Complexity of Air Freight Networks

A regional focus on Jönköping

Master’s thesis within Business Administration

Author: Petrina Akor
Zlata Bulic

Tutor: Susanne Hertz
Hamid Jafari

Jönköping May 2011
Abstract

Companies face competition that comes at them from different directions in the current environment of globalization, deregulation and the push for greater mass customization of products, which still can be differentiated from other products and services. A large number of companies have outsourced a large percentage of their non-core activities in order to concentrate on their core competencies with transportation of their goods being one of the aspects that they have outsourced. Companies are faced with shorter lead times, inaccurate forecasts, unexpected delays in production and need to seek out alternative transportation modes in order to get their goods to market on time. Transportation by air ends up being the best choice to handle requirements of time sensitivity and the transportation of high value goods.

The purpose of this thesis was to investigate how the air freight supply chain and network that is in place in the Jönköping region is constructed; in addition to seeking out information in regards to the type of air freight goods being transported into and out of the region; along with the buying behavior and promotion strategies utilized in the promotion of air freight within the region of Jönköping.

The conclusions from this thesis show that there are a number of key actors (integrators and freight forwarders) involved in the air freight network within the Jönköping region. A number of them indicated that the actors they mainly interacted with, in terms of activity links and resource ties, were limited to the airports that were outside of the Jönköping region. There were a few of the actors in terms of integrators that did interact with the Jönköping airport in a capacity that was greater than other actors. In terms of the type of air freight goods that were transported into and out of the region spare parts made up a major portion of the goods transported, followed by clothing and textiles, and other mechanical industry products. The promotion of air freight mostly performed by integrators to their customers is done in terms of emphasizing reliability, punctuality, regularity and security to their customers.
Acknowledgements

We wish to use this opportunity to thank our supervisor Professor Susanne Herz and PhD candidate Hamid Jafari who provided valuable inputs, guidance and advice throughout the process of this thesis project. Furthermore we would like to thank Jönköping Axamo airport for initiating the project and connecting us with the right people. Moreover, we would like to show gratitude to all interviewed companies for giving us the opportunity to execute the interviews that were essential to this thesis. Finally, we are grateful to our families, friends and colleagues for their support.

_Petrina Akor & Zlata Bulic_

_May 2011_
List of Abbreviations

Actor-Network Theory (ANT)
Business-to-Business (B2B)
Container-On-Flatcar (COFC)
Full Truck Load (FTL)
Global Commodity Chains (GCC)
Gross Domestic Product (GDP)
Just In Time (JIT)
Less Than Truckload (LTL)
Logistics Service Provider (LSP’s)
Network and Actors, Resources and Activities (ARA)
Revenue Tonne-Kilometer (RTK)
The International Air Transport Association (IATA)
Third Party Providers (TPP)
Trailer-On-Flatcar (TORC)
Supply Chains (SC)
Supply Chain Management (SCM)
# Table of Contents

1 Introduction ........................................................................................................... 1
   1.1 Background ....................................................................................................... 1
   1.2 Problem Discussion ......................................................................................... 3
   1.3 Purpose ............................................................................................................. 5
   1.4 Research Questions ......................................................................................... 5
   1.5 Delimitations .................................................................................................... 5
   1.6 Disposition ...................................................................................................... 5

2 Theoretical Framework .......................................................................................... 6
   2.1 Supply Chain Management ............................................................................. 6
   2.2 Dynamics of Networks .................................................................................... 7
      2.2.1 Global Commodity Chains (GCC) and Actor Network Theory (ANT) .......... 9
   2.3 Dynamic of Companies in Networks ............................................................. 9
   2.4 Network and Actors, Resources and Activities (ARA) model ....................... 11
      2.4.1.1 Resource Ties
      2.4.1.2 Actor Bonds
      2.4.1.3 Activity Links
   2.5 Development of the Air freight industry ....................................................... 13
      2.5.1 Hub and Spoke ....................................................................................... 17
   2.6 Types of goods transported by air .................................................................. 17
   2.7 The Actors in the air freight transport industry ............................................. 18
      2.7.1 Forwarders ............................................................................................... 18
      2.7.2 Airlines .................................................................................................... 18
      2.7.3 Integrators .............................................................................................. 18
   2.8 The buying behavior and selection process for air freight ......................... 20
   2.9 Uncertainty ..................................................................................................... 23
   2.10 Transportation modes overview .................................................................... 25
      2.10.1 Motor Carriers ....................................................................................... 25
      2.10.1.1 Industry overview
      2.10.1.2 Operating and Service Characteristics
      2.10.2 Air Cargo Transportation ....................................................................... 26
      2.10.2.1 Industry Overview
      2.10.2.2 Cost Structure
      2.10.2.3 Current Issues
      2.10.3 Rail Transportation ................................................................................. 27
      2.10.3.1 Industry Overview
      2.10.3.2 Operating and Service Characteristics
      2.10.3.3 Current Issues
      2.10.4 Sea Transportation ................................................................................. 28
      2.10.4.1 Industry Overview
      2.10.4.2 Current Issues
      2.10.5 Intermodal .............................................................................................. 28
   2.11 Summary ....................................................................................................... 29

3 Methodology ........................................................................................................... 31
   3.1 Research strategy ......................................................................................... 31
   3.2 Research Approach ....................................................................................... 32
   3.3 Case Study ..................................................................................................... 32
   3.4 Data Collection Method .............................................................................. 33
4 Results of the empirical study ........................................ 38
  4.1 Introduction of Jönköping Axamo airport ...................... 38
  4.2 State responsibility for and privatization of the airports in Sweden ..................................................... 38
  4.3 Introduction of the companies .................................. 41
    4.3.1 Integrators .................................................. 41
    4.3.2 Freight Forwarder .......................................... 42
    4.3.3 Manufacturer ................................................ 42
    4.3.4 Airlines ...................................................... 42
  4.4 Air freight compatible goods .................................... 43
  4.5 Transportation mode substitution ................................ 44
  4.6 The buying behavior and solution costing aspects of air freight .............................................................. 45
  4.7 Air freight Actors .................................................. 47
    4.7.1 Integrators .................................................. 47
      4.7.1.1 Solution options .........................................
      4.7.1.2 Activities ................................................
    4.7.2 Forwarders .................................................. 50
      4.7.2.1 Solution Options .........................................
      4.7.2.2 Activities ................................................
    4.7.3 Manufacturer ................................................ 51
  5 Analysis .................................................................. 53
  5.1 Airfreight Network actors ......................................... 53
    5.1.1 RQ1 .................................................................. 53
  5.2 Air freight compatible goods ...................................... 56
    5.2.1 RQ2 .................................................................. 56
  5.3 Buying behavior and selection process for air freight .... 58
    5.3.1 RQ3 .................................................................. 58
  6 Conclusions ................................................................ 60
  7 Future research ....................................................... 62
  List of references ....................................................... 2
Figures
Figure 1.1. Jönköping region................................................................. 4
Figure 2.1. The dynamics of business networks........................................ 8
Figure 2.2. A Firm's Value Net............................................................... 10
Figure 2.3. ARA model......................................................................... 11
Figure 2.4. Company connected relations in a Dyadic Relationship ........... 12
Figure 2.5. Development of Air freight from traditional to global network 19
Figure 2.6. A Pyramid Model of Freight Buyers’ Needs............................. 22
Figure 2.7. Uncertainty circle model....................................................... 24
Figure 2.8. Developed logistics uncertainty model.................................... 24
Figure 2.9. The Structural inelasticity of modal substitution in freight transport 25
Figure 3.1. The Research Process........................................................... 31
Figure 4.1. Flight management centers and airports in Sweden................. 40
Figure 4.2. Logistics service providers and integrators responses.............. 43
Figure 4.3. Logistics service providers and integrators responses (II)........... 44
Figure 4.4. Transport modes of the logistics providers............................. 45
Figure 5.1. ARA Model Analysis............................................................ 53
Tables
Table 1.1. Historical and forecast air cargo growth rates ............................................. 2
Table 2.1. Approaches to Supply Chain Management ....................................................... 7
Table 2.2. Collaborative logistics management and the role of third-party service providers ................................................................................................................................. 15
Table 2.3. Collaborative logistics management and the role of third-party service providers (II) ................................................................................................................................. 16
Table 3.1. Case study matrix .................................................................................................. 33
Table 3.2. Types of interviews and their usual characteristic .............................................. 34
Table 3.3. Schedule of interviews ....................................................................................... 35
Table 3.4. Three activity flows of data analysis ................................................................. 36
Table 4.1. Nationalized and privatized airports in Sweden .................................................. 40
Table 4.2. Integrators Interview Summaries ....................................................................... 50
Table 4.3. Forwarders interview Summaries ....................................................................... 51
Table 4.4. Manufacturer interview Summary ..................................................................... 52
Appendix
Appendix A: Questionnaire (Integrators, Freight forwarders) ............... 9
Appendix B: Questions (Airlines) ......................................................... 15
Appendix C: Questions (Manufacturer) ............................................. 16
Appendix D: Employees and net sales in transport sector .................. 17
I Introduction

