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Jönköping, May 2013

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Angelopoulos Panagiotis

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Leivo Piia

# 1 Introduction

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*In this chapter the general background is given, as well as the problem definition and the purpose of this master thesis. Thereafter, the research questions are raised. Finally, the structure of the thesis is presented.*

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## 1.1 Air freight industry

The air freight sector has already been a growing market worldwide for many years. The total volume has tripled from 5.1 million tons in 1986 to 17.9 million tons in 2000. The development can be explained by economic globalization and the associated growth of worldwide production and supply networks. New production has required more flexible deliveries of smaller quantities of goods and there has also been an increase in the air transport of valuable goods, which must be delivered quickly (Neiberger, 2008). The international air cargo industry has encountered several headwinds during the last years, such as the Eurozone fiscal crisis, which has put pressure on demand for export from Asia. Shippers have started putting more emphasis on cost-cutting and the more traditional airborne products have shifted to other modes of transportation (The journal of commerce, 2013). However, by 2030 it is forecasted that 13.5 trillion passenger kilometres will be flown annually, which is three times the level in 2013. The number of aircraft movements is forecasted to double in the same period and reach 49 million per year (Airline international, 2013). The passenger flights have an important role also in air freight industry, because *“typical passenger flights allocate half of their cargo holds to cargo...more than a third of cargo volume that entered the U.S. in 2010 came in to passenger jets”* (Graebel, 2012, p. 2) Over the past decade, air cargo has presented an annual growth rate of 5.24 per cent. North America, Europe and Asia-Pacific are the three key areas to the air freight industry by making up 86.1 per cent of the air cargo market share in terms of freight tonnes carried (Graebel, 2012).

The rapid growth of scheduled freight aircraft services in particular has been a remarkable feature of the international airline industry during the past decades (Bowen, 2004). Air freight traffic has grown faster than passenger traffic and the production of goods has become more dependent upon air freight services that link global supply chains together. As already mentioned, the expansion of air freight volume is a result of the rapid growth in world trade which has influenced the volumes upward. Also, the increased use of e-commerce has influenced the expansion of air freight, because the products which are ordered via e-commerce are in small quantities and need to be delivered quickly (IATA, 2012). However, emerging economies have driven demand for bulk items carried by sea, while economic weakness has dampened the demand for high-value consumer goods, such as electronic devices which are transported by air. Nowadays high-value products such as Apple iPhones and iPads keep the air transportation volumes up and in that way, they underpin the industry (The journal of commerce, 2013). Some particular regional economies that produce the aforementioned goods in their area appear to have high demand for air freight transport.

## 1.2 Jönköping area and airport

Jönköping is located in the centre of Southern Sweden and in the centroid of the triangle of Scandinavia's three capitals: Stockholm, Oslo and Copenhagen. Therefore, it is an ideal geographical location for logistics operations. The airport is located only 8 km

away from the E4 highway, which goes North to Stockholm (323 km) and South to Malmö (292 km) and Copenhagen (331 km). In addition, the R40 connects Jönköping's airport with Gothenburg (146 km) and as a consequence with Oslo (392 km) (Jönköping airport, 2013 & Google Maps, 2013). Moreover, a railway network exists and connects Jönköping with the aforementioned cities (Figure 1.1). What is more, according to Log-Point South Sweden (2013), 80% of Sweden's population lives within a range of 400 km from Jönköping. Finally, according to the Swedish magazine Intelligent Logistik (2013), Jönköping region is at the 3rd place for the year 2013 Sweden's best logistics locations after Gothenburg and Linköping/Norrköping.



Figure 1.1: Road and railway network in South Sweden (H. Larsson, personal interview, 2013-02-08).

### 1.3 Problem definition

The cargo transported by air is mostly high-value, low-density items and includes for example computers, electronic equipment and time sensitive documents. Air freight cargo travels mostly in the baggage holds of scheduled passenger flights and only a few major airlines have their own all-freight aircrafts. Furthermore, the fast transit time, that air transport provides, has had an impact on global distribution. The global transit times decreased from 30 days to 1 or 2 days, when companies started to use airplanes as a new means of transport. In general, world's air carriers have focused mostly on passenger services and air cargo has provided only a small percentage of international transport demand but the importance of air transportation has increased nowadays (Langley et al., 2009).

However, demand for air cargo transport began to weaken in early 2011 and the slide continued during the first 8 months of 2012, with the traffic going down 2%. In 2011, air cargo traffic declined about 1% after expanding 18.5% in 2010. In June 2010, jet prices were on the rise, climbing at 42% by December 2011 and it contributed to an air cargo traffic slowdown that was aggravated by the Japan earthquake and flooding in Thailand, which disrupted the manufacture of automobile components and information technology goods (both are key commodity groups for air cargo). Rising fuel prices (the price of jet fuel has tripled over the past 8 years) have also been a main factor in air cargo traffic slowdowns since 2004 and it has diverted air cargo to the road transport and maritime modes, which are less sensitive to fuel costs. Nevertheless world air cargo traffic has been forecasted to double over the next 20 years, compared to 2011 levels, for an average of 5.2% annual growth rate. It is also forecasted that the number of airplanes in the freighter fleet will increase by more than 80% over the next two decades (Boeing, 2012).

Thus, airports must pay more attention to new strategies in order to cope with increasing competition from other modes and air cargo terminals competing for the increased traffic. Airports should provide opportunities for service companies to remain competitive, by making expansion available, providing modern infrastructure or opening the airport to competitors in the area of ground service. Airports are mostly caught between the demand of trans-local and local business networks, which means that only those airports which conform to the requirements of the global market will continue to maintain their importance in the global networks of the logistical service providers (Neiberger, 2008).

#### **1.4 Purpose of study**

The main purpose of this thesis is to reveal the key factors, either positive (drivers) or negative (barriers), which can affect the decision of freight operators to relocate their express services to smaller airports.

#### **1.5 Delimitations**

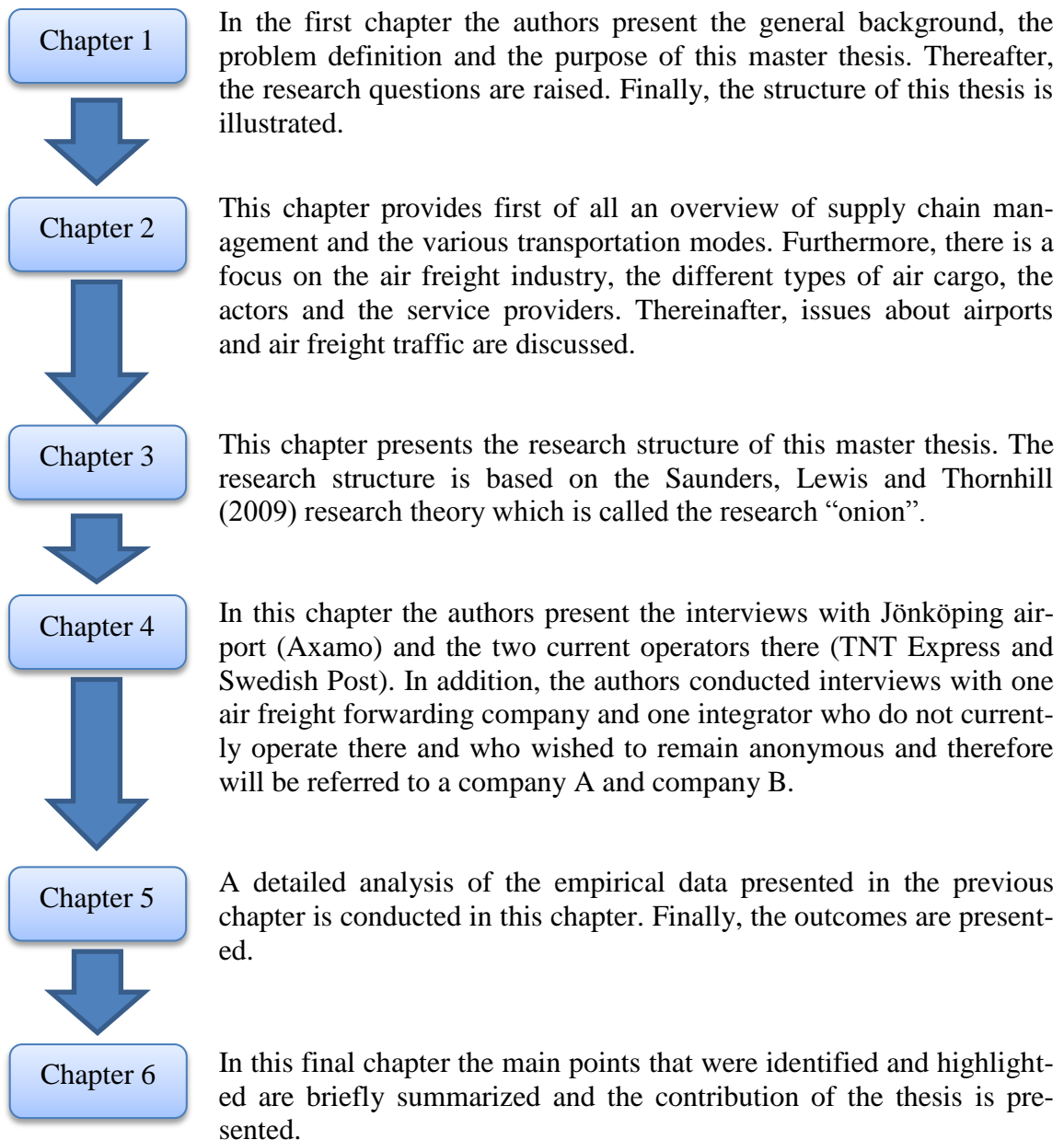
This thesis examines the perspectives of freight operators already performing in Sweden and especially the possibility of relocation from a big airport to a small one. Therefore, it does not intend to investigate the reasons, drivers and barriers, which could lead a freight operator to relocate from one small airport to another one. Additionally, the focus was only set on express services and therefore, there might be a differentiation between these and other services that have not been studied by the authors.

#### **1.6 Research questions**

In the face of the described problem, this master thesis aims to answer the following research questions by using appropriate research methods:

- What are the drivers for freight operators to relocate their express services in smaller airports?
- What are the barriers for freight operators to relocate their express services in smaller airports?

## 1.7 Thesis structure





## 2 Literature review

*This chapter provides first of all an overview of supply chain management and the various transportation modes. Furthermore, there is a focus on the air freight industry, the different types of air cargo, the actors and the service providers. Thereinafter, issues about airports and air freight traffic are discussed. Finally, a summary of the whole literature review is given.*

### 2.1 Supply chain management

“Supply chain management represents the third phase of an evolution that started in the 1960s with the development of the physical distribution concept that focused on the out-bound side of a firm’s logistics system”. (Langley, Cole, Gibson, Novack & Bardi, 2009, p.14). The concept of supply chain is not new and organizations have been moving from physical distribution management to logistics management to supply chain management. Supply chains are therefore mainly about managing three flows: production, information and financial, and these flows must work together. Information is power, and tight internal and external collaborative relationships within the supply chain are the key to success (Ibid). Good relationships and information flow between the different actors increase the integration of the supply chain overall. An example is given in figure 2.1.

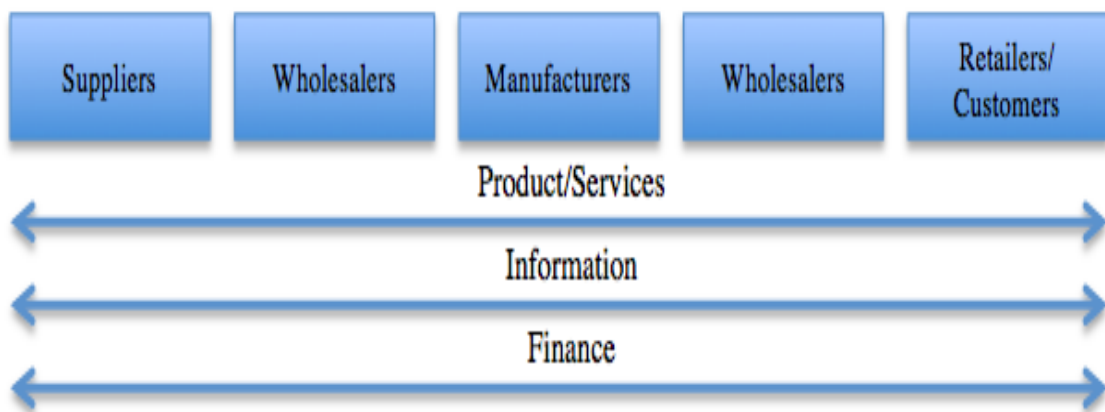


Figure 2.1: An example of integrated supply chain (Langley et al., 2009).

An intergraded supply chain must include good relationships between shippers and service providers with the various transportation modes.

### 2.2 Transportation modes

It is problematic to decide what the best way to transport goods (freight) is, because the chosen transportation mode affects the cost of a product. Major trade-offs related to the cost of transporting freight, speed of delivery, and flexibility are involved. Information systems have a major role in coordinating activities, such as allocating resources, managing inventory levels, scheduling and order tracking. It is of major importance to find the best solution to transport materials and products from the plant to the final customers. There are six modes of freight transportation (Figure 2.2): road (highway), water, air (air cargo), rail, pipelines and hand delivery (Jacobs, 2011).

