Air Freight in the Stockholm Region with focus on Eskilstuna Airport

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Abstract

Purpose: The purpose of this article is to analyse the conditions for commencing air freight operations at the regional Eskilstuna Airport in Sweden, which require investments in airport infrastructure of at least SEK 140–180 million.

Design/methodology: The qualitative data collection for the study was carried out through open-ended interviews with representatives of airport management, staff, representatives of residents, and actors and stakeholders in the field. In addition, much written material was collected from different authorities. Document analysis was used to systematically evaluate and review the collected documents. Content analysis was applied to organize collected data into categories. Based on the reports, decisions, environmental scanning and interviews, the data have been coded and categorized in tables via thematic analysis.

Findings: The major findings of the study are that Eskilstuna Airport lacks cargo facilities and has limited apron space, and that there is strong competition from four other airports in the Stockholm region. The prospects for permanent air freight operations at Eskilstuna Airport are therefore not favourable in the current situation. However, if the development of Eskilstuna Logistics Park and the concept of inter modal highway-rail transportation are successful, they could serve as a major driving force for the development of air cargo. Furthermore, with sustainable development as a guiding principle, there is great potential to develop an airport with a high standard of environmental profile.

Originality/value: My findings are of great value to managers of airports and cargo airlines, as they highlight some of the competition aspects associated with engaging in air cargo at regional airports. The study fills a gap in existing research whose main focus is environmental issues concerning airports in general.

Keywords: Regional airport; air cargo; air freight; environment; environmental restrictions; airport infrastructure; airport marketing; airport fees; environmental charges; airport competition.
1. Introduction

International trade between Sweden and other countries occurs via shipping, road, rail and air transport modes. Shipping has a central role in the Swedish transport system and accounts for a large proportion of foreign trade. The majority of imported and exported goods pass through one of the Swedish ports via inter modal terminals which provide an interchange with road or rail. In terms of value carried, a large share of the international cargo moved between the European countries is transported by truck. International research shows that road and rail traffic has an advantage over air transportation at the regional level due to comparative advantages in travelling times and costs (Fröidh, 2008; Park & Ha, 2006; Román, Espino & Martin, 2007; SOU 2007:70).

Globalization of production and consumption markets has increased air carriage of goods substantially since the 1970s. However, of the cross-border consignments transported into or out of Sweden in 2013, air freight accounted for less than 0.1 percent of the volume (Trafikanalys, 2014a-d). On the other hand the proportion by economic value of the air freight was significantly higher than the proportion by volume, since the goods largely consisted of highly processed products. International studies indicate that the air cargo volume share amounted to less than 2 percent, while the value of the share was more than 35 percent (Association of European Airliners, 2012). Some of the international air cargo is transported by truck to hub airports outside of Sweden, such as Copenhagen, Amsterdam, Brussels or Frankfurt (SIKA Report, 2005:9). The cargo is flown from these key hub airports to its final destination, usually on other continents.

The major cargo airports in Sweden are concentrated in densely populated regions around the major cities of Stockholm, Göteborg and Malmö, which have developed infrastructures and expanding economies. Almost 90 percent of the goods that are flown into or out of Sweden pass through Stockholm Arlanda Airport, Göteborg Landvetter Airport or Malmö Airport. More than fifty percent of the air freight goes through Stockholm Arlanda Airport, which serves as a key central aviation hub in Sweden for both cargo and passenger traffic. Domestic air freight in Sweden is very marginal and in 2014 accounted for approximately 2 percent (2409 tons) of Sweden’s total air freight volume (Transportstyrelsen, 2015).

There are, however, also a number of regional airports in the Stockholm area, such as Eskilstuna Airport. The purpose of this paper is to analyse the conditions for commencing air freight operations at a regional airport, specifically Eskilstuna Airport, which requires investments of at least SEK 140-180 million in order to meet regulatory requirements for air freight on regular basis.
2. The Swedish air freight industry

The Swedish air freight industry has grown and developed in parallel with the international air freight industry since the 1970s, when new air carriers were introduced to the civilian market (B747F, DC-10F, A300F, etc.). International air freight into and out of Sweden increased by about 300 percent between 1970 and 2000, while domestic air freight fell by 50 percent over the same period. See Figure 1.

Figure 1. Air freight loaded and unloaded at Swedish airports with scheduled and non-scheduled traffic 1970–2014. (Trafikanalys, 2014a; Transportstyrelsen, 2015)

Air freight is highly dependent on foreign trade expansion, which means that freight volume varies with the economic cycle. As a result of the ongoing recession, total Swedish air freight volume contracted sharply by almost 45 percent between 2007 and 2013. Volume began to recover in 2010 but fell back to 2009 levels the following year. In 2014 there was an increase in volume of just over 2 per cent compared to 2013 (Trafikanalys, 2014a; Transportstyrelsen, 2015). Economic growth in Sweden has been strong since the beginning of the world economic crisis in 2008. However, GDP began to decline alarmingly quickly in late 2012 and at the beginning of 2013. The global air transport industry suffered a 2 percent decline in 2012 but then increased by more than 5 percent in March 2014 compared to the same period in 2013 (IATA, 2014a; IATA, 2014b). However, a challenge remains in the fact that the impact of a recession on the aviation industry tends to lag behind overall global economic cycles (Franke & John, 2011).
2.1. Airports in the Stockholm region

There are six airports of varying size and capacity for transporting passengers and air cargo in the Stockholm region. The largest airport in Sweden with respect to both passenger and air freight is the state-owned Stockholm Arlanda Airport. Stockholm Bromma Airport is also state-owned and flight operations there are focused on passenger and business jets. Stockholm Skavsta Airport is the Swedish aviation hub of the passenger air line and low cost carrier (LCC) Ryanair. The airport is owned by the American company Airports Worldwide and Nyköping municipality (with 9.9%). Örebro Airport is mainly focused on cargo and charter flights. The airport is owned by Örebro County Traffic and some municipalities in the region. Stockholm Västerås Airport operates passenger flights, including Ryanair, and freight flights. It is owned by Västerås municipality. There are no regular scheduled flights at Eskilstuna Airport. See Table 1.

