter's Five Forces (Own illustration adapted from Porter, 2008)

The *power of suppliers* (high) manages to subtract the value of the supply chain on the supplier site by '[…] charging higher prices, limiting quality of services, or shifting costs to industry participants.' (Porter, 2008). The smaller the number of suppliers, the higher the existing power within a certain market grows. Additionally, a decreasing level of price sensitivity as well as increasing switching costs of the buyer can lead to an increase in power of the supplier (Porter, 2008). By taking this statement and connecting it to Giannakis' (2007) explanation of the supplier relationship presented in the aforementioned Sub-section 2.2.2 'Performance Measurements of the Air Freight Industry' a certain pattern regarding the power distribution within the air freight industry can be identified. The fact that a certain actor takes on the role of the supplier within the transportation and handling process of goods, either the airline or the freight forwarder, suggests that this particular actor has considerable influence on the supply chain and other participants/actors.

The *power of buyers* (high) represents powerful customers within the supply chain. In this case, their influence on the air freight industry relies on '[…] demanding better quality or more service […]' (Porter, 2008), as well as '[…] generally playing industry participants off against each other, all at the expenses of industry profitability.' (Porter, 2008). Customers have an advantage of benefiting from low switching costs due to the fact that air cargo is nowadays perceived as a standardized product. Another reason for the high power of buyers arises from the increased price transparencies of the transportation modes enabled by the age of e-commerce. (Porter, 2008)

The *threat of substitutes* (medium and rising) refers to a product or a service that offers similar value to a customer as another product or service. The transportation of goods via ocean is an example of a substitute for shipping the same goods via air. Depending on the nature of the substitutes the threat can be high if the substitute offers a competitive price-performance trade-off to the already available product/service, or if the buyer's switching costs are low. (Porter, 2008)

The *rivalry among existing competitors* (high) can be described as '[…] price discounting, new product introductions, advertising campaigns, and service improvements.' (Porter, 2008). The intensity of rivalry is greatest where the industry has limited economies of scale and limited product differentiation due to similar company structures. Also, industries with slow growth and high exit barriers tend to be more vulnerable. (Porter, 2008) The air freight industry handles mainly lightweight, high-value commodities and the most important segment of the total market share of cargo is divided into few major airline carriers, such as Lufthansa, Cathay Pacific, Cargolux, and Air France. Only 32% of the total market share of cargo is handled by smaller airlines. This fact also applies to the freight forwarders, where the market leaders remain on the top positions such as DHL Logistics, Kuehne & Nagel International, Panalpina World Transport, and Schenker. In order to optimize the revenues, airlines are focused on differentiating their services and products depending on their customers. Combined with this, strategies such as instigating mergers, acquisitions, and sticking to core competencies influence the air freight industry by increasing the rivalry among existing competitors. (Popescu, Keskinocak & Mutawaly, 2010; Burnson, 2013)

The other way to outline the distribution of power within the air freight industry is presented in the following paragraphs. The concept originates from Cox (2001) where the author implies ways to transfer power relationships into opportunities that describe how to increase the value buyers possess within the supply chain. In addition, the author also highlights that buyers should not seek to take advantage of suppliers, but furthermore focus on

achieving the best deal for both parties and increase the benefits of collaboration. (Cox, 2001)

As pointed out by Neiberger (2008) there are two ways as to how airlines or freight forwarders can gain influence within the supply chain:

(1) by implementing prior or subsequent functions (e.g. forwarders by gaining control when reorganizing the supply chain and airlines by expanding their status as a carrier) or

(2) by long-term relationships between both parties (Neiberger, 2008).

The first approach proposed by Neiberger (2008) supports Cox's (2001) statement that refers to buyers or suppliers needing to increase their power within the supply chain by implementing prior or subsequent functions. The second approach advised by Neiberger (2008) relates again to Cox's statement that describes how benefits increase for both parties by collaborating. This recommendation seems to be more complicated since freight forwarders are no supporters of this concept due to their consequently limited freedom of choice of airline, a fact that can result in dependence towards the airline. The benefits on the other hand can be having high price reductions and good availability of space provided by the air carriers (Neiberger, 2008).

Based on the characteristics and on the way some actors interact within the air freight industry, as well as the position within the power matrix presented by Cox (2001) the following assumptions can be stated:

(1) the freight forwarder acts as a buyer since he books and buys capacity on a certain flight from a certain air carrier,

(2) the carrier acts as a service supplier since he provides a certain transportation towards the consignor (shipper) and end customer.

Both perceptions of the power distribution seem to fit the purpose of analyzing the distribution of power within the air freight industry well. Even though at first sight they seem to be different, both approaches tackle the characteristics of carriers and freight forwarders that evolve within the supply chain in their own specific way. The first model described by Porter (2008) does this by analyzing the threats of new entrants and substitutes, the bargaining power of buyers and suppliers, and the rivalry amongst competitors of the air freight industry at a detailed level. Cox (2001) and Neiberger (2008) however, focus more on the relationships between carriers and freight forwarders and highlight the need for cooperation and interdependency of both actors within the air freight industry. Concluding, a combination of both models would provide the highest possible outcome to this study.

2.4 Sustainability within the Air Freight Industry

According to Rodrigue, Slack, and Comtois (2001) 'a healthy environment is critical for efficient transport […]' and, '[…] through its capacity to open markets and promote economic growth […]', transport '[…] is essential for effective and lasting environmental management.'. In recent years the concept of logistics has broadened to global level due to increased outsourcing of activities (Rodrigue et al., 2001; Andersen & Skjoett-Larsen, 2009).

Rodrigue et al. (2001) state that 'globalization and global logistics have in many instances harmed the environment by encouraging governments and firms to compete on the international market by lowering environmental standards in certain countries while maintaining higher standards in rich countries.'. They are stating further, that only with a complex interplay between both, local and global environmental governance, green logistics can be successfully implemented (Rodrigue et al., 2001). The goal therefore is to achieve an '[…] environmentally-friendly and efficient transport and distribution system.' (Rodrigue et al., 2001).

Green and sustainable supply chains can improve productivity and competitive advantage, and at the same time limit the total environmental impacts by decreasing the use of resources, reducing or even eliminating waste, and in general decreasing general ecological footprints (Porter & Linde, 1995; Van Hoek, 1999; Sarkis, 2003; Bowen, Cousin, Lamming & Faruk, 2001; Preuss, 2005). Due to its infrastructure, different transportation modes, and the traffic generated, the transport industry is highly involved in environmental degradation (Banister & Button 1993; Whitelegg 1993). It has been stated that 'nearly 6% of greenhouse gases generated by humans are due to the flow of products to consumers.' (Dizikes, 2010).

Rodrigue et al. (2001) state that the least reliable transportation modes in terms of safety, lack of damage, and on-time delivery are also the most sustainable modes, in terms of pollution. In this case, 'ships and railways have inherited a reputation for poor satisfaction, and the logistics industry is built around air and truck shipments – the two least environmentally-friendly modes.' (Rodrigue et al., 2001). The significant increase of flexibility in the production systems and in the retailing sector created time constraints for the delivery of goods which led to an increase of air freight and road transport. Other modes besides these two cannot satisfy just-in-time strategies or door-to-door services. (Rodrigue et al., 2001)

However, when comparing the greenhouse gas emissions of the four different transportation modes, ship, train, truck, and airplane (Figure 2.4), it is clear that different amounts of greenhouse gasses per tonne of goods shipped per one mile are being emitted.

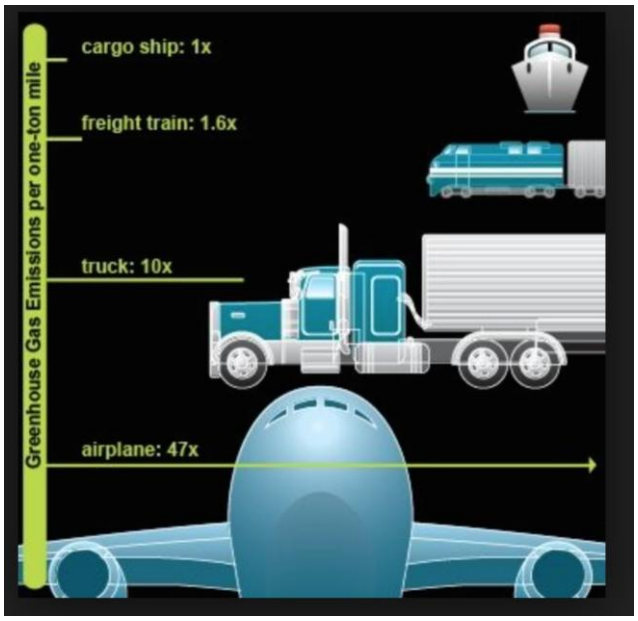

Figure 2.4 – Greenhouse Gas Emissions of Different Transportation Modes (Daniloff, 2010)

Compared to a cargo ship, the greenhouse gas emissions of a freight train are 1.6 times higher, whereas a truck emits 10 times the amount of harmful gases. The highest level of greenhouse gas emissions is reached while transporting cargo via airplane: 47 times as many emissions as a cargo ship.

The sustainability aspects of e-AWB and e-freight initiative will be described in a more detailed manner in Sub-section 4.1.3 'Sustainability and e-AWB/e-Freight'.

2.5 Synthesis

The information gathered so far is summarized into an overview presented in Figure 2.5 and leans towards the Logic Model* presented by Kumpfer, Shur, Ross, Bunnell, Librett, and Millward (1993).

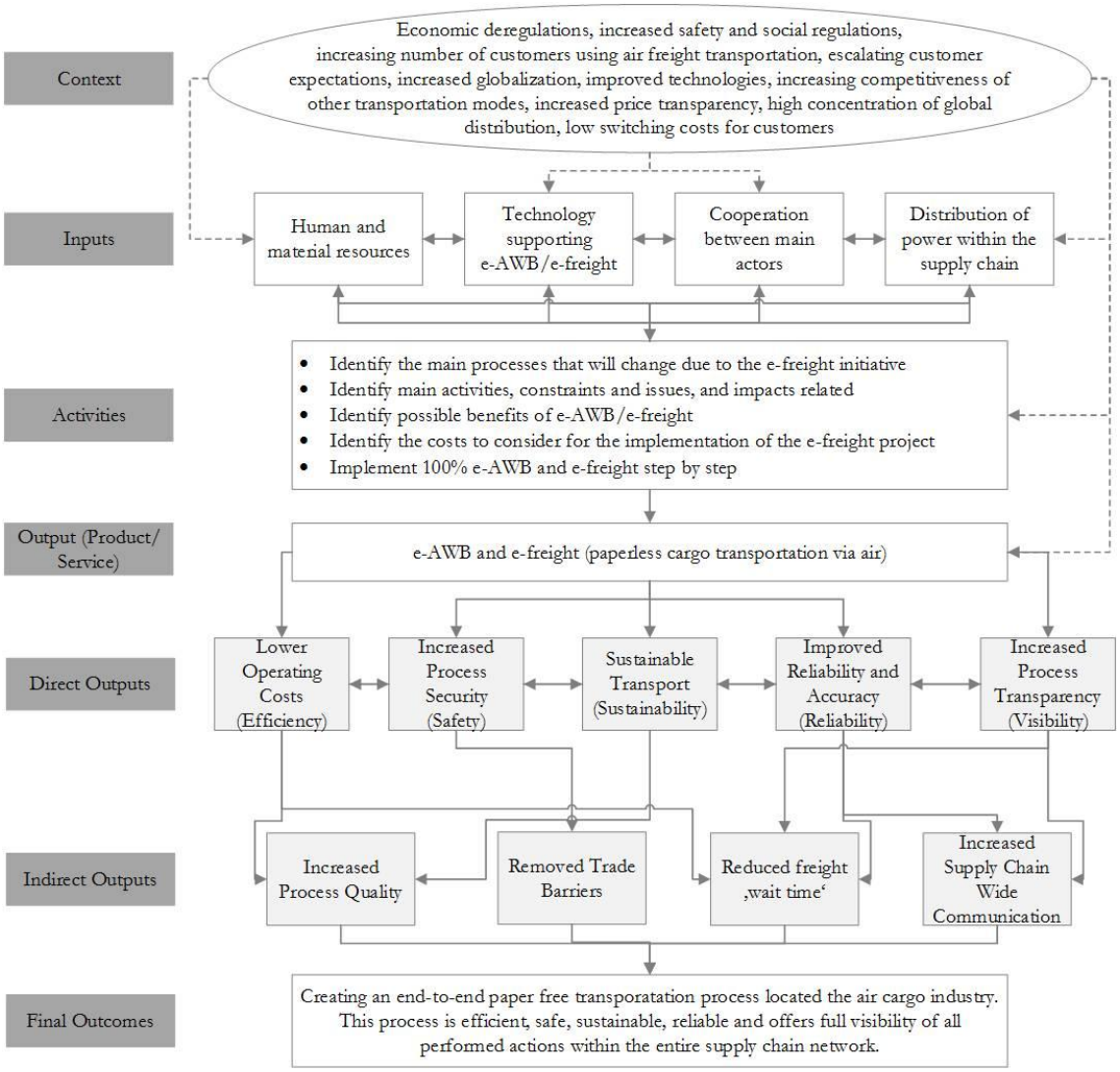

Figure 2.5 – The Logical Overview of Implementing e-Freight within the Air Freight Supply Chain Network (Own illustration based on the Logical Model described by Julian, Jones & Deyo, 1995)

However, the overview acts as a summary of the theoretical framework highlighted within previous chapters and should not be mistaken for a Logic Model applied to the air freight industry. Figure 2.5 has been designed while mapping the air freight industry in combination with the implementation of e-freight within the supply chain network.

Three descriptive components such as context, inputs, and activities plus further four consequential components, namely output (product/service), direct outputs, indirect outputs, and final outcomes are presented. It can be stated that the red thread, that connects for example several inputs with the activities, represents the direct interaction of these two components.

Furthermore, the severed line describes a possible influence that can occur between the context and the inputs, as well as activities and outputs.