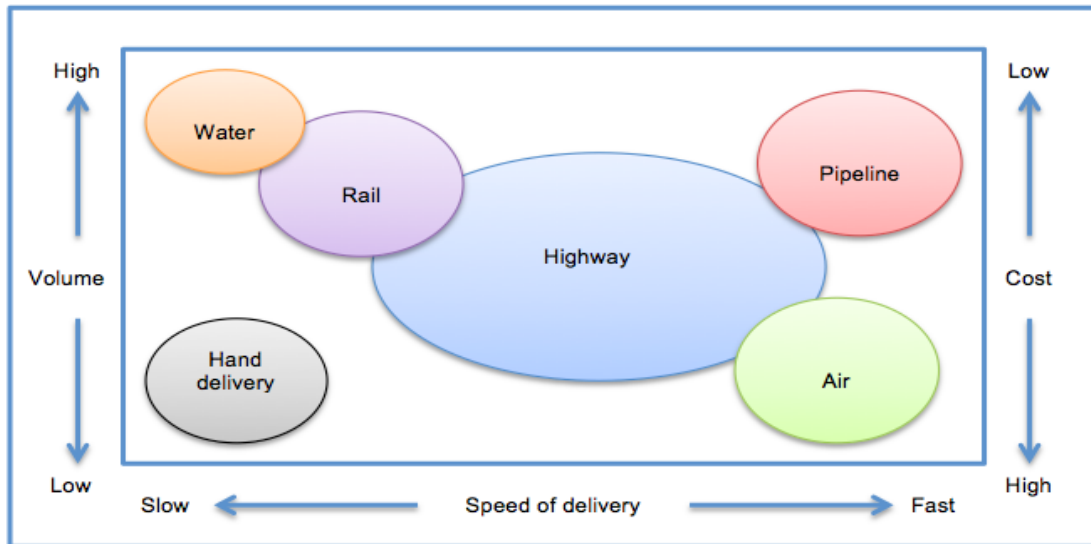


Figure 2.2: Transportation processes (Jacobs, 2011, p.435)

The four main modes for freight transport (pipelines and hand delivery extend the objectives of this thesis) will be discussed in the next sections with emphasis on air transportation.

### 2.2.1 Road transportation

Companies often use road transportation when shipping goods, especially in Europe, where transport distances are relatively short. Motor carriers are mostly a part of every logistics company's supply chain and almost every logistics operation utilizes the motor truck. The main goods transported by motor carriers are general commodities, household goods, heavy machinery, liquid petroleum products and building materials. The major advantage of this transportation mode is its inherent ability to provide service to any location. The shipments go directly from the shipper to the final destination, bypassing any terminal area and consolidation time. That is why motor transportation provides lower transit time than rail and water, but still higher than air transportation (Langley et al., 2009).

### 2.2.2 Rail transportation

Rail as a transportation mode is capable of transporting all commodities tendered for transportation. Railroads are suitable for long-distance and large-volume movers such as heavy or bulky shipments. The main advantages using rail transportation is the long-distance movement in large quantities at low price rate. Forests, mines and agriculture products are the main product categories, which are transported by using railroads. The main disadvantage of rail transportation is long transportation time, which can be covered from clients' point of view with high level of security (Langley et al., 2009). Rail service is relatively slow and inflexible, but less expensive compared to air or motor carriers (Wisner, Leong & Tan, 2005).

### 2.2.3 Water transportation

Transport by ship is the most pervasive and important shipment method globally and it accounts per two-thirds of all international movements. The main advantages of maritime transportation are low rates and the ability to transport a wide variety of products

and shipment sizes. Large cargo ships are used for ocean freight and can hold from a few thousand up to around 12000 containers (Webster, 2008). There are also disadvantages, such as long transit times because of slow speed, low accessibility, and higher potential for shipment damage. Sea transportation can be divided into three main categories, which are liner service (scheduled service on regular routes), charter vessel and private carriers (Langley et al., 2009).

#### **2.2.4 Air transportation**

Air transportation is useful especially for materials with a low weight to value ratio and especially if the goods must be delivered quickly. This type of goods, are high value goods, e.g. electronic components, which are light but expensive (Bozarth & Handfield, 2013). Air transportation is still the least used transportation mode, but it is growing all the time. It is usually used in large domestic markets, such as Canada and the USA and for intercontinental transportations (Brewer, Button & Hensher, 2001). Air transportation plays an important role in just-in-time (JIT) production systems and most of the companies use air cargo to fine-tune intermediate input flows and to ship goods within high-value to weight ratios (Dicken, 2011).

*“The air freight business is inherently competitive, because of the large number of direct and indirect routing that can be used to move a consignment, together with the ability in many cases of choosing between different means of movement; for example in the belly of passenger planes or of freight”* (Kim & Park, 2012, p. 12). Air transportation allows for more flexible hub-and-spoke networking structures, which are able to offset some of the problems of indirect flows. However, air transportation has also disadvantages, which affect the firms’ way to adopt the most suitable transportation mode. According to Langley et al. (2009, p. 99): *“A disadvantage of air carriage is high rates, which have precluded many shippers from transporting international shipments by air... Only high valuable, highly perishable, or urgently needed commodities can bear the higher cost of air freight”*. Global warming has also proved to have negative impact on air transport and especially the airports which are located in coastal areas, face problems because of uncertain weather conditions (Black, 2010).

*“When carriers in any mode reduce transit times from four days to three, it typically does not affect shippers’ modal choices...But when three days become two and two days become one, some erosion from air to ground occurs”* (Schulz, 2006, p. 18). Air transportation is all about speed. Goods can be delivered faster over longer distances than with any other transport mode (Karp, 2012). Approximately 35 per cent of internationally traded goods are transported by air, mostly because of fast transportation time, reliability and security. Despite the fact that air transportation is indisputably expensive, it is still sometimes a better option than for example sea transportation, which is slow and can cause long delays (the time spent in transporting goods can be delayed for example upward of six weeks by port congestion) (Graebel, 2012). The selection criteria of transportation are mostly dependent on the industry sector. Service price, speed, reliability, accuracy, scheduling, convenience and safety are typically the most important factors when companies are making their transportation decisions. High price per kilogram ratio of products and the short life cycles cause high price erosion and support the selection of transport based on speed. Especially in local industries (e.g. the construction industry) the price of logistics services is a more important selection criterion than for example in electronics or pharmaceutical industries. Electronics industry is a good exam-

ple the need for air transportation. In this case, speed, quality and safety are more important than cost (Punakivi & Hinkka, 2006).

## **2.3 Different types of air cargo and express delivery**

There are two main air cargo types: express cargo and general “heavy lift” cargo (for example, over size paper machine parts) (Heavy cargo news, 2012). The integrators have expanded their presence during the past 15 years by moving into high value-adding, express, door-to-door services. They have moved to a new level of service standards via extensive use of information technology and comprehensive global network (Zhang, Lang, Hui & Leung, 2007).

The term “express delivery” can be described as the rapid delivery of goods and documents using fast modes of transport. This concept varies from country to country and from one operator to another. It is a door-to-door delivery operation from the point of collection to the point of delivery. It is usually the fastest possible type of delivery and it can be identified at any point of the delivery chain by using identification systems. Express delivery is also considered as a collective term comprising three concepts: courier service, express delivery services and parcel delivery services. The more general concept of express delivery is also called “CEP service” and it is the abbreviation of these three main forms of express delivery (Brewer et al., 2001).

### **2.3.1 Courier service**

This type of express service is designed for goods (documents, small samples, patterns or important spare parts up to 5kg in weight), which are accompanied personally during all stages of transportation from sender to the final destination, without re-routing. These services are the fastest possible type of express delivery and also the most expensive way to carry goods (Brewer et al., 2001). Courier services are mainly found in inner-city areas and use cars, motorcycles or bicycles. The services play a minor role in international deliveries, mainly due to high transportation costs. The most important feature of the courier service is the personal accompaniment of the transported goods. (Gile & Oyden-Grable, 2010).

### **2.3.2 Express delivery services**

Express delivery service carries goods from the sender to the final destination by grouping together large numbers of units and distributing them internally with a flexible transportation program and with guaranteed delivery time (same day delivery, next day delivery within 24h). It is also possible in this type of service to negotiate the specific delivery time and that is why the main feature is the guaranteed delivery time. Specific forms of express delivery services are the express freight systems, which specialize in the express delivery of large amount of goods for industry. Long-term contracts exist and deliveries are undertaken for a few main clients. Express services are often tailored for specific industries (e.g. pharmaceutical sector) or are the result of the outsourcing of transportation from industry to logistics service providers (Brewer et al., 2001).

### **2.3.3 Parcel delivery services**

These services primarily convey parcels and documents in accordance with a fixed, defined transportation program, using logistical networks with fixed running times for the specific goods. Parcel services are the most standardized and automated of the express

delivery services, with fast delivery times and low price. The transported goods have to be standardized to allow automated transportation and re-routing in order to meet the requirements of the standardized transportation program of a parcel service. Parcels have to fit in to specific requirements (maximum weight and length). The requirements differ between companies and countries. Automated transportation programs allow delivery times, which are close to the express delivery services or even meet them, but exclude guaranteed times and agreements on specific delivery time. No guarantees are given, but the transportation process with fixed running times allows fairly reliable expected delivery times for parcels to a given destination (Ibid).

## **2.4 The actors in the air freight industry**

Air freight mainly operates in a forwarder-airline-forwarder format, in which airlines provide airport-to-airport transportation and forwarders handle the rest of the transport logistics. The sales agents of the airlines (freight forwarders) have evolved to become third-party operators who conclude contracts with the shippers and manage their cargo shipments (Zhang et al., 2007).

In the beginning of 1990, the air freight industry consisted of agents whose roles were to provide point-to-point transportation, customs clearance and storage services and their main assets were aircraft, trucking vehicles and warehouses. At that time the three main players of the industry were (i) traditional airlines which carried passengers and cargo (in the belly hold of passenger aircraft) and were known as combination carriers; (ii) dedicated cargo airlines: which carry only cargo using dedicated freight aircraft and (iii) freight forwarders. There was lack of process focus by independent forwarders and airlines, owing to the fact, that traditional industry was influenced by the passenger industry. Only very few agents possessed the global network as well as the information technology necessary for the provision of integrated services. The forwarder-airline alliances started to focus more on end users and they improved competitiveness by providing the fully integrated door-to-door services. Later on, the Internet changed the industry in very dramatic ways by giving rise to e-commerce, which enabled business to sell their products worldwide. Small shipments are conducive to the use of air transportation, even though charges are higher, since it allows for speedy and more frequent delivery. The practice of supply chain management has also changed with the Internet, which means that integrated logistics activities and alliances with suppliers and customers have resulted in new markets. Nowadays many companies outsource their transportation and logistics to agents, who have become partners in managing companies' supply chains (Ibid).

Nowadays, the three main strategic groups in the air freight industry are integrators, forwarders and airlines.

Integrators are firms that synthesize the air and ground transport functions (traditionally carried out by separate firms) to provide door-to-door services. These types of firms have enjoyed very robust growth by leveraging for example real-time shipment tracking and product development (Bowen, 2004). Integrators specialize mostly in letter and small parcel shipments and their main operations are door-to-door pickup and delivery services. The integrated air-cargo carriers are not as dependent upon location and it is much easier for them to relocate to another airport if it makes operational and economic sense (Federal Aviation Administration, 1991).

The main duty of forwarders is to consolidate small shipments, which they present to the air carrier for movement to the destination. The main competitors of air freight forwarders are the air carriers, who go directly to the shipper and eliminate the forwarders. Air express carriers, such as UPS Air, Federal Express and DHL compete directly with the forwarders (Langley et al., 2009). The shippers, forwarders, brokers, consolidators and individual airlines are dependent on each other to put cargo shipments together at competitive rates, times and routes. No element can be moved to another airport facility without the other elements. This dependence on location applies also to the scheduled passenger airlines, because all the cargo that moves as belly or combi cargo must travel from one passenger hub airport to another until it reaches its final destination (Federal Aviation Administration, 1991).

Approximately 60% of air freight is carried in the belly-holds of passenger planes. Passenger flights are scheduled for the convenience of passengers, but for shippers, services departing in the late evening and night-time are more compatible with daily production schedules (Bowen, 2004).

## **2.5 Air freight service providers and freight forwarding services**

*“Air freight forwarders are third-party brokers/operators who coordinate and manage cargo shipments. Operating in a forwarder-airline-forwarder format, they provide ground transport logistics for enterprises using in-house resources, partners and sub-contracting agents.”* (Yang, Hui, Leung & Chen, 2010, p. 1365). Air freight forwarders can be divided into three main categories: line-haul operators, integrated / courier / express operators and niche operators.

Line-haul operators move cargo from airport to airport, and rely on freight forwarders to deal directly with customers. These operators can be divided into three categories: All cargo operators (they only move freight in dedicated freighter or cargo aircraft and cargo operators have the capability to move large volumes over long distances); Combination of passenger and cargo operations (they use dedicated cargo aircraft and also the belly holds in passenger aircraft to move freight); Passenger operators (they use the belly holds in passenger aircraft and are seen to offer the lowest prices and the least reliable service).

On the other hand, integrated/courier/express operators move consignments from door-to-door with time-definite delivery services. These integrated carriers operate multi-modal networks and combine air services with extensive surface transport in order to meet customer demand. A variety of products is offered to shippers that supplement air services with ground transport to provide time-definite delivery with continuous shipment tracking. In order to be able to offer door-to-door next day deliveries, the integrators require night-time operations. In the beginning the carriers offered services in the small parcel/document sector, but now they also offer a broad range of services in terms of maximum weight and dimension restrictions (Brewer et al., 2001).