<table>
<thead>
<tr>
<th>Airport (ICAO code)</th>
<th>Principal shareholder</th>
<th>Ownership form</th>
<th>Freight (≥ 500 tonnes/year)</th>
<th>Dimensions of runway (m)</th>
<th>RWY code</th>
<th>Noise Abatement Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sthlm-Arlanda Airport (ESSA)</td>
<td>Swedavia</td>
<td>State</td>
<td>Yes</td>
<td>3301 x 45 2500 x 45 2500 x 45</td>
<td>4E 4E 4E</td>
<td>Yes</td>
</tr>
<tr>
<td>Sthlm-Bromma Airport (ESSB)</td>
<td>Swedavia</td>
<td>State</td>
<td>No</td>
<td>1668 x 45</td>
<td>3C</td>
<td>Yes</td>
</tr>
<tr>
<td>Sthlm-Skavsta Airport (ESKN)</td>
<td>Airports Worldwide</td>
<td>Private</td>
<td>No</td>
<td>2880 x 45 2039 x 40</td>
<td>4E 3C</td>
<td>Yes</td>
</tr>
<tr>
<td>Sthlm-Västerås Airport (ESOW)</td>
<td>Västerås Municipality</td>
<td>Municipal</td>
<td>Yes</td>
<td>2581 x 46</td>
<td>4C</td>
<td>Yes</td>
</tr>
<tr>
<td>Örebro Airport (ESOE)</td>
<td>County Traffic Örebro AB</td>
<td>County/ Municipal</td>
<td>Yes</td>
<td>2602 x 45</td>
<td>4D</td>
<td>Yes</td>
</tr>
<tr>
<td>Eskilstuna Airport (ESSU)</td>
<td>Eskilstuna Municipality</td>
<td>Municipal</td>
<td>No</td>
<td>1886 x 35</td>
<td>2C</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1. Overview of airports in the Stockholm region in 2015 (AIP Sweden, 2013–2015; different shareholders)

Table 1 shows that there are five airports that have the capacity for some form of air freight operations within a radius of 100 kilometres from Eskilstuna Airport. Stockholm Bromma Airport is not suitable for air freight because the airport is located in an urban area and the apron and runway cannot expand. Stockholm Arlanda Airport is the largest competitor, followed by Örebro Airport and Stockholm Västerås Airport. These three airports accounted for 64 percent of Swedish air freight in 2014 (Trafikanalys, 2014a; Transportstyrelsen, 2015).
2.2. Eskilstuna Airport

The city of Eskilstuna, with more than 100,000 inhabitants, is situated 100 kilometres west of Stockholm. Its regional airport, Eskilstuna Airport, situated 10 kilometres east of the city, has been owned by the municipality since 2008. Eskilstuna Logistics Park (ELP) is in the process of being established at the airport. The park is emerging around the three transportation systems: rail (the Svealand line), road (the E20 motorway) and air (Eskilstuna Airport). The airport operates around training flights, ambulance flights and general aviation. A former maintenance workshop for aircraft and helicopters closed down and moved to Stockholm Skavsta Airport at the end of 2013. There are plans to establish air freight operations in the logistics park, and the municipality is investing in basic infrastructure. Environmental assessments for major expansion of commercial flight operations were performed in the early 2000s (Miljödom, 2006).

The current Eskilstuna Airport was adopted in the master plan of the Swedish Air Force in 1952, and an emergency landing field was built 10 km east of Eskilstuna in 1956. The airbase expanded in the early 1960s and the military authorities and Eskilstuna municipality entered agreements on civil aviation operations on the site in 1967 (Törnell, 2007). The airbase became progressively more civilian in nature and the Armed Forces stopped using it completely in 2005. In recent years the airport has been included as an ingredient in the forthcoming ELP, which is being linked through road, rail and air transportation routes.

The plans of Eskilstuna municipality for the development of Eskilstuna Airport into an air freight airport for the Stockholm region were not supported in the government inquiry into Swedish airports (SOU, 2007:70). Stockholm Arlanda, Stockholm Bromma, Stockholm Skavsta, Stockholm Västerås and Örebro airports are established in the region (see Table 1), and most of them already have the infrastructure needed for air freight.

Since around 2005 municipal and industrial operators have, however, been deliberately driving the ELP project forward, with continuous investments in infrastructure and land improvements (Eskilstuna kommun, 2011). The majority of the politicians in Eskilstuna are positive about the development of the airport. However, the question remains to what extent the synergistic effects as a result of the combination of different modes of transportation systems are capable of supporting air freight. "Eskilstuna Airport budget is based on keeping the current function and size to decrease costs in anticipation of future exploitation in Eskilstuna Logistics Park". (Eskilstuna Kommunföretag, 2011a, my translation).

Since the Rio Conference in 1992 Eskilstuna municipality has strived towards an ecologically sustainable society. In March 2011, the Board of Eskilstuna Municipality Company decided on an environmental policy for the airport with the following overall objectives: "Eskilstuna airport shall continuously work to improve the environment related to airport operations and reduce
pollution”. In May 2011, the operations at Eskilstuna Airport were environmentally certified according to the environmental standard ISO 14001. (Eskilstuna Kommunföretag, 2011b, my translation)

3. Data and methods

The study of the airports in the Stockholm region with focus on Eskilstuna Airport took place over five years. The qualitative data collection for the study was carried out through open-ended interviews with representatives of the airport management, Eskilstuna municipality, and actors and stakeholders in the field. Most of the interviews used a general interview guide approach, and some used an informal conversational approach. Interviews were also conducted with staff, managers, and representatives of residents about their views on the activities at the airport.