This chapter will give the background to the topic of interest which includes a problem discussion, where different problems affiliated with air-freight will be presented, together with a purpose of the thesis as a clarification of the discussion. This introductory chapter ends with the delimitations. This chapter aims to give an understanding of the intention and the boundaries of this thesis by using an approach, from general to specific. The scope is introduced by a general background of the selected topic and the region selected that is of particular focus.

1.1 Background

Air transportation is one of the quickest ways to move both goods and passengers to their destinations. It is also one of the fastest ways to transport air cargo over long distances (Bureau of Labour Statistics, 2011). The air freight sector has been growing rapidly, from around 5 million tonnes in the 1980-ties to around 18 million tonnes in 2000 (Neiberger, 2008). From the years 1997 to 2007 the world air cargo growth rate was an annual 3.9%. The sector saw a recent decline in 2008 (-1.8%) and 2009 (-11.3%) due to the global economic downturn which had a global market effect (Boeing, 2010). At this time the world industrial production fell rapidly leading to the lowest freight transportation levels in the past century. The air industry has faced challenges such as increased security checks of cargo post 9/11 (Air Cargo World, 2011). From 1999 to 2009 the world cargo growth rate was an annual 1.9%. Conversely in 2010 there was a shift towards a rising air freight sector. According to forecasts the world air cargo traffic are estimated to increase within the next ten years and have an annual growth rate of 5.9% compared to the levels in 2009. This forecast predicts that air cargo traffic will be three times higher than it was in 2009 and over the next twenty years will continue to increase driven by economic activity (Boeing, 2010). Hence, economic globalisation with increased growth of worldwide production and rising complexity of supply chains can help clarify the forecasted increase of the air freight sector (Neiberger, 2008). Certain geographical markets will have a higher or a lower forecasted air cargo growth rate, as illustrated in Table 1.1 (Boeing, 2010).

According to Table 1.1 the overall world air freight will increase from 1.9% to 5.95%, breaking that up into the various parts the greatest percentage increases are estimated to be air traffic flows between Latin America and North America as well as between Europe and Asia.
Air freight is part of the global goods distribution chain. The transportation modes include road, rail, sea, and air which often can transport the same type of goods. This leads to the selection of transportation modes being one of the key decision making attributes within logistics management. In addition to the main transportation modes there are a number of inter-modal options, where more than one transportation mode is being utilized (Coyle, Bardi & Novack, 1999). For intercontinental freight there are mainly two choices of transportation modes; air and sea. Sea transport is a slow moving and low cost option whereas air transport is a quick and reliable option (Coyle et al, 1999). The sea transportation industry is larger than the air transportation industry when measured in tonnekilometers of goods transported (Boeing, 2010). However the divergence is often in the type of goods being transported. The sea transportation industry includes the transfer of goods such as oil, metal and grain. The air transportation industry includes high value, dry goods that have a tendency to be smaller in volume and more time sensitive (Wang, 2007). Air Cargo and air freight are terms that describe goods, which are seen by the sender of the goods, as possessing time and speed utility (Gentry, 1952). Air freight can either be moved in the cargo holds of passenger airplanes or carried on airplanes specifically designed to carry air freight (Career Guides to Industries, 2011).

When making the decision about what transportation mode or modes to use the focus often can lie on costs and transit time. Transportation costs within manufacturing firms aver-

<table>
<thead>
<tr>
<th>Region</th>
<th>Historic 10 Years (1999-2009)</th>
<th>Forecast 20 Years (2009-2029)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>1.9%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Intra-North America</td>
<td>-2.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Latin America-North America</td>
<td>-0.7%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Latin America-Europe</td>
<td>2.5%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Europe-North America</td>
<td>-1.5%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Intra-Europe</td>
<td>0.1%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Middle East-Europe</td>
<td>6.5%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Africa-Europe</td>
<td>3.3%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Asia-North America</td>
<td>1.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Europe-Asia</td>
<td>4.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Intra-Asia</td>
<td>3.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td>South Asia-Europe</td>
<td>4.1%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Domestic China</td>
<td>13.1%</td>
<td>9.2%</td>
</tr>
</tbody>
</table>

Table 1.1. Historical and forecast air cargo growth rates (Boeing, 2010)
age 20% of total production costs (Russell & Taylor, 2003) and is hence a major part of total cost that a manufacturing firm has to include and can be of importance when pursuing competitive advantage and long term orientation (Reimann, 1989). Carrier selection is one key decision making attribute that perhaps becomes more vital with worldwide sourcing in an era of deregulation (Monczka, Trent & Handfield, 2005). Currently there has been a shift from firms finding a transportation mode and carrier themselves to that of logistic providers doing that work for them (Neiberger, 2008). In a historical view, supply chain management has become more complex with more choices within the transportation modes mainly due to deregulation within the trucking, rail and air industries. Higher customer requirements with the introduction of Just In Time (JIT) (Morton, 2001) and quality management (Murphy & Farris, 1993) also have had an effect on the complexity of the supply chain.

1.2 Problem Discussion

It is of increasing importance to define the environment in which organizations operate, according to Lamey (1996), one concept that has been developed to define the environment that organizations operate in is Supply Chain Management (SCM). The concept includes flow of goods from manufacturer to the retailer, together with information flow. SCM is an extension of a logistics concept, logistics considers the wide set of activities dedicated to the transformation and circulation of goods. Today, globalization has presented companies with added stresses, as they are no longer competing with other firms on a local, regional or national level, but rather competing with companies on a global level (Rodrigue & Notteboom, 2010).

In Sweden, the airports have been state owned until recently, to be specific 2010, when there was shift towards privatization of the air traffic services (LFV, 2011). Today, there are number of airports in Sweden, that are private; Jönköping airport is one of them. The airport is owned by the community and is known as Axamo airport. Jönköping Axamo airport is located geographically at the centre of Sweden, 2 hours from Göteborg in the west, 4 hours from Stockholm in the east and close to 4 and half hours from Köpenhamn heading towards the south. Axamo airport is located 9 km from Jönköping’s city center. Figure 1.1 illustrates the region where the Jönköping Kommun is situated.
The airport is well situated to address some of the logistical issues of businesses in the Jönköping area, which are presented as cargo storage facilities that are large enough to allow for the on-boarding and off-boarding of cargo, as well as sorting of pallets and goods (Larsson, 2011). Nowadays, at airports, the air-freight supply chain is constructed differently with different types of logistic providers acting as integrators.

Hitherto, little is known in respect to regional airports domain and activities, which includes, the kind of goods that are transported, different roles in the network and how important the airport is in the transportation of air freight in the view of logistics service providers within the Jönköping region.

Therefore, the authors think it will be interesting to investigate the current state of the air freight supply chain network that exists within the Jönköping region and hopefully provide a comprehensive description of the current state of the air freight network in the region. In turn, more insights will be drawn in assessing the kind of goods that are suitable for air transportation since goods change over a period of time. Thus, there is a need for a better understanding of the Jönköping region in regards to the construction of the network actors, resources utilized and the activity links that tie them together as they address the need to transport air freight. Knowing this, it could lead to a better understanding of the region, creating a full overview of the actors, resources utilized and the activities that take place to move air freight goods into and out of the region of Jönköping.