The line-haul combination carriers mainly focus their cargo operations on international gateway airports, allowing consolidation or break out loads to be transferred between long-haul and short-haul services. On the other hand, the integrated carriers focus their operations at cargo hubs that do not have very high volumes of passenger traffic (Ibid).

Niche operators leverage or operate specialized equipment, in order to fill extraordinary requirements for air cargo. These operators mainly attract business through their capabilities for handling special consignments, including line-haul to locations with poor infrastructure facilities. Furthermore, time is one of the most important factors in air-freight services. Passengers prefer typically daytime, non-stop flights, but from the shipper's point of view the most important operational time is night-time carriage of goods, with early morning delivery (Ibid).

There are four main groups of actors in the air-cargo industry: airlines, customers, air-cargo terminals and freight forwarders (Wan, Cheung, Liu & Tong, 1998). Air freight services can be sold in many different ways and freight forwarders play a very important role in this area by serving as the middleman for the information flow among airlines, air-cargo terminal and customers. In the case of cargo the rates are determined on the basis of a number of characteristics and circumstances, including the following aspects: volume, density, weight, commodity type, routing, season, and regularity of shipments, imports or exports and priority or speed of delivery. The freight forwarders have a variety of services and expertise and they offer to shippers a wide range of logistical and transport options. These services usually include collection and delivery of shipments door-to-door, completing paperwork and documentation for customs purposes, customs clearance, tracking of shipments and inventory management and control. The forwarders act as a wholesaler and they make their profit by maximizing the difference between what they pay to airlines and other carriers and what they get from shippers. The integrated operators offer a variety of products or services depending on the weight of the consignment and the speed of delivery required by the customer (Brewer et al., 2001).

## **2.6 Air freight traffic**

In this section the air cargo traffic in Europe and Scandinavia along with the future trends will be presented.

### **2.6.1 Traffic in Europe**

Approximately 72% of all cargo moving into, within, and out of Europe passes through one or more of the northern European countries, such as Germany, France, the United Kingdom, the Netherlands, Belgium and Luxembourg. The geography of air cargo markets within Europe has limited routes and relatively short hauls, which are typically between 900 and 1200 kilometres. The air cargo market in the intra-Europe region has grown 11.2% in 2010, after falling 9.1% in 2009 and the market grew only 0.1% in 2011. Between 1990 and 2000 the market has grown approximately 6% per year after express carriers built air networks and expanded service offerings. Air cargo within Europe can be divided into three main categories: scheduled, mail and express freight. The amount of express services has grown nearly 13% per year, when at the same time the amount of scheduled freight and mail services have been stable. Nowadays integrated express carriers transport almost 54% of all intra-Europe air cargo, reflecting the declining market share of scheduled freight and mail over the past two decades (Boeing, 2012).

The Schengen treaty in 1990 removed customs inspection on goods moving between several countries in northern Europe and later on within most of the EU. It also facilitated intra-Europe truck transport and reduced the need for expedited scheduled air freight

service. Trucking has become the most used mode of transport for freight and mail, even for small-parcel express shipments in short-haul markets. The shift to ground transport has affected overall intra-Europe air traffic, which has grown only 0.6% between 2006 and 2011. Generally, intra-Europe express shipments have grown about 3.8% per year, from 342.100 shipments per day (in 2001) to about 495.500 shipments per day (in 2011) (Ibid).

## 2.6.2 Traffic in Scandinavia

Copenhagen airport is the largest airport in Scandinavia and in North Europe. The airport is in an important position, because it has connections to the rest of Denmark, Malmö and southern Sweden by train and motorway. Copenhagen airport offers direct flights to approximately 132 destinations around the world and it also serves as an air cargo hub for the Nordic countries, the Baltic region as well as the northern European mainland. The airport is located centrally (Figure 2.4) in Scandinavia and it has fast connections to anywhere in Europe. In 2005, 335 000 tons of cargo were handled with direct flights to 31 cargo destinations and in the same year the airport was the tenth largest cargo airport in Europe. The growth in cargo to and from Copenhagen is increasing all the time and it is also driven by the strong import growth from Asia (Scandinavian logistics, 2005). However, Sweden holds the leader position in the Scandinavian air cargo market with some 400 000 tons in annual air cargo tonnage. Sweden has strong export industry and about 50% of Sweden's GDP (gross domestic products) is linked to export, which is twice the global average. Sweden's good location in central Scandinavia has brought opportunities for the country to develop its air cargo activities. The three main airports, which can have extensive air cargo operations, and heavy cargo air services are Stockholm Arlanda airport, Gothenburg Landvetter airport and Malmö airport (Swedavia, 2013).



Figure 2.3: Air transport times within Europe (Scandinavian logistics, 2005)



### **2.6.3 The future**

In the future, socio-economic growth, national and international trade and the airport demand will continue. New markets, such as Asian countries, will grow and spread their global influence. It is seen that some crises and wars will temporarily affect the growth of air transport demand. Moreover, the impact of air transport from the environment point of view, with eco-taxes for air travellers, will slow down the growth of the generally price-sensitive air transport demand. Many airports, especially the large ones, will face the requirement to include fully integrated systems consisting of different transport modes providing door-to-door services for the final customers (Janic, 2008).

The future of intra-European air cargo market is forecasted to expand at an average annual rate of 2.4% per year until 2031. Economic and industrial activity will remain the primary drivers for traffic growth in the air cargo market. Inflexible labour markets, expensive pension systems and slow economic reforms will set barriers for economic growth, especially in the countries of northern Europe, which will slow down the air cargo growth. The positive fact is that growing distances between eastern and southern markets will make trucking times longer, which will have positive impacts on global air cargo' traffic (Boeing, 2012).

International air cargo will grow over the next 20 years about 5.2% per year. Air freight, including express traffic will grow on average 5.3% until 2031. Asia will be the world air cargo industry leader in average annual growth rates, with domestic China and intra-Asia markets expanding 8.0% and 6.9% per year (Ibid).

## **2.7 Airports**

Competition for freight business worldwide has grown. Airports play an important role by providing the air transport infrastructure and services for their main users which are airlines, passengers and freight shippers. Airports are mostly dependent on their main users and along with the airline industry and individual airlines have been influenced by global, local, regional, economic and political developments. Generally, airports hosting airlines operate point-to-point networks and they have continued to operate their single or multiple runways and transport configuration of passenger terminals. These terminals have been modularly expanded to accommodate growing demand, usually concentrated in a few daily peak periods (Janic, 2008). Moreover, Hall (2002) found that passengers and cargo are interdependent in international travel. Thereinafter, the issues of the size of the airports, the hub and spoke system, the location and relocation will be discussed.

### **2.7.1 Different size of airports**

The difference between small and big airports is usually measured by using the number of passengers and the length of runway. In US small airports have passengers less than 10 million per year; in Europe less than 1 million per year. Airports also vary in size, with smaller airports often having a runway shorter than 1000 m. In big and international airports the length of the runway is usually 2000 m or longer (Tourist review, 2007). Airports can also be defined as an important, basic infrastructure to a society in which aviation is one of the drivers of modern economy (Adler, Liebert & Yazhensky, 2013). The management of small airports is usually driven by political and social objectives, which may affect the efficiency of their operations. For example, extended opening hours to serve ambulance flight or subsidized departures may be justified for the sake of regional welfare. Small airports are quite often under pressure to keep expenses down

and establish their contribution to the community (Merkert, Odeck, Brathem & Pagliar, 2012).

The demand for air transport has increased in the recent years and, it has affected airports' need to accommodate peak-time traffic. Gardinet et al. (2005) cited that it is likely to be an imbalance of transported volumes between the connected destinations and it can be solved by operating triangular routes. In small airports, the gap between hourly volume and design peak hourly traffic has little economic effect, but in larger airports the impact is greater. The growing numbers of large airplanes have led to increase of large airports, which outperform small airports on both technical efficiency and technological gap measures. The recent European economic crisis started a discussion about the cost and benefits of maintaining small airports. The fact is that small airports play an important role for connecting remote communities (Lee, Kim and Choi, 2012). Almost 2/3 of all airports in Europe are characterized by annual traffic volumes of less than 1 million, which means that these airports' size is small. These small airports, which are located a bit far away from hub airports, may have substantial economic impacts. This means that their place in an existing network really matters. In order to understand the economic impacts of small airports, it is important to locate them in the context of their national and continental network. The countries that are most affected by the loss of small and very small airports are Finland, Norway, Sweden, Denmark, France and Spain. These countries are experiencing a large fall in accessibility because of the relatively small proportion of population (Redondi, Malighetti & Paleari, 2013).

### 2.7.2 Hub and spoke

*“In a hub-and-spoke network (Figure 2.3), an airline concentrates most of its operations in one airport, called the hub. All other cities in the network (the spokes) are connected to the hub by non-stop flights such that travellers between two spoke cities must take a connecting flight to the hub”* (Aguirregabiria & Ho, 2010, p. 377). The physical distribution network comprises of two key links, which are spokes and hubs. In the network, “vehicle links” are trucks, trains or aircraft that directly connect physically a pair of facilities (Lin, 2010).

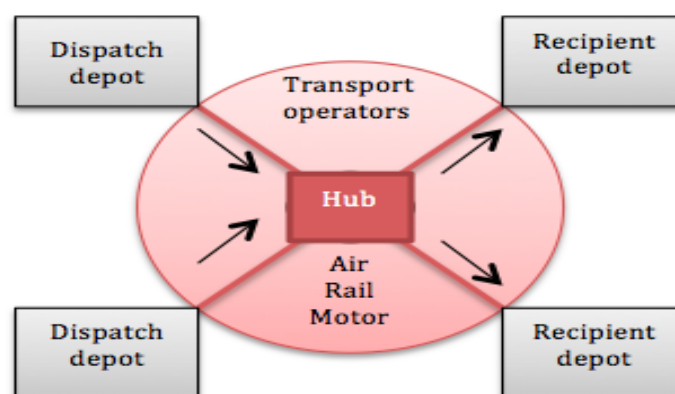


Figure 2.4: Hub-and-spoke network (Brewer, Button & Hensher, 2001, p. 460)

### **2.7.3 Location**

The concept of developing regional air-cargo centres can be seen from many different perspectives. Indeed, integrated, small-package, express carriers choose less congested airports, away from major metropolitan areas, as their primary and regional hubs. The main reason for this separation is that all cargo aircraft require take-off, landing and runway time that could be used by passenger aircraft. Cargo operations use valuable ramp space and potential passenger terminal space for warehousing and cargo-handling facilities (Federal Aviation Administration, 1991). In addition, according to Buyck (2002), secondary airports are preferred by carriers and integrators because of congestion and not vacant slot at international hubs. Regional air-cargo centres must be built far enough from the major metropolitan airports to avoid interferences and delays of aircraft on approach to, or departure from, these airports. The best location for the airport could also be quite close to the metropolitan area with good access to highway systems in order to support the overnight and one or two-day delivery requirements of air freight. It would enable the centre to serve its customers through a hub-and-spoke network of feeder airlines and road feeder services (Federal Aviation Administration, 1991).

Airports without regular cargo traffic (because of seasonal variations in demand) may be chosen as a hub. In addition, Buyck (2002) stated that 24/7 schedules and lack of noise restrictions are significant characteristics in order to attract freighter operators. Moreover, Berechman and De Wit (1996) found that charges of the airport affect the airport selection of the airlines as well as of the freight operators. Airports designated as hub should have enough runway to receive large cargo aircraft with high traffic densities (Matisziw & Grubestic, 2010). The selection of aircraft type and fleet planning are also important factors to consider when making decisions which are linked to expensive investments (Oktal & Ozger, 2013). Different sizes of cities can be favourable location for the air cargo hub. High competence levels around larger cities usually make companies build their hubs in these areas, but also small cities can benefit from the strong growth potential of air cargo and from the competition it causes (Menou, Benallou, Lahdelma & Salminen, 2010). Furthermore, it is vital for an integrator's hub operation to exist a good connection between the airport and the road network (Gardiner, Humphreys & Ison, 2005a). But connectivity to existing rail transport networks and current or potential freight traffic volumes are also important factors in airport location selection. All these factors are important, because the cargo airport must be served well by the road networks. From an operational perspective, this is relevant when considering costs such as driving distance between highways and airports (Matisziw & Grubestic, 2010).

### **2.7.4 Relocation**

The correct location is important for firms in order to develop their own resources, consolidate their competitive position and ensure their growth. Once the company has located it is hard to relocate, and this is why the location decision has to be made carefully. Firms should have a good knowledge of where they will buy from and sell to, and to what extent they will deal with each of their customers and suppliers. Even though firms need to make location decision by using this information, this knowledge is not always perfect (Min & Melachrinoudis, 1999). Economic situations are changing all the time, which can affect to firms' relocation decisions. There are two main types of relocation: complete relocation (the movement of an entire unit from one location to another) and

partial relocation (a new local unit, linked with a pre-existing unit which is not eliminated). The main force for firms' relocation is expansion, the need for more suitable premise and cost saving (Rasmussen, Jenssen & Servais, 2001). Infrastructure is also very important factor when making relocation decisions and the access to motorway has been found out to be the most important infrastructure criterion. Most of the companies believe that being closer to the customer is more important than being closer to the suppliers (Min & Melachrinoudis, 1999).