In addition, much written material was collected from different authorities. Key documents, studied to gain an understanding of the local development ideology in the municipality, included the Environmental Judgement from 2006, three consultant reports from 2008, 2011, and 2012, and various political views concerning the development of Eskilstuna Airport. The complexity of air freight at airports and logistics parks appears in a different light through the study of international reports and articles. Consequently, a triangulation of study methods was used.

The studies of the documents mentioned above focused on key texts in order to examine the critical decisions (and non-decisions) taken around Eskilstuna Airport at different times. Document analysis has been used to systematically evaluate and review the collected documents for this purpose.

The document analysis has been combined with content and thematic analysis. Content analysis was applied to organize the collected data into categories. The most important criteria identified by Gardiner, Ison and Humphreys (2005), the aspects identified as central in the four reports mentioned above and the views on a possible air freight business mentioned in interviews and other document studies have all been considered. Based on the reports, decisions, environmental scanning, and interviews, the data have been coded and categorized in tables via thematic analysis.
4. Results and discussion

4.1. Four reports concerning Eskilstuna Airport between 2005-2012

Over the past 10 years, various investigations and analyses have been performed concerning the conditions for extended flight operations at Eskilstuna Airport. A key policy document for the future business is the Environmental Judgement from 2006, which specifies the conditions for the projected aircraft movements in 2015. Several of the reports reviewed stated that there was intense competition for air freight in the region.

4.1.1. Environmental Judgement on Eskilstuna Airport

In 2005 Eskilstuna Airport was reclassified from a military training airport to a civilian facility. The municipal executive board of Eskilstuna decided that the application for an environmental assessment relating to increased civil aviation activity would be submitted to the jurisdiction of the Environment Justice department (Tillståndsansökan, 2005). The application set out the changes that extended operations would require (Miljökonsekvensbeskrivning, 2005), namely:

- strengthening the civil station area with a new short taxiway parallel to the existing station area from the runway
- construction and remodelling as well as occasional new construction adjacent to existing buildings in the station area
- widening of the runway from 35 m to 45 m
- widening of the runway area anticipating future modification by the encoding of the airport, to a maximum width of 300 m, an increase of more than 75 m on each side
- clearing of existing forest curtains inside the airport to meet the requirements for clearance

According to the Environmental Code, airports with a runway length of more than 1200 m are licensable. The permit application must be preceded by an Environmental Impact Assessment (EIA) (Miljöbalken, 1998). The Environmental Court's decision of 2006 gave the airport a licence to increase civil aviation activity to a maximum of 27400 movements per year. This permission was granted with certain conditions: that the measures set out in the EIA were taken and that the activities were started by 2016 at the latest. The permit was subject to conditions for the handling of chemicals and hazardous wastes, noise reduction measures for certain buildings, a time limit on training flights in the traffic pattern, and restrictions on discharges to water and land. In addition, agencies for cooperation with relevant actors and stakeholders should be set up and control programs created (Miljödom, 2006).
4.1.2. Investigation of the future of Eskilstuna Airport in symbiosis with Eskilstuna Logistics Park

Söderberg (2008) conducted a market survey in spring 2008, containing a questionnaire relating to five main areas, namely:

- Is there a need for air freight and business aviation within the existing conditions of the airport today?
- Would the need for air freight and business aviation increase with an expansion of the airport?
- Is there any interest in integrating the airport with the logistics centre?
- Is the commercial interest large enough to cover the airport costs?
- What are the shipping companies and travel habits like today?

The study was qualitative and the answers were presented in textual form. Söderberg (2008) interviewed eleven persons with key positions, who were responsible for logistics operations in eleven companies. The main purpose of his study was to examine the degree to which various companies in Eskilstuna were interested in the expansion of Eskilstuna Airport in connection with the establishment of the logistics park. The main findings from the study (Söderberg, 2008) indicated that:

- The companies’ need of air freight and business flights is marginal with the existing conditions at the airport
- The companies’ need of air freight would increase if a large air freight carrier (integrator) was established at the airport.
- The companies have a strong interest in the airport being integrated with ELP
- The companies are not interested in investing in the airport
- The staff of the companies mainly fly from Stockholm Arlanda, Stockholm Bromma and Stockholm Skavsta Airports. Companies use air freight on a limited scale.

While the interviews were being held the world economy was still in good shape, but the financial and banking crisis drastically changed the economic situation by autumn 2008. Societal development during the period 2008–2012 has been marked by economic recession with the result that creation of new businesses in the logistics park has been limited. During this period Eskilstuna municipality has made plans and new investments in the infrastructure of the area. Investment incentives and employment in Sweden did not show positive trends until mid-2010, but the economy slowed once again at the end of 2012.
4.1.3. WSP Market conditions for air freight

In 2011 the consultancy WSP Analysis & Strategy published a report focusing on two issues (Wigren, Åkerman & Pädam, 2011):

- What are the prerequisites for the development of air freight at Eskilstuna Airport?
- To what extent has the air freight business positive effects on the location of land-based logistics business?

The analysis was performed by comparing Eskilstuna Airport with the competing airports in the Stockholm region. Results from the study show that the conditions of Stockholm Skavsta and Stockholm Västerås airports are similar to those of Eskilstuna Airport, but they already have the capacity for air freight, although Stockholm Skavsta closed down their air freight business about five years ago due to unprofitability. Eskilstuna Airport has massive investment needs in infrastructure and air freight related facilities. According to the report there are, however, external factors in the short and medium term which may be favorable for Eskilstuna Airport. The potential to establish comprehensive logistics operations around the airport is larger than that of the competing airports and Eskilstuna Airport is located in an area with a well-developed network of roads and great opportunities to expand in area.

Among their conclusions the authors state that the economies of scale associated with air freight through good terminal management and extensive route network are missing at Eskilstuna Airport. The prospects for permanent air freight operations at Eskilstuna Airport are therefore not favorable in the current situation. Wigren et al. (2011) find that it is too early to decide on major investments with a view to achieve a full scale air freight airport. Furthermore, the authors recommend that the logistics park be developed in parallel with dialogues between the municipality and the air freight companies TNT, UPS, FedEx, and DHL. Finally, the authors recommend that Eskilstuna Airport should be kept in a state where it can be used by general aviation and smaller transport aircraft.