The context of the overview should reflect the actual and prospective situation of the air freight industry. This component relates to the problem definition, the delimitations, and also to the air freight industry itself described earlier in this chapter. The inputs show all factors that are used to successfully implement the e-freight initiative. The presented activities stand for main actions needed in order to identify the main process activities, constraints, and possible impacts that come along with eliminating all physical paper documents and replacing them with electronic data. The output itself describes the main impact and the actual e-freight initiative: achieving efficient and sustainable paperless cargo transportation within the air freight industry. Direct outputs focus on possible impacts such as efficiency, safety, sustainability, reliability, and visibility. When further analyzed, these direct outputs should correlate to other indirect outputs such as increased process quality and reduced freight wait time.

As stated by Kumpfer et al (1993), the final outcome should be defined prior to the development of the strategy. The final outcome represents the main and long-term goal of the e-freight initiative. It stands for creating an end-to-end paper free transportation process located in the air cargo industry. Furthermore this final outcome should represent a process that is efficient, safe, sustainable, reliable, and offers full visibility to all performed actions within the entire supply chain network.

Concluding, inputs such as human and material resources and IT systems of the involved parties as well as the cooperation between the actors, and finally the distribution of power within the air freight industry have a major influence depending on the fact whether the implementation of e-freight will take place and how it will be achieved. The expected first hand outcomes of the paperless initiative, portraying a sustainable approach of the air freight industry, are defined by IATA and highlighted in the Sub-section 4.1.1 'E-Freight Initiative'. These innovative and eco-friendly goals relate to lower operating costs, increased process security, a more sustainable transportation process, improved reliability and accuracy, and a overall increased process transparency. On the long run the process quality is expected to increase. Also, it can be argued that any remaining trade barriers are expected to be reduced and supply chain-wide communication improved and increased due to the electronic processing of documents. Ultimately, the operational handling process of documents will result in reduced freight time.

3 Methodology

This chapter outlines the research methodology of this thesis in regards to the purpose of the study. The purpose of this chapter is to fully understand how the study was conducted in order to present guidance for future researchers who want to replicate or implement a similar study. To start off, the research process will be outlined (Section 3.1), followed by the research approach and purpose (Section 3.2). The literature review procedure (Section 3.3), the research strategy (Section 3.4) and the methodological choice (Section 3.5), as well as the data collection (Section 3.6) and data analysis (Section 3.7) will be described. To conclude this chapter, the trustworthiness of this study (Section 3.8) and the ethical considerations (Section 3.9) are discussed.

3.1 Research Process

This section outlines the entire research process of this study and visualizes a guidance for future researchers (Figure 3.1).

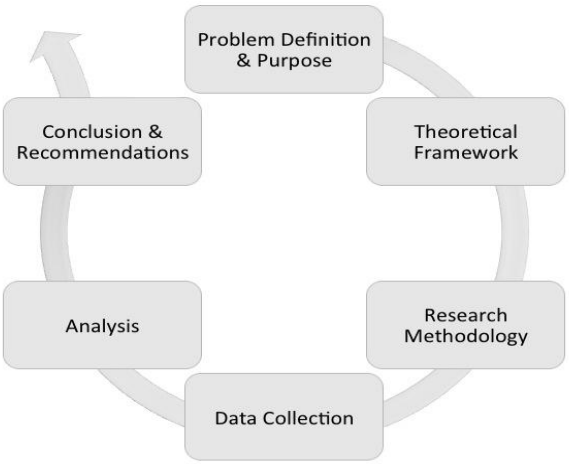

Figure 3.1 – Research Process of the Thesis (Own illustration based on Ghauri, & Grønhaug, 2005)

The first part mentioned under the headline 'Problem Definition & Purpose' provided a short overview of the key elements of the research subject, starting with the background of the topic and narrowing it down to the problems and the overall contributions of the study.

The second part illustrated the 'Theoretical Framework' which focuses on essential aspects accompanying the research topic at hand and specifying the three research questions. Various relevant studies were presented in order to provide a deep knowledge about the elements influencing the e-freight initiative within the air freight industry.

The third part 'Research Methodology' describes the way the particular research was conducted. The authors chose to follow a mixed-method research with a deductive approach and collection of primary and secondary data. Also within this part the case companies are discussed.

The next two parts, namely 'Data Collection' and 'Data Analysis', concern the way data was gathered and how the authors tried to find links between the collected data and the literature provided within the second part 'Theoretical Framework'.

The sixth, and last part illustrated in Figure 3.1 - 'Conclusion & Recommendations' - concentrates on final thoughts drawn from the body of the report based on the findings accumulated. The authors provide a logical extension of the information presented in the study and finally propose specific solutions for the research problem.

3.2 Research Approach and Purpose

This study follows a deductive approach. Hyde (2000) describes this reasoning as '[…] a theory testing process which commences with an established theory of generalization, and seeks to see if the theory applies to specific instances.'. Referring back to the purpose (Section 1.3) and research questions (Section 1.4), the authors explore the phenomena of the implementation of e-AWB/e-freight by testing theory presented within the theoretical framework described in Chapter 2. In terms of the power distribution within the air freight industry, the two models presented in Section 2.3 will be combined in order to provide the highest possible outcome of the study. While exploring the supply chain network, the aforementioned theory regarding the traditional air freight supply chain, as well as performance measurements of the air freight industry will be combined with the findings. Further, the authors will test how well the initial goals of the e-freight initiative introduced by IATA have been reached at the point of this study.

3.3 Literature Review

The literature review is an important part of every research study. It not only proves the researchers' understanding of the topic, but also, and most importantly, demonstrates how the research topic fits into the current state of literature. (Gil & Johnson, 2002, cited by Saunders, Lewis & Thornhill, 2011)

The aim of the literature review in this study was to gain insight of the supply chain of the air freight industry, the air freight industry itself – including the main actors, power distribution, sustainability, performance measures, the traditional air freight supply chain, and last but not least, the integrators of the air freight supply chain.

To find suitable literature for the theoretical framework of this study the researchers used the University of Jönköping library database, EBSCO, ABI/INFORM, Web of Science, Business source premier, and Google Scholar. Key words applied were the following: 'traditional supply chain', 'integrators', 'air industry supply chain', 'air freight supply chain', 'air freight', 'air logistics', 'air cargo power distribution', 'Porter's 5 forces', 'e-freight', 'e-cargo', 'performance measurement', 'defin* sustainability', 'green logistics', 'sustainability AND air freight', 'air cargo sustainability', and 'sustainability metrics'.

At point of research there has been no suitable literature published concerning the e-freight initiative and its outcomes that fits the purpose of this study. Although there was a lot of

literature concerning the air freight industry, only very few stated the e-freight initiative and no one analyzed the power distribution within the air freight supply chain.

3.4 Research Strategy and Time Horizon

This section presents the research strategy, the case selection process, and the time horizon of this study to build the base of the research design.

3.4.1 Research Strategy

As the purpose of this study is to explore the phenomenon of the implementation of e-AWBs/e-freight within the air freight industry, a case study strategy was chosen so as to benefit from combining several different research strategies (Johansson, 2003). Yin (2009, p.18) defines a case study as '[…] an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundary between phenomenon and context are not clear evident.'. Further, case studies are often used when a study focuses on exploring a phenomenon in depth by using a variety of data sources which is conform with the purpose of this study (Baxter & Jack, 2008; Bonoma, 1985; Hyde, 2000; Yin, 1994, cited by Ghauri & Grønhaug, 2005, p.115). It is also evident to mainly use 'why' and 'how' research questions while performing a case study (Yin, 2009).

Yin (2009), distinguishes between single case studies and multiple-case studies. The researchers chose a multiple-case design to have a more robust and compelling study. Two different cases were analyzed and conclusions drawn cross-case. With this research design it was possible to explore differences between and also to replicate findings across the cases (Yin, 2009; Baxter & Jack 2008).

Additionally, Stake (1995) distinguishes intrinsic, instrumental, and collective case studies. Choosing an instrumental case study, the case itself is of secondary interest. The cases played a supportive role, helping the researcher to explore the external phenomenon, in this case the e-freight initiative within the air cargo industry. (Baxter & Jack, 2008)

Even though conclusions of the findings are drawn cross-case, the cases presented in this study are not fully comparable. The only reason for this is the fact that the implementation stages of e-AWB and e-freight are different for each case and further described in Subsection 3.4.2. Findings regarding the power distribution within the air freight supply chain, as well as the supply chain itself, can be analyzed cross-case. However, findings regarding the benefits and challenges cannot, as these might differ with respect to the different implementation stages.

3.4.2 Case Selection Process

In order to analyze general impacts of the e-freight concept two major airlines - Pegasus Xpress Airways (PXA) and Ikarus Airways Limited (IKA) – names have been changed to grand anonymity – are used. These cases were purposefully selected for this study representing two major markets, U.S. and China, with respect to cargo volume.

The first case, Pegasus Xpress Airways (PXA) is a cargo airline located in Chicago, U.S. ('The Americas - USA only' region) and is operating at the O'Hare International Airport.

The second case, Ikarus Airways Limited (IKA), has its main hub in Hong Kong, China ('Asia Pacific' region) and is operating at the Hong Kong International Airport. Within these two cases, freight forwarders of the relevant supply chains are also part of this study – regardless whether they have implemented e-AWB/e-freight or not. As the freight forwarders are working closely with the airlines, PXA and IKA provided the researchers with the contacts of those firms.

The reason why these two cases were chosen by the authors is based on the different levels of e-freight implementation that have been reached by PXA and IKA within the mentioned airports so far. Whereas PXA implemented 21.4% e-AWB and 0% e-freight at the O'Hare Airport in Chicago by March 2015, IKA successfully implemented 100% e-AWB and 5% e-freight at the Hong Kong International Airport. Due to different implementation rates and market characteristics of the airlines, it is not useful to directly compare the two cases. However, they are helpful to illustrate the different phases of the e-AWB/e-freight implementation. (Internal Source, 2015/2015b)

Also in terms of the U.S. and Chinese market, the airlines are representative. The following paragraphs will elaborate the importance of the two chosen cases due to their e-freight/e-AWB implementation worldwide, e-freight/e-AWB implementation at the airports the cases operate in, the market, and cargo-volume per year.

As of January 2015, PXA has implemented an average of 15.4% and IKA 56% e-AWB penetration worldwide. When looking at the airports, the O'Hare International Airport in Chicago manages 25.5% of the goods transported via e-AWB, whereas the Hong Kong International Airport in Hong Kong has already achieved 54.1%. Comparing this data with the overall e-AWB penetration by region, the O'Hare International Airport operates above the regional standard of the U.S. with a penetration of 22.8% and the Hong Kong International Airport operates above the regional penetration of 32.4%. (IATA, 2015b)

The forecast for the largest air cargo markets in the world in 2014, analyzed by cargo volume (in million tonnes), states that China and the U.S. are forecasted to represent 53.5% of the largest air cargo markets in 2014 (Statista, 2015). This illustrates how important these two airlines are in terms of their location and cargo handling.

When looking at the top 10 airlines worldwide by international and domestic freight tonne-kilometers (FTK) in 2013 (in millions) of the in total 81,545 Mio FTK worldwide, Pegasus Xpress Airways and Ikarus Airways Limited carried 15,549 Mio FTK, representing 19% of the top 10 in 2013 (Statista, 2015a).

Comparing the two airports, O'Hare International Airport in Chicago and Hong Kong International Airport in Hong Kong, 10.47% of the cargo volume of the top 30 airports worldwide in 2013 was handled by these two major airports. Hong Kong International Airport handled 4.2 Mio tonnes of cargo which would fill up 37,200 Boeing 777 per year. In comparison, O'Hare handled 1.2 Mio tonnes of cargo, filling up 11,000 Boeing 777 per year. (Airport Council International, 2014)

3.4.3 Time Horizon

As time is one major constraint of this study, the authors chose a cross-sectional time horizon. This allows the researchers to focus on a particular phenomenon at a particular point of time (Saunders et al., 2011). This study focuses on the status quo of the e-freight initia-

tive within the air freight industry, but also compares the situation of freight handling processes and the supply chain of the air freight industry before and after the e-freight initiative. This however, it not to be confounded with a longitudinal time horizon which refers to changes over time (Saunders et al., 2011).

3.5 Methodological Choice

One major feature of case studies is that researchers are allowed to combine a variety of data sources and analytical methods to explore and illuminate a phenomenon from all different perspectives using a variety of data sources (Baxter & Jack, 2008; Johansson, 2003). Studying a phenomenon in depth therefore requires unlimited predetermined categories of collection and analysis techniques (Hyde, 2000). According to Yin (2009, p.63), mixed methods allow to investigate complex research questions and to '[…] collect a richer and stronger array of evidence than can be accomplished by any single method.'. On this account, and to improve the results and judgments, the researchers used a mixed-method to collect and analyze data, even though this study primarily is a qualitative case study.

Using a mixed-method also refers to the term 'Triangulation'. Denzin (1978, cited by Johansson, 2003) describes triangulation as '[…] an important way of ensuring validity of case study research.'. Therefore, not only data collection methods were triangulated, but also data sources (Johansson, 2003).

3.6 Data Collection and Relevant Measures

This section amplifies the data collection and further discusses the relevant measures used in this study.

3.6.1 Data Collection

Accordingly to the triangulation of case studies, multiple sources to collect data were used to fully illuminate the cases from all possible perspectives. Not only primary data, such as semi-structured interviews (Appendix 3 & 4), data provided by the company, and email contact but also secondary data, such as public company annual reports and case studies, were used to achieve this goal. Further, the authors chose to use semi-structured rather than open questions as part of the data collection method in order to indirectly motivate the interviewees to take and complete the interview. The methods were purposefully divided based on the research question:

Research question one was answered by starting off with gathering primary data through semi-structured interviews to identify drivers to implement e-freight/e-AWBs. This was subsequently followed by looking at primary documents and secondary data to further identify other compelling forces. All identified factors were then presented back to the participants in order to rank the drivers accordingly to their importance.

In order to answer the second research question, semi-structured interviews were conducted, including qualitative and quantitative questions. Primary documents provided by the companies were also used.

As the third research question required information about IATA and the initial goals set to target with the e-freight initiative, information about IATA was collected by using the IATA website. Afterwards, the researchers conducted semi-structured interviews with the participants and collected data by receiving primary documents from the companies.