Gardinet et al. (2005a) found through their research that in the past years 43% of the freighter operators have relocated a cargo service from one airport to another but in the same region. Demand from key customers was identified as the main reason for locating their service somewhere else. In addition, when the freight operator has to decide to relocate, the major feature that affects his decision is the quality of facilities and the second is the lower charges at another airport. Finally, the choice of airport can also be influenced by certain environmental limitations (sound, night regulation etc.) that are becoming stricter and stricter (Gardinet et al., 2005b).

## **2.8 Drivers and barriers**

Increased responsiveness to customer needs drive organisations to invest in time-based approaches to perform enhancement. The most important elements of customer service are products delivery time, and the time which is needed to deal with customer queries, estimates and complaints. High level of responsiveness strengthens customer loyalty. Logistics play an important role in companies' supply chain, because logistics networks have consequences for inventory, handling and transportation policies. Inventories can be advantageous in terms of inventory-holding costs and levels that are especially relevant for high-value products. Handling and transportation are coping with differences in infrastructure, while needing to realise delivery within the time-to-market (Harrison & Van Hoek, 2011). Important part of the supply chain operation is its geographical position, location. The decision of company's location has to be made carefully, because it usually has an effect on the costs of an operation as well as on its ability to serve the customers. Wrong location can have a significant impact on company's profit as the costs of moving an operation from one site to another can be very expensive and the risk of inconveniencing customers very high (Slack, Brandon-Jones, Johnston & Betts, 2012) Moreover, Zhang (2003) found that some of the reasons that a cargo operator will choose an airport are lower fees, fast deliveries and proximity to haulers (shippers). Hence, the level up to which an airport performs regarding these three, defines if it can be considered for relocation or not.

A strong growth in worldwide air traffic substantiate that the interest to air transportation has also increased from the companies' point of view. As a result, some important airports (for example London Heathrow, Frankfurt, Paris Charles de Gaulle and New York La Guardia) have faced capacity problems that have affected airlines planning and scheduling. There are many airports with traffic volumes that reach capacity only at certain peak times, but there are also airports with high traffic loadings and huge capacity problems (Gelhausen, Berster & Wilken, 2013). In addition, Conway (2002) cited that there is a restriction in aircraft types which can operate during the night in big airports, such as Brussels airport. However, according to Gardiner et al. (2005b), the availability of flying any time during the day or night is highly important in order to select an airport. Moreover, busy airports face also flight delays, which are usually connected to

bad weather or technical problems with the aircrafts. Delays at the airport cause obviously delays in the published schedules, which add an unpredictable element to the time at which any given flight wish to use the runway. For cargo operators weather conditions can have a significant impact on the preference of one airport instead of another because complying with time schedule is crucial for cargos. Indeed, if an airport is more probable to face problems in operating, especially during night hours, then there is a high risk that it will not be chosen. (Gardiner, Humphreys & Ison, 2005b). Furthermore, airports which operate close to their runway capacity are likely to impose additional delays on flights, but those with spare runway capacity are more capable to accommodate delayed aircraft without disrupting other flights. However, on average 42% of the delays occurs in the pre-flight preparing phases and 58% because of delays due to weather conditions or airport congestion (Graham, 2010).

Most of the transportation rates are almost linear with distance, but not with volume (Simchi-Levi, Kaminsky & Simchi-Levi, 2008). This fact describes the reason why air transportation has not been a very common transportation mode in the past. However, companies have started to pay more attention to their customers' needs, especially in terms of quick and safe transportation.

## 2.9 Summary of literature review

Table 2.1 was made from the authors in order to provide an overview of the literature review to the reader.

Table 2.1: Literature review summary

Supply chain management	<ul style="list-style-type: none"> <li>• Supply chains are about managing three flows: production, information and financial</li> <li>• Information is power, and tight internal and external collaborative relationships within the supply chain are the key to success</li> <li>• Good relationships and information flow between the different actors increases the integration of the supply chain overall</li> </ul>
Transportation modes	<ul style="list-style-type: none"> <li>• The six modes of freight or cargo transportation: highway (motor carriers), sea transportation, air (air cargo), rail (rail transportation), pipelines and hand delivery</li> </ul>
Different types of air cargo	<ul style="list-style-type: none"> <li>• Two main air cargo types: express cargo and general “heavy lift” cargo</li> <li>• Express delivery is considered as a collective term comprising three concepts: courier service, express delivery services and parcel delivery services.</li> </ul>
The actors in the air freight industry	<ul style="list-style-type: none"> <li>• There are three main strategic groups in the air freight industry: integrators, forwarders and airlines.</li> <li>• Air freight mainly operates in a forwarder-airline-forwarder format, in which airlines provide airport-to-airport transportation and forwarders handle the rest of the transport logistics.</li> <li>• Strategic groups in the air freight industry: integrators, forwarders and airlines</li> </ul>

Air freight service providers	<ul style="list-style-type: none"> <li>• Three main categories of the operators: line-haul operators, integrated/courier/express operators and niche operators</li> <li>• Line-haul operators move cargo from airport to airport, and rely on freight forwarders to deal directly with customers</li> <li>• Integrated/courier/express operators move consignments from door-to-door with time-definite delivery services</li> <li>• Niche operators leverage or operate specialized equipment, in order to fill extraordinary requirements for air cargo</li> <li>• The freight forwarders have a variety of services and expertise and they offer to shippers a wide range of logistical and transport options</li> </ul>
Air freight traffic	<ul style="list-style-type: none"> <li>• Air cargo within Europe can be divided into three main categories, which are scheduled, mail and express freight</li> <li>• Trucking has become the most used mode of transport for freight and mail, even for small-parcel express shipments in short-haul markets</li> <li>• Copenhagen airport is the largest airport in Scandinavia and in North Europe. It is in an important position, because it has connections to the rest of Denmark and Sweden by train and motorway</li> <li>• The future of the intra-European air cargo market is forecasted to expand at an average annual rate of 2.4% per year through 2031</li> </ul>
Airports	<ul style="list-style-type: none"> <li>• Airports provide the air transport infrastructure and services for their main users which are airlines, passengers and freight shippers</li> <li>• The difference between small and big airports is usually measured by using the number of passengers and the length of runway</li> <li>• Right location is important for firms in order to develop their own resources, consolidate their competitive position and nurture their growth</li> <li>• Two main types of relocation: complete relocation (the movement of an entire unit from one location to another) and partial relocation (a new local unit, linked with a pre-existing unit which is not eliminated)</li> <li>• The main force for firms' relocation is expansion, the need for more suitable premise and cost saving.</li> <li>• Demand from key customers was identified as the main reason for relocation</li> </ul>

Drivers and barriers	<p data-bbox="624 197 724 226"><u>Drivers</u></p> <ul data-bbox="587 235 1326 383" style="list-style-type: none"><li data-bbox="587 235 767 264">• Lower fees</li><li data-bbox="587 273 815 302">• Fast deliveries</li><li data-bbox="587 311 1023 340">• Proximity to haulers (shippers)</li><li data-bbox="587 349 1326 383">• Availability of flying any time during the day or night</li></ul> <p data-bbox="624 427 730 456"><u>Barriers</u></p> <ul data-bbox="587 465 1385 651" style="list-style-type: none"><li data-bbox="587 465 868 495">• Capacity problems</li><li data-bbox="587 504 1385 573">• Restricted aircraft types can operate during the night in big airports</li><li data-bbox="587 582 1027 611">• Busy airports face flight delays</li><li data-bbox="587 620 927 651">• Bad weather conditions</li></ul>
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### 3 Methodology

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*This chapter presents the research structure of this master thesis. The research structure is based on the Saunders, Lewis and Thornhill (2009) research theory which is called the research “onion”. Finally, additional sources were used for supporting the research theory.*

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#### 3.1 Research philosophies

The research “onion” encompasses four main research philosophies: positivism, realism, interpretivism and pragmatism. The implementation of one of these philosophies in accordance with its assumptions illustrates how the researcher sees the world. Moreover, it is these assumptions which finally define the research strategy and the methods of the chosen strategy (Saunders et al., 2009).

According to Saunders et al. (2009):

*Positivism* is being used mostly by natural scientists with law-like generalisations as results.

*Realism* is based on the fact that the reality which is built from the senses of the researcher represents the truth.

*Interpretivism* requires from the researcher to comprehend the dissimilarities between humans under the aspect of social actors. This philosophy is more appropriate for research among people rather than objects.

*Pragmatism*: The most important factor of this philosophy is the research question. If the research question does not focus on positivist or interpretivist philosophy, then in most of the cases pragmatism is going to work well with some changes in epistemology, ontology and axiology.

Interpretivism is the most appropriate philosophy for this master thesis. As the authors will try to investigate and highlight the factors that lead air freight forwarding companies to relocate their express services. This investigation will demand interpretation of multiple values, social constructions and maybe feelings. Furthermore, they will try to comprehend these factors and reasons through real life experience and not through intangible generalities (Mathison, 2005).

#### 3.2 Research approaches and purpose

After having chosen the research philosophy of this master thesis, and following the next step of the research “onion”, the research approach must be chosen. According to Saunders et al. (2009), there are two main research approaches, the deductive and the inductive. The *deductive* approach is when the research tests the theory and the *inductive* approach is when the researcher builds the theory (Ibid).

The research approach of this master thesis tends to be an inductive approach due to the fact that there is little existing literature. In addition, the topic goes from the specific to general and tries to study a particular situation in order to draw conclusions and generalize or produce a theory later. (Saunders et al., 2009) Moreover, as O’ Reilly (2009) suggests, the authors start the research with as few presumptions as possible and let the ‘theory’ be built by the data collection and the findings of the research.



According to Saunders et al. (2009), the purpose of the research can be *exploratory*, *descriptive* or *explanatory*:

*Exploratory* study is going the answer to question “what” and it is being used for an in-depth understanding of a problem. The researcher can perform an exploratory research by searching the literature, interviewing “experts” in the subject and/or having focus group interviews (Ibid).

*Descriptive* study aims to provide a precise profile of persons, events or situations (Robson, 2002). It is important that if the researcher wants to study phenomena, he or she has to have a clear picture of them before the data collection (Saunders et al., 2009).

*Explanatory* study explains the relationships between variables of a situation or a problem by studying them.

The purpose of the current master thesis is going to be exploratory. According to Stebbins (2008) exploratory research is commonly used for qualitative data and the core objective of exploratory research, is the “*production of inductively derived generalizations about the group, process, activity, or situation under study*” (cited in Givens, 2008, p. 327).

### **3.3 Research strategy**

In this part, the main research strategies will be illustrated. According to Saunders et al. (2009), there are seven different research strategies: *experiment*, *survey*, *case study*, *action research*, *grounded theory*, *ethnography* and *archival research*.

According to Saunders et al. (2009):

Experiment strategy, according to Hakim (2000), is more commonly used in natural sciences. The main aim of this strategy is to test if there is any change between one or more independent variables and one dependent variable (cited in Saunders et al., 2009). Moreover, the number of independent variables and the size of the change determine the level of complexity.

Survey strategy is being used more often with the deductive approach. In addition, it can provide answers to the question of “who, what, where, how much and how many”. Moreover, the researcher can collect big amounts of data with no big cost (Saunders et al., 2009).

According to Robson (2002), “*case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence.*” (cited in Saunders et al., 2009, p. 178).

Action research has two main goals. The first one is to accomplish the agenda of the researcher rather than that of the sponsor. And the second one is to start with the needs of the sponsor and then include those of the researcher in the sponsor’s issues, rather than the sponsor in their issues.

Grounded theory has no theoretical framework and theory is being built by the data which were collected from a series of observations.

Ethnography describes and explains the social world in the same way that the research subjects, which live in that social world, would describe and explain it.

Archival research uses as a prime source of data administrative records and documents. These records and documents can be either old or new.

In conclusion, the research strategy that will be followed in this master thesis is the case study. The data collected will mainly be qualitative and the technique will be interviews conducted in each one of the identified transportation companies. According to Williamson (2002) the best strategy to understand a phenomenon in their natural environment is the case study.

### **3.4 Method choices**

According to Saunders et al. (2009), there are three main method choices. The first one is the mono method and it is when only one data collection technique and analogous analysis processes are being used. The second one is the mixed methods and it is when the researcher uses at the same time for the designing of the research not only quantitative but also qualitative data collection techniques and analysis processes. Finally, the third one is the multi-method. According to Tashakkori and Teddlie (2003), multi-method is when more than one data collection technique is being used with appropriate analysis techniques and constrained by either a quantitative or qualitative approach (cited in Saunders et al., 2009).

Thus, the chosen method for this master thesis is the mono method because the data collection technique that will be used is qualitative (interviews) and the analysis processes will be qualitative as well.

### **3.5 Time horizons**

The time length of the research is defining if the study is going to be cross-sectional or longitudinal. In other words, *cross-sectional* study is the study of one phenomenon or phenomena at a specific given time. Thus, it is being used in most research projects for academic purposes which have time limitations. On the other hand, *longitudinal* study is the study of one phenomenon or phenomena over longer periods of time. As a result, the researcher gains the ability to study change and development (Saunders et al., 2009).

The cross-sectional study fits better to the time length of this master thesis due to the fact that the research took place at a particular time. Moreover, the master thesis aims to deliver incidental indication about the effects of time on the findings, as defined by Vogt (2005).

### **3.6 Data collection and analysis**

According to Williamson (2002), there are four different research techniques: *sampling*, *questionnaires*, *interviews* and *focus groups*. More specifically:

*Sampling* concerns the selection of real data sources from a greater set of possibilities. It involves two interconnected components: (a) defining the full set of possible data sources which is generally termed the population, and (b) choosing a particular sample of data sources from that population (Givens, 2008).