4.1.4. Business analysis of Eskilstuna Airport

In 2012 the consultancy group Arvidsson, Bergqvist, and Skoog published a report based on the fact that the airport had experienced a lack of profitability for a number of years that threatened its long-term existence (Arvidsson, Bergqvist & Skoog, 2012). The owner of the airport tasked the consultancy group with an analysis of the competition between the other airports in the Stockholm region. In addition, the authors of the report were asked to point out a number of interesting areas for the development of Eskilstuna Airport.
Of the thirteen entrepreneurs who were interviewed in Eskilstuna city, a number verified regular use of air freight via Stockholm Arlanda Airport. In recent years, the project group for the expansion of ELP has discussed a proposal to build a transshipment center for air cargo at the airport and to establish a truck shuttle between Eskilstuna and Stockholm Arlanda Airport. The transport and export/import companies interviewed in the study were in favour of the proposed resolution. The companies operating in the region who were interviewed unanimously expressed that although they were not using the airport at the moment, closure would be perceived as defensive and negative from an infrastructure point of view. Some companies also perceived great potential in future air cargo operations at Eskilstuna Airport.

The general opinion among the interviewed entrepreneurs was that the airport has not developed sufficiently because of inadequate or no marketing. They also stressed that the airport is important for development around ELP and the power of attraction and competitiveness of the region.

The report presents an analysis of the competition between the five other airports in the Stockholm region (Arvidsson et al., 2012):

- Stockholm Arlanda Airport: The airport has two competing relatively large air cargo terminals, both of which have excess capacity. All types of air cargo are handled at the airport, including extensive trucking throughout the Nordic countries.

- Stockholm Bromma Airport: There are no cargo flights apart from Jetpak activity, performed exclusively by Malmö Aviation.

- Stockholm Skavsta Airport: There are currently no cargo aircraft operations at the airport.

- Stockholm Västerås Airport: There is a great need for reinvestment in runways and taxiways within the coming years. The airport has become increasingly enclosed by urban development, which may result in future restrictions.

- Örebro Airport: There is no scheduled air freight at the airport but there is ad hoc traffic. The airport has good capacity for both passenger and cargo flights.

The investigators note that there are hidden and unused values at Eskilstuna Airport. The airport is included both as an integral part of ELP, and as a job-creating function in the region. By establishing land-based air cargo handling, transferring business aviation from Stockholm Bromma Airport and establishing regular airlines, Eskilstuna Airport would develop and flourish, according to the investigators.
Arvidsson et al. (2012) believe that the airport owner must develop a long term strategy for the business as well as a marketing plan. The consulting group points out a number of areas of development to focus on:

- **Market orientation**: About 20 percent of all transmissions for heavy vehicles in the world are produced in the southern part of the Mälar region.

- **Technology**: SAAB Security has developed a system called Remote Tower. The system enables an airport to be remotely controlled from an air traffic control center at another airport. The individual airport is expected to save 30–60 percent of its operating costs.

- **Relief organization**: A possible area to develop is relief consignments from various aid organizations (e.g. Red Cross).

- **Tourist Flights**: Passenger traffic on a large scale, alternatively by charter.

- **Center for business aviation and general aviation in the Stockholm region**.

- **Flight School**: The airport offers good conditions for training flights and good access to facilities and hangars.

### 4.2. Factors to be considered by freighter operators when selecting an airport in the Stockholm region

The main issue concerns the requirements that Eskilstuna Airport has to meet to serve as a cargo airport. A decisive factor for air cargo to be established at Eskilstuna Airport is that a cargo airline actually chooses to locate its operations at the airport. In most of the four reports referred to in 4.1, area air freight is discussed from different angles. Gardiner et al. (2005) reported in their article how different cargo airlines worldwide prioritize a number of factors when choosing an airport. Their study was based on surveys and interviews with numerous companies in the air cargo area. The aim was to balance the international aspects of the factors that determine a cargo company’s choice of airport and the national, and especially regional, factors that influence decisions. See Table 2.

Based on the reports mentioned above the following factors have been chosen as tools for analysis. Environmental aspects of flight operations within the EU, and particularly in Sweden, have a high priority when considering the activities at an airport. In current Swedish environmental legislation, activities at a commercial airport are defined as environmentally hazardous activities (Miljöbalken, 1998). Airports that operate or intend to launch air cargo must therefore have an environmental judgement that allows the intended traffic. The most important environmental restrictions are airport opening hours, night time restrictions,
discharge of emissions, noise restrictions, and maximum number of landings and take-offs per year.

The geographical locations of the airports in relation to markets and road conditions in the region are highly significant when selecting cargo airport. Thus, in Table 2, the road network is divided into major highways and roads. The trucking time to main markets is of considerable interest when choosing a freight airport.

High quality terminal facilities and additional apron space are important considerations for cargo airlines when choosing airports for freight. Table 2 divides facilities between aeronautical facilities (runways, taxiways, apron space) and cargo facilities (cargo handling, terminals for cargo) with a view to clarifying the conditions for air cargo.

When selecting a cargo airport, the cost levels of various fees are important for shipping companies. As the relevant airports have different forms of ownership, it has been interesting to investigate whether there are large discrepancies in the fees. Fuel prices are also acknowledged in Table 2, since they constitute a large proportion of the airlines’ variable costs.

Freighter operators' choice of airport is influenced by the extent of airport marketing. One indicator of how an airport prioritizes air freight is the degree to which the area is visible on the airport's website. Airports usually offer different types of incentives to airlines. Table 2 shows the incentive programme that the airports can offer to prospective customers.