Nonetheless, with the aforementioned, this thesis will try to investigate and hopefully provide answers to questions regarding the supply chain networks of air freight in the region, the type of goods being transported and the buying behavior in promotion of air freight in the region.
1.3 Purpose

The purpose of this thesis is to analyze air freight in the region of Jönköping by identifying the supply chains and networks that make use of air freight, the air freight compatible type of goods and the buying behaviour and selection process for air freight.

1.4 Research Questions

RQ1. How are the supply chains and networks that include the transportation of air freight goods and services constructed in the region of Jönköping?

RQ2. What are the type of goods that are air freight compatible in the Jönköping region?

RQ3. What is the buying behavior and selection process for air freight?

1.5 Delimitations

This thesis is limited to the region of Jönköping (Figure 1.1) involving several different modes of transportation. All modes of transportation are presented, however, the focus is on the mode of air; air freight. Jönköping Axamo airport is the regional airport that is referred to in this thesis. The initial focus in the thesis was on integrators and freight forwarders. Through the interviews with those actors there arose a need for further contact with airlines and manufacturers. Thus, it resulted in a limited interview focus on airlines and manufacturer. This thesis will analyze the current transportation practises in the region of Jönköping, however it will not give any transport suggestions.

1.6 Disposition

The first chapter – Introduction – gives a background to the subject of interest and a problem discussion. This is followed by the purpose of the thesis and three research questions. The first chapter ends with the delimitations of this thesis. The second chapter - Theoretical framework – provides the theory behind supply chain management and networks, air freight compatible goods and the buying behavior and selection process for air freight. The third chapter – Methodology – states the structure of this thesis and the type of research method chosen. The fourth chapter – Results of the empirical findings – presents the results from the interviews. In the fifth chapter – Analysis – the findings from the interviews are connected to the theoretical framework. The sixth chapter – Conclusions – discusses the analysis in regards to the research questions found in the first chapter. The final chapter – Future research – presents ideas for future research that could be of interest.


2 Theoretical Framework

In this chapter we will discuss Networks as a component of Supply Chain Management and the air freight industry and theories associated with networks to best understand theories pertaining to the above mentioned topics. Furthermore there will be a section on type of goods transported by air and an overview on transportation modes.

2.1 Supply Chain Management

Since the early 1970’s businesses have operated in the post-fordism production era. Dicken (1998) describes the post-fordism era as being, charactized by four major process changes of technological improvements, labour practice change, “industrial organizational changes: multinationals and small medium-sized enterprises concentrating on their ‘core’ specialities as part of networks of collaborating firms”(Dicken 1998, p. 360) as well as “market demand/consumption changes: increasingly differentiated (customized, segmented, niche, life-style) demands for goods and services” (Dicken 1998, p. 360). These process changes have occured within the context of “globilization”, where the “quantitative” shift view is that intergreation of the world economy occurs through the interconnectness of communities across the globe and the emergence of networks to assist in this shift (Dicken 1998, p. 360). In addition to the ‘quantitative’ shift there is also a ‘qualitative’ shift whose view is based on the fact that both production and investments operate in a global context without regards to national boundaries (Dicken, 1998).

Globalization presents companies with added stresses as they are no longer simply competing with other firms on a local, regional or national level but rather compete with companies on a global stage as customers are now able to get their products across borders (Auger & Gallaugher, 1997; Rodrigue & Notteboom, 2010). End consumers of products and services are now more than ever acting as strong influencers on supply chains (SC) dictating when and where and how they would like their products to be delivered to them. This forces firms to seek to create systems which can adapt to the rapid customer demands and changes in the global market environment (Razzaque & Sheng, 1998). Some companies have adapted their processes and business models to respond to the shifting demands presented by customers. This has resulted in large number of companies establishing multiple production sites, and offering multiple business opportunities to their clients. These changes have been influenced by trends such as Just in Time (JIT) (Meng, Liang & Chen, 2010), mass customization, and postponement of production until goods have been demanded by customers rather than simply pushing products into the market place (Ford, Gadde, Håkansson & Snehota, 2006; Lynch, 2004).

Increasingly of importance has been the need to define the changes that have occurred as a result of this new environment in which companies operate, one concept that has developed has been that of supply chain management (SCM). There are several definitions of SCM that various authors have arrived at such as the distribution channel perspective (Lamey, 1996) where by the supply chain is inclusive of the flow of goods from the manufacturer to the retailer with information flows going on between all the members of the supply chain.
(Håkansson & Persson, 2004); an extension of the logistics concept where supply chain activities deal with transformation and flow of both goods and information flows from raw materials to the final customer as defined by Handfields and Ernest (1999); Christopher (1998) and Mentzer et al. (2001) as well as Hertz (2006) define the supply chain as involving firms which are interconnected through a network that are involved in both upstream and down-stream flows from as far as the sub-supplier until the final customer (Hertz, 2006). Håkansson and Persson (2004) provide an excellent overview of the different theoretical underpinnings of the SCM literature whereby they discuss Harland (1996) four different theoretical levels as presented within her 1996 article in the British Journal of Management and highlighted within Table 2.1 below. The main levels are the “internal supply chain, the dyadic relationship, the external supply chain, and the inter-business network” (Håkansson & Persson 2004 p.12).

Table 2.1. Approaches to Supply Chain Management (Adapted from Håkansson & Persson, 2004)

<table>
<thead>
<tr>
<th>Approach</th>
<th>Internal Chain</th>
<th>Dyadic Relationship</th>
<th>External Chain</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Operations, Factory, Firm</td>
<td>Firms in specific relationships</td>
<td>Series of activities of firms defined by value creating process</td>
<td>Network of actors or firms</td>
</tr>
<tr>
<td>Phenomena studied</td>
<td>Design &amp; management of internal activities and processes: Operations, move, store</td>
<td>Organization of a relationship</td>
<td>Systems performance: Design and management of system as a whole</td>
<td>Position, exchange processes and network structure and performance</td>
</tr>
<tr>
<td>Theoretical foundation</td>
<td>Analytical Operations management; Systems theory</td>
<td>Industrial Organization; Contract theory</td>
<td>Systems Theory: Logistics; Distribution: Channel Theory</td>
<td>Industrial Organization: Network Theory</td>
</tr>
</tbody>
</table>

Within Table 2.1 the internal chain identifies the business processes involved with the movement and flow of both information and materials into and out of the company that enables it to perform its operations (Håkansson & Persson, 2004). The dyadic relationship focuses on the management of “two party relationships between immediate supplier” and focal company (Håkansson & Persson, 2004). Whereas the external chain is involved with the management and coordination of a business chain which includes “a supplier, supplier suppliers, a customer and customers customers” (Håkansson & Persson, 2004). The fourth, the network involves the interconnectedness of businesses that are interdependent working towards the provision of products and services required by the final customer (Håkansson & Persson, 2004, p. 12). Halldorsson and Skjott-Larsen (2006) view the network approach as shedding light on the “development and management of inter-organizational relationships” (Halldorsson & Skojtt-Larsen, 2006, p. 493). The network approach will be further developed in the following section as it has a central placing within this thesis.

### 2.2 Dynamics of Networks

Ford et al. (2006) present a model that outlines the dynamics of networks comprising of companies, relationships and networks. The following figure argues that the environment
Companies are faced with are increasingly becoming complex due to the added pressures they face along with their relationships with other companies within the networks they do business in. Figure 2.1 discusses the stresses faced by companies doing business across boundaries these days. They are faced with cost and time pressures which cause them to need to create situations where their relationships within and between firms are constantly with complexity and added pressures. This in turn affects the networks they are a part of as they are faced with the need to be aware of the globalization effects as well as added complexity in their networks.

Anderson, Håkansson and Johanson (1994) believe that it’s important to create a conceptual framework towards a better understanding of the dyadic relationships which allows them to showcase how they developed and the embeddness from which those relationships occur. The focal firm focus with the review of how it is connected with other partners within their network. Working to expand the knowledge base of how firms are interconnected. Other authors that have emphasized the importance of dyadic relationship are; Anderson and Narus, 1990; Anderson and Weitz, 1989. They work towards building on the research that the firm environment encompasses the socially created environments, the sense of the firms environment is contested and that firm boundaries are not as strongly constructed as previous research and that firm boundaries continue to dissolve. Creating a situation where the firm interacts with its perceived environment. Those researchers emphasize the importance of dyadic relationships between businesses that focus on the ties between firms. Anderson et al. (1994) work towards describing the characteristics of the environment in respect to the type of forces which create the environment and the way in which the focal firm’s relationship with another firm is connected and the environment it operates within.