*Questionnaires* are used in cases when there is the need for many respondents, when the nature of the data that is sought is known, when the data needed is explicit, and when the respondents are literate persons who can understand the questions and give written answers (Laws, Harper & Marcus, 2003).

*Interviews* are a method of gathering information or opinions by asking a sequence of questions that can be either of pre-defined order (structured), unstructured, or semi-structured. The traditional interview is a personal discussion between the interviewer and the interviewee. However, it can also be done through telephone calls or even via Internet (Jupp, 2006).

*Focus groups* are group interviews of 7-12 people and concern a sort of organized discussion that is designed and planned by the interviewer. The main aim of this method is to investigate people's views in depth and in combination with other opinions. (Stewart, Shamdasani & Rook, 2007).

The authors chose to base their research technique on interviews because interview is an organized method to talk and listen to people with the intention of discovering knowledge and getting comprehension on a certain topic or area (Kvale, 1996). It is used in both quantitative and qualitative research, but it's more useful to qualitative, because it describes experience and it gives an in-depth (Neuman, 2006). Interviews should be preferred when there are clear objectives for the research, when time is limited, when there are many experiences from different people to be studied (Taylor & Bogdan, 1984), when the required data is very personalized or a remarkable return rate is needed (Gray, 2004). Furthermore, the authors conducted semi-structured interviews. The semi-structured interview is a technique that is mostly used in social science, because it gives the opportunity to introduce new questions depending on what the interviewee says. Williamson (2002) states that the interviewer commonly has an agenda of themes but there is freedom to ask other questions as well when he/she considers it essential.

On one hand, we have the collection of new data which are called primary data. On the other hand, the data that have already been collected for other purposes and they are used again for new purposes are called secondary data (Saunders et al., 2009).

### **3.6.1 Primary data**

Primary data is the information that is taken by the researcher with as few intermediaries as possible between him/ her and the data source (Vogt, 2005).

### **3.6.2 Secondary data**

Secondary data can be either qualitative or quantitative data. In addition, these data can be raw data or published summaries. Moreover, the secondary data can be categorized as documentary, multiple sources and survey. The documentary data can be written or non-written materials. The multiple sources can be area based or time-series based. Finally, the survey can be censuses, continuous and regular surveys or ad hoc surveys (Saunders et al., 2009).

Primary data and were used for answering the research questions of this master thesis and meeting our objectives. The authors collected only primary data by conducting in-

interviews due to the fact that there was a lack of secondary data related with the topic of this thesis.

At the beginning of the data collection phase, the authors conducted an informant interview with the marketing director of Jönköping airport in order to have an open discussion about their history, air freight operations and issues related to the topic. Based on that interview, the authors finalized their topic and their research questions and built the three questions lists. The first one is for Jönköping airport (see Appendix II), the second one is for the freight forwarding companies that already operated in Jönköping airport (see Appendix III) and the third one is for the freight forwarding companies that did not operate there (see Appendix IV). The authors decided to have semi-structured interviews with all the interviewees in order to cover the different themes of their research. In addition, the interviews with TNT, freight forwarding company A and freight forwarding company B were face-to-face interviews with the head of the air freight division of each air freight forwarding company. Moreover, one telephone interview was conducted with the representative of Swedish Post. The duration of the interviews varied from 25 to 65 minutes.

### **3.7 Validity and reliability**

Validity represents the level of correspondence between the findings of the research and reality (Saunders et al., 2009). Thus, all the interviews were recorded by the authors and they were transcribed within a short time period in order to ensure that the credibility of the data would not be affected. Finally, the transcribed text of each interview was sent back to each interviewee for final correction and approval.

Reliability represents the degree of the consistent findings that have been elicited from the data collection techniques or analysis procedures (Saunders et al., 2009). The authors tried to achieve more reliable findings and analysis through several ways. Hence, the related literature was profoundly checked and studied so that all existing principles and methods would be considered. Furthermore, the structure and content of the interviews were planned and executed in such a way that vague, ambiguous, leading, or misleading questions that could add bias and influence the consistency of findings were avoided. Overall, the authors made sure that they would have much time to devote for the discussions with each interviewee in order to make them feel convenient, gain their trust, help the discussion flow well and therefore extract more dependable data.

## 4 Empirical findings

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*In this chapter the authors present the interviews with Jönköping airport (Axamo) and the two current operators there (TNT and Swedish Post). In addition, the authors conducted interviews with two freight operators which wished to remain anonymous and therefore will be referred to as company A and company B. The latter two companies are already located in Jönköping and are significant big freight operators in Sweden but they do not use Jönköping airport for their express services.*

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### 4.1 Jönköping Airport

Jönköping airport was built in 1961 and it is owned by Jönköping Municipality (since 2010 when the airport was privatized). The company (Jönköping Airport AB) is working closely with the airlines in order to develop new connections for passengers and cargo traffic. The airport operates various scheduled and charter flights, general and business aviation flights and cargo flights. Four airlines operate daily from Jönköping to Stockholm, Copenhagen and Barcelona. There are also 11 charter destinations from Jönköping airport and the total operating volume is increasing all the time (Jönköping airport, 2013).

TNT Express and Swedish Post are the main cargo partners, which operate from Jönköping airport cargo terminal (see Appendix I). The terminal is an integrated part of the airport and its cargo facilities include a 600 m<sup>2</sup> temperature controlled warehouse and 1500 m<sup>2</sup> storage capacity for overflow and non-sensitive cargo. The terminal provides a wide range of logistics services including handling of pallets and loose deliveries, special cargo, cargo consolidation services, import and export terminal services and the arrangement of distribution (see Appendix I) within Sweden and throughout Scandinavia (Ibid).

However, Jönköping airport authorities have many times come in contact with other international air freight operators in order to offer them a business deal, but none of these discussions had any successful outcome. Until the time that this master thesis is written, these companies do not want to locate any of their operations in Jönköping airport (Axamo) and continue to invest money in their facilities in other airports (H. Larsson, personal interview, 2013-02-08).

#### 4.1.1 Operations, services and customers

Jönköping airport has developed to be one of the main air freight cargo hubs in Sweden mainly because of its geographical location and excellent connectivity. The airport cargo terminal operates 24/7 and it can handle cargo aircraft up to Boeing 767s and Airbus 330s. The runway is 2203 meters long and 45 meters wide (see Appendix I). In addition, Jönköping airport provides hangar facilities.

Jönköping airport has two main customers: passengers and air freight operators. The core services are passenger operations, cargo operations, charter operations, incoming traffic from Germany and LCC (low cost carriers). The airport is more focused on passenger flights and its aim is to develop more in this area. The airport started cooperation with Ryan air by opening a new route from Jönköping to Barcelona. At the beginning TNT Express did not want to locate a part of its express services in Axamo due to the fact that they had already invested 50 MSEK in Gothenburg. But in the end, they were

forced to relocate and start their operations in Jönköping since they signed a contract with a big customer in the area (H. Larsson, personal interview, 2013-02-08).

Moreover, Swedish Post operates also in Axamo but they have reduced their operations since 2012 and they have integrated them with TNT Express's operations in express services (Ibid). Table 4.1 illustrates the total transported volumes of cargo/mail and passengers in the last three years from Jönköping airport (Axamo).

Table 4.1: Cargo/Mail transported tons/year from Jönköping airport (H. Larsson, personal interview, 2013-02-08).

	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>Cargo / Mail</b>	<b>4699 t</b>	<b>5456 t</b>	<b>5313t</b>
<b>Passengers</b>	<b>73 572</b>	<b>82 852</b>	<b>78 209</b>

TNT Express has seen the need for air cargo in Jönköping area and is growing all the time, by adopting new customers in Jönköping area. It is the only company who provides in-night solutions for its customers. The service is the fastest way to operate goods from point A to B. Many customers in Jönköping area have adopted the service even if it is the most expensive way to carry goods. Growing interest of TNT's services has brought new traffic to the airport. The interviewee believes that there are generally enough customers in Jönköping area. The city is on 3rd place in the best logistics location ranking in Sweden after Gothenburg and Linköping/Norrköping.

The main cargo operation times at Jönköping airport are taking place at night. The interviewee pointed out that it would be nice to have cargo operations in the middle of the day, because it would be more environmental friendly. The fact is that most of the forwarding companies' customers are looking for night operation services, in order to prove morning deliveries for their own customers. Jönköping airport has not problems to operate at night time, even almost every big airport has set a rule for night traffic and those airports are usually closed between mid-night and early morning. On the other hand, there is not any legal restriction of this kind for Jönköping airport. But Swedish environmental court sets for each airport a limit of number for landings and take-offs/year, which are measured by using the term "movements". Jönköping airport has a limit of 6800 "movements" per year. The only rule is that landing or taking-off during the day time counts as one "movement" for the airport, but during the night it counts as ten "movements". But even with this rule, Jönköping airport does not use more than 50% of the available amount of "movements".

#### **4.1.2 Location and infrastructure**

The interviewee believes that the most important advantage of Jönköping airport is location. Good location helps freight operators to save time by loading their goods straight from the airplane to trucks and delivering to the final customers. Customers are located close to the airport, so companies do not need to store the goods and as a result, there is no warehousing cost. On the other hand, the location can also be a disadvantage. Jönköping airport cannot be a complete airport, because the runway is not long enough

for really big airplanes to take off with a full load. Another disadvantage is the small number of passenger flights and the airplanes are small in size.

The airport does not face cargo delays almost at all. Approximately only 1% of all cargo flights each year face problems and the main problem is the condition of the runway during winter. If the runway is too slippery, airplanes cannot land and they have to go to the closest airport, which is Gothenburg or Växjö. The airport has not any penalty agreement with the forwarding companies, which means that delays do not cost that much for the airport. The only cost that the forwarding companies have to pay in the case that the airplane cannot land is the airport staff.

#### **4.1.3 Challenges and future opportunities**

There is not any big investment planned in the near future for Jönköping airport. The only planned upgrade is for the terminal, which is too small at the moment, but the interviewee does not see any needs to invest for example to extend the runway. The airport is not willing to make any big investment even if they could get more and bigger customers, because the extension of the runway will take approximately 5 years and will cost a lot of money. In addition, there are not any freight operators, who could be available to make such a long-term agreement. The interviewee also thinks that loading equipment are working well and he does not see any need to build a warehouse, because the main idea of operating at Jönköping airport is to move goods straight from the airplane to trucks and not to store them. Jönköping airport's biggest competitor is Örebro airport, which shared the third place in the ranking with Jönköping this year. Örebro has a very good location close to Stockholm and there are many customers in the area. The airport also has a longer runway compared to Jönköping's airport which gives better advantages for Örebro, because the airport can host bigger airplanes.

The interviewee believes that the future of smaller airports is good only if the air transportation volume will increase. But this will cause problems at bigger airports. If the big airports would be congested, freight operators will have to move their operations to smaller airports. At the moment most of the smaller airports around Europe are trying to operate in cargo sector, but in most of the cases their location is not logistically good, so the airports lose their customers which prefer the bigger airports.

#### **4.1.4 Summary**

This section provides a synopsis of the positive and negative factors which turned out to be the drivers and barriers for relocation:

##### Positives

- Cargo operations are also available in the middle of the day
- Axamo has no problem to operate at night time
- Big airports are usually closed between midnight and early morning
- Jönköping airport does not use more than 50% of the available amount of "movements"
- Customers are close to the airport
- The airport does not face cargo delays almost at all
- Axamo has not any penalty agreements
- The increase of air transported volumes will cause congestion at bigger airports

## Negatives

- Few passenger flights
- Small size airplanes
- There is only one runway
- The runway is 2203 meters long
- The condition of the runway during winter
- The extension of the runway will take approximately 5 years and will cost a lots money

## 4.2 TNT Express

TNT Express operates in the courier, express and parcel market. The company picks up, transports and delivers documents, parcels and freight on a time-certain or day-definite basis. TNT Express's services are mainly classified by speed, distances, weight and sizes of consignments. The majority of shipments are between businesses, but the company also offers B2C (business to customer) services to selected key customers. TNT Express has a worldwide presence and the company offers domestic, regional and intercontinental deliveries in 61 countries and can deliver to more than 200 countries through own operations, subcontractors and agents. Services are delivered through depots, aircraft and vehicles and electronic infrastructures such as track and trace systems. The company operates interconnected international air (a central hub locates in Liège, Belgium) and road networks (operates in Europe, the Middle East, Asia, Australia and South America) (TNT Express Annual Report, 2012).

TNT Express is a market leader in the domestic and intra-European express market with a market share of 17.3%. The company generates more than half of its revenues in Europe (the majority is in international services). The air network in Europe connects 65 airports through a fleet of 45 aircrafts, while the road network connects 40 countries through 20 road hubs. TNT Express operates domestic and international express services within Asia Pacific and between Asia Pacific and Europe. The company's dedicated intercontinental air fleet serves Chongqing, Shanghai, Hong Kong and Singapore. TNT Express operates also in North America providing full service capabilities to the customers to and from Europe via New York. The company has four gateways (New York, Los Angeles, Chicago and Miami) that feed a nationwide parcel distribution network. TNT EXPRESS provides next-day (before 3pm) delivery services to many key metropolitan areas across the United States, by using a combination of its own operations, regional partners and commercial airlines. The company also provides services in Brazil (the network covers 140 locations around the country), in the Middle East (connects seven countries and three hubs as well as air-based services), Africa (own operations in four countries and the rest of the continent is served by using partnerships and agents) and Australia (Ibid).