The semi-structured interview sheet combined with a description of the purpose of the study was send out to the participants prior to the interview via telephone or Skype. Questions that required a quantitative answer were either answered during the interview or separately via email by providing internal data. All interviews were tape-recorded and transcribed, then presented back to the participants to ensure consistency and accuracy. Participants and direct observations were not possible due to safety and security precautions at the Chicago O'Hare and Hong Kong International airport.

All airlines contacted agreed to participate in this study. From a total of 12 freight forwarders in the U.S. and China only one freight forwarder from Hong Kong agreed to participate in this study, leading to a response rate of 8.3%. Table 3.1 provides an overview of all interviews held for this study. As only one freight forwarder operating in Hong Kong, China, agreed to participate in this study, it was not possible to analyze the freight forwarder position regarding the implementation of e-AWB/e-freight in the U.S. market.

Table 3.1 – Overview of Interviews within this Study

Date	Interviewee	Company	Position	Interview Type	Duration
31.03.2015	A. Schultz	Pegasus Xpress Airways	Manager Process and Controlling	telephone	1,5 hours
15.04.2015	J. Chan	Ikarus Airways Ltd.	Cargo Services Manager e- freight	telephone	1 hour
17.04.2015	S. Heinz	Pheonix Forwarding Ltd.	Process Manager Global Air Logistics	telephone	1 hour

3.6.2 Relevant Measures

As per Section 1.4 'Research Questions', different measures were used in this study to answer the research questions. As the terms cost, time, visibility, quality, and sustainability are generally quite broad terms, the author's interpretations of these measures were discusses in Section 1.4.

Effects on costs of the e-freight initiative were analyzed by identifying incurred cost savings. Optimization of the data-handling process, general process costs, and product handling before and after the implementation were compared.

Time is another important aspect influenced by the initiative. Lead time for handling goods before and after e-AWB/e-freight, including the time for physical receiving, checking, and forwarding of documents with AWB compared to e-AWB were analyzed.

Through looking at the communication between the actors, before and after the implementation of e-AWB and e-freight, and the possibility to access data and documents 24/7 from any location, the visibility was assessed.

Quality, aforementioned in Section 1.4, was measured by looking at security, accuracy, and customer service. One measure was the probability of freight being at the right place at the right time, including all relevant documents. For instance, for dangerous goods (DG) the correct handling of those products is essential; it can be highlighted that security issues arise in cases where important documents regarding safety instructions are missing.

Last but not least, the influences on the sustainability were measured by looking at the paper usage (including archiving process), weight and kerosene savings.

3.7 Data Analysis

While processing the findings the authors pooled all data together to create a one-stop excel database that was used to fully overlook, as well as understand, the entire case and see the big picture (Baxter & Jack, 2008).

Starting off with findings about IATA, the researchers present general aspects about the e-freight initiative and its initial goals, as well as the sustainability aspect so that further data provided by the participating companies can also be referred back to these aspects and not only to literature. This aspect becomes more clear when looking at research question three where the researchers compare the initial e-freight initiative goals to actual achievements. Next, the participating companies are presented, using a general introduction of the companies as a starting point.

The authors categorized all raw data gathered from semi-structured interviews and secondary sources individually by creating keywords through which an integration of two different interpretations of the data was possible (Yin, 2009).

The next step of the analysis included a jointly creation of categories to present the findings in a way that a clear link between the collected data, the research questions, and the theory introduced in Chapter 2 is visible. Categories include motivations and drivers, power aspects, relevant performance measurements, the corresponding supply chains, and difficulties and challenges of the e-AWB/e-freight implementation. The relevant performance measurements were divided into quantitative (cost and time) and qualitative (visibility, quality, and sustainability) measurements in accordance to the Sub-section 2.2.2 within the literature framework. The last section of the findings, describing the processes of transporting and handling goods (Section 4.5) is displayed separately as the findings were similar for all participants which makes a repetitive process presentation redundant.

3.8 Trustworthiness of Research

To ensure the strongest possible validity and reliability the authors closely followed the recommended case study design proceedings described by Yin (2009).

3.8.1 Validity

According to Saunders et al. (2011, p.157) validity describes '[…] whether the findings are really about what they appear to be about.'. Following the triangulation described by Yin (2009), the authors collected data using multiple sources and methods to explore the phenomenon of the e-freight initiative from different perspectives and at the same time enhanced the quality of this research.

Transcripts of interviews were sent back to the participants to ensure consistency and accuracy. While collecting data for this study, the researchers implemented a database for all the findings using Excel to track and organize the data. During the analysis stage, the authors independently analyzed the data and then met to find consensus results. Further, drafts of the analysis were reviewed by the participants to check, discuss, and clarify researcher's interpretations and they were able to include further aspects.

3.8.2 External Validity

Saunders et al. (2011) describes external validity with the ability to apply the findings of a study to other research settings. Although case studies have not always been considered as a proper research method due to the missing foundation to generalize the research (Yin, 2009), the authors followed Yin's recommendations to create external validity and purposefully selected the two cases as already described in Sub-section 3.4.2 'Case Selection Process'.

3.8.3 Reliability

Reliability refers to the transparency of how raw data was analyzed and whether similar results can be obtained by other researches (Saunders et al., 2011). By providing a clear and detailed methodology for this thesis future researchers are able to replicate the study and also to come to the same conclusions. To further increase the reliability, the authors created a database to organize all data for this research.

Robson (2002, cited by Saunders et al., 2011, p.156) identified four threats to reliability: participant bias, participant error, observer bias, and observer error. In order to avoid the participant error a neutral time for the interviews was chosen to ensure that the participants are not rushing through the questions to finish off the day or week. In order for the participants to be able to tell the truth during the interviews without fearing negative consequences from their supervisor or other instances, anonymity was and will be provided at all times, thus reducing the participant bias. The authors reduced the observer's bias and error by asking questions in the interviews in different ways and also by analyzing the data separately to be able to obtain different perceptions of the cases.

3.9 Ethical Considerations

Concerns of ethical issues in research have become increasingly important and are a critical aspect for the success of research studies (Saunders et al., 2011). When undertaking research the '[…] design should not subject those you are researching to embarrassment, harm or any other material disadvantage.' (Saunders et al., 2011, p.16).

The authors conducted all parts of this study, finding the research topic, research design, gaining access to data, collecting, processing, and storing data, as well as writing the report,

in conformity with the ethical considerations stated by Saunders et al. (2011). All companies in this study participated voluntarily and had the right to withdraw fully or partially at all times. The identities of companies have been kept confidential unless a written approval was granted to use the real names. Records of the interviews were transcribed and cross-checked by the participants in order to work truthfully. Names of the participants have also been kept confidential unless a written approval was granted. All data was and will be handled confidentially and can only be accessed by the authors of this study. Further, companies received a copy of the results of this research.

4 Empirical Findings

The empirical findings presented in the following five sections are based on primary and secondary data collected by the authors. The first Section 4.1 'IATA' (secondary data) describes the International Air Transport Association, emphasizes the e-freight initiative while including the meaning of the e-AWB/e-freight and highlights the relevance of sustainability with regards to the e-AWB/e-freight concept. The second Section 4.2 'Airline 1: Pegasus Xpress Airways (PXA)' as well as the third Section 4.3 'Airline 2: Ikarus Airways Ltd. (IKA)' present the findings based mainly on primary data gathered via semi-structured interviews and also secondary data that are relevant for each particular airline. This approach also applies to the fourth Section 4.4 'Freight Forwarder 1: Phoenix Forwarding Ltd. (PF)' that shows the findings relevant for the FF within the air freight supply chain of both PXA and IKA. The fifth Section 4.5 'Process Description of Transporting and Handling Goods' highlights both the carriers as well as the freight forwarders processes of handling freight and documents before the implementation of e-AWB/e-freight. This section is based on information gathered by all participating companies.

All findings presented in the Section 4.2 are based on an interview with A. Schulz (2015) and Internal Source (2015b). Furthermore, data highlighted within Section 4.3 is conducted due to an interview with J. Chan (2015) and Internal Source (2015). Finally, the Section 4.4 shows an overview of the interview with S. Heinz (2015) and Internal Source (2015a).

Concluding, all featured results related to the supply chain network and the actors of the air freight industry represent one uniform supply chain that is being explained in a detailed manner within the Sub-section 4.2.4. Since all analyzed respondents (carriers and freight forwarders) perform within a similar environment the findings highlighted apply to all following paragraphs.

4.1 IATA

IATA, is '[...] the trade association for the world's airlines, representing some 250 airlines or 84% of total air traffic.' (IATA, 2015). The main focus of this association relies on supporting many areas of aviation and helping industry policies when it comes to critical aviation issues (IATA, 2015).

'Global Development, Regional Delivery' represent the guiding concept of IATA's vision. A more detailed version of the vision and mission of IATA underlines the importance of representing, leading, and serving the airline industry. By representing the airline industry, IATA refers to increase the '[...] awareness of the benefits that aviation brings to national and global economies.' (IATA, 2015). The leading part of the IATA vision focuses more on developing global commercial standards that help building, simplifying, and increasing convenience of the air freight industry, while reducing the costs and increasing the efficiency. Serving the airline industry describes safe, secure, efficient, and economical processes - under clear defined rules - that outline the entire airline industry. (IATA, 2015)

4.1.1 E-Freight Initiative

The e-freight initiative was launched by IATA in 2006. Being part of the 'Simplifying the Business' (StB) program, e-freight was developed to transform the entire journey experi-

ence for customers with the help of innovative solutions. The StB initiative evolved from the initial 'improving the customer experience and reducing industry costs' to a more broad approach that aimed for an easier way of conducting the industry for both customers and partners. (IATA, 2015f)

In the last couple of years e-freight became an industry-wide initiative that influences parties within the entire supply chain such as carriers, freight forwarders, ground handlers, shippers, and customs authorities. The goal hereby is to create and realize an end-to-end paper free transportation process located in the air cargo industry. In order to succeed all paper documents are replaced by electronic data. (IATA, 2015d)

There are several goals and targets highlighted by IATA that apply to the actors engaged in implementing the e-freight initiative within the air freight industry. Table 4.1 shows an overview of these particular goals and targets needed to be reached by 2017.

Table 4.1 – e-AWB Industry Targets (Own table based on IATA, 2015a)

February 2015	**2015**	**2016**	**2017**
26.9%	45%	80%	90%
global e-AWB penetration	year-end target	year-end target	year-end target

These specific numbers apply to all main actors within the air freight network. Furthermore, the goals attempt to create a network that allows customs to become an electronic and regulatory environment that supports paperless transportation of goods. Also a 'full industry capability for paperless transport between airports by end 2015' (IATA, 2015e) should be created. This step will allow the paperless acceptance and delivery of goods from airport to airport while using electronic documents instead of physical ones. Lastly, the '[…] digitalization of commercial and special cargo documents […]' (IATA, 2015e) created by the shipper and FF aims for the removal of the document pouch that is attached to the freight, travelling from the shipper to the consignee. (IATA, 2015e)

The e-freight program motivates the industry participants to adopt the involved standards by using '[…] targeted change management initiatives […]' (IATA, 2015d). Furthermore, it uses the already existing air cargo industry wide messaging infrastructure. Involved parties have to use in-house technology to communicate to their partners or rely on technology provided by their partners or even 3PL. The electronic data - also called 'e-Doc' - relies on the use of Electronic Data Interchange (EDI) or scanned images, which can be only used for some specific documents. (IATA, 2015d)

The implementation and support of the e-freight initiative is beneficial for the main actors involved within the air freight supply network. The successful achievement of all aforementioned goals is predestined to lead to the following benefits (Figure 4.1) (IATA, 2015d):

- *Lower Costs* (eliminating paper handling, transporting, processing costs, and data re-capture)
- *Time - 'Speeding up Service'* (reducing freight 'wait time')

- *Gaining Visibility* (using quality electronic messaging to easily track the status of freight)
- *Improved Reliability and Accuracy* (one single data entry at the point of origin)
- *Quality* (providing a better service for customers)
- *Removing Trade Barriers* (facility information requirements for security purpose)
- *Sustainability* (contributing to the environment by reducing paper consumption).

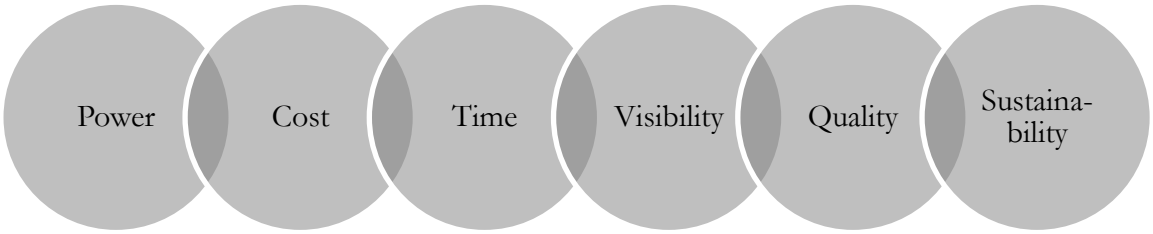

Figure 4.1 – Main Areas Affected by the e-AWB/e-Freight Initiative (Own illustration)

4.1.2 Electronic Air Waybill (e-AWB)

The air waybill is a physical paper document that defines the contract between the shipper and the carrier of goods. This document can either be completed by the shipper itself or on behalf of it (by the freight forwarder). The AWBs have an one-of-a-kind number which contains the specific airline prefix (such as PXA or IKA) and a serial number. (Internal Source, 2015b)

The e-AWB, represents the electronic version of the most important transportation document in the air freight industry. This electronic document also stands for the first step to achieve the e-freight vision that IATA has set into place.

Both AWB and e-AWB contain information such as the '[…] conditions of the carriage, […] the carrier's limits of liability and claims procedures, a description of the goods and applicable charges.' (BusinessDictionary.com, 2015). There exists an industry-wide standard applicable for both the domestic and the international transportation of goods. The AWB/e-AWB is non-negotiable, does not specify which flight transports the goods and when the goods will reach their destination. (BusinessDictionary.com, 2015).