In the Stockholm region there are four other airports besides Eskilstuna Airport, each having different conditions for cargo flights. The goal has been to analyse the degree to which Eskilstuna Airport can handle the competition with the other four airports based on five main factors affecting the freighter operators’ choice of airport. See Table 2.
<table>
<thead>
<tr>
<th>The most important factors considered by freighter operators when selecting Eskilstuna Airport</th>
<th>Four airports in the Stockholm region can offer (Sthlm-Arlanda/ESSA, Sthlm-Skavsta/ESKN, Sthlm-Västerås/ESOW, Örebro/ESOE)</th>
<th>Eskilstuna Airport (ESSU) can offer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Environmental restrictions</strong>&lt;br&gt; a. Operating hours&lt;br&gt; b. Night operation&lt;br&gt; c. Noise restrictions&lt;br&gt; d. Max. LTO/year</td>
<td>ESSA – a) H24. b) Restrictions during night, some runways closed. c) Idle-reverse thrust is prohibited, chapt 2 aircraft are not allowed during night. d) 372 100.&lt;br&gt; ESKN – a) H24. b) Yes. c) Chapt 1 &amp; 2 aircraft must not use the aerodrome. Aircraft should not be operated below 3 000 ft over the city &amp; a nearby village. d) 75 000.&lt;br&gt; ESOW – a) Open Mon-Fri 0445-2145; Sun 1900-2145. b) Closed during night. c) Flight should be avoided over the central part of the city &amp; nearby village and natural area. d) 55 000.&lt;br&gt; ESOE – a) Open Mon 0330-2230; Tue-Thu 0500-2230; Fri 0500-2030; Sat 1815-1915; Sun 0530-0630, 1800-2145. b) Closed during night. c) Maintain a height during arrivals &amp; departures where the noise emission is below 70 dB(A) until on final vs track. d) 30 000.</td>
<td>a) Open Mon – Fri 0700-1100; 1200-1600. b) Closed during night. c) Overflight of the built-up areas of the nearby village is not allowed below 2000 ft ground. d) 27400.</td>
</tr>
<tr>
<td><strong>2. Infrastructure</strong>&lt;br&gt; a. Location&lt;br&gt; b. Airport road access&lt;br&gt; c. Trucking time to main markets&lt;br&gt; d. Airport railway access</td>
<td>ESSA – a) 42 km north of Sthlm C. b) Motorway, c) 0 h 35 m. d) Railway for passenger.&lt;br&gt; ESKN – a) 106 km south of Sthlm C. b) Motorway (100 km), road (6 km), c) 1 h 25 m. d) No.&lt;br&gt; ESOW – a) 103 km west of Sthlm C. b) Motorway (91 km), road (12 km). c) 1 h 20 m. d) No.&lt;br&gt; ESOE – a) 211 km west of Sthlm C. b) Motorway (168 km), road (43 km). c) 2 h 45 m. d) No.</td>
<td>a) 103 km west of Sthlm C. b) Motorway (100 km), road (3 km). c) 1 h 20 m d) New railway for freight.</td>
</tr>
<tr>
<td><strong>3. Facilities</strong>&lt;br&gt; a. Runways&lt;br&gt; b. Taxiways&lt;br&gt; c. Cargo handling&lt;br&gt; d. Terminals for cargo&lt;br&gt; e. Apron space</td>
<td>ESSA – a) 4E-01L/19R; 01R/19L; 26/08. b) Yes. c) All types. d) There is a cargo area labelled “Cargo City” with warehouses. e) Yes.&lt;br&gt; ESKN – a) 4E-08/26; 3C-16/34. b) Yes. c) No. d) Yes, but not in use. e) Yes.&lt;br&gt; ESOW – a) 4C-01/19. b) Yes. c) All types. d) No. e) Yes.&lt;br&gt; ESOE – a) 4E-01/19. b) Yes. c) All types. d) Yes. Warehouse. e) Yes.</td>
<td>a) 2C-18/36. b) Yes. c) No. d) No, but ELP. e) No.</td>
</tr>
<tr>
<td><strong>4. Costs</strong>&lt;br&gt; a. Airport fees (take-off, emission, noise, terminal navigation, parking)&lt;br&gt; b. Fuel prices (Jet A-1)</td>
<td>ESSA – a) 5 950 SEK. b) 9,30 SEK/litre&lt;br&gt; ESKN – a) 7 200 SEK. b) 9,10 SEK/litre&lt;br&gt; ESOW – a) 5 100 SEK. b) 10,35 SEK/litre&lt;br&gt; ESOE – a) 6 900 SEK. b) 10,45 SEK/litre</td>
<td>a) 7200 SEK b) 9,15 SEK/litre</td>
</tr>
<tr>
<td><strong>5. Airport marketing</strong>&lt;br&gt; a. Cargo pages on airport website&lt;br&gt; b. Incentive programme</td>
<td>ESSA – a) Yes. b) ≤ 3 years, take-off charge discount. ESKN – a) No. b) No.&lt;br&gt; ESOW – a) Yes. b) ≤ 2 years, take-off charge discount. ESOE – a) Yes. b) Yes (?).</td>
<td>a) No. b) No.</td>
</tr>
</tbody>
</table>


Table 2. Factors considered by freighter operators when selecting an airport in the Stockholm region (AIP, 2013-2015; Transportstyrelsen, 2014)
4.2.1. Environmental restrictions

Stockholm Arlanda and Stockholm Skavsta airports are open around the clock, and thus allow night operations. At Stockholm Arlanda Airport there are some considerations regarding which runways are used at night. In November 2014, Stockholm Arlanda Airport received permission to continue to use straight-in approaches from the south, i.e. over the northern parts of Stockholm (Miljödom, 2014). Stockholm Skavsta Airport currently has only passenger flights, mainly with Ryanair. Stockholm Västerås and Örebro airports are closed for a number of hours at night, determined by the times of departures and arrivals of the airlines. Eskilstuna Airport is normally only open in the daytime on weekdays.