### 4.2.1 Operations, services and customers

TNT Express provides global express services as fast as possible from 24 hours to 2-3 days. TNT Express's main air hub in Liège, Belgium is the central spot in its global air network. Handling volumes in Scandinavia consist mainly of import, which is much



higher than the amount of export. TNT Express already operates in smaller airports and the company has seen it as an advantage compared to bigger airports. Good example of development of smaller airports is in Turku, Finland, where the company started to operate many years ago because of a big customer. At that time TNT Express operated already from Helsinki, but they found out that a smaller airport closer to the customer could be more profitable for them. TNT Express built a big warehouse at Turku, because volumes were high and the company operated from Helsinki and Turku. Later on the customer's volumes traded off and also other companies faced recession, which had impacts for TNT Express's operations. TNT Express moved permanently from Helsinki airport to Turku and nowadays all air cargo is flying out from this small airport. Goods from Helsinki are transported by trucks to Turku and fly out via Gothenburg (delivery to Gothenburg/Jönköping area) to Liège.

Most of the cargo operates by using belly-holds, but TNT Express also has its own airplanes, which operate mainly in Europe. The company started its air operations with small airplanes and later on continued the business with bigger planes for longer flights, for example from Europe to China. The company buys all the belly-hold operations from commercial airlines, such as British Airways, Air France or KLM. The main goods, which are transported by airplane, consist of documents, spare parts, medical instruments and samples, which have to be delivered quickly. The interviewee believes that the increased Internet shopping has also affected TNT Express's volumes, even though the company delivers only for business customers.

TNT Express has many key customers around Jönköping area and that is why Jönköping airport gives good opportunities for the company to develop services. TNT Express cooperates with Swedish post, Bring (owned by Norwegian post and operates basically around Oslo area and also in Jönköping and Gothenburg) and JetBag (quick deliveries to the North part of Sweden) in Scandinavia. Some of the co-operation companies are at the same time TNT Express's competitors, such as Bring and Swedish post. Other strong express service competitors are United Parcel Service (UPS), DHL and Federal Express. Some of these companies also provide in-night operations, like TNT Express does, but TNT Express's advantage is that the company is the only one who operates from Jönköping. Almost all the competitors operate from Gothenburg or Malmö.

Approximately 300 days per year are good operating days, without any technical problems or other problems, which could cause delays. The company faces delays mostly during the wintertime, when the weather is not good. In smaller airports traffic is not high, so usually delays are only around 15min. Reasons for delays in Jönköping airport are usually connected to the airport facilities or to delays in some other airport, where the airplane is coming from. If trucks are running late to the airport of Liege because of the weather there, it automatically causes problems to flight schedules in Jönköping.

An overview of the TNT Express air freight operation network is given by Appendix V. TNT Express operates at Jönköping airport (Axamo) only a few hours during the night and provides overnight deliveries from Europe to the Scandinavian market. Trucks with cargo from Sweden arrive at the airport. The cargo is sorted and loaded into specific containers which later on will be loaded directly into the airplane's hall. Meanwhile, cargo airplanes from Brussels' airport and Karlsruhe/Baden-Baden's airport arrive in Jönköping around midnight. Their cargo is being unloaded, sorted and distributed. Then, the new cargo is loaded in order to arrive at the final destinations which are the

airport of Oslo (Norway), the airport of Helsinki (Finland) and the Billund Airport (Denmark). The whole process of unloading and sorting the incoming cargo, as well as, the loading of the new cargo lasts less than one and half hour (TNT Express's representative, personal interview, 2013-03-12).

#### **4.2.2 Location and infrastructure**

The main criteria for TNT Express's location choices are the company's customers. Mostly customers and potential customers are the main criteria for TNT Express to locate somewhere. The TNT Express interviewee believes that when the service is built and is running for one customer, the other potential customers will come closer and then the freight forwarding company can develop its operations and provide them for new customers. The company is very satisfied with Jönköping airport, because of its small size and good location, which is not too far away from Scandinavian destinations. The airport's service is better than in big airports and overall the company is treated very well in Jönköping. The airport is always open if TNT Express has to quickly change schedules and the price is suitable. Loading and unloading works quickly and airport's staff is very flexible. The company has not faced any environmental problems, like they did in some other airports and it is also advantage of Jönköping airport. TNT Express has faced only a few disadvantages, which are mainly connected to winter weather. The airport has only one runway and it sometimes causes problems, because it is hard to keep clean and if the airplane cannot land at Jönköping airport because of the runway issue, the pilot has to change the direction and land at the closest airport, which is in Gothenburg. At the beginning, Jönköping airport did not have good loading equipment, which also has seen as a disadvantage, but the problem is solved by renting the airport better equipment.

#### **4.2.3 Challenges and future opportunities**

The interviewee believes that the future looks bright for smaller airports, especially in the express delivery area. There are many opportunities, which are not exploited. TNT Express came to Jönköping because of a big customer, who was previously located in Gothenburg. At that time the company was transporting their goods from United Kingdom to Gothenburg, by using TNT Express's services and the delivery time was set to be in Sweden early in the morning. Thus, later on TNT Express understood that it could use Jönköping airport as a main airport for this specific customer's needs and that way TNT Express could deliver goods to the customer before the working hours. The new route from United Kingdom to Sweden worked well and the customer was satisfied. Later on the company traded off and its production volume decreased, so TNT Express had to find new customers in order to fill the gap.

#### **4.2.4 Summary**

This section provides a synopsis of the positive and negative factors which turned out to be the drivers and barriers for relocation:

##### Positives

- A smaller airport closer to the customer could be more profitable than
- TNT Express has many key customers around Jönköping area
- In smaller airports traffic is not high
- The company is very satisfied with Jönköping airport, because of its small size

and good location, which is not too far away from Scandinavian destinations

- The airport service is better than in big airports
- The airport is always open if TNT Express has to quickly change schedules
- The price is suitable
- Loading and unloading works quickly and airport's staff is very flexible
- Bright future for small airports in the express delivery area

#### Negatives

- The company buys all the belly-hold operations from commercial airlines
- The airport has only one runway
- Weather during winter

### **4.3 Swedish Post**

Swedish post (Posten AB) is a part of PostNord AB, which was founded through the merger of Post Danmark A/S and Posten AB in 2009. The company offers communication and logistics solutions to, from and within the Nordic regions. 40% of the parent company PostNord AB is owned by the Swedish state and the rest (60%) is owned by the Danish state. The group's headquarter is located in Solna, Sweden and over 40.000 employees work for the group. (Swedish post, 2013)

#### **4.3.1 Operations, services and customers**

Mail and express services are the main service types that Swedish post offers to its customers. The company handles mails of approximately 55 tons per day between Monday-Thursday and 12 ton per day on Sundays. The amount of express deliveries is approximately 250 000 parcels per year. Swedish post has its own airplanes, which operate inside the country. But when final destination of the goods is outside Sweden or the volumes are high and there is not enough capacity in their own airplanes, they buy space from commercial airlines (belly holds transportation). Trucks, airplanes and trains are used as a combination of different transportation modes to handle express deliveries (mainly letters) inside and outside of Sweden. Finally, their key customers are mostly banks, companies from the financial sector and e-shops (which operate mostly from United Kingdom and Asia).

#### **4.3.2 Location and infrastructure**

Sorting centres of Swedish post are always located close to the railway network and that is why the main transportation mode is railway. Air operations in Jönköping County take place from 10pm to 2am (figure 4.1). Swedish post takes care of all mail transportation in Sweden but co-operates with other companies (i.e. city-mail, Bring) outside Sweden. Swedish post is satisfied for its location decisions and the most important criterion for location is good access to railway track. The Swedish post uses Jönköping airport as an airmail distribution point, because one of its sorting centres locates in Nässjö (50 km from Jönköping) next to the railway. The interviewee does not see any specific disadvantages in Jönköping airport. The only problem is the high possibility of spring/autumn fog, which affects the take-off and landing at the airport. Swedish post is

generally satisfied with the high quality services of Jönköping airport. Finally, Swedish post usually takes decisions for (re)locating by following its customers' demand.

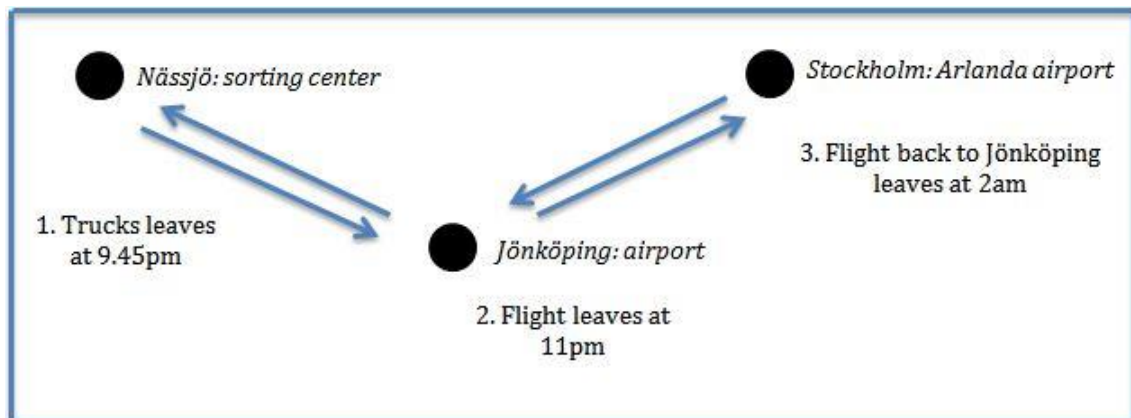


Figure 4.1: The connecting role of Jönköping airport between the two sorting centres.

### 4.3.3 Challenges and future opportunities

The interviewee sees opportunities in Jönköping airport, because of its near location to Nässjö sorting centre. The future of smaller airports looks promising, because the interviewee believes that smaller airports can reduce airmail operation times. Nowadays, there is a significant need of express services for transporting spare parts in North part of Sweden because of the forest industry. This industry is really time-sensitive and there is a big loss of profitability if they do not operate their heavy machines.

### 4.3.4 Summary

This section provides a synopsis of the positive and negative factors which turned out to be the drivers and barriers for relocation:

#### Positives

- Swedish post usually takes decisions for relocating by following its customers' demand
- Good access to railway track
- Swedish post is satisfied with the high quality services of Jönköping airport
- Smaller airports can reduce airmail operation times

#### Negatives

- High possibility of spring/autumn fog

## 4.4 Company A

Company A is one of the biggest freight operators in the world and it provides transportation services locally, nationally and globally.

#### **4.4.1 Operations, services and customers**

The handling volume of the company, in Sweden, consists of both exports and imports. The exports are 11000 tons/year, which is a bit higher than the amount of imports (10000 tons/year). The company has approximately 75000 import shipments yearly to Sweden and most of the goods are coming from Asia. The company has outsourced its parcel services to another big forwarding company, which operates worldwide. Company A uses only big airplanes, but still most of the cargo goes in passenger flights' belly holds. The main focus is on road and over sea transportation and the company does not have any domestic flights in Scandinavia and hardly any inside Europe.

The main operation times depend on customers' needs. The company buys capacity from commercial airlines, which mostly operate during daytime. Sometimes the company faces problems on this stage, because most of the customers look for night solutions. Customers expect to have their goods delivered before the next morning. The company does not face delays very often and if it does, the delay is usually only 15 minutes up to an hour. Penalty of delays has been agreed between the company and its customers.

#### **4.4.2 Location and infrastructure**

The company has located in the three main cities in Sweden: Stockholm, Gothenburg and Malmö. The interviewee believes that the current locations are good, because connections from each city are very good and customers, warehouses and the biggest airports are close enough. Malmö is located very close to Copenhagen airport, which is Scandinavia's main air hub to Europe. The interviewee does not believe that company A would be ready to relocate somewhere else. 80% of the customers are located inside the Stockholm-Malmö-Gothenburg "triangle" area and the company does not have a big customer that would make them consider relocating. The interviewee does not see any advantages of using smaller airports, because the company uses mostly passenger flights for transporting cargo outside Europe and there are only few airports which provide that kind of flights. He also points out that one of the biggest advantages of big airports is that the suppliers are close to the forwarding companies and in this way it is easier to consolidate everything in one airport.

#### **4.4.3 Challenges and future opportunities**

The interviewee does not see any future in Jönköping airport for the company, because they mostly use belly hold cargo of passenger airplanes and Jönköping airport does not have many passenger flights, which could provide belly cargo services. Jönköping airport could be an option if the airport could host bigger airplanes which increases loading and reloading capacity and provides good flight schedules. According to the interviewee, it is important that Jönköping airport is open 24/7 but it has only one runway, which is long enough for big airplanes to land but not long enough to take off with a full load. According to the interviewee, Jönköping's location is not logistically good, because it is too south in Sweden and there are only a few customers in that area. The airport also locates a bit too close to the city centre, which can cause environmental problems, for example too much noise, when big airplanes are taking off and landing at night-time.

The future of smaller airports will be bright in his opinion, only if the express air freight providers will invest in the airports. Small airports are not an option for companies which use mainly passenger flights to move the cargo. Also smaller airports which can-

not host big airplanes are not profitable for the forwarding companies and usually small airports do not have good loading and reloading equipment, which has a negative effect on the operation times. Furthermore, after 2009 air cargo volume decreased and companies started using more transport combinations in order to decrease customers' total costs. For example, company A can transport goods from Japan to Sweden by using a vessel from Japan to the United Arab Emirates and then an airplane from Emirates to Sweden. The interviewee believes that the shipment volume from Internet stores will keep increasing. Company A believes that it has a very good competitive advantage on the field, because it has made agreements with Internet stores to transport their products. This way the total price is cheaper compared to the price of small parcels.