Ritter, Wilkinson and Johnston (2003) also present a different viewpoint, that of firms being in control of themselves and their surrounding organizations. Franchisor that controls and directs its franchisees is given as one example of when a firm both chooses and directs the relationship. Management of relationships and networks is about managing interactions that include both influencing and being influenced by others (Ritter et al., 2003).

One of the resulting systems that has evolved is that of the industrial network. Hertz (1996, p. 106) points out that the industrial network is derived from a set of connected exchange rela-
tionships amongst actors and can be from three different angles: “the single organization, relationship between organizations and the total network”. The industrial network focuses on the interdependence of companies in the network and emphasizes the interconnected relationships and the innovation that takes place through the evolution of their relationship. It also takes in the social exchange factor as being important in the network along with the adaptation that takes place throughout the network (Hertz, 2010).

Hertz (1996) ties that in with internationalization and mentions that internationalization within networks building up on the point above is further “based on the changes in single organizations, in the relationships among them, and in the total network” (Hertz, 1996 p. 106). Involve both companies and individuals interacting through business activities which are viewed as business actors (Halinen & Tornross, 1996, p. 188). Companies and the networks they form are socially and historically constructed. Should be studied under the type of connections the actors have with their surrounding actors, 1. Actor network, 2. The Dyad Network, 3. Micronet/Macro Net (Halinen & Tornross, 1996). Networks are attractive as they provide economies of scale and are constructed over a geographically span.

2.2.1 Global Commodity Chains (GCC) and Actor Network Theory (ANT)

Dicken, Kelly, Olds and Yeung (2001) on their study of the validity of using a network methodology to analyse the global economy discussed two types of network methodologies that of “global commodity chains (GCCs) and actor-network theory (ANT) (Dicken et al., 2001, p. 92) Gereffi (1996, p. 96-7) define GCCs as “sets of interorganizational network clustered around one commodity or product, linking households, enterprises, and states to one onther within the world-economy. These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embeddedness of economic organization.” (Dicken et al., 2001, p. 98).

Actor-networks are seen as “the chains which give rise to natural and social realities, realities which can only be understood as tabilized sets of relations which allow the construction of centers and peripheries, insides and outside, humans and non humans, nature and society, and so on” (Dicken et al., 2001, p. 102).

2.3 Dynamic of Companies in Networks

Firms are linked in business systems and therefore a single firm cannot solely stipulate an understanding of the processes of business (Ritter et al., 2003). A firm is connected to other organizations rather than being an island. “A business relationship can be defined as a process where two firms or other types of organizations form strong and extensive social, economic, service and technical ties over time, thereby achieving mutual benefit” (Ritter et al., 2003, p. 176). The relationships of a firm provide a range of benefits such as access to markets and competencies, making the management of these relationships essential. The management of business relationships needs to include both internal and external relationships however the business networks are self-organizing systems where a firm is both influencing others and being influenced by others. In these self-organizing systems order
comes in a bottom-up manner meaning from the regular interactions. Single firms as well as network of firms have complex relationships and are not completely instrumented by central directions. This makes the management of business relationships a complex matter and a source of competitive advantage (Ritter et al., 2003). The types of business relationship partners that are possible can be illustrated by Figure 2.2.


The firm’s value net model as displayed in Figure 2.2 was first developed by Brandenburger and Nalebuff (1997) where four types of organizations are recognized. These four organizations are other customers, suppliers, complementors, and competitors which have an effect on a firm’s ability to produce and to deliver value to a customer. There are relationships with customers, suppliers, complementors, and competitors. The model has been extended by Ritter et al. (2003) to include intrafirm relations (shown by the arrow within the four organizations and the company). Intrafirm relations play a role since these relations are the base through which interaction with other firms is done. There are both positive interdependence (the actions of a firm facilitate another firm to achieve its objectives) and negative interdependence (the actions of a firm hamper another firm to achieve its objectives) between the actors that can be viewed in the model. Positive interdependence tends to involve relationships with customers, suppliers and complementors whilst negative interdependence tends to involve relationships with competitors.

Dynamics of companies in the current business environment are one where companies are continually faced with increased levels of competition from multiple new sources (Ford et
Companies are continually forced to work towards reducing prices of their goods and services. This in turn causes suppliers to lower costs and creates a ripple effect throughout the network and chain affecting other suppliers in the network (Ford et al., 2006). Companies are also faced with the need to get their goods and services to market in a timely fashion placing added stresses on them in relation to time pressures.

### 2.4 Network and Actors, Resources and Activities (ARA) model

When it comes to understanding how relationships between companies operate it is important to note that there are three main ways to access the relationships through the ARA model (Figure 2.3) which stands for Activity links, Resource Ties and Actor bonds (Ford et al., 2006).

![Figure 2.3. ARA model.](image)

Business-to-Business (B2B) relationships between customer and a supplier can be linked together by some activities which they both perform in order to ensure successful business operations these are known as activity links. Whereby resource ties can also tie their relationship interactions together. These resource ties are created through interactions between various knowledgeable staff that are continually in contact across both organizations. Take for example a purchasing manager in company A interacting with supply company B's relationship manager, they are both resources in their corresponding firms and their resources are their expertise and their knowledge which they utilize in their interactions together (Ford et al., 2006). Actor bonds are human and social aspect of the relationship interactions in B2B environment. It is important to have an understanding of networks and how relationships can be perceived within networks in order to understand better how these interactions or bonds can be affected when there are uncertainty or disruptions to these rela-

11
tionships within a network (Ford et al., 2006).

### 2.4.1.1 Resource Ties

Connections in terms of having relations whereby one exchange or interaction is dependent on there being a corresponding interaction and exchange taking place in order to create the connection (Anderson et al., 1994). Connections within networks take place where one company interacts with another and their interactions take place in the form of resources such as individuals interacting with another resource or individual within another firm and their activities such as purchasing supplies within another firm has the corresponding actor (individual) completing another interaction within their firm to create an order for goods that will be delivered to the Cosignee in order to fulfill the order to completion. Connections can be both directly and indirectly connected to other connections in terms of relations within the business network. Anderson et al. (1994) argue that connections between firms are supported by dyadic relations and thus the following Figure 2.4 outlines the connections of firms that are involved in a dyadic relationship and presents the focal relationship between a customer and its supplier and discusses the other links which are the other relationship links to the other actors involved with both the supply and the customer simultaneously as the focal relationship is taking place.

![Company connected relations in a Dyadic Relationship](image)

Figure 2.4. Company connected relations in a Dyadic Relationship (adapted from Anderson, Håkansson & Johanson 1994).
2.4.1.2 Actor Bonds

Demsetz (1993) and Henderson and Quandt (1971) (cited within Anderson et al., 1994) created some of the first research on companies operating as actors that are performing activities and utilizing resources. Relationships between firms can be explained further through actors, resources and activities. Primary and Secondary functions are discussed by Anderson et al. (1994) with primary functions creating greater efficiencies through the linking of resources, leveraging of resources and the actors mutuality that is based on self interest (Anderson et al., 1994, p. 3) Secondary functions can be interchanged with network functions and are connections that exist within relationships and focus on three main components such as chains of activities, constellations of resources that are in the occur between two or more firms and shared network perceptions; from two or more companies. When companies adapt their activities through their relationships to other companies they are creating chains of activities which enable them to create complementary and or interdependent activities that cross several companies. When companies engage their resources in developing a relationship they in turn can create constellations of their resources through the interconnected relationship links within their company and that of other companies in their network. Companies will be exposed to the views of their relationship partners and as a result can be shaped by their views as well as have an impact that can shape the views of their partners leading to the shared network perceptions (Anderson et al., 1994).