All five airports have varying degrees of noise restrictions, which are mainly influenced by how near they are to urban and town centres. There are many suburbs and towns beyond Stockholm that are affected by air traffic at Stockholm Arlanda Airport. In addition, flight movements at Stockholm Bromma Airport have risen sharply in recent years, and affect residents in a number of districts in Stockholm. Stockholm Västerås Airport is located near the centre of Västerås and new houses are being built on the east side of the airport.

Stockholm Skavsta, Örebro and Eskilstuna airports are located outside the cities and therefore mainly affect the population in smaller towns and rural villages situated near the airports.

The maximum number of approved landings/take-offs per airport gives an indication of the scale of flight operations at full capacity utilization. The degree of perceived noise around an airport is usually strongly associated with the extent of the air traffic.

4.2.2. Infrastructure

The Stockholm region has a total population of three million inhabitants or about one third of the total Swedish population. The main market in the region is in the Stockholm area, and it places heavy demands on a good infrastructure. All five airports are located close to a highway.

Stockholm Arlanda Airport is connected to Stockholm via a highway and thus provides short trucking time primarily to the northern parts of the region. Goods to be shipped to the southern parts of the Stockholm region must pass through areas characterized by bottlenecks. There is a rail passenger service connecting the airport with down town Stockholm.

The other four airports are linked with the Stockholm region through a combination of highway, which constitutes the main sections, and a shorter section of smaller road. Stockholm Skavsta and Eskilstuna airports have geographical advantages in relation to trucking time to the south of the Stockholm region. The trucking time from Örebro airport to the main markets in the Stockholm region is about 1.5 hours longer than that from Stockholm Skavsta, Stockholm
Västerås and Eskilstuna airports. On the other hand, Örebro Airport has a strategic geographic location relatively close to the Göteborg region, which has almost one million inhabitants. Eskilstuna airport has had rail for freight since 2013.

4.2.3. Facilities

In terms of aeronautical facilities, runways and taxiways have to meet minimum requirements for various cargo aircraft. All runways are classified in a reference code system. The main code consists of two elements. The first element is related to the aircraft reference field length, which is defined as "the minimum field length required for take-off at maximum certificated take-off mass for the aircraft". This is classified with the numbers 1–4. The second element is related to the width dimension of the aircraft (wingspan or wheel track) and classified with letters A–F (ICAO, 2013a).

A cargo carrier that operates a specific aircraft model and is considering relocating to or setting up at an airport must ensure that the airplane reference field length is consistent with the airport reference code. In this context it is important to point out that aircraft with a large runway requirement at maximum take-off weight can operate on shorter runways by reducing the total load. Stockholm Arlanda, Stockholm Skavsta, and Örebro airports have runways with the reference code 4E, which means that the Boeing 747 and Antonov 124 can take off and land at these airports. Stockholm Västerås Airport has a runway with the reference code 4C, which means that the Boeing 737 and Airbus 320 can use the airport. Eskilstuna airport has a runway with the reference code 2C, which means that no cargo aircraft in the class of Boeing 737 or Airbus 320 can use the airport.

In terms of cargo facilities, Stockholm Arlanda and Örebro airports have comprehensive facilities to handle air freight. Stockholm Skavsta and Stockholm Västerås airports have some limitations regarding air freight. Stockholm Skavsta Airport has previously had cargo, and Stockholm Västerås Airport conducts shipping business but lack terminals for cargo. Eskilstuna Airport lacks cargo facilities and has a limited apron space.

4.2.4. Costs

Every airport establishes an official price list for airport fees annually, consisting of take-off, emissions, noise, terminal navigation, and aircraft parking charges. The charges are related to the aircraft model, type of engines, and airport. The take-off charge is based on the authorised maximum take-off weight (MTOW) in the aircraft's certificate of airworthiness. The emission charge is based on certified NOx emission values in the landing take-off (LTO) cycle for a specified engine in accordance with ICAO (2008). The noise charge is based on the aircraft's
certificated noise level in accordance with ICAO (2012). An environmentally friendly and quiet aircraft model is thus rewarded with lower fees. The charges in Table 2 are based on the Boeing 737-700C cargo aircraft.

Stockholm Västerås Airport has the lowest fee in the region – 5000 SEK/take-off. The next lowest is Stockholm Arlanda Airport at 6000 SEK/take-off. Stockholm Skavsta, Örebro and Eskilstuna airports charge around 7000 SEK/take-off. Thus there is a difference of as much as 40 percent between the cheapest and the most expensive airport fees in the Stockholm region. However, it is important to note that the airport fees are negotiable at the non-state owned airports, but specific information is classified as secret.

The price levels of aviation fuel (Jet A-1) were investigated in February 2014. A cargo airline is relatively limited in refuelling outside take-off and landing airports. The amount of fuel needed for a specific flight distance is determined by the estimated flight time plus extra flight time to the alternative aerodrome and additional reserve fuel. If the weather at the desired landing airport is below landing minima in terms of visibility, ceiling, braking action, crosswind, etc., the landing must be made at an alternative airport that has approved weather minima. The strategy of an airline is thus a given, i.e. to limit the amount of fuel to what is required by the rules and safety in order to optimize the profitability of freight.

Prices of aviation fuel differ between airports in the region, but are primarily decided by the price on the international oil market. The cheapest were Stockholm Arlanda, Stockholm Skavsta and Eskilstuna airports with a price of about 9 SEK/liter. The prices at Stockholm Västerås and Örebro airports were just over 10 SEK/liter. The difference in price of Jet A-1 was about 15 per cent between the cheapest and the most expensive airport.

4.2.5. Airport Marketing

The marketing of Stockholm Arlanda Airport highlights that the airport is located in the region with the largest number of exporting companies in Sweden, and that the geographical location is central in Scandinavia. Thus, it also serves the markets in Finland and Norway. It also underlines that most of the Swedish freight forwarders have their headquarters in Stockholm.

The website of Stockholm Västerås Airport has a sub-link “Airfreight” entitled "Send delivery by air". The reader is recommended to contact TNT via their Swedish website.