#### **4.4.4 Summary**

This section provides a synopsis of the positive and negative factors which turned out to be the drivers and barriers for relocation:

##### Positives

- The airport is open 24/7

##### Negatives

- There is no big customer to excuse the company's relocation
- Company A uses mostly passenger flights for transporting cargo outside Europe
- One of the biggest advantages of big airports is that suppliers are close to the forwarding companies and make it easier to consolidate everything in one airport
- Jönköping airport does not have many passenger flights, which could provide belly cargo services
- Smaller airports which cannot host big airplanes are not profitable for the forwarding companies
- Jönköping airport has only one runway
- Jönköping airport's runway is long enough for big airplanes to land but not long enough to take off with a full load
- Jönköping's location is not logistically good, because it is too south in Sweden and there are only a few customers in that area
- Jönköping airport lies a bit too close to the city centre
- Small airports usually do not have good loading and reloading equipment

## **4.5 Company B**

Company B is one of the largest air freight operators worldwide and it provides transportation services (i.e. express deliveries, freight forwarding, customized shipments etc.) all over the world.

### **4.5.1 Operations, services and customers**

Company B can transport any kind of goods. The only limit is the size of the package (it has to fit in the container). Their clients are big companies and private customers. Generally, most of the shipments contain small packages. The main transported goods are parcels and documents. There are no different operational requirements for the trans-

ported goods. The goal of the company is to reach every capital in Europe before 9am the next day and the whole world in 48 hours. If they miss delivering the cargo on-time, they compensate their customers by refunding them 100% of the fees. In Sweden the inbound shipments are around 3500 packages per day and the outbound shipments are approximately 1500 packages per day.

Company B operates all over the world and owns many different types of aircrafts but they mostly use the Boeing 737-500. In Sweden, they use three airports (Landvetter in Gothenburg, Arlanda in Stockholm and Örebro). In addition, there is a connection between Malmö and Copenhagen where everything is sent by truck from Malmö to Kastrup airport in Copenhagen. The general process that parcels follow to reach their final destination in Sweden is that everything goes to one of the main distribution centres in Sweden and they fly to the main distribution centre in Europe. There, all the parcels from all over the world whose final destination is Sweden are sorted with the parcels from Sweden and they return back to one of the main distribution centres in Sweden according to their final destination. Finally from there, they are sent by trucks or vans to their final destination. Company B has contracts with big customers from different industrial sectors, but these customers do not provide full-load shipments. Thus, the shipments from the key customers must be always consolidated with smaller shipments.

Company B mostly uses trucks for short distances in order to connect some places with the airport. Moreover, when they face technical problems with an aircraft and it is not loaded yet, they can send the cargo by truck. Finally, when the weather conditions do not allow the aircrafts to take off but allow the trucks to drive, they send the cargo by trucks. This is applicable for national and in-Europe transportation. In other occasions, the cargo is sent by aircraft no matter what.

In general, company B does not cooperate with other air freight forwarders or logistics companies. In addition, they do not buy space from commercial airline companies but they only use the capacity of their own airplanes. But there are some exceptions. When a parcel or a document must reach a very remote place, there are high chances that the company will send it by a commercial airline flight as close to the final destination as possible in order to save time and reach its goal in terms of time.

Company B faces a lot of delays during winter because of the weather. Otherwise, during summer everything runs smoothly. Moreover, they do not face delays in Landvetter airport often. They have their own terminal there and whenever they face any delay regarding arriving times, it is not a problem for the airport to serve them. Landvetter airport owns the company which loads and unloads the aircrafts of the company.

#### **4.5.2 Location and infrastructure**

Company B is customer oriented. Thus, they started to operate in Gothenburg because there were and still are many customers there. Consequently, the demand for express services is higher. They also started to operate in Örebro a few years ago due to the fact that there is a big amount of customers. In addition, Örebro is in the middle of Sweden which means better services for their customers, better distribution times and later pick-ups. In the past, everything was sent by truck to their facilities in Linköping and Norrköping and then they were sent again by truck to the Arlanda airport.

### **4.5.3 Challenges and future opportunities**

Company B stated that there are low volumes of goods to transport from Jönköping to other destinations and it is not profitable to have a direct flight from Jönköping to their main distribution centre in Europe. Instead, Gothenburg airport is only one and a half hour driving from Jönköping and they can consolidate the shipments there. But if in the future the demand will get higher, which means better chances for profitability; they have no problem to start operating from Jönköping airport.

### **4.5.4 Summary**

This section provides a synopsis of the positive and negative factors which turned out to be the drivers and barriers for relocation:

#### Positives

- Big amount of customers
- Better services for their customers
- Better distribution times
- Later pick-ups
- If the demand will get higher, they have no problem to start operating from Jönköping airport.

#### Negatives

- Low volumes of goods to transport from Jönköping to other destinations
- It is not profitable to have a direct flight from Jönköping to their main distribution centre in Europe
- Gothenburg airport is only one and a half hour driving from Jönköping and they can consolidate the shipments there



## 5 Analysis and outcomes

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*A detailed analysis of the empirical data presented in the previous chapter is given in this chapter. Firstly, the findings are linked to suggestions from the literature review and the final outcomes are presented afterwards.*

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The authors decided to structure the analysis of the empirical findings into three parts. The first part is the analysis of the findings regarding Jönköping airport's perspective about drivers and barriers of companies to operate from there. The second part is the analysis of the findings from the two companies that already operate in Jönköping airport. Finally, the third part is the analysis of the findings from the two companies that operate in other airports.

### 5.1 Jönköping's airport perspective

According to Adler, Liebert and Yazhensky (2013) and Merkert, Odeck, Brathem and Pagliar (2012), Jönköping airport can be categorized as a small airport because it has less than 1 million passengers per year (78209 passenger in 2012), despite having a runway slightly over 2000 meters (2203 m).

According to Gardiner et al. (2005b), the availability of flying any time during the day or night is highly important in order to select an airport. In addition, Buyck (2002) stated that 24/7 schedules is a significant characteristic in order to attract freighter operators. Thus, it is a strong driver the fact that Jönköping airport is allowed to operate 24/7. Moreover, Conway (2002) cited that there is a restriction in aircraft types which can operate during the night in big airports. Jönköping airport mentioned the same and pointed out that there is not such a restriction for them, which is another driver. According to Federal Aviation Administration (1991), express carriers choose less congested airports, away from major metropolitan areas, as their primary and regional hubs. As a matter fact, Jönköping airport is located 146 kilometres from Gothenburg, which is the closest metropolitan area, and it can be considered as an additional driver. In addition, Jönköping airport uses no more than 50% of the available "movements", which means that there is an extra capacity for hosting more flights which could drive the demand there. Furthermore, as a consequence of low traffic, there are no delays. And even if there is a delay from the side of the air freight forwarding company, Jönköping airport has no penalty agreements. All these are strong drivers because they allow air freight forwarders to provide to their customers' just-in-time (JIT) services which, according to Dicken (2011), is one of the most important characteristics of air transportation. Furthermore, according to Langley et al. (2008) one of the disadvantages of air transportation is the high rates. But according to Jönköping airport, the location of the airport can offer proximity to existing or potential customers which can lead to cost savings (i.e. direct shipments to the airport and vice versa without the need for warehousing). Finally, according to Lee, Kim and Choi (2012), the demand for air transport has increased in recent years and, it has affected airports need to accommodate peak-time traffic. As a result, Jönköping airport believes that the increase of air transported volumes will cause more congestion at bigger airports, than currently would be expected at the smaller airports.

On the other hand, according to Janic (2008), airports play an important role providing the air transport infrastructure and services for their main users. But the fact that Jönköping airport has only one runway and in case of bad weather conditions (such as heavy snow) when the staff of the airport cannot maintain the runway open; there is no other

option than redirecting the incoming flights to other airports. Thus, the lack of multiple runways and the lack of equipment to maintain the runway open can be considered as barriers. Furthermore, Jönköping airport hosts a small number of passenger flights and in addition, the size of these airplanes is small. These are two more barriers because according to Bowen (2004), approximately 60% of airfreight is carried in the belly-holds of passenger planes. Thus, the number of reached destinations from Jönköping airport is limited and there is small or no capacity for belly-hold cargo. Finally, according to Merkert, Odeck, Brathem and Pagliar (2012), the management of small airports is usually driven by political and social objectives which may affect the efficiency of their operations and small airports are quite often under pressure to keep expenses down and establish their contribution to the community. Thus, the combination of time consuming procedures and the lack of capital for future infrastructure investments that Jönköping airport has to deal with are two more significant barriers.

## **5.2 Companies already operating in Jönköping airport**

According to Bowen's (2004) categorization, TNT Express and Swedish Post can be considered as integrators which means, that they combine the air and ground transport to provide door-to-door services and they specialize mostly in letter and small parcel shipments and their main operations are door-to-door pickup and delivery services. Thus, according to TNT Express the traffic in small airports is not high. In consequence, the possibility for delays due to traffic is negligible. In addition, Swedish Post mentioned that smaller airports can reduce airmail operation times. All the aforementioned are strong drivers since they support the speed of air transportation which according to Karp (2012) is one of the performance characteristics of air transportation.

According to, Min and Melachrinoudis (1999) most of the firms believe that being close to the customer is more important than being close to the suppliers. Swedish post shares this perception by taking decisions for relocating by following its customers' demand. Moreover, according to Slack et al. (2012), the decision of company's location has an effect on operations costs and on the company's ability to serve its customers. Wrong location can have a significant impact on company's profit. TNT Express went further and stated that operating from a small airport which locates closer to their customers can be more profitable. Moreover, TNT Express believes that the location of Jönköping airport is ideal for reaching Scandinavian destinations. Furthermore, the existence of key customers in the catchment area of Jönköping airport provides good opportunities for the company to develop their services. This can also contribute to the attraction of new customers for the company. Matisziw and Grubestic (2010) mention that current and potential freight traffic volumes are important factors in airport location selection. Another important factors in airport location selection that Matisziw and Grubestic (2010) mention is connectivity to existing rail transport networks. This supports the fact that the one of the main reason that Swedish Post chose to operate from Jönköping airport was the good access to railway which provides connection with its main sorting centre in Nässjö.

Furthermore, TNT Express made a comparison of the quality of services between Jönköping airport and bigger airports and came to the conclusion that Jönköping airport's services are better. In addition, Swedish post is also satisfied with the high quality services of Jönköping airport. This conclusion is connected with the fact that Jönköping airport is always available to be opened according to companies schedule or to adjust its operation times in case of unpredicted delays. These can be more drivers to relocate in a

smaller airport, such as Jönköping airport, since according to Janic (2008), services for air transportation is one of the main activities that airports provide to their main users. Finally, Berechman and De Wit (1996) found that charges of the airport affect the airport selection of the airlines as well as of the freight operators and since TNT Express believes that the fees charged by Jönköping airport are good, this could be another driver.

On the other hand, at the beginning the loading equipment of Jönköping airport was not good, but the problem was solved by renting Jönköping airport better loading equipment. However, there are two important issues that could cause problems to the operations of Jönköping airport current users and can be considered as barriers. The first is the existence of only one runway and the second one is the bad weather conditions during winter, mentioned from both of them, which can lead to delays and extra cost.

### **5.3 Companies operating in other airports**

According to Bowen's (2004) categorization, company A is an air freight forwarder and company B is an integrator.

According to Buyck (2002), a 24/7 schedule is a significant characteristic for attracting a freighter operator. The same issue - that the airport should be open 24/7- was mentioned by company A and is a significant driver. Moreover, company B went one step further and stated that in order to choose an airport three factors are needed: enough customers in the region, better distribution times and later pick-ups.

According to Buyck (2002), lack of noise restrictions are significant characteristics in order to attract freighter operators. But, company A believes that Jönköping airport locates too close to the city centre, which can cause environmental problems, such as noise, when their big airplanes will be landing or taking off during the night-time. Furthermore, company A uses mostly passenger flights for transporting cargo outside Europe. But the fact that Jönköping airport does not have passenger flights which reach destinations outside Europe is a significant barrier. As matter of fact, this barrier is supported by Hall (2002) who found that passengers and cargo are interdependent in international travel. On the other hand, it could be easy to say that it is possible to reach indirectly an international destination from Jönköping airport due to the fact that there are direct passenger flights to Copenhagen airport (Kastrup) and Stockholm airport (Arlanda). But then again, company A stated that the size of the existing airplanes cannot provide enough belly cargo services which is another barrier.

However, Gardinet et al. (2005) identified as the main reason for freighter operators to relocate their service somewhere else the demand from key customers. But according to company A one key customer is not enough for them to relocate their services. In addition, company B stated that there are not enough volumes of goods to transport from Jönköping to other destinations. Thus, according to company B it is not profitable to have a direct flight from Jönköping to their main distribution centre in Europe. In addition, company A indicated that Jönköping's location is not logistically good, because it is too much on the South side of Sweden and there are only a few customers in that area. Moreover, most of the companies believe that being closer to the customer is more important than being closer to the suppliers (Min & Melachrinoudis, 1999). In contradiction, company A believes that one of the biggest advantages of big airports is that the

suppliers are close to the forwarding companies and it is easier to consolidate all the shipments in one airport.