2.4.1.3 Activity Links

Activities links are constructed of the tasks the firms who are interacting together through a dyadic relationship or within a network complete together or in tandem in order to achieve their common goals. When companies adapt activities together across multiple relationships they are able to create complementary or “interdependent activities” whereby they end up spanning several firms at the same time (Anderson et al., 1994, p. 3)

2.5 Development of the Air freight industry

Historically air freight as a commercial industry did not develop until after the Second World War where a separate categorization for air freight was created in 1944 (Gentry, 1952). Prior to the introduction of the Federal Express by Frederick Smith which later became known as FedEx in 1982 the landscape of the air freight industry was one where air freight was transported by passenger airlines in the underbelly area dedicated for cargo using the same traffic lines as that of the air passenger airlines (Century of Flight, 2011). Smith identified “that there was a difficulty in getting packages and other air freight within one or two days and linked it to the inefficient passenger route systems that were at the time being used by air shippers” (Fedex, 2011) in an undergraduate research paper in 1965 whilst he was at Yale university (Fedex, 2011). Smith’s solution was to establish a separate route system to that of passenger airlines which resulted in the creation of a separate hub in Memphis, Tennessee in April 1973 from where they were able to deliver goods rapidly and reliably to their customers (Century of Flight, 2011; FedEx, 2011). The overnight express industry can trace its routes to the creation of FedEx’s and its entry into the air freight transportation market (Cargo Airline Association, 2010).
The advent of the internet and the establishment of commerce over the internet through electronic commerce (e-commerce) has created changes in the market environment for businesses (Auger & Gallaugher, 1997; Tenenbaum, Chowdhry & Hughes, 1997; Bowen, 2004; Morton, 2004; Neiberger, 2008 p. 248) and opened up further opportunities presented by globalization, deregulation (Neiberger, 2008) and adoption of new business practices (Hertz, 2001; Rodrigue & Notteboom, 2010; Kay, 2005; Neiberger, 2008) to supply chains with the need to integrate logistics functions and establish networks with both suppliers and customers (Sowinski, 1999).

These changes in turn have created an environment where goods need to be transported quickly, efficiently and on time in order to meet the increasing customer orders which are coming from the global market (Rodrigue & Notteboom, 2010). In addition company adoption of new inventory management processes such as Just in Time (JIT) has also driven the movement of goods via air freight (Morton, 2001). The environment has continued to change for companies as there is a continual movement towards outsourcing of transportation to external transportation firms (Razzaque & Sheng, 1998) in order to focus on core competencies (Meng et al., 2010). Usually firms select the option of outsourcing with the aim of achieving greater efficiency and effectiveness of their logistics functions (Meng et al., 2010).

Researchers such as Gentry (1996), Larsson and Gammelgaard (2001), Skjoet-Larsen et al. (2003) define a logistics triad as a relationship between the shipper, carrier and the receiver and carrier. Their definition of the triad is explained in the Table 2.2. This relationship is key in ensuring the movement of goods by logistics service providers to their customers which are the receivers. In order to best understand the remaining actors involved in the air freight network reviewing the literature on logistics service providers creates a good start to be better able to understand what the various actors do and what researchers have said they have done over time.
A recent study by Stefansson and Gunner (2006), produced a comprehensive review of previous authors definitions of logistics service providers and the types of services they provide towards their customers. The findings are outlined in Table 2.3. Researchers in the 2000’s seemed to focus on defining the logistics actors that arose to work towards addressing the changes within the international transportation environment and their definition of Logistics Service Provider (LSP’s) are that they are usually asset based firms that have their own warehouses, and distribution centers. Langley et al. (2004), Lieb and Bentz (2004), Delfmann et al. (2002) argue that LSP’s provide an array of services to thier customers to address thier need to transport thier goods efficiently and effectively. Logistics Service Intermediaries is the name coined by a number of researchers for non-asset based companies which transport goods through the coordination of carriers, contractors and focuses on the administration activities needed to control and organize the movement of goods. They are considered to be the actors needed to coordinate goods transport efficiently and effectively for their clients.
In order to address competition issues firms are choosing to transport goods which are "low-volume, light-weight, time-sensitive, and high-value goods by air" (Wang, 2007, p. 221). If we were to look at the growth of airfreight from the 1970's it can be shown that measured in terms of Revenue Tonne Kilometer (RTKs) it has grown "7.1 percent annually" or greater than 2.4 times faster than that of the rate of Gross Domestic Product (GDP) growth (Kay, 2005, p. 1). In order for businesses to continue to achieve success they need to continue to focus on being able to respond and adapt to the ever-changing customer needs (Neiberger, 2008, p. 248). With product cycles also becoming shorter there is the need for corporations to be able to introduce new products and technologies into the market as quickly as possible as well (Neiberger, 2008) they are able to achieve this through the transportation of their goods via air freight.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Actor</th>
<th>Focus</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheffi (1990),</td>
<td><strong>Carrier:</strong> Asset based operator that owns their own trucks and assets and provide transportation of goods</td>
<td><strong>Point to Point:</strong> Movement of goods from one location to another usually with a full load. <strong>Multiple Stop Network:</strong> Either full Truck Load (DTL), Less than Truck Load (LTL) with multiple stops within a planned route.</td>
<td>*Inbound/Outbound Transportation  *Door to Door transportation service  *Contract Delivery  *Administration of Transportation  *Transport Tracking  *Tracking and Tracing</td>
</tr>
<tr>
<td>Sink et al (1996),</td>
<td><strong>Logistics Service Providers (LSP):</strong> Are asset based with ownership of trucks, handling equipment warehouses, distribution centers and terminals.</td>
<td><strong>LSPs:</strong> provide an expansive array of services along with transportation services</td>
<td>*Tendering and Contracting  *Forwarding Services  *Track and Trace of goods in transit.</td>
</tr>
<tr>
<td>Stefansson (2006)</td>
<td><strong>Logistics Service Intermediaries (LSI):</strong> Non owner of assets but organize the administration of logistics activities</td>
<td><strong>Create</strong> Design of Distribution set ups  <strong>Locate</strong> right contractors (Carriers and LSP’s)  <strong>Implement</strong> the solutions they set up using their contracted partners.</td>
<td>*Create logistic setups  *Operate Logistics Setups  *Forwarding Services  *Track and Trace services  *Customs Services</td>
</tr>
</tbody>
</table>
The percentage of goods transported via air has increased over the past two decades from the 1980s until recently and reviewing the percentage of air freight carried through in 2006 it can be shown that air freight had thirty five percent of the overall global trade of merchandise (IATA Cargo Symposium, 2010). Overall there appears to be a lack of visibility into the importance of air freight to the global economic market. This point came to light at the IATA World Cargo Symposium in Vancouver in the early months of 2010 where members within the industry gathered to discuss the image of air cargo being thought of as the neglected "poor cousin" in the industry and why it was not selling its services effectively and ensuring that its benefits were more widely known (IATA, 2010).

2.5.1 Hub and Spoke

Dennis (2001) argues that the Europe has significant geographical differences to the US that make its adoption of the Hub and spoke system processes such as used in the US to be ineffective. Hubs are seen to be of little importance as the geographical make up of Europe and the proportion of capacity constrained airports is much larger than that of US. Further on to that he discusses that airports operate passenger traffic in waves of arrivals and departures and some airports are operating daily up to seven waves of arrivals and departures and it appears a majority of the major hub airports are reaching capacity of the number of waves they can implement daily. This has in turn affected the hub creation of airports. Major hub airports such as Heathrow in London are faced with questions of how they will increase the number of airlines they can accommodate at their airport this has lead to the offshoot from these hubs towards outgoing spokes on the network that they are part of to take on new routes to allow for greater variety of airports and to accommodate the capacity issue (Dennis, 2001). Continuing on that line Dennis (2001) emphasizes that there is opportunity for the creation of hubs that create a niche especially if they are geographically situated in a good location and have “local business demand and under-utilized airport facilities” (Dennis, 2001, p. 54). By bringing in traffic from other regions they will be able to build up a larger network on top of their local limited flights. Though Dennis focuses on passenger traffic it is important to note the differences and similarities that passenger traffic holds to that of cargo traffic.