Örebro Airport markets itself as the freight hub of Scandinavia under the motto "Nothing is impossible!" and states that the airport is an expert on adhoc shipping. The airport handles all types of aircraft and there are no slot restrictions. The marketing of the airport highlights that it specializes in air transportation of dangerous goods, international aid and bulky goods.
Stockholm Skavsta and Eskilstuna airports have no marketing of air cargo on their respective websites.

Stockholm Arlanda Airport offers two different volume-enhancing pricing tools for freighters, whose purpose is to stimulate traffic growth. The incentive programme is aimed at airlines that start new scheduled air freight routes that no other cargo airlines have flown regularly for the previous 12 months. Newly established airlines get a take-off charge discount of 40 percent up to a maximum of 3 years.

Stockholm Arlanda Airport also offers a progressive discount scheme that aims to support an increase in the number of weekly departures. If an airline operates two weekly departures and increases the frequency to three weekly departures, they are given a 10 percent discount on all three departures. The two programs cannot be combined, and the discount only applies to take-off charges.

Stockholm Västerås Airport has an incentive program for non-contracted cargo customers, which is valid for two years. The discount only applies to the take-off fee and varies between 20–40 per cent in year 1 depending on freight volume. In year 2 the discount is reduced to 10–20 percent depending on freight volume. When a freight airline intends to establish a shipping line between Västerås and another airport, in practice the level of airport charges is negotiated between the parties. They are confidential and therefore not made public.

Örebro Airport provides discounts on certain airport fees for the establishment of new air services to destinations that have not been served by the airport during the previous 12 months.

Stockholm Skavsta and Eskilstuna airports have no incentive program for air cargo.

4.3. Why choose Eskilstuna Airport instead of four competing airports in the Stockholm region?

I have chosen to analyse the competition among the airports with the capacity for air freight in the Stockholm region. Table 3 shows a qualitative estimation of how Eskilstuna Airport compares with four other airports based on various criteria as a cargo airport based on Table 2.
Eskilstuna Airport asserts itself very well with regards to environmental restrictions. The infrastructure in the region is relatively good, as there is a highway to Stockholm and a new railway extension to the airport area. The trucking time to the main markets is favourable, due to a lack of congestion problems. However, the airport lacks almost all the facilities it would need for effective air freight. Nevertheless, a very positive facility for the airport is the newly established ELP. The cost level at Eskilstuna Airport is relatively high in comparison with the other four airports. Airport fees are the highest, whereas fuel prices are the lowest. Airport marketing is not up to date, as there is no cargo at Eskilstuna Airport as yet. Overall, the analysis in Table 3 shows that Eskilstuna Airport cannot currently compete with the four other airports in the Stockholm region.

Stockholm Arlanda Airport accounts for more than 50 percent of Sweden's international air freight. There is also overcapacity at the airport. The advantage for the airport is that it is a central hub in Sweden and that both "belly cargo" and ordinary air freight can be coordinated there. The disadvantage is that in the future there may be congestion and lack of slots. However, the heavy freight is carried at night when air travel (belly cargo) is limited.

Stockholm Skavsta Airport provided air freight until 2009, when this activity closed down due to poor profitability. Stockholm Västerås and Örebro airports are competitors for air cargo in the western parts of the region. TNT has been established in Stockholm Västerås Airport since...
2008, with five return flights a week from Liege in Belgium. Örebro Airport mainly handles adhoc and charter cargo flights. In addition, the Swedish Civil Contingencies Agency (MSB) uses Örebro for mission shipping in emergency and defence operations. DHL established themselves at Örebro Airport in 2012.

Consequently, in the short term, there is no need to establish air freight at Eskilstuna Airport. DHL has a centre in Eskilstuna which is being relocated to ELP. Most of the freight from there is carried by truck to Stockholm Arlanda Airport. The question is what need does DHL have to establish air freight from Eskilstuna Airport and if so, to which hub in Europe?

4.4. What is required to develop Eskilstuna Airport into a recognized and competitive cargo airport in the Stockholm region?

Three of the competing airports in the Stockholm region have the capacity to handle air cargo in the size class B747/AN124. Stockholm Västerås Airport has the capacity to handle air cargo with cargo aircraft in the size class B737/A320. It is therefore reasonable to assume that Eskilstuna Airport must be able to handle aircraft of the same size as the Stockholm Västerås Airport to become attractive as cargo airport. A consequence of this is that the airport code must be upgraded to at least 4C, which means that several investments have to be carried out at the airport. As the airport owner has indicated in various documents that the airport code should be raised to 4D, I have chosen to use this code in the subsequent analysis. In addition to the necessary investments to upgrade the airport code, various investments are required for the actual freight handling. In addition, the airport owner needs to take a number of economic measures to stimulate interest in the airport.

In the following discussion, I will start from Table 2, but only comment on the factors that need to be addressed to upgrade the airport to code 4D and to function as a cargo airport.

4.4.1. Environmental restrictions

There are no restrictions on the operating hours at the airport, which means that it can stay open 24 hours a day. The existing environmental judgement allows 27400 LTO per year, of which 2400 aircraft may be >25 tonnes. A maximum of 100 LTO annually are allowed at night, i.e. between 2200 and 0700.

4.4.2. Facilities

The width of the runway must be increased from 35 m to 45 m, the taxiway from 15 m to 23 m, and the runway strip width from 150 m to 300 m to meet the requirements of the
airport code 4D. There is also a probable need for investments in new runway turn pads at both ends of the runway, as they are not directly served by taxiways. The length of the runway needs to be extended from 1886 m to 2172 m to allow the cargo aircraft to optimize their freight loads. The existing runway was 2172 m long for many years but was crossed by a local road for residents. A new road was designed and built outside the airport area in 2014 and the official length of the runway can once again be extended to 2172 m. The runway and taxiway bearing capacity is currently 36 pcn (pavement classification number) and may need to be strengthened to at least 45 pcn when the runway and taxiways are widened.