Furthermore, since the airport provides the infrastructure (Janic, 2008) and according to company A Jönköping airport has only one runway which is long enough for big airplanes to land but not long to take off with a full load, this is another barrier. In addition, company A stated that smaller airports which can't host big airplanes are not profitable for the forwarding companies as well as small airports do not have good loading and reloading equipment.

Finally, Federal Aviation Administration (1991) cited that the best location for the airport could be either quite close to or far away from the metropolitan area with good access to highway systems in order to support the overnight and one or two-day delivery requirements of airfreight. In this case, company B supported the first idea (close to the metropolitan area) and this is the reason that they use Gothenburg's airport which is only one and a half hour driving from Jönköping and they can consolidate the shipments there.

## **5.4 Discussion**

In this section, the authors deal with the arguments of the interviewees that need further discussion.

First of all, the argument of company A that, smaller airports which cannot host big airplanes are not profitable for the forwarding companies can be connected with the economies of scale. On the other hand, real life has shown us that the current users can operate with smaller airplanes and make profit at the same time.

Secondly, the argument of company A that small airports do not have good loading and unloading equipment is not valid in this case because the current users of Jönköping airport do not face any kind of problem with the existing loading/unloading equipment.

Thirdly, the argument of company B that it is not profitable to have a direct flight from Jönköping to their main distribution centre in Europe is not new. Gardinet et al. (2005) cited that it is likely to be an imbalance of transported volumes between the connected destinations and it can be solved by operating triangular routes.

Finally, the argument of company A that Jönköping's location is not logistically good, because it is too much on the South side of Sweden and there are only a few customers in that area is inconsistent with two facts. The first is that Jönköping region is at the 3rd place for the year 2013 "Sweden's best logistics locations" according to Swedish magazine *Intelligent Logistik* (2013). The second one is that there enough customers in the area. Otherwise the current users of Jönköping airport would not operate successfully so far.

## **5.5 Outcomes**

In this section, the final outcomes of the analysis and discussion are presented jointly. The authors chose to divide them in two main categories: i) drivers and ii) barriers.

### **5.5.1 Drivers**

All the factors that contribute at the decision making for (re)location in a smaller airport, specifically Axamo, can be considered as drivers. The following were identified:

- No constraints on operation times
- Extra capacity for hosting more flights
- Low traffic levels
- No delays
- No penalty agreements in case of delays
- Customers demand
- Proximity to customers
- Development of users' customer services
- Congestions at big airports
- Rise of user's profitability
- Airport's quality of service
- Airport's price policy
- Connectivity with road and rail network

### **5.5.2 Barriers**

All the factors that generate problems or possible obstacles for a company to relocate in a smaller airport, specifically Axamo, can be considered as barriers. The following were identified:

- Limited number of passenger flights
- Limited number of reached destinations of passenger flights
- Small size of passenger airplanes
- Lack of multiple runways
- Weather conditions during winter
- Bureaucracy in infrastructure investments
- Lack of capital for infrastructure investments

## 6 Conclusion and further contribution

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*In this final chapter the main points that were identified and highlighted are briefly summarized and the contribution of the thesis is presented.*

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### 6.1 Conclusions

The current thesis aimed at recognizing and defining the main factors that can drive or repulse freight operators to decide to relocate their express services from bigger to smaller airports. The literature review introduced the reader with the notions of airfreight transportation, different cargo types, actors, air traffic, service providers, size of the airports, location relocation and gave important suggestions about the main issues that can influence the selection of operating airports. Furthermore, the empirical part examined the case of Jönköping airport and was based on qualitative data gathered from Jönköping airport, three integrators and one air freight forwarding company. Moreover, the topic was investigated from three different perspectives: the small airport's perspective (Jönköping airport), the companies that have already chosen Jönköping's airport and operate from there (TNT Express and Swedish Post), and finally two companies that operate in other airports (Company A and Company B). The findings were consequently analysed, linked to theory and compared with each other and as a result, the drivers and barriers that make a freight operator to relocate its express services were acknowledged. Hence, the posed research questions were answered as follows:

RQ 1: What are the drivers for freight operators to relocate their express services in smaller airports?

- No constrains on operation times
- Extra capacity for hosting more flights
- Low traffic levels
- No delays
- No penalty agreements in case of delays
- Development of users' customer services
- Proximity to customers
- Customers demand
- Congestions at big airports
- Rise of user's profitability
- Airport's quality of service
- Airport's price policy
- Connectivity with the road
- Connectivity with the rail net work

RQ 2: What are the barriers for freight operators to relocate their express services in smaller airports?

- Limited number of passenger flights
- Limited number of reached destinations of passenger flights
- Lack of multiple runways
- Bureaucracy in infrastructure investments
- Weather conditions during winter
- Lack of capital for infrastructure investments
- Small size of passenger airplanes

### 6.2 Further contribution and generalization

The thesis has investigated the drivers and barriers for relocation by the freight operators' and airport's perspective. What is more, the fact that data were collected by both freight operators that already use a small airport and freight operators that use bigger airports strengthens the outcomes' validity and offers a holistic view of the topic.

Hence, the findings can be used either by freight operators to assess the possibility to relocate their express services or by small airports to enhance their performance and services and therefore attract more users. Besides, the outcomes can be the used for further research to investigate the reasons why freight operators choose to relocate between two small airports.

Generally, it has been identified that each freight operator and each airport is unique, sets different goals and acts according to its own priorities. However, the main outcomes of this thesis could be generalized and valid for other freight operators or other small airports under certain conditions regarding their clients, portfolio, objectives, strategies, strengths and weaknesses.

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## Appendices

### Appendix I (Jönköping Airport)



Overview of Jönköping airport (Axamo) (H. Larsson, personal interview, 2013-02-08).



Cargo terminal of Jönköping airport (Axamo) (H. Larsson, personal interview, 2013-02-08).



Logistics services offered by Jönköping airport (Axamo) (H. Larsson, personal interview, 2013-02-08).



Jönköping region (Jönköping/Näs sjö/Vaggeryd) (H. Larsson, personal interview, 2013-02-08).

## Appendix II (Interview Questions 1)

Interview Questions for Jönköping airport.

- What is your name?
- What is your current position and how long do you work at this position?
- What were your previous positions?

Category 1 (Operations, services and customers)

- What are your core services?
- Can you provide us the level of in-coming and out-coming volumes?
- What are the main goods which are transported from Jönköping airport?
- Is any flight delays and how often do you face delays?
- Have you calculated how much delays cost for airport?
- What are the main operation times? (landing and take-off times)

Category 2 (Location and Infrastructure)

- What are the advantages of locating in Jönköping airport?
- What are the disadvantages of locating in Jönköping airport?
- Are any legal restrictions (noise level etc.)? \*(does airport locates to close to the city?)
- How do you try to attract new customers?
- What would you expect from air freight forward companies?

Category 3 (Challenges and future opportunities)

- Do you have any investment plan for the near future?
- Would a big customer make you to invest immediately in machines, infrastructure, facilities etc.?
- Do you see any opportunities by operating in Jönköping airport?
- How do you see the future of smaller airports for express air freight operations? (is it cheaper, priority etc.)

## Appendix III (Interview Questions 2)

Interview Questions for air freight forwarding Companies that operate in Jönköping airport.

- What is your name?
- What is your current position and how long do you work at this position?
- What were your previous positions?

### Category 1 (Operations, services and customers)

- What are your core services for air freight transportation?
- Do they have different operation requirements?
- Can you provide us the level of the volumes that you handle?
- Is it belly-hold or pure cargo transportation and what is the percentage? \*
- What are the main goods which are transported by airplanes? (internet stores)
- Is there any “key” customer in Sweden, Scandinavia and Europe? If yes, where are they located and what is the level of dependency?
- What are the most used transportation modes?
- Do you cooperate with other Logistics Companies?
- Is any flight delays and how often do you face delays?
- Have you calculated how much delays cost for the company?
- What are the main operation times? (landing and take-off times)

### Category 2 (Location and Infrastructure)

- What are your criteria to locate somewhere?
- What are the advantages of locating in Jönköping airport?
- What are the disadvantages of locating in Jönköping airport?
- Why did you relocate to Jönköping airport?
- What were main difficulties that you faced when you moved to Jönköping airport?
- What would you expect more from Jönköping airport authorities?

### Category 3 (Challenges and future opportunities)

- What would make you to invest in a specific location?
- Would a big customer make you to start operate in a new location close to him?
- Do you see any opportunities by operating in Jönköping airport?
- How do you see the future of smaller airports for express air freight operations? (is it cheaper, priority etc.)
- Would you do it again (to relocate in Jönköping airport) and would you do different?



## Appendix IV (Interview Questions 3)

Interview Questions for air freight forwarding Companies that do not operate in Jönköping airport.

- What is your name?
- What is your current position and how long do you work at this position?
- What were your previous positions?

### Category 1 (Operations, services and customers)

- What are your core services for air freight transportation?
- Do they have different operation requirements?
- Can you provide us the level of the volumes that you handle?
- Is it belly-hold or pure cargo transportation and what is the percentage? \*
- What are the main goods which are transported by airplanes? (internet stores)
- Is there any “key” customer in Sweden, Scandinavia and Europe? If yes, where are they located and what is the level of dependency?
- What are the most used transportation modes?
- Do you cooperate with other freight forwarding companies?
- Are there flight delays and how often do you face delays?
- Have you calculated how much delays cost for the company?
- What are the main operation times? (landing and take-off times)

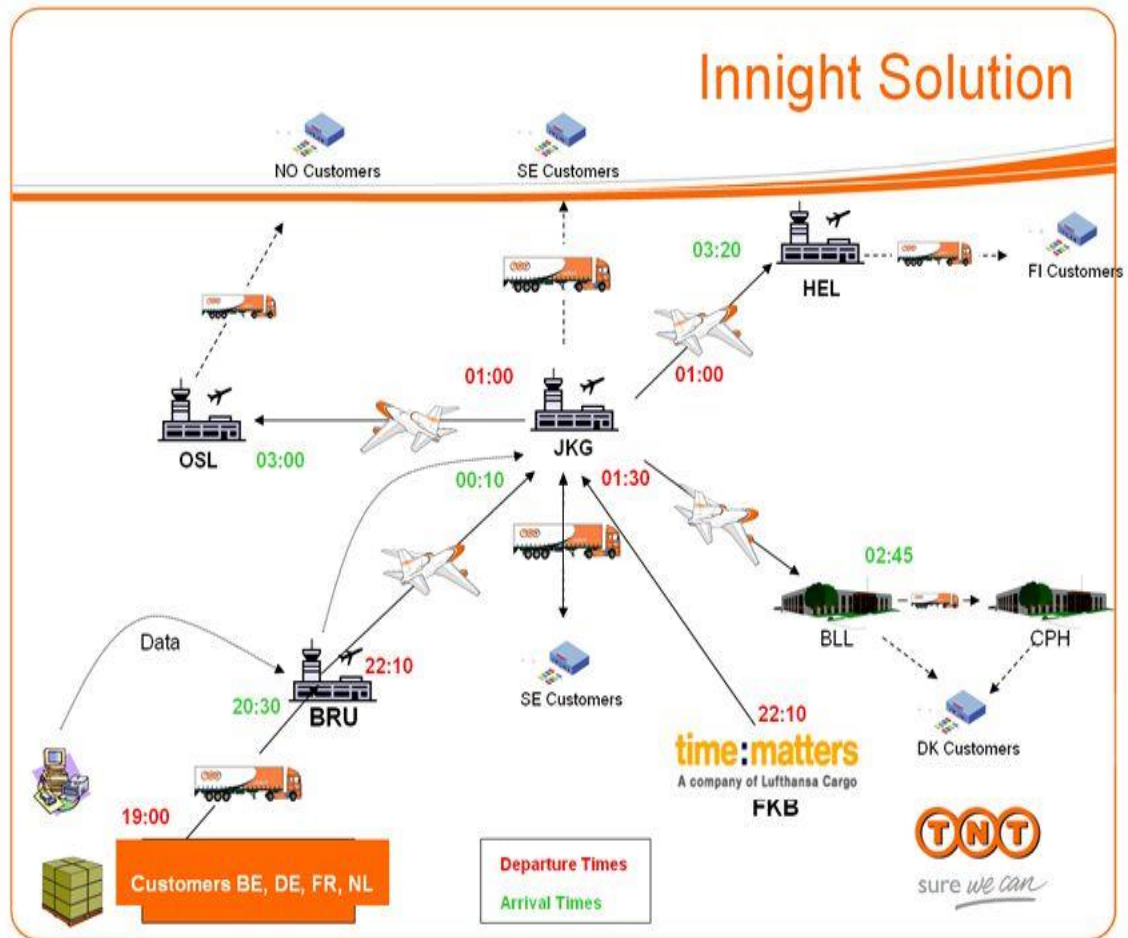
### Category 2 (Location and Infrastructure)

- What are your criteria to locate somewhere?
- What are the advantages of locating in Gothenburg/airport?
- What are the disadvantages of locating in Gothenburg/airport?
- How important is for you to locate close to the port of Gothenburg?
- Why did you build new facilities next to the airport of Gothenburg?

### Category 3 (Challenges and future opportunities)

- What would make you to invest in a specific location?
- What would make you to relocate in another airport?
- Would a big customer make you to start to operate in a new location close to him?
- Do you see any advantages or disadvantages to operate from Jönköping airport?
- How do you see the future of smaller airports for express air freight operations? (is it cheaper, priority etc.)

## Appendix V (TNT Express)



TNT Express’s air freight network “Innight Solution” (TNT Express’s representative, personal interview, 2013-03-12)