2.6 Types of goods transported by air

What are the type of goods and who are the actors responsible for transporting those goods via air would you ask yourself? One possible way of determining what goods would need transportation by air could be by assessing the inherent factors as outlined by Gentry (1952) such as the "density, the fragility, the perishability along with the intrinsic value of the good" as well as the incidental factors such as the "emergency or urgent reasons why it must be transported by air, the advertising and novelty value" that is linked with air freight (Gentry, 1952, p. 2). The decision to transport goods via air is usually dependent on the emphasis put on time being of greater importance to that of overall cost of moving the good by air (Gentry, 1952). Goods transported by air are as vast and varied as "high value, time-critical products such as computer chips, pharmaceuticals, just-in-time inventories, urgent documents, electronic components, aircraft parts, high-fashion apparel, cellular telephones, and time and temperature critical perishables" (Kay, 2005, p. 2) were some of the
types of goods outlined by Dora Kay in the 2005 spring issue of the International Air Cargo Association as an introduction to the newsletter. The air freight market not only provides movement of high-technology products, perishable and jewellery but has also grown to encompass seasonal toys, footwear and fashion clothing (Kasarda, 2007).

2.7 The Actors in the air freight transport industry

The type of firms which were responsible for the transport of goods via air were traditionally air cargo forwarders, airlines and later on integrators (Zhang et al., 2007). With the greater outsourcing of transportation activities to external firms there has been an increase in the different types of transportation firms which have evolved to provide service offerings to address the need for goods to be transported more efficiently, effectively and quickly (Neiberger, 2008).

2.7.1 Forwarders

Originally airlines used forwarders as their sales agents. Forwarders sold the services of airlines to their customers. Their role has evolved from that of the traditional sales agent to that of a broker or agent who creates contracts with shipper and organizes all aspects related to coordination and management activities associated with the shipment of cargo (Zhang et al., 2007). Bowen and Leinbach (2004) describe a freight forwarder as an “intermediary linking a shipper to an airline, shipping line or trucking firm and or/linking one of those transportation services firms to the consignee” (p. 174).

2.7.2 Airlines

Airlines are what you would call combination carriers as they carry both passengers and freight. Air Freight is carried in the hold of passenger aircraft along with the freight aircrafts. Conventionally airlines are known to not deal with customers directly (Bowen & Leinbach, 2004). Traditionally airlines worked with forwarders who highlighted their services to their customers who later ordered their goods to be transported by the airlines via forwarders (Neiberger, 2007).

2.7.3 Integrators

Are a relatively new entrant into the air cargo industry. Zhang et al. (2007) argues integrators have taken on high value customers and the premium market within the air cargo industry and have introduced them as competing actors within the industry taking up market share from forwarders. Bowen and Leinbach (2007) discuss that integrators provide handling of shipments from origin until destination dealing directly with the customer providing a situation where they have created a work around and taken over the traditional role played by the forwarders (p. 175). Well known integrators are Fedex, UPS which are North American founded as well as DHL and TNT from Europe. Traditionally integrators used
to be express mail providers and leaders in the postal business. Integrators have since expanded their service offerings through extensive investments in technology and expansion of their global network (Melbin, 1997; Chu et al., 2004).

Figure 2.5. Development of Air freight from traditional to global network (Adapted from Neiberger, 2008, p. 249).

Neiberger argues that due to deregulation and globalization a number of firms which had previously been responsible for transporting goods have branched out their services to become logistics service providers who offer a vast service offerings for their customers and possess greater responsibility for organizations and the "direction of material and information flows between businesses" (Neiberger, 2008, p. 249). It appears that within the air freight industry hierarchies have developed amongst logistic service providers whereby they moved away from more of a traditional simple air freight chain to that of a global networks (Neiberger, 2008). Figure 2.5 as presented within Neiberger's 2008 article outlines the changes that have arisen due to deregulations, globalization and changed customer requirements perfectly outlines that change discussed above in relation to the movement of air freight networks towards that of global networks.

In the first part of Figure 2.5 above Neiberger explains that it shows the traditional way the air freight industry used to operate in that the exporter would engage an Airfreight forwarder who would acquire space in an airline. The Air freight forwarder would be the go be-
tween the exporter and the cosignee. In the second part due to movement from traditional to global network there are a number of different levels added with there being multiple touch points from the time the Exporter requested their goods to be transported until the Cosignee receives their product. It is no longer a simple transaction between Exporter, Air freight forwarder, airline and Cosignee. Currently goods seem to travel over multiple modes such as overland transport, warehousing as those activities are being outsourced towards further ground handling prior to being transported via the airline. During all the multiple touch points the Airfreight forwarder is still able to be in contact in regards to where the good is located at any point in time as they have systems set up where they keep track of goods for both the Exporter and the Cosignee (Neiberger, 2008, p. 249).

Forster and King (1995) present information on the both traditional actors involved in the air freight industry as well as the new entrants into the scene as well and their definition of the traditional actors is somewhat similar to that of (Neiberger, 2008). Their version of the traditional actors includes the following; Airlines (“passage” cargo carriers and cargo only carriers), Ground Transport Companies (truck and rail) and Freight Forwarders (door to airport and airport to-door ). They also believe that a new entrant has entered the market and that entrant is what they call the integrated carrier or integrator. The Integrated Carrier which are also known as integrators and developed from transporting “small, high value, time-critical packages” into highly integrated firms which do everything including flying the cargo within their own aircrafts. An example of such a firm is Fedex (Forster & King, 1995).

Forster and King (1995) unlike other authors which present integrators as being a large threat and success rather argue that though integrators revenue level have increased to equal that of the traditional air freight providers they are facing issues whereby they are reaching the limit of “economies of heterogeneity and integration (Forster & King, 1995, p. 151). They go on to further argue that integrators are able to be successful in domestic market but face challenges when they attempt to operate across national boundaries as they are faced with government regulations that work to limit their ability to effectively conduct their business (Forster & King, 1995).

2.8 The buying behavior and selection process for air freight

As global business and sourcing are increasing there is a secure need for speed in freight services (Bowen & Leinbach, 2006). Additionally, new technologies, immediate communications, just-in-time production (JIT), as well as intense competition to add value all enable an environment where air freight thrives. Air freight services, such as next day delivery, are increasingly being demanded due to this urgency in demand; “the suppression of inventory levels is… promoting the growth of express freight services” (Lillie & Sparks, 1993, p. 14). Higher service levels, inventory reductions and other area savings compensate for the higher costs of using air freight. The highest increase of air freight usage has been in the air express sector which is executed by the integrated carriers. The integrated carriers collect, transport on own aircrafts and deliver packages in a transparent way where the customer can access up-to-date information about the fast shipment. There are also more traditional carriers where freight forwarders collect and transfer packages to and from an air carrier. Airlines experience that both integrated carriers and other traditional cargo carriers are growing which is why airlines are expanding and improving their cargo services. “Many car-
riers previously regarded cargo services as merely a by-product of operating passenger services. They recognize, however, that revenue can be maximized through air cargo... Air freight makes a significant net contribution to the profitability of airline services, even after deducting all the additional costs incurred to earn it” (Lillie & Sparks, 1993, p. 15). Closer relationships between airline carriers and freight forwarders could result in the airline carriers being able to affirm their market share. “95% of all air freight is handled by air freight forwarders... although this figure is reduced today by competition...freight forwarders are the air carriers front line troopers in the battle against integrated express carriers” (Lillie & Sparks, 1993, p. 15). Freight forwarder is a “…shipping or forwarding agent- initial role was one of “arranger” of international transport services, finding space for a shipper’s export cargoes. In recent years this role has expanded encompassing the co-ordination of transport documentation, custom clearance and other such ancillary services” (Lillie & Sparks, 1993, p. 15). Lillie & Sparks (1993) define five core activities offered by freight forwarders; arrangement of carriage of payments, consolidation of air freight, advice on routing, take on related documentation, and customs clearance arrangements. These activities are further described as concerning “assembling small shipments into large consignments which are passed on to an airline in the name of the freight forwarder as shipper” (Lillie & Sparks, 1993, p. 15). Freight forwarders are purchasing services from the airline carriers and to be able to tackle the rise of the integrated carriers they need to operate in a close manner with the airline carriers.

There are three groups of theoretical models that explain a buyer’s behavior within the procurement process; task models, non-task models, and complex models. Task models concentrate on the economic factors of a decision. Non-task models are concentrating on the influences human factors (preferences based on personal satisfaction, seller relationships, risk minimization) have when selecting an air carrier. An example on a complex model is the Buygrid model where there are three buying situations that are different from each other; new task (other/new needs that require finding potential carriers), modified re-buy (re-evaluate carriers), and straight re-buy (purchasing services from the carrier chosen on a previous occasion/routine) (Davies & Gunton, 1983).