The main purpose of an e-AWB is to replace the traditional paper documentation by implementing an electronic contract of cargo between the FFs and the airlines. The benefits that IATA wants to achieve by implementing the e-AWB are related to accuracy, confidentiality, and efficiency. (IATA, 2015a)

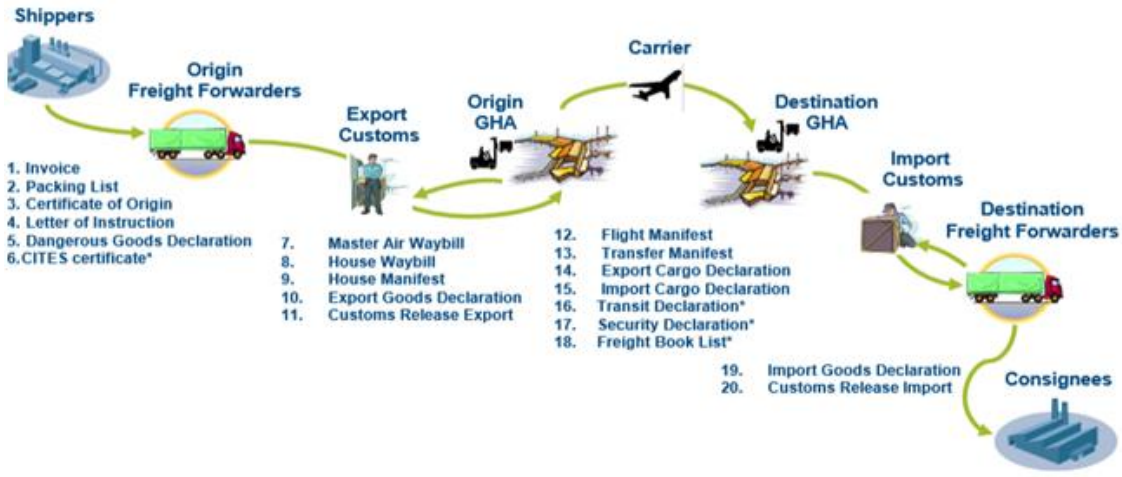

Figure 4.2 – Amount of Paper Documents Needed for the Transportation via Air (IATA, 2013)

Figure 4.2 shows all documents involved in the shipping process between shipper and consignee without the implementation of e-freight or e-AWB. Starting with the first six documents created by the shipper* another five documents* are added to the previous ones as soon as the delivery/cargo arrives at the export customs. In order to successfully pass the import customs check, further seven documents* are attached to the shipment before take-off. The last two documents* are being attached to the shipment as soon as the cargo is undertaken by the destination freight forwarders on its way to the consignees. This all sums up to 20 different documents that need to be part of the shipment. (IATA, 2013)

4.1.3 Sustainability and e-AWB/e-Freight

IATA's concept of the e-AWB and e-freight has already been described in the previous section; however, this sub-section will focus on the sustainability aspects of e-AWB and e-freight.

Traditionally, several paper documents were attached to each shipment, causing waste of the resource paper, unnecessary use of space and increased use of kerosene. e-AWBs not only safe time, increase safety and efficiency, but also influence the environment in a positive way.

Every single airfreight shipment generates up to 30-35 different documents that have to travel with the shipment from the origin to the destination point (IATA, 2013a; Galagoda, 2007). In 2013 air freight documents added up to 24 million paper AWBs worldwide (Internal Source, 2015b). This is equivalent to 7,800 tonnes of paper travelling via air freight every year, '[…] adding time, cost, and environmental waste to air freight […]' (Panalpina World Transport Ltd., 2013). This amount of paper per year can fill up 80 Boeing 747-700 freighters (Internal Source, 2015b). It can be argued that IATA's project will have a substantial positive impact on the environment.

To be able to implement e-AWB the airline and the freight forwarder have to follow six steps which are illustrated in Appendix 2 (IATA, 2015a).

4.2 Airline 1: Pegasus Xpress Airways (PXA)

Pegasus Xpress Airways (PXA) is one of the world's leading cargo airlines, operating in more than 100 countries worldwide.

PXA's main competitive advantages refer to high quality provided to customers and a large and fast network that offers direct access to more destinations than some of their competitors. Quality and flexibility can be mainly performed due to unified process standards, combined specialized features, and increased service recovery options, that are unique compared to other airlines. The supply chain wide integration of transportation services is based on the collocation of export drop-off and import delivery, fast accessibility and transaction time but also on the access to the joint network of many other partners.

The e-AWB concept was launched in January 2014 with a 8.4% penetration which has been more than doubled within a year to 19.4% in January 2015. Up to the point of this study, PXA managed to further increase the penetration of e-AWB to 24.1%. E-freight has not been implemented yet. 'There are still some documents that are required to be in paper form […]', Schulz[3] said, '[…] for example, customs still need physical documents.'. PXA sees the e-freight concept as important for the air freight industry. PXA also sees an importance for the freight forwarder industry, '[...] in the end, all actors are linked and interconnected, […] we all have the same benefits.'[3].

4.2.1 Motivation and Drivers to Implement e-AWB

'IATA as the trade association pushed and initiated everything.'[3] PXA is following even higher goals than the ones prescribed by IATA[4]. PXA's main motivation is to act sustainable and to achieve savings concerning the kerosene consumptions. One of the main benefits is that archiving of AWBs became easier, '[…] as it safes time and space […]'[3]. 'It is also easier to find things again and it is more environmental friendly.'[3] The biggest driving force to implement e-AWB is IATA, as it '[…] influences the airlines the most.'[3]. However, analyzing the market as well as how the competitors perform are also pushing factors towards the initiative.

Power

The power distribution remains similar to the scenario before the implementation of e-AWB. According to Schulz (2015) the shipper is the actor that possesses the highest power within the supply chain network of the air freight industry. When looking at the power distribution between the freight forwarder and carrier, the freight forwarder owns the power to choose, as long as there is no partnership between the actors, which carrier is in charge of carrying on with the transportation of goods. Not to be underestimated is still the power that customs holds, when it comes to exporting and importing goods.

The reason why the distribution of power remains the same is the driving force of IATA preventing the airlines to take a different position as it already has. Therefore, both, airlines and freight forwarders, are pushing this initiative. 'At the end of the day, the power is with

[3] Source: Schulz (2015).

[4] Compare with Figure 4.1

the customer (FF), as there is more supply than demand on the market at the moment, which provides the customer with the predominance.'[3].

When looking at the economy, as soon as the demand for capacity is higher than the supply, the airline will be in the possession of power towards the freight forwarder. 'The airline would then also be in the position to push e-AWB towards the customer.'[3]

4.2.2 How e-AWB Influences PXA's Operations in Terms of Cost and Time

Cost

According to PXA, so far, no link between the e-freight initiative and the revenue of PXA has been identified.

Time

Time would only improve in case of wrong information in the AWB/e-AWB, since the customer would have to issue a new AWB which has to, again, be physically transported from the customer to the airline; in case of an e-AWB, those changes could be done electronically, thus, saving time. 'But as not every AWB is containing wrong data, time would only change marginally.'[3]

When it comes to handling, 'the physical handling of products is more complicated than electronic handling. Standard and express freight are easiest to handle.'[3]. Most difficult to handle are '[...] DGs and anything that needs some sort of cooling.'[3], also high value goods and living goods are difficult to handle.

Within the operations of PXA, no changes have been noticed regarding the lead time. The reason for this is that the handling time is calculated by how much time is needed to physically build the freight. The documentation handling is the smallest part of this process. 'The time savings at the acceptance of the documents are not big enough so that the airline could reduce their lead times.'[3]

4.2.3 How e-AWB Influences PXA's Operations in Terms of Visibility, Quality, and Sustainability

Visibility

The computer system of PXA is already communicating with PXA's customers and with the broker, but not with the shipper and end-customer. Visibility is more linked to tracking of goods and not exclusively to e-freight.

Quality

Schulz's (2015) personal view upon security is that e-AWB provides a higher security level. 'You can check documents automatically and synchronize data without doing so manually, where you review the AWB and further three to four certificates. Mistakes can easily happen during this process.'[3]

The e-AWB system is also relatively safe in terms of hacking. The IT security within the air freight industry is very high and different types of data have been sent electronically for a while now.

There is no direct link between e-freight and an improved customer service at current state. PXA is not offering a better product, but better quality. E-freight simplifies processes for the FFs and the airlines, as they can compare data more easily.

Sustainability

E-freight is a very important aspect for PXA, in regards to the environment, and savings in paper, weight, and kerosene. As the topic of sustainability became more important for society in recent years, Schulz (2015) thinks that the air freight industry, including freight forwarders, are forced to act more sustainable. '[…] Especially because customers always tend to compare where the products come from ('buy locally'). Particularly when the airlines are doing something to reduce paper and kerosene, it becomes important.'[3]

Environmental protection is an important corporate goal at PXA and the guidelines overlap the sustainability goals of IATA's e-freight initiative. The company wishes to reduce the CO_2 gases by 25% (18,000 tonnes) until 2020 with upgrading the exerted freighters and replacing old ones with the new Boeing 777F.

PXA does not locally recognize a significant reduction in weight of the freight and fuel, but for the whole company (on a high level). Schulz (2015) says there is a '1 to 1' relationship between paper and kerosene when implementing e-freight. 'When paper is being saved, so is kerosene.'[3]

There is no documentation about the amount of paper attached to each different kind of shipment, as the process before was done manually. Depending on the shipment itself it can vary between one AWB for standard goods and numerous AWBs for dangerous or living goods.

4.2.4 PXA's Supply Chain and Main Actors Involved

The supply chain of PXA consists of the freight forwarder, the airline, and the broker or consignee. The freight forwarder is in charge to issue the AWB and all other relevant documents, including security relevant or DGs documents, and to deliver the freight to the airline. The airline transports the freight from A to B. Only upon request, the airline issues documents, like temperature fluctuation sheets* for cooled products or 'Proof of Delivery*', however, no documents for authorities. The broker or consignee receives the freight from the airline and delivers it to the end-customer.

Communication between freight forwarder and airline is mostly done via email and telephone and only rarely face-to-face. The same applies for the communication between airline and broker or consignee.

54.2% of all agreements between airline and freight forwarder are contractual agreements. The cooperation between PXA and its freight forwarders is at a partnership level. There is a positive correlation between the degree of cooperation and the amount of tonnes/revenue generated by a customer. The relationship between the broker or consignee usually is purely transactional.

4.2.5 Difficulties and Challenges of Implementing e-AWB

One of the biggest issues preventing PXA to implement e-freight is the IT platform. 'Many small freight forwarders do not have the IT platform to send e-AWBs. At the moment

there is only a suboptimal platform. IATA is working on an IT platform which then can be used industry wide.'[3] The demand for e-freight will increase long-term as the IT problems are solved. Schulz (2015) sees two years as a realistic timeframe to overcome this challenge.

A very difficult part was to come to the stage that the customer sends the correct information with the e-AWB. 'In the end, customers, who are not able to send e-AWB, have to be ignored by the airline, as the customer's IT system has to be able to communicate with the airline's IT system. These customers have to be rejected.'[3]

4.3 Airline 2: Ikarus Airways Ltd. (IKA)

Ikarus Airways Ltd.* (IKA) '[…] has grown to become one of the world's leading international air cargo carriers.'[5]. The network of IKA covers 44 destinations around the world. IKA was the first airline to achieve 100% of e-AWB between freight forwarders and itself for all export shipments. Already on the 1st of January 2011, the cargo company has reached 100% e-AWB at the Honk Kong International airport. Since then the airline focuses on expanding the e-freight business, reaching a level of 5% in April 2015.

One of the company's main advantages are the strong network and the strategic location of the Honk Kong International Airport that makes it possible to reach half of the world's population within only five hours. The goal relies on reducing costs and improving efficiency within the cargo business and on the long run.

Chan (2015) points out that, at the moment the demand for e-AWB/e-freight from major carriers is high. However, freight forwarders do not fully support the concept and act passively, leading to a lower demand of e-business. The situation in two years time will chart another path, increasing the demand from both carriers and freight forwarders due to the need of standardizing handling processes instead of using duel procedures (paper and e-AWB simultaneously). 'In five years, e-AWB will be mandatory for both parties.'[5]

4.3.1 Motivation and Drivers to Implement e-AWB/e-Freight

The business expansion of IKA on the worldwide market further enhances the motivation for implementing e-AWB/e-freight in order to lower the handling costs in the future.

'IATA is acting as a leader in driving the e-AWB/e-freight project.'[5] To encourage the carriers and freight forwarders engaged within this project, IATA has formed different working groups to define relevant policies, procedures, standards, and tools for the stakeholders to follow. IATA has also organized many workshops in various countries and appointed IATA managers to help stakeholders to implement e-AWB/e-freight. Therefore 'IATA's position is to guide, assist, and encourage stakeholders to perform e-AWB/e-freight.'[5], as pointed out by Chan (2015).

Main actors have and have been influenced by the e-AWB/e-freight concept on various levels. Carriers for example are key players to drive the project and volumes of e-AWB. They are also responsible for the transportation documents of the freight. The freight forwarders on the other hand are the key players when it comes to drive the project and vol-

[5] Source: Chan (2015)

umes of e-freight. Therefore, this actor focuses on providing the commercial documents (invoice and packing list).

'In the future more people will be likely to use the air transportation […] compare to the other means of transportation.'[5], based on a better connection of the world and an easier way for companies or people to exchange goods. By implementing the e-AWB/e-freight concept air transportation will be even easier to proceed and therefore the economy will be positively influenced.

Power

The distribution of power within the air freight industry will remain the same since IATA's concept simply changes the paper handling into electronic handling. 'The actor with the highest power within the supply chain is the shipper since he chooses who is the freight forwarder transporting the goods and then the freight forwarder chooses which carrier he prefers.'[5] Customs is also quite powerful due to the fact that it makes the decision whether the cargo might enter or pass a certain country or not.

4.3.2 How e-AWB/e-Freight Influences IKA's Operations in Terms of Cost and Time

Cost

Operational efficiency gained in several handling processes has been identified by using e-processes. Based on the level of e-AWB and e-freight implementation three different scenarios can be described as shown in Figure 4.3.