In order to handle air cargo at Eskilstuna Airport, there is a need for investments in terminals and apron space for cargo. The level of investments required for the various facilities at Eskilstuna Airport is relatively difficult to assess. The costs of widening of the runway, taxiway and runway strip, and the expansion of runway turn pads are estimated in the range of SEK 80-100 million. The investment costs for the new terminal buildings and apron space for cargo are estimated at SEK 60–80 million.

4.4.3. Costs

The level of airport charges according to the official price list is relatively high. This is due to the demand from the owners for increased revenue from the airport. At the same time, there is great potential for reducing fees in the short term in order to make the airport economically competitive with competitors in the Stockholm region. In the long term however, revenues and expenses will have to be balanced.

4.4.4. Airport Marketing

Before choosing to focus on marketing, it is important that the decision to make the investments discussed above is taken. One simple measure that can be taken is to develop the airport’s websites and highlight air freight. Investments in marketing Eskilstuna Airport should be placed together with the ELP and should focus on the positive combinations of the airport, the ELP and three different modes of transportation. Furthermore, the airport needs to develop an incentive programme for cargo flights using the model available at Stockholm Arlanda Airport.
4.5. The future of air freight in the Stockholm region

Growth in global passenger traffic is expected to be 4.6 percent per year until 2030. Global air cargo is expected to increase by 5.2 percent per year during the same period, which will of course affect the volume of air cargo in the Stockholm region (ICAO, 2013b).

Stockholm Bromma Airport is specialized in passenger traffic due to its location and has a lease agreement with the Stockholm municipality that ends in 2038. After the change of government in Sweden in Autumn 2014, the issue of closing down Stockholm Bromma Airport long before 2038 was highlighted. A future phase-out of the passenger traffic at Stockholm Bromma Airport would mean that the traffic might initially be divided between Stockholm Arlanda Airport and Stockholm Skavsta Airport. The two airports are expected to cope with the annual increase in passenger traffic plus 2.5–3 million passengers if Stockholm Bromma Airport is closed down. In 2014, the owner of Stockholm Arlanda Airport decided to invest SEK 13 billion over the next 30 years, of which SEK 7 billion would be invested by 2025. Thus, the annual passenger capacity is estimated to increase from 22.5 million (2014) to 35 million by 2045 (Swedavia, 2015). In 2028 it is anticipated that a high-speed train (Eastern Link) will start operating between Stockholm City and Linköping via Stockholm Skavsta Airport (Trafikverket, 2012). The travel time between Stockholm City and Stockholm Skavsta Airport is expected to be 30 minutes by direct train, which is comparable with today's "Arlanda Express" train between Stockholm Arlanda Airport and Stockholm City.

Given that international air cargo will probably double by 2030, the demand for airports with cargo capacity in the Stockholm region is expected to increase sharply. The assessment is, however, that the freight capacity at Stockholm Arlanda Airport is sufficient for the foreseeable future due to the fact that only half the capacity is currently being used. This forecast applies regardless of whether Stockholm Bromma Airport will be closed before 2038. However, in view of the risk of increased congestion in the Stockholm road network, Stockholm Arlanda Airport is not optimal for the southern parts of the region (Trafikverket, 2012). Stockholm Skavsta Airport has great potential to resume its discontinued air cargo operations and focus on the southern regions of Stockholm. The planned route of the new railway line to the airport will also be expected to attract new freight customers.

The aeronautical facilities at Stockholm Västerås Airport are of a good standard and have sufficient capacity for the type and volume of air cargo operations occurring there. However, the establishment of additional freight operators requires large investments in a new cargo terminal and expansion of the apron. (LFV Aviation Consulting, 2013) An aspect that counts against Stockholm Västerås Airport is its geographical location between Stockholm Arlanda and Örebro airports, which are both classified as hub airports for air cargo in Sweden (Trafikverket,
Moreover, the airport is situated close to the city. The prospects for expanding the airport are therefore limited.

In a new geopolitical era there are also other factors to take into consideration, of which defence issues are the most important. Up until the mid-1970s there were five air bases in the Stockholm region, two in Stockholm city, one at Stockholm Skavsta Airport, one in Uppsala and one at Stockholm Västerås Airport. The air bases were gradually phased out, with the last closing in Uppsala in 2004, even though it is currently classified as an active air base. There was also an air base at Eskilstuna airport, which was closed down in 2005. The defence and geopolitical situation in Northern Europe/Scandinavia has changed drastically during the last two years. There are currently no stationary air force bases in the Stockholm region and the nearest air base is located in western Sweden (Lidköping). From a defence perspective, it would be of interest to ensure that Eskilstuna airport is not settled, but retained for future use.

5. Conclusions

This paper has considered some of the competition issues associated with handling air cargo at the regional Eskilstuna Airport in the Stockholm area. The major findings of the study are that there is strong competition from four other airports in the region. Stockholm Arlanda and Örebro airports already have a full capacity, while Stockholm Skavsta and Stockholm Västerås airports have some limitations regarding air freight. Eskilstuna Airport lacks cargo facilities and has limited apron space. The prospects for permanent air freight operations at Eskilstuna Airport are therefore not favourable in the current situation.

However, if the development of ELP and the concept of inter modal highway-rail transportation are successful, they could serve as major driving forces for the development of air cargo. This would require a major air freight carrier to choose to locate at the airport, which would in turn require a substantial investment in the runway, strip and terminal buildings.

Furthermore, there are some aspects that could make Eskilstuna Airport unique. With sustainable development as a guiding principle, there is great potential to develop an airport with a high standard of environmental profile. The defence and geopolitical situation around the Baltic Sea could mean that Sweden will need air bases in the Stockholm region. In conclusion, Eskilstuna Airport is a great asset for the municipality, which should be continuously maintained for an uncertain future. Nobody knows today what the transport needs in the Stockholm region will look like in 15 years!
Acknowledgments

The author thanks the editors and anonymous referees for many helpful comments and suggestions. The author is also very grateful to all the airport managers who participated in this study. All remaining errors are the responsibility of the author.

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