These three different groups of models were unified into one model; a generalized model, by Davies and Gunton (1983). This model was unified with Maslow’s hierarchical model of needs and provides four dimensions listing freight buyers’ selection criteria as being: risk reduction, price, ease of use, and company image (illustrated in Figure 2.6).
The bottom of the period is made up by the risk reduction criteria that implies service carriers being chosen by how risk advert they are. This perceived risk reduction is based on the reputation of the carriers. Freight buyers include price and other financial aspects (credit facilities, nett billing) in the selection of carriers. There is a need for ease of use arising from the freight buyers indicating that the carriers should provide all those services (consolidation) and know-how (forwarder’s operations) that the freight forwarders might need. Company image include both the promotional material and staff courtesy. The pyramid model of freight buyers first satisfies basic needs at the bottom and prior to the higher needs. The top of the pyramid with appraisal will be used when the four previous steps have been satisfied (Lillie & Sparks, 1993). Critics towards this model are arguing that buyers might not be motivated to implement all the criteria but will reach satisfactory needs instead of optimum needs. As illustrated by the Figure and concluded in a study done by Lillie and Sparks (1993), price is part of the buying decision but is not the main decision making attribute. Furthermore this study concluded that long-term relationship building is depended on a wide range of products being offered by the carriers.

Shippers (producers of goods) and freight suppliers differ in the choice of purchasing criteria for freight transportation services such as air freight transportation services. Criteria such as carrier characteristics, timing, and pricing are vital for shippers. Whereas the transportation route of a shipment is not of particular interest for the shippers. Criteria including scheduling, space, price, and frequency are vital for freight suppliers in their air transportation services buying process. Different criteria used by the shippers and freight suppliers can help recognize areas on which the purchase decision is based and provide a clearness for competitiveness (Matear & Gray, 1993).
2.9 Uncertainty

Due to the increasing complexity of networks and supply chains companies are being exposed to greater levels of uncertainty and risk in their supply chains especially in regards to transport of goods. We want to focus on the need to provide Emergency deliveries. Studies show what this can result from inaccurate weekly forecasts from customers which in turn affects transport demand (Van der Vorst & Beulen, 2002). When suppliers are unable to meet their demand forecasts and as a result become delayed in the production of their products this creates stress on their partners who are in need of component parts at certain points in time.

This in turn will cause them to seek out alternate transport modes such as express airfreight services or express trucking. As discussed earlier this can occur in the form of loads of goods not being ready to be dispatched on time or an issue of full/part loads. Whiteing Rodrigues, Stantchev, Potter and Niam (2008) argue that uncertainty in supply chains lead to increase in total cost, little discussion on the factors, which are the underlying contributors as well as the consequences of having uncertainly, present within freight transport operations (Whitening et al., 2008, p. 389). "From transport perspective, uncertainty can arise for the increase of outsourcing and geographical dispersion within the supply network" (Whitening et al., p. 391). This is due to outsourcing of non core competences to lower cost countries or areas and the implementation of global teams which are working across multiple networks along the supply chain. There arises increased risks of disruptions no longer being locally focused rather they become more global in nature with small disruptions being felt further and longer than the initial localized area of uncertainty. “Transport uncertainties in supply chains can lead to an increase of both risk and vulnerability” (Whitening et al., 2008, p.391). Transport uncertainty is affected by the following factors: transit times, schedules, volume, transport mode (Coyle et al., 1999).

What are some of the contributors to uncertainty in supply chains with focus on the transport aspect of it? Whiteing et al. (2008) argue there has been much research done on the issue of uncertainty in the supply chain management ranging for the early 1900 until the most recent study taking place mid 2000’s, they continue on to emphasis the point that previous research has not focused on the logistics/transport aspect of uncertainty in the supply chain (p. 391). Uncertainty circle model: uncertainty originate from four main areas they are; supply angle, the manufacturing process control systems and the demand side (Whiteing et al., 2008). Events such as terrorism, industrial actions such as (strikes, stoppage of work), disease epidemics and sever weather area present more updated studies which focus on supply rise and vulnerabilities (Whiteing et al., 2008, p. 393). Sanchez-Rodrigues, Potter and Naim (2010) also discuss Mason-Jones and Towill 1998) uncertainty circles model which they further adapted from the earlier work of Davis (1993); their model adds an additional source of uncertainty that being the control system, where they argue that “uncertainty initiated in the supply side and the manufacturing process can be mitigated by application of lean-thinking principles” but that uncertainty which is caused by control systems as well as the demand side must try to understand the intricacies of the entire supply chain this can be seen in Figure 2.7 below (Mason-Jones and Towill, 1998 as cited in Sánchez-Rodríguez et al., 2010, p. 47).
Sanchez-Rodrigues et al., (2007) developed a logistics oriented uncertainty model to address gaps and criticisms that they saw to be present in the transport uncertainty framework. Sanchez-Rodrigues et al., (2007) created a logistics Uncertainty Pyramid Model and its shown below in Figure 2.8 and it discussed the external environmental factors that present uncertainty and have an impact on the internal systems that are faced in relation to the triad relationship of the carrier, shipper and customer.
2.10 Transportation modes overview

During the last decade, between 1997-2007, the increase of the transport in Sweden has had a higher speed of turnover growth than GDP's (ongoing prices) growth in general. For the same time period the number of employees in transport has increased by 30% where the highest total number of employees can be found in Road Transportation and the lowest in Air transportation (SIKA Statistics). Appendix D shows the number of employees and net sales in the transport sector in 2007.

Figure 2.9 shows the structural inelasticity of modal substitution in freight transport.

![Figure 2.9. The Structural inelasticity of modal substitution in freight transport. Axamo airport illustrated by star (Adapted from J.Rich, O, Kveiborg, C.O. Hansen, p. 138).](image)

2.10.1 Motor Carriers

Historically the trucking industry started to play a role during world war one with converted cars that were used for small shipments and small distances (Coyle et al., 1999).

2.10.1.1 Industry overview

There are mainly two ways of division of motor carriers, namely for-hire carriers and private carriers. There are trade-offs for both of these motor carriers and it is finally up to the shippers to decide what option best fits their needs. If utilizing the for-hire carrier there are again two carriers options, the one that operate with a full truckload (FTL) and the ones that offer a less-than-truckload (LTL) option (Coyle et al., 1999).
Of all the transport in Sweden concerning cargo the vast part is made up by road transporta-
tion which in 1997 accounted for net sales of SEK 109 billion and around 62000 employees within the sector. 90% of all companies in this sector are small with up to nine employees with the vast majority being either Limited companies or Sole proprietorships. Road transportation consists of mainly route transporters but also logistics companies and truck centers (SIKA Statistics). One of the reasons for such a high number of small companies is the low entry barrier into this industry in the form of purchasing a truck (Coyle et al., 1999).

Transportation by trucks primarily involves hauling high-value products of various types; including cattle, food, manufactured products as well as consumer and industrial goods. The trucking industry is both expected to and able to meet customer demand by being responsive to high customer service requirements (Coyle et al., 1999).

2.10.1.2 Operating and Service Characteristics

Motor carrier transportation has the advantage of accessibility over the transportation modes Rail, Air and Sea and is sometimes referred to as “universal coordinators” for their function as connectors to the different modes of transportation (Coyle et al., 1999).

2.10.2 Air Cargo Transportation

2.10.2.1 Industry Overview

One of the quickest ways to move both goods and passengers to their destinations is by the mode of air. This is valid particularly for long distance transportation (CGI, 2011). Within the cargo industry cargo carriers do not focus on door-to-door service rather they are responsible for movement of the goods from the airport of cargo origin to that of its destination airport (CGI, 2011).

The International Air Transport Association (IATA) with more than 250 members from 31 nations mostly situated in Europe and North America; is the mode through which inter-airline promotion of in safety, reliability, affordability and security of air travel (IATA, 2011). They state that Air Cargo is a US$ 50 Billion industry that transports around thirty-five percent value of goods, which are part of a larger airline industry value chain of US$ 450 Billion (IATA, 2011).