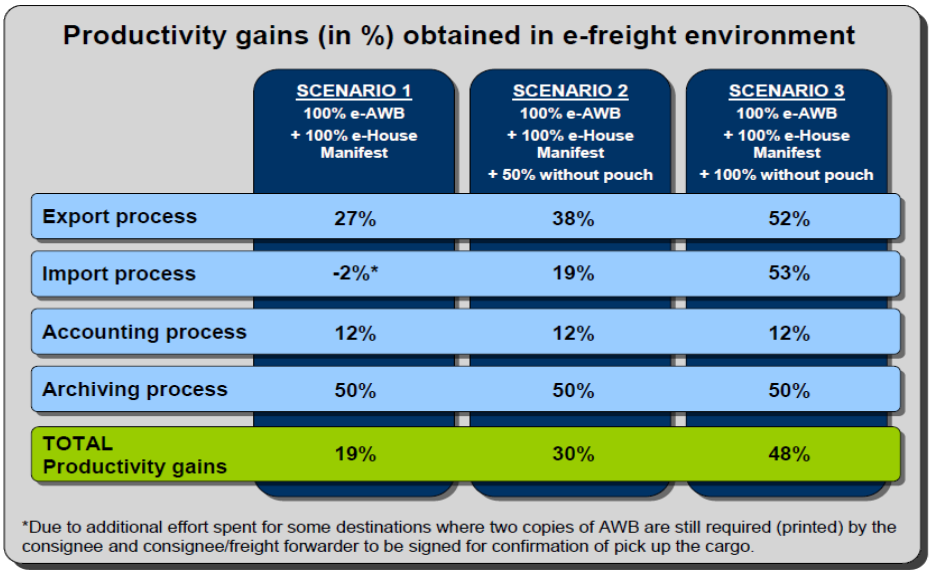

Figure 4.3 – Productivity Gains of IKA Obtained after Implementing e-AWB/e-Freight (Internal Source, 2015)

The first scenario reveals a total productivity gain of 19% after implementing 100% e-AWB and 100% e-House Manifest. The second scenario describes how, after achieving 50% of goods handled without pouch (e-freight concept) additionally to the first scenario, the car-

rier managed to gain a total productivity increase of 30%. The third scenario highlights the completed e-freight concept based on 100% e-AWB, 100% e-House Manifest and 100% without pouch handling of goods. The total productivity of this scenario would reach 48%.

Below the line, the costs have been reduced due to less paper and printer usage after achieving 100% e-AWB. This also applies to the storage of documents within the office buildings. However during the dual process, where both physically and electronically handling was done, the usage of printers was increased temporarily.

The overall revenue of the carrier will increase, as pointed out by Chan (2015), due to more business created by e-AWB/e-freight.

Time

The goods that carry the smallest or biggest amount of paper documents (and therefore fastest or slowest to handle) align with the goods presented in the Sub-section 4.2.2 'How e-AWB Influences PXA's Operations in Terms of Cost and Time'.

Special cargo, such as DGs, carries the highest amount of paper and has the highest lead time when being transported. Taking individual shipments into account one can state that the documents attached to the freight are in general not that heavy: 'Every flight sums up to the weight of one or two student bags.'[5]

'In the future, even the data coming from the shipper will be sent out electronically to the freight forwarder. Hopefully this vision will be realized in ten years from now.'[5] This leading to a faster handling and processing of the goods within the entire supply chain (from origin to destination). The lead time for handling goods after implementing e-AWB/e-freight will change according to Chan (2015). 'The goal is to shorten the cycle time between the origin and destination by 24 hours.'[5] The major saving of time, however, occurs as soon as customs clearance is being done electronically.

4.3.3 How e-AWB/e-Freight Influences IKA's Operations in Terms of Visibility, Quality, and Sustainability

Visibility

Chan (2015) points out that there will be a higher integration between the airline and the freight forwarder after implementing e-AWB/e-freight due to the virtual connection between these actors. 'Visibility of the whole SC will increase a lot, providing a full transparent tracking of the cargo movement.'[5] The carriers are better connected with each customer resulting into a great potential for future e-business.

Quality

e-AWB/e-freight improves the customer service. Not only does this concept help to eliminate the risk of losing documents, but it also reduces the number of manual errors that can occur while processing goods.

Security within the e-AWB/e-freight concept can be best described by electronic Cargo Security Declaration (e-CSD*). This allows the members to implement both information types at the same time and makes information more transparent. Additional features, such

as pro-actively alerting freight forwarders regarding documentation issues, can reduce the overall handling time and ensure the loading of cargo as scheduled.

Sustainability

Major upgrading and modernizing of the fleet as well as the purchase of three Boeing 747-8F freighters are part of the new cargo strategy. Advanced technology such as the electronic system for recording and retrieving aircraft maintenance introduced in 2013 has led to the recording of 33 million pages of paper and conversion into electronic format. IKA aims to demonstrate how advanced technologies of airlines can have a positive impact on the environment.

Chan (2015) declares e-AWB/e-freight as a very important project that focuses on sustainability and helps companies to grow and increase efficiency and therefore lowering handling costs. 'The e-AWB and e-freight procedure will be the future cargo processes to replace existing paper mode process.'[5].

4.3.4 IKA's Supply Chain and Main Actors Involved

IKA is the founding airline implementing e-AWB/e-freight and taking a leading role within IATA's initiative by influencing '[…] other airlines and freight forwarders to implement e-AWB/e-freight. Other carriers and freight forwarders can learn from IKA, since we share information on how it needs to be done and be prepared.'[5].

IKA's SC as well as the cooperation levels with other actors (shipper, freight forwarder, carrier, customs) involved are similar to the supply chain described in the Sub-section 4.2.4 'PXA's Supply Chain and Main Actors Involved'.

4.3.5 Difficulties and Challenges of Implementing e-AWB/e-Freight

'The first thing to change is the management support.'[5] There is a need of top management support since the e-AWB/e-freight concept is a long journey. The mindset of employees as well as other people involved within the air freight industry has to reach a level where they are convinced of the benefits and cost savings in the future of the e-AWB/e-freight concept.

To be able to change physical paper data to electronic data an IT solution has to exist. 'Even though many might think that this is enough, the connection between the carrier and other actors, that facilitates the electronic communication is very important and has to be set up.'[5]

Also the right conditions need to be met. Examples for that are the information system used to proceed data for carriers and partners, as well as a favorable environment that includes the support of the local market and government (customs). There is an additional need of resources (manpower as well as office supplies) to implement and roll out the e-AWB/e-freight project.

A major challenge is the fact that not all countries are ready to support e-AWB/e-freight yet: 'Some countries' customs still require the shipping document as paper […]'[5]. Examples for that are China, the Philippines, and Russia (classified as not feasible countries). Chan further points out that '[…] more and more countries will change from not feasible to feasible in the coming two to three years time.'[5].

Last but not least, the necessity to manage several dual processes to cover both e-freight and non e-freight destinations has to be mentioned. There is no real added complexity but the situation leads to additional workload with non value-added and some additional costs.

4.4 Freight Forwarder 1: Phoenix Forwarding Ltd. (PF)

Phoenix Forwarding Ltd. is leading global freight forwarder operating in over 100 countries worldwide. One of its facilities is placed in Hong Kong, where PF is closely operating with IKA. Due to this cooperation, PF also managed to implement 100% e-AWB in 2011. 'In the current and last two years, focus was mainly on e-AWB. The demand for e-AWB is very high and only now, they open the focus also to e-freight again.'[6]

4.4.1 Motivation and Drivers to Implement e-AWB/e-Freight

The main motivations to implement e-AWB/e-freight are to reduce the handling time, optimize processes, and the risk of capturing wrong data of the shipping documents. As documents can be rejected at any time due to faults, these have to be re-generated at point of origin (which is usually not where the freight is at that stage). Also, the risk of overlooking special cargo requirements is high. For forwarders, benefits come from data integration with key partners, such as shippers, airline ground handler and other freight forwarders.

Power

Heinz (2015) stated that PF is mostly influenced by authorities to implement e-freight, but by looking at e-AWB the driving force is the carrier. However, the '[...] e-freight initiative should be based with the shipper, the official authorities, and freight forwarder.'[6].

When looking at the influence that freight forwarders have on the supply chain, it is visible that the PF has the ability to increase the efficiency of processes by providing an electronic warehouse system and therefore avoiding printing the House AWBs and physically sending the shipper documentation.

4.4.2 How e-Freight Influences PF's Operations in Terms of Cost and Time

Cost

PF achieved cost savings from 8% to 19%. These savings are due to reduced storage, elimination of paper destruction and recycling, and reduced paper consumption. Even higher cost savings are expected with the implementation of e-freight, e-customs, and further internal e-processes. When looking at the change in revenue however, PF can only see an influence long-term, but not before the next ten years.

Time

As already stated within the IKA case, PF's goal is to shorten the cycle time by up to 24 hours. This is to be achieved due to the ability to send and receive all shipment information in advance of the freight itself and a faster check of documents.

[6] Source: Heinz (2015)

4.4.3 How e-Freight Influences PF's Operations in Terms of Visibility, Quality, and Sustainability

Visibility

With e-AWB the functionality of track and trace services improved, as well as the possibility to provide real time information of freight movements. PF implemented an electronic fill in system for documents a couple of years ago, making documents available at the destination of the shipment after being scanned in. Therefore, '[…] the import process can already start during the flight.'[6].

Quality

As the shipper is automatically adding its data into the freight forwarder's system, there is only one electronic data entry point reducing delays caused by missing or incorrect data. Therefore, fewer documents are missing, resulting into fewer discrepancies. 'Accurate security information is also getting more and more important.'[6] Communication between the actors improved as there are now '[…] standard EDI regulations […]'[6]. The archiving and retrieving of documents changed similarly to the airlines. When looking at customer service aspects, urgent shipments are now easier to handle. In general, goods are being delivered quicker.

Sustainability

Using 100% e-AWB operations boosted PF's company image of being more green and eco-friendly.

4.4.4 Supply Chain and Main Actors Involved

PF's supply chain, including the cooperation levels with other actors (shipper, GHA, carrier, customs), are similar to the previously described SC of PXA and IKA.

4.4.5 Difficulties and Challenges of Implementing e-AWB/e-Freight

Changes regarding the processes within PF and technology were needed, such as investing in new technology to optimize their processes.

One main challenge faced by PF was that not every airline was ready to accept e-AWB and paperless processes. Heinz (2015) pointed out that there is a missing capability of suggested industry standards. Furthermore, customs procedures in different countries inhibit the full implementation of e-freight. 'Official authorities need to adapt e-freight processes.'[6]

Another challenge is the limited shipper - forwarder integration across supply chains that prevents a smooth implementation of e-AWB/e-freight.

4.5 Process Description of Transporting and Handling Goods

The following sub-section describes the processes involved while transporting and handling goods for both airlines and freight forwarders before the implementation of e-

AWB/e-freight. The presented information is based on the findings gathered while interviewing both actors and highlighted in two process diagrams (Figure 4.4 and Figure 4.5).

4.5.1 Airlines

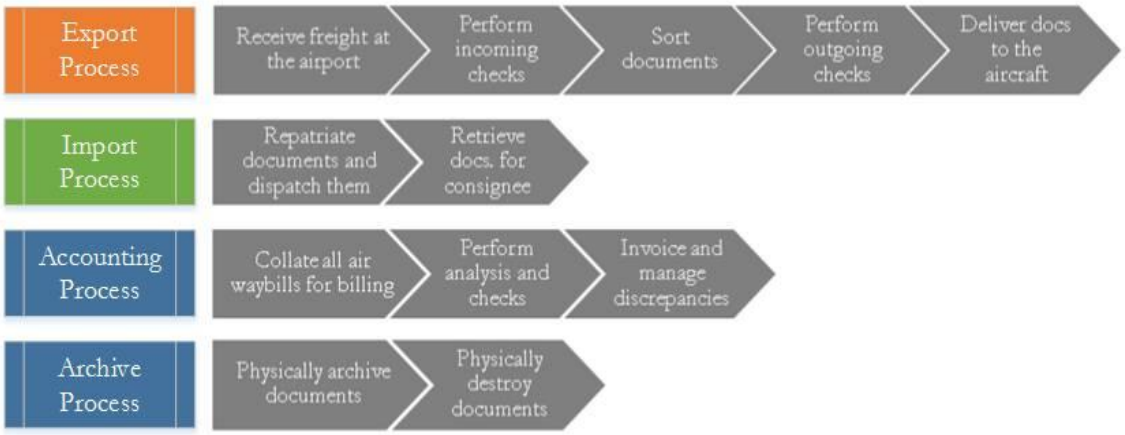

Figure 4.4 – Processes of Airlines before the Implementation of e-AWB/e-Freight
(Own illustration based on Internal Source, 2015)

Export

As soon as the freight arrives at the airport a warehouse agent (neutral party) weights and counts the number of pieces, checks the total weight and measures the cargo dimensions. After the acceptance, data is accessible for both freight forwarder and airline. Documents are being checked manually at the airlines export desk, where freight forwarders, depending on the number of other drivers, have to queue up to one hour. The amount of documents that have to be checked influences how long this activity takes. There is a risk of overseeing some hidden DGs due to potential human error. The next step is time consuming and requires the sorting of the received documents. After all documents have been checked and validated against the flight manifest*, the agent inserts them in the flight bag (pouch). Finally the pouch together with the AWB, the house manifest, and other required papers are being reunited with the actual freight.

Import

When the freighter arrives at its destination the paper documents are being repatriated to the import office and temporarily stored in so called 'pigeon holes*'. Freight forwarders need to collect the documentation first, complete the shipment release form* and sign it. As soon as the driver retrieves the documents he can go to the warehouse and pick up the goods and sign the proof of delivery.

Accounting

During accounting, all documents required are being collected, missing papers identified, analyzed, and checked. After all AWBs are being brought to the accounting department, the processing per customer takes place. Potential discrepancies, due to lost documents are being dealt with and corrected. Finally, the invoices for the customers are send out.

Archive

Documents that are required to be archived are physically collected and sorted in a room that has been particularly designed and equipped for. Depending on the airlines policies, retention periods are up to seven years.

4.5.2 Freight forwarders

Figure 4.5 – Processes of Freight Forwarders before the Implementation of e-AWB/e-Freight (Own illustration based on Internal Source, 2015a)

Export

Freight and documents are delivered at the freight forwarder's warehouse, which in some cases is not directly located at the airport. After the freight is unloaded and the data captured, a FF employee creates and prints the cargo acceptance receipt and the received inspection check list documents. A warehouse planner consolidates and organizes the pallets. At this point the booking can be arranged and a master AWB number assigned to each pallet. All documents need to be copied - a time consuming and inefficient step. The cargo is being assembled and transported to the airport. Finally, the freight forwarder finalizes the pouch and hands it in at the export office of the airport.

Import

The first step of the import process has already been explained within the Sub-section 4.5.1 'Airlines - Import'. The second step describes how the freight forwarder calculates and prints the invoice and delivery note for the consignee. The third and final step refers to the freight forwarder physically delivering the cargo to the consignee.

Archive

Some freight forwarders have already implemented an electronic archive solution. For those who have not see Sub-section 4.5.1 'Airline - Archive' description.

5 Analysis

The following chapter provides answers to the research questions presented in the introducing part of the study (Section 1.4). Empirical findings combined with the literature framework help to analyze the effects the of e-AWB/e-freight within the air cargo industry. Firstly, the extent to which the given e-freight initiative goals of IATA have been successful and why these have failed is uncovered (Section 5.1). Secondly, the implementation of e-AWB/e-freight reveals how cost, time, visibility, quality, and sustainability change and how processes of carriers and freight forwarders, as well as the supply chain network, need to adapt (Section 5.2). Thirdly, main drivers related to the power distribution are applied to the previously presented power model of Porter and Cox (Section 5.3).

All data presented in this chapter is based on the findings from Chapter 4 and literature framework introduced in Chapter 2.

5.1 Achieving the Goals of the e-Freight Initiative

Keeping IATA's goals in mind (highlighted in Table 4.1) it can be stated that the year-end target 2015 of 45% e-AWB penetration is most likely not to be achieved industry wide. Main reason behind that lies within the missing IT platform that simplifies the conversion of paper based documents into electronic data as well as the real-time communication between all actors involved. Even though IKA has reached 100% e-AWB and PXA 24.1%, it is not guaranteed that the industry-wide implementation of e-AWB/e-freight constantly precedes. Regarding the targets of 2016 (80%) and 2017 (90%) further support needs to be installed (e.g. industry-wide IT platform) by IATA, so that these goals can be successfully reached.

A controversy fact relates to the inconsistency of statements regarding the driving force of implementing e-AWB/e-freight. For example, carriers point out that particularly freight forwarder do not support the initiative. Whereas freight forwarders on the other hand blame the carriers for not achieving the industry-wide targets.

The last step of the paperless initiative (e-freight) not only implies a one data entry point (IT platform) but furthermore the world wide support of all involved actors within the air freight supply chain, mainly customs.

The set goals regarding cost, time, visibility, quality, and sustainability will be analyzed within the next section.

5.2 Changes within the Air Freight Supply Chain

Several changes within the air freight supply chain network, in regards to relevant performance measurements, processes, and the information flow within the supply chain, can be identified after the implementation of the e-AWB/e-freight initiative.

Table 5.1 provides an overview of the changes affecting the air freight supply chain at different stages of the e-AWB implementation, namely 24.1% and 100%.

Table 5.1 – Overview of the Changes Affecting the SC Caused by Different Levels of e-AWB/e-Freight Implementation (Own illustration)

	Implementing 24.1% e-AWB + 0% e-freight	**Implementing 100% e-AWB + 5% e-freight**
Cost	No savings	8 - 19%
Time	Marginal improvement	Total lead time reduced to 24h
Visibility	No improvement given Communication improved	Higher integration Communication improved
Quality	Security level improved Customer service constant Accuracy improved	Security level improved Customer service improved Accuracy improved
Sustainability	Less paper easier archiving process	Less paper, less kerosene easier archiving process

Cost

First of all, at a lower e-AWB implementation level (24.1%) no direct link between the implementation of e-AWB and revenue of company can be identified. However, cost savings from 8%-19% can be achieved based on an increased efficiency of the handling processes after a full implementing.

Costs can be saved due to reduced paper and printer usage, less storage offices, and the elimination of destruction and recycling processes of paper. During the dual process, needed during the implementation to process both electronic and physical handling, however, a slight cost increase can be identified based on investments for additional printers and IT systems.

Time

With implementing only 24.1% e-AWB the carrier only realizes marginal time savings, as the documentation handling only accounts for the smallest part of the handling process. In contrast, after fully implementing e-AWB overall time savings within the supply chain can be achieved, leading to a reduced total lead time to up to 24 hours. The exact location of the time savings could not be detected during this study. However, savings cannot occur within the carrier's time frame, as the documentation handling process only accounts for a short time frame withing the entire freight handling process, but rather within the operations of the freight forwarder and/or customs.

The key element that reduces handling time, is a faster processing of incorrect data, as the FF does not have to physically return to the warehouse to update the freight's information.

Visibility

Depending on the existing communication level between the freight forwarder and carrier at the time of starting the implementation of e-AWB there are zero to considerable improvements after the implementation. Real-time information of the freight movement is now possible.

Quality

The security level (especially for special cargo) improves, as documents are checked automatically, eliminating the possibility of manual errors. As there is only one data entry point, preexisting delays due to missing and/or wrong data no longer exist, leading to fewer discrepancies. In case of any incorrect or missing data, the IT system proactively alters the relevant actor. The electronic data handling also lowers the risk of losing documents and at the same time facilitates the data retrieving processes. Last but not least, customer service can be improved, as for example urgent shipments are easier to handle using e-processes.

Sustainability

With the implementation of e-AWB/e-freight paper can be saved for both, archived and shipped documents. Shipped documents sum up to two schoolbags per freighter. With the saving of paper and therefore weight, kerosene can also be saved. However, the saving of kerosene can only be detected on a higher level, that is globally, and not on single airports where the cases of this study are located. Accompanied with the savings in paper and kerosene, the air freight industry attains a green image with both, the companies and transportation mode becoming more environmental friendly.

Another aspect which is also more sustainable after the implementation of e-AWB/e-freight are the archiving and recycling processes, which are shifted to be electronic.

5.2.1 Changes in Processes after Implementation of the e-Freight Initiative

The changes occur due to the implementation of e-AWB and affect the processes of the carriers and FF are highlighted in Figure 5.1 and Figure 5.2. The crossed out steps (red mark) represent manually performed steps of the processes that are no longer needed after using e-AWB. The steps that are marked by the green 'e-abbreviation' represent steps that are performed electronically. Additionally, the execution of some steps, such as 'retrieving docs for consignee' (import process) and 'invoice and manage discrepancies' still depend on the preferences of the consignee (electronically or paper).

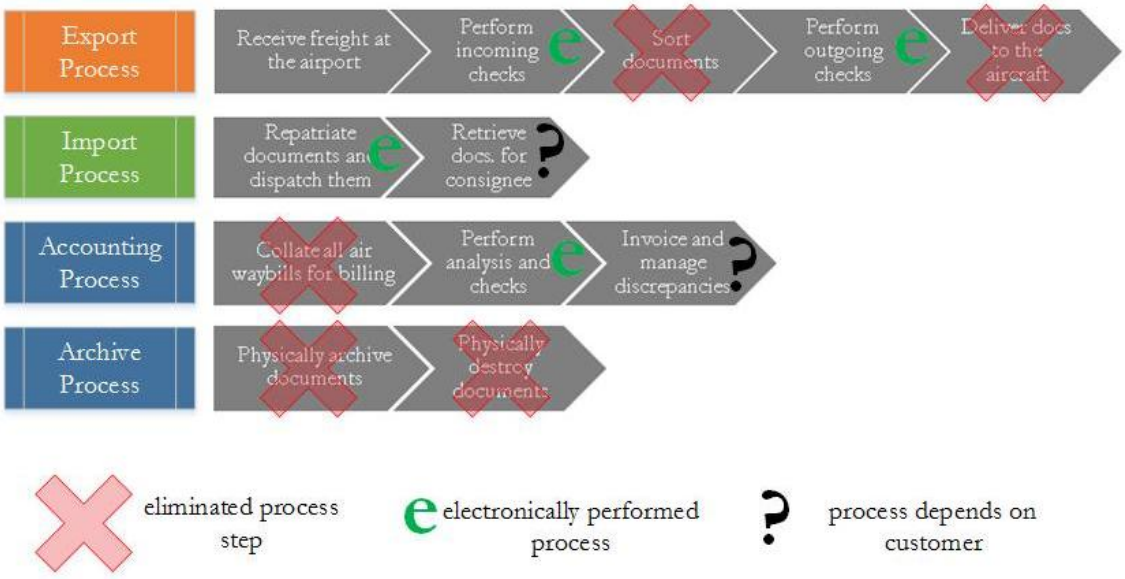

Figure 5.1 – Processes of Airlines after the Implementation of e-AWB/e-Freight (Own illustration)

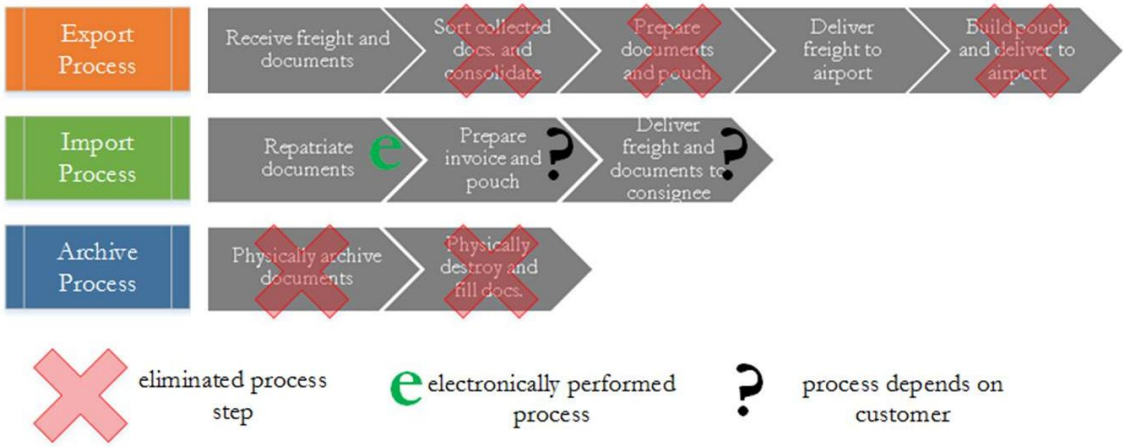

Figure 5.2 – Processes of FFs after the Implementation of e-AWB/e-Freight (Own illustration)

5.2.2 Changes of the Flows within the Air Freight Supply Chain after the Implementation of e-AWB/e-Freight

With the implementation of e-AWB/e-freight the material flow does not alter, however, the information flow does chance drastically. As seen in Figure 5.3 having a 100% e-freight penetration would result in one single data entry point and all the other actors would access and feedback new data from a central IT platform.

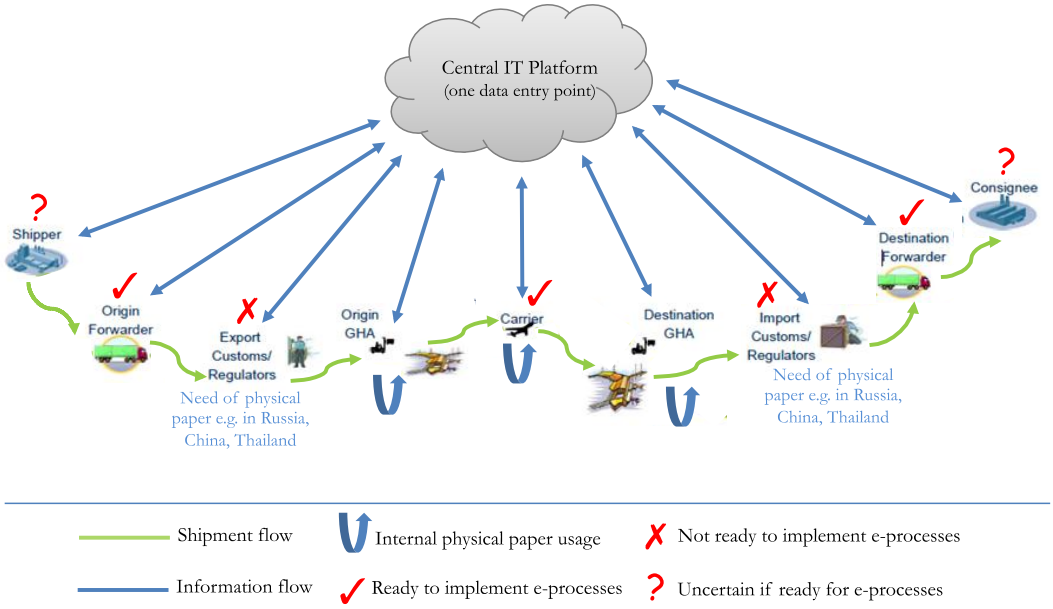

Figure 5.3 – Air Freight Supply Chain after the Implementation of e-AWB/e-Freight (Own illustration adapted from IATA, 2013)

At the current stage on which this study is based on, however, it can be stated that there is still a long way to achieve this ideal scenario. At the moment the origin forwarder is the actor who transforms physical into electronic documents. The export and import customs (for example in Russia, China, and Thailand) are not yet at a stage where they accept elec-

tronic data – meaning that several shipment documents have to be printed. When looking at the GHAs and the carrier it can be seen that those actors are still using physical documents within their internal processes. The unknown actors within the supply chain are the shipper and the consignee as they were not part of this study. Thus, it cannot be said whether they support the e-freight initiative or not.

5.3 Main Drivers related to the Power Distribution

Figure 5.4 describes the power distribution within the air freight SC before the implementation of e-AWB as well as the scenario that will encounter the main actors after applying IATA's concept. The upper part of Figure 5.4 illustrates the power distribution between shipper, freight forwarder, customs, carrier, and consignee. The lower part on the other hand highlights only the power distribution between freight forwarder and carrier. The beginning of the arrow represents the actor with a higher power compared to the actor that the arrow is pointing at. The representation of the power distribution is based on the findings mentioned within Chapter 4 (4.2.3 and 4.3.3 'How e-AWB/e-Freight Influences PXA's/IKA's Operations in Terms of Visibility, Quality, and Sustainability') and was emphasized by representatives of the carriers that took part in this study.

IATA influences airlines the most. As a trade association and a leader in driving the e-AWB/e-freight project it guides, assists, and encourages stakeholder (such as carriers) to implement the new technology. At the same time IATA prevents the power from shifting within the air freight industry.

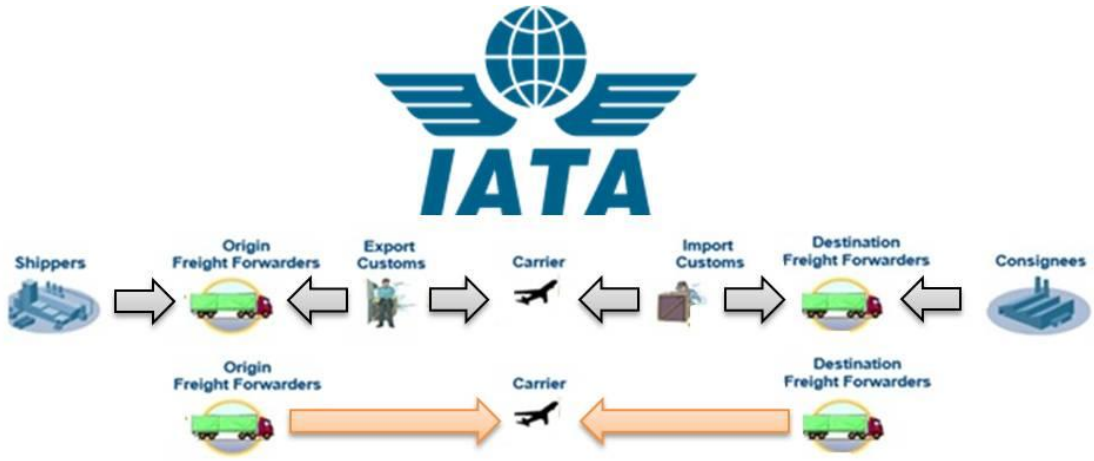

Figure 5.4 – Power Distribution within the Air Freight Supply Chain
(Own illustration adapted from IATA, 2013)

When looking at the main actors themselves, customs is the most influencing since it has the power to decide whether the freight is allowed to pass export/import. Second to follow is the shipper who chooses which FF to use to transport freight. The freight forwarder acts on behalf of the shipper and therefore has the option of choosing which carrier should further take on the transportation of the freight.

As long as the supply of transportation services is higher than the demand within the air freight industry, the carrier remains as the actor with the lowest power within the supply

chain. Thus, providing a similar service with no real competitive advantage compared to the direct competitors underlines the highlighted circumstances.

Figure 5.5 shows how the main drivers of the e-AWB/e-freight concept change the power distribution for both freight forwarders and carriers within the supply chain. The performance of competitors as well as relevant market happenings pushes the need to implement e-AWB and e-freight. Hereby carriers are key players to drive the e-AWB concept, whereas FFs focus more on the e-freight project.

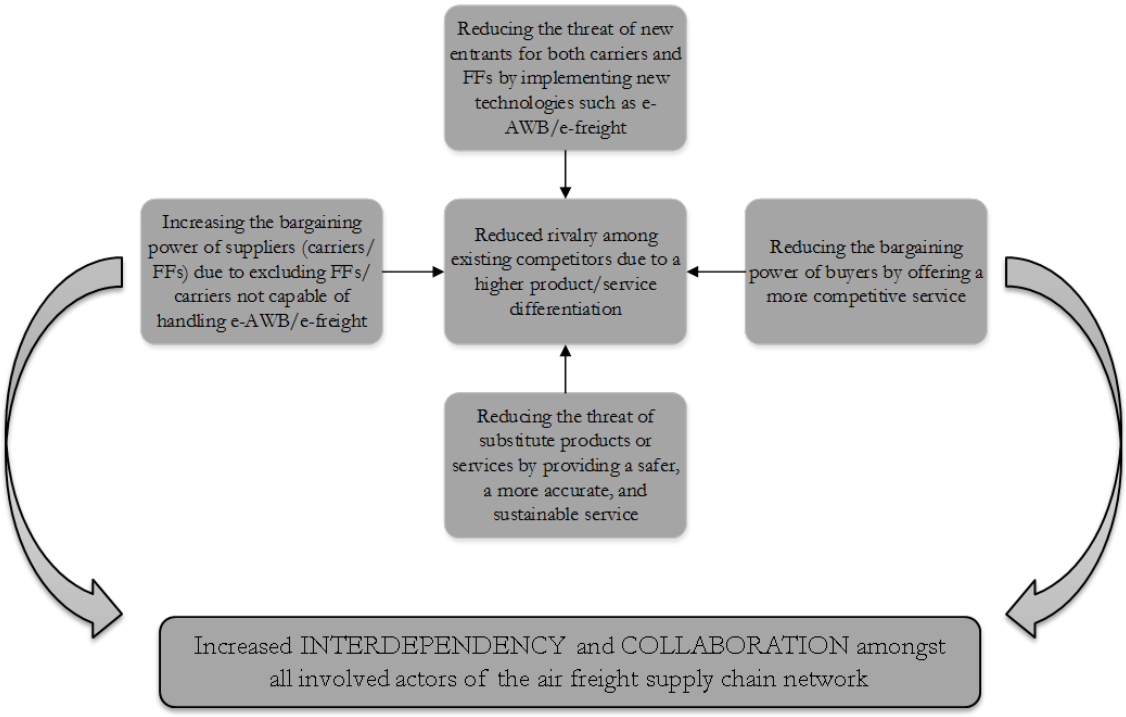

Figure 5.5 – Power Distribution after implementing e-AWB/e-Freight (Own illustration)

Compared to other transportation modes (threat of substitute products or services) there is a general need to increase power for FFs and carriers. This relates to providing a unique and sustainable service that increases the quality and business expansion on the worldwide market.

Increasing efficiency and lowering handling costs results in providing the same service for lower costs and being more competitive. Therefore the concerned actor gains more power compared to its competitors (threat of new entrants) - a fact that is indirectly influencing the supply chain - and increases its position within the air freight industry.

The sooner the implementation takes place the better the outcomes (bargaining power of suppliers/buyers). IKA and PF are the first airline and FF to implement 100% e-AWB (export processes) which grants them a higher power status within the SC and also the main benefits highlighted in the Section 5.2 'Changes within the Air Freight Supply Chain' that can only be fully achieved and exploited when 100% e-AWB has been obtained.

An advanced technology, such as e-AWB/e-freight, provides a competitive advantage (rivalry among existing competitors) that relates to a strong network, reducing costs, and improving efficiency.

Adapted to the concepts originating from Cox (2001) it can be stated that the implementation of e-AWB/e-freight increases the long-term aspect of interdependency and collaboration amongst all involved actors (shipper, FF, customs, carrier, and consignee) of the air freight supply chain network. By working together for the same cause, actors achieve a faster and smoother implementation of the concept and a faster utilization of the benefits connected to the paperless transportation of goods. Even though collaborations limit the freedom of choice of airline for freight forwarders, the benefits on the other hand are not to be ignored. Especially smaller freight forwarders that do not have the resources to implement the e-AWB/e-freight initiative on their own can benefit from a collaboration with carriers or even shippers by using one/the same IT platform.

5.4 Visual Summary of the Study

Figure 5.6 sums up identified main drivers and main issues for e-AWB/e-freight, and the contemporary e-AWB penetration of all analyzed and participating actors of the air freight supply chain network within the study.

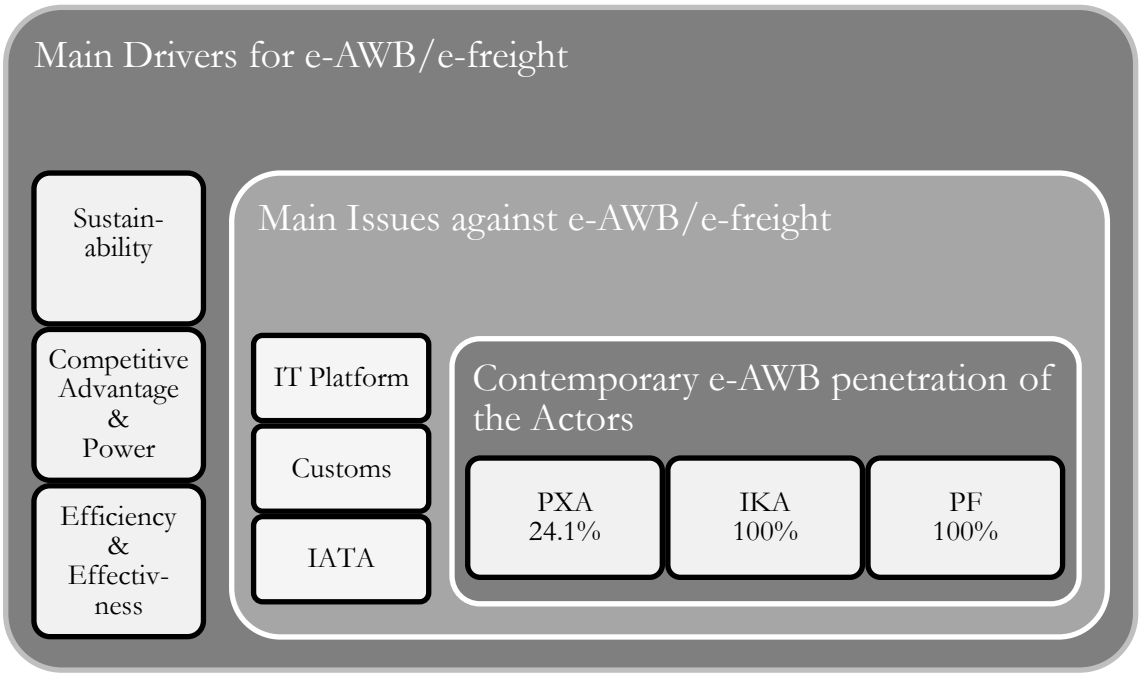

Figure 5.6 – Summary of the Study (Own illustration)

6 Conclusion

The following chapter shows, as part of the first section and in a compact manner, how the study has managed to answer the three research questions (Section 6.1). The study also observed a number of managerial implications for the actors of the air freight supply chain, which are highlighted within the second section (Section 6.2). Several concluding remarks that still withhold some uncertainties and could not be dealt with in the study are presented in the last section (Section 6.3).

6.1 Summarizing Evaluation

While focusing on two specific cases within the U.S. and Chinese market, mainly positive as well as some negative effects of implementing e-AWB/e-freight were identified. New insights into the phenomenon of e-freight, that are mainly related to the leading role of the trade association IATA, were presented and analyzed. In order to do so the study did not only address problems, but also focused on positive and negative outcomes related to the main actors within the supply chain network of the air cargo industry.

It can be stated that more cost savings are possible in the future as soon as e-freight and e-customs are fully implemented. The optimization and switch to electronic internal processes of the main actors within the air freight supply chain is a further requirement for the smooth handling of cargo documents and also additional cost savings (archiving and storage). The importance of implementing e-AWB/e-freight on a worldwide level is based on the fact that cost reductions are only to be seen on a higher level and not locally within one station/airport.

Time savings are to be maximized when the e-freight initiative is fully completed (Figure 4.3, Scenario 3: 100% e-AWB, 100% e-House Manifest and 100% without pouch) and the data between shipper and freight forwarder is directly uploaded into a full transparent supply chain. A virtual connection amongst all main actors of the air freight supply chain needs to be granted to perform a faster handling of freight.

Customs was identified as one major barrier of the implementation of e-AWB/e-freight, since some countries still require paper cargo documents. This prevents a vast improvement of the cargo lead time within the air cargo supply chain network. Based on the interviews conducted it is not likely that this fact will change in the near future. Even though e-AWB/e-freight was highlighted as a quite safe procedure when it comes to the security level of data, the possibility to hack the system that contains all relevant cargo information, cannot be disregarded. Compared to the paper based processes only people in charge of handling the freight were able to gain insights about the freight, whereas the electronic process is more vulnerable to third parties.

The air freight industry has taken the right direction towards becoming a more sustainable transportation mode by implementing the e-freight initiative. It managed to not only to reduce the usage of paper, and therefore saving resources, kerosene, and lower emissions, but it also acts more sustainable in eliminating unnecessary trips by freight forwarders (in case of faulty documents). The air freight is certainly not the most sustainable transportation mode, but it is doing everything to keep their good reputation and to stay competitive towards other transportation modes.

The lack of literature analyzing the outcomes of the e-AWB/e-freight initiative as well as the evaluation of the power distribution within the air freight industry have been successfully covered due to the detailed analysis provided within Chapter 5. The importance of the study is premised on implications that show that the implementation of e-AWB/e-freight not only prepares the air cargo industry for future challenges by providing a more innovative, secure, and sustainable service, but also by providing a tool to increase the coordination and communication amongst all actors involved in the supply chain.

6.2 Managerial Implications

Significantly, several implications for managers can be drawn from this research but two major areas that need to be highlighted are the importance of IATA as a leading role and the need for SC-wide collaboration in order to fully and successfully expand the e-AWB/e-freight initiative. This will eliminate possible barriers of the implementation and provide the possibility of gaining all mentioned benefits on a high scale.

Being applicable as a result of this study, carriers and freight forwarders should introduce the e-freight concept as part of their service portfolio in order to remain competitive within the air freight industry as well as within the general transportation industry, and to provide a safer and more sustainable mode of transportation.

6.3 Further Research

Future research would include an analysis of all involved actors (not only carriers and freight forwarders) and also take place within other important markets (besides U.S. and China). While doing so, a detailed analysis needs to be conducted that highlights the exact amount of paper that is being used within the manual process as well as the power distribution of all actors involved in the supply chain network.

Furthermore, a longitudinal point of view would help to analyze the changes over a longer period with regards to the power distribution and changes within the supply chain network.

Nowadays few of the main airports handle the biggest amount of cargo worldwide - with rising tendency - a fact that leads to a possible breach of the capacity of these airports and therefore creates bottlenecks when handling air cargo. Investigating how the implementation of e-AWB/e-freight could avoid the creation of cargo overload and bottlenecks within the airport hubs by reducing the handling time of cargo would be of significant benefit.

Of additional interest would be a deep analysis of customs procedures of different countries, especially the ones that do not accept e-Docs, in order to fully understand the reasons behind it and to estimate the approximate date of full acceptance of e-AWB/e-freight on a worldwide level.

Finally, IATA's actual role especially in terms of how IATA acts towards member and non-members involved within the air freight supply chain network has to be closely analyzed. There is a need to perceive an understanding of why small freight forwarders and carriers are not supported to implement the e-freight initiative as they lack financial resources to set

up an individual IT platform. It is essential to understand how the lack of support of some actors within the air freight supply chain not only directly influences those actors, but also indirectly influences the entire air freight industry and potentially leading towards a deceleration of the e-AWB/e-freight initiative. This effect has already been seen and analyzed on a minor level in the case of customs and small freight forwarders.

Glossary

Airline

According to Sales (2013) three types of carriers can be differentiated: passenger airlines, also known as combination airlines (carrying passengers and minor amount of freight and mail), all-cargo airlines (transporting heavy cargo shipments with nearly no passenger traffic on basis routes), and charter airlines (flying ad-hoc services on special demand via unusual destinations).

Archiving Process (PXA)

The archiving of AWBs is/was organized by the AWB number, therefore a selection by country of kind of shipment cannot be done.

Carriers' Documents

Flight Manifest, Transfer Manifest, Export Cargo Declaration, Import Cargo Declaration, Transit Declaration, Security Declaration, and Freight Book List.

Customs' Documents

Import Goods Declaration and Customs Release Import.

e-AWB

e-AWB represents the electronic version of the most important transportation document in the air freight industry.

e-CSD

Electronic Cargo Security Declaration defines a new format requiring security related data to be part of the electronic AWB. It allows to check which actor, where and at what time has done the security check. Furthermore freight forwarders and airlines have to declare how they secured the cargo during the shipment journey.

e-Freight

e-freight represents an air freight industry-wide initiative that focuses on creating and realizing an end-to-end paper free transportation process located in the air cargo industry.

E-House Manifest

Contains electronic information of the goods that are consolidated and transported as a unit. Also the e-House Manifest contains information that can be used for customs (declaration of cargo).

Flight Manifest

Paper based list that contains all information of the goods (parcels) that are consolidated/compiled and it is need for customs or other officials.

Freight Forwarder (detailed)

'[...] a consolidator that collects small shipments from shippers, consolidates them into large loads, and uses a basic mode to transport them to a consignee destination. [...] Freight forwarders can be classified as domestic or international (foreign), depending on whether they specialize in shipments within a country or externally to other countries. [...] Freight forwarders have a strong knowledge of transport alternatives, can prepare and provide the required international documentation, are able to offer a lower transit time for small shipments, special freight handling, and customs clearance, and, because they are regulated carriers, are liable for cargo damage. [...] A freight forwarder usually acts as an agent of the shipper and not as a carrier [...]' (Wankel, 2009).

Freight Forwarders' Documents

Master Air Waybill, House Waybill, House Manifest, Export Goods Declaration, and Customs Release Export.

House Manifest

Paper based e-House Manifest.

Ikarus Airways Ltd. (IKA)

IKA 'has grown to become one of the world's leading international air cargo carriers.' (Internal Source, 2015). As stated by the annual report of 2013, the airline transported around 1.5 Mio tonnes of cargo (including mail) and HK$20,293 million revenue. The cargo load in 2013 was 61.8%. IKA continues to expand the e-AWB rollout to all feasible regions within its own network. Examples for this are the following countries (State: April, 2015): India and Middle East (93%), North Americas (67%), South West Pacific (68%), South East Asia (45%), North East Asia (26%), and Europe (15%). Since then the airline focuses on expanding the e-freight business, reaching a level of 5% in April 2015. (Internal Source, 2015)

Logic Model

The 'Logic Model' as described by Kumpfer et al. (1993) and cited by Julian, Jones and Deyo (1995) is '[…] a logical series of statements linking the conditions a social service program is intended to address, the activities that will be employed to address specific conditions, and the expected outcomes of activities.'. This approach can be used to ensure that strategic outcomes - direct outcomes as well as indirect outcomes – are related to a broad industry in order to solve complex issues. (Kumpfer et al., 1993, cited by Julian et al., 1995)

Pegasus Xpress Airways (PXA)

Back in 2014 the airline transported around 1.7 Mio tonne of freight, including mail, and sold around 8.6 billion revenue tonne-kilometers worldwide. The cargo load factor in 2014 was 69.7%. About 4,500 people work for the company around the globe. Furthermore 300 destinations in more than 100 countries are being delivered using the company's own fleet of freighters and taking advantage of the extensive network that has been build together with many of their partners along the last couple of decades. (Internal Source, 2015b)

Pigeon Hole

Similar to the compartments of a shelve.

Proof of Delivery

Document which states that the shipment has been received by the recipient.

Shipment Release Form

Document which states that the shipment has been released and handed over to the recipient. It further states that the recipient releases the carrier/freight forwarder from all liability for any loss or damage after leaving the shipment at the recipients request.

Shippers' Documents

Invoice, Packing List, Certificate of Origin, Letter of Instruction, Dangerous Goods Declaration, and CITES Certificate.

Temperature Fluctuation Sheet

A paper based proof (created by the carrier) that shows the consignee how the temperature changes have evolved while warehousing the special cargo (that needs cooling or heat). It is used to proof that a proper environment for the cargo was granted.

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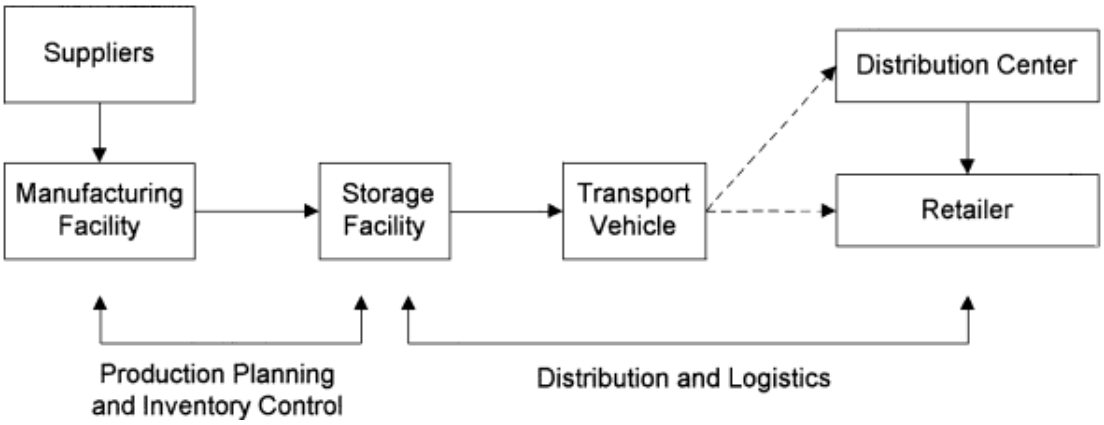
Appendix

Appendix 1 – The Supply Chain Process (Beamon, 1998)



Appendix 2 – The Six Steps of Implementing E-AWB (IATA, 2015a)

Step 1
- **Set a multilateral e-AWB agreement in place**
  (The agreement representing a a single standard agreement that both - the airline and the freight forwarder - can sign to enter with all parties)

Step 2
- **Provide a technology that supports a smooth exchange of electronic data**

Step 3
- **Provide a flawless quality of electronic messages**
  (Reason behind it is the non-existence of paper AWB)

Step 4
- **Review every single business process**
  (Takes place in cooperation with the business partners to assure that these are adapted to a paperless way of operating)

Step 5
- **Roll-out of e-AWB is made after deciding which airport is going to implement e-AWB first**
  (additional to this all involved stakeholders are trained and ready to handle e-AWB shipments)

Step 6
- **All airlines are encouraged to keep IATA up to date about the e-AWB shipments**

Appendix 3 – Semi-Structured Interview Questions for the Airlines

Semi-Structured Interview Questions

Part 1: General Questions

1. Is your company providing the service of e-AWB and/or e-freight (percentage)? *[7]
   1.1 If yes, since when and which service are you providing?
   1.2 If not, what are the reasons?

2. Do you think that there is enough demand for e-AWB/e-freight?
   2.1 At the moment?
   2.2 In 2 years?
   2.3 In 5 years?

3. How would you describe IATA's position and attempt with regards to e-AWB/e-freight?

4. How is e-freight initiative/concept influenced by the following aspects?
   (Please provide additional information to explain your answer)
   4.1 Airlines/Carriers
   4.2 Freight forwarders
   4.3 Integrators
   4.4 Power within the supply chain
   4.5 Economy
   4.6 Security
   4.7 Sustainability

5. Does your company use contractual agreements to settle business with the freight forwarders?
   5.1 Amount of freight handled regular (based on contractual agreement)*
   5.2 Amount of freight handled sporadic (not based on contractual agreement)*

Part 2: Describing your company's main drivers for implementing e-freight/e-AWB

1. What are your company's biggest competitive advantages?

2. What motivated your company to implement e-freight/e-AWB?

3. What are the main issues preventing the implementation of e-freight/e-AWB?

4. What are the main benefits of implementing e-freight/e-AWB?

5. Do you think your company is influenced by others to implement e-freight/e-AWB? (airline/freight forwarder)
   5.1 Actors influencing your company the most

[7] * These answers require quantitative data. Feel free to answer these questions via email or within the interview.

Part 3: Describing your company's supply chain of handling goods

1. Which actors are involved?

2. What actions (transportation process) are these actors responsible for?

3. How does the communication between the actors take place?

4. Does your company have a strong cooperation with the other actors involved in the supply chains?
   4.1 Actors
   4.2 Level of cooperation (transactional, partnership, strategic alliance)
   4.3 Factors relevant for strong cooperation
   4.4 Benefits of the cooperation with regards to the handling of goods

5. Which goods are the ones that carry the biggest/smallest amount of paper documents with them?
   5.1 Amount of paper attached to shipment (export/import)*****
   5.2 Approximate weight of paper shipped*****

6. What is the lead time for handling goods (without e-freight and with e-AWB/e-freight)?
   6.1 Dangerous goods*****
   6.2 Living animals*****
   6.3 Bulk goods*****
   6.4 Average time (for all products)*****

7. Which are the steps of handling imported/exported goods (process) and how are they administered (without and with e-AWB/e-freight)?

Part 4: Achieving the e-freight initiative goals

1. What changes are needed to support e-freight?

2. How do you think will the e-freight concept influence the company's revenue?
   2.1 In the short-term (2 years)?
   2.2 In the middle-term (5 years)?
   2.3 In the long-term (10 years)?
   2.4 Do you have any data that relates to your assumptions?

3. How do you think will the air freight industry change after implementing e-freight?
   3.1 Time
   3.2 Security
   3.3 Sustainability
   3.4 Visibility

4. Were there any physical changes in the offices (export/import/customs) required while/after implementing e-freight?
   4.1 What kind of changes are you referring to?
   4.2 How did the physical offices change?
   4.3 How did the organization's structure change?

Appendix 4 – Semi-Structured Interview Questions for the Freight Forwarders

Semi-Structured Interview Questions

Part 1: General Questions

1. Is your company providing the service of e-AWB and/or e-freight (percentage)? *****[8]
   5.3 If yes, since when and which service are you providing?
   5.4 If not, what are the reasons?

2. Do you think that there is enough demand for e-AWB/e-freight?
   a. At the moment?
   b. In 2 years?
   c. In 5 years?

3. How would you describe IATA's position and attempt with regards to e-AWB/e-freight?

4. How is e-freight initiative/concept influenced by the following aspects?
   (Please provide additional information to explain your answer)
   a. Airlines/Carriers
   b. Freight forwarders
   c. Integrators
   d. Power within the supply chain
   e. Economy
   f. Security
   g. Sustainability

5. Does your company use contractual agreements to settle business with the airlines?
   a. Amount of freight handled regular (based on contractual agreement)*****
   b. Amount of freight handled sporadic (not based on contractual agreement)*****

Part 2: Describing your company's main drivers for implementing e-freight/e-AWB

1. What are your company's biggest competitive advantages?

2. What motivated your company to implement e-freight/e-AWB?

3. What are the main issues preventing the implementation of e-freight/e-AWB?

4. What are the main benefits of implementing e-freight/e-AWB?

5. Do you think your company is influenced by others to implement e-freight/e-AWB? (airline/freight forwarder)
   a. Actors influencing your company the most

[8] ***** These answers require quantitative data. Feel free to answer these questions via email or within the interview.

Part 3: Describing your company's supply chain of handling goods

1. Which actors are involved?

2. What actions (transportation process) are these actors responsible for?

3. How does the communication between the actors take place?

4. Does your company have a strong cooperation with the other actors involved in the supply chains?
    a. Actors
    b. Level of cooperation (transactional, partnership, strategic alliance)
    c. Factors relevant for strong cooperation
    d. Benefits of the cooperation with regards to the handling of goods

5. Which goods are the ones that carry the biggest/smallest amount of paper documents with them?
    a. Amount of paper attached to shipment (export/import)*****
    b. Approximate weight of paper shipped*****

6. What is the lead time for handling goods (without e-freight and with e-AWB/e-freight)?
    a. Dangerous goods*****
    b. Living animals*****
    c. Bulk goods*****
    d. Average time (for all products)*****

7. Which are the steps of handling imported/exported goods (process) and how are they administered (without and with e-AWB/e-freight)?

Part 4: Achieving the e-freight initiative goals

1. What changes are needed to support e-freight?

2. How do you think will the e-freight concept influence the company's revenue?
    a. In the short-term (2 years)?
    b. In the middle-term (5 years)?
    c. In the long-term (10 years)?
    d. Do you have any data that relates to your assumptions?

3. How do you think will the freight forwarder industry change after implementing e-freight?
    a. Time
    b. Security
    c. Sustainability
    d. Visibility

4. Were there any physical changes in the offices (export/import/customs) required while/during implementing 3-freight?
    4.1 What kind of changes are you referring to?
    4.2 How did the physical offices change?
    4.3 How did the organization's structure change?