2.10.2.2 Cost Structure

The aviation industries profit margins are 0.1 percent and have been that way over the past forty years. Speaking at a recent conference, Vision 2050, IATA’s director general and CEO Giovanni Bisignani stated. “But our margins are pathetic – just 0.1 percent over the last 40 years. This is not sustainable. We need to look ahead to anticipate change as we prepare to handle the 16 billion passengers and 400 million tonnes of freight that we will handle in 2050” (Air Cargo World, 2011).
2.10.2.3  Current Issues

Since the 9/11 attacks on the World Trade Center the airline industry has been faced with a number of significant set backs; increased scrutiny, reduction of profits, increased fuel prices. Barnard (2011) forecasts that it will be “hard for the global air cargo business to grow any faster in 2011 than it did last year” (Barnard, 2011, p. 164) It is estimated that Asia and Latin America will be driving the market boom in exports as opposed to the fledgling and fragile growth in Europe and North America (Barnard, 2011). China is forecast to set out to gain greater market share within the emerging market for cargo air business in 2011 (Barnard, 2011). There are predictions that say there will be tighter international regulation of the worldwide cargo security in 2011 in the aftermath of the October discovery of explosive devices at U.K. and Dubai international airports originating from Yemen on U.S bound flights (Barnard, 2011).

2.10.3  Rail Transportation

2.10.3.1  Industry Overview

Rail was first established in Sweden in the 1850’s where the construction of railroads started being built with the aim that they would be mainly built inland and away from the coasts in order to be secure from possible military attacks (CIT Associates, 2011). Sweden’s rail network is the twentieth largest network in the world with an estimated coverage area of 175,000 square kilometers. (CIT Associates, 2011) Rail is usually utilized for the movement of bulk commodities such as grain, ore, chemicals, and coal (Lynch, 2004, p. 29).

2.10.3.2  Operating and Service Characteristics

Rail transportation can be used for both passengers and commodities. Within Rail transportation they have been movement towards greater inter modal options with rail. There are trailer-on-flatcar (TORC) they are used by motor carriers who ship trailers via rail in order to reduce the cost of fuel and drivers. The second intermodal form is known as, Container-on-flatcar (COFC). This mode form is used to help transport goods which arrive by sea by the ports and allow for ease of mobility of goods from ocean carriers onto rail and being transported to their end destination via rail (Lynch, 2004).

2.10.3.3  Current Issues

Increased competition with trucks as they offer greater flexibility in comparison to rail. Much of the rail infrastructure are old and in need of repair. There needs to be heavy investment towards upgrading rail tracks and planning how best to handle future congestion issues. (CIT Associates, 2011)
2.10.4    Sea Transportation

2.10.4.1    Industry Overview

Sea transportation is the least costly option in terms of the amount of weight that can be transported and the distance it can cover. In relation to time it takes on average six weeks to travel from Asia to Europe where goods are then distributed from the major port hubs onto either trucks or rail. This is an industry that consists of large global freight forwarders and Sea vessel companies (Lynch, 2004).

2.10.4.2    Current Issues

The industry has always faced the threat of pirates but as recently as 2008 there have been an increased threat faced by shippers off the coast of East Africa. A large number of vessels have been attacked and taken by pirates. That added risk could continue to increase insurance premiums that in turn could cause ripple effects throughout supply chains and networks that rely heavily on the transportation of goods via sea vessels (Lynch, 2004).

2.10.5    Intermodal

Intermodal transportation involves transportation by at least two different transportation modes with the transfer between the modes being at an intermodal terminal. Usually these types of multimodal movements are provided by various carriers, stretch over long distances, and can involve door-to-door services (Barnhart & Laporte, 2007). The integration of shipments across modes unlike different transportation modes separately being involved is what differs intermodal transportation from multimodal transportation. The advantages of different modes are efficiently utilized from the start off point to the final destination in shape of one integrated transportation chain (Brewer, Button & Hensher, 2005). Multimodal chain of container-transportation services is a frequently used denotation of intermodal freight transportations. There are three focal factors to the success of the container; standard dimensions of loads that can be mechanically handled, standard dimensions of loads that allow for better utilization of ship capacity, and reductions in manpower. The first factor recognizes that standard dimensions of loads enable machines to speed up the unloading and loading of ships; “Ships that once spent 25 days in port can now be turned around in less than 2 days” (Brewer et al. 2005, p. 143). The second factor recognizes that standard dimensions of loads enable economies of scale since ships can hold more cargo than prior to the standard sizing. Finally, the third factor recognizes that less manpower is needed to unload and load a ship; “…whereas a 40 000ton container ship requires 750 man-hours to be unloaded, a similar amount of cargo handled by traditional methods would have required 25 000 man-hours… Ports are thus less constrained by labor conditions, thereby achieving economies which are passed on down the transportation chain” (Brewer et al., 2005, p. 143). Container-based intermodal transportation, as well as intermodal transportation in general (less than container load), are growing and are predicted to continue to grow. An intermodal chain could start with trucks with containers leaving the shipper’s facility and going to a rail yard, an airport or a port. By rail, air or sea (or first by rail/air to a port) the containers (or less than container load, pallets) would be transported to their final destinations, the consignee of the container, where the final transportation will
be made. It could both be more time efficient and cost effective to combine different modes such as air and sea. Air is a rapid transportation mode whereas sea is more cost efficient (Barnhart & Laporte, 2007). Through the usage of hubs there are less points of transfer leading to reductions of terminal costs. This is something that the intermodal industry is utilizing; “Air transport, including passenger traffic, has perhaps gone furthest in developing a hub and spoke network structure” (Brewer et al., 2005, p. 148). However intermodal terminals require spacious sites to operate in and for storage; “Airports require 10 000 ha or more” (Brewer et al., 2005, p. 148). Large aircrafts such as Boeing 727 and Boeing 747F are solely transporting cargo and can respectively hold 115m³ and 748m³ (Brewer et al., 2005) the latter being close to the size of 11 standard 40 foot container that has the volume of 67 m³ (Transport Information Service, 2011)

Freight transportation systems include shippers and carriers. Producers need transportation services of raw materials and final products. In the case of transportation the producers could be referred to as shippers. The supply of transportation services comes from carriers that are a range of actors such as trucking companies, sea ports, and ocean shipping lines (Barnhart & Laporte, 2007).

2.11 Summary

The supply chain view was used to introduce the chapter as it provides background information to the type of business environment that companies have faced since the 1970s where globalization, deregulation and networks were adapted in order to enable them to remain competitive. There are various viewpoints of networks, the essential one is that networks involve companies, relationships between these firms and the type of network they are a part of. Researchers such as Anderson et al. (1994) stress the importance of the dyadic relationship between firms and the level to which they are embedded within their network meaning the development process they under take to reach the level at which they currently are at. Environment in which the organizations operate within, this is emphasized through their relation with other actors, the deregulated business environment and the need for continual solution evaluation in order to compete effectively to get customer orders in order to increase market share and profit. Industrial Networks look at the interconnected relationships and the degree of interdependence facing companies within the network. Networks evolve in order to achieve economies of scale and through both the management of relationships internal and external to the company.

The Activities links, Resource ties and Actor bonds model also known as the ARA model is a basis in which to review how firms construct themselves within a network in terms of how they establish their activity links, resource ties and are related to other firms through their actor bonds. The ARA model and the discussion of Networks provides a great platform from which to discuss the air freight industry and how theory from that area can best be used to discuss the air freight industry in regards to the Actors, Resources and activities in play within the Jonkoping transportation network of air freight goods into and outside of the region. Previous research showed that the air freight industry globally faced a shift in terms of their initial development prior to deregulation and post deregulation. Authors such as Stefansson and Gunner (2006), showed through their review of research on Logistics Service Provider (LSP’s) that they are one of the actors that are involved in the organization of transportation of air freight and that they operate in a type of triad that consists
of Shipper, Carrier and Receiver. This relationship further expanded that of the relationship between the buyer of goods the supply of those goods and the logistics service provider who is the actor that assists in the movement of those goods between the buyer and the supplier. Logistics Service providers are also interacting with other actors within the network these are known as Logistics Service Intermediaries which are the actors through whom administrative organization are able to coordinate the activities needed to achieve the movement of air freight goods by designing a solution and then contracting out those activities to LSP’s who move the goods to the consignee.

Further review of the literature showed that there is a traditional and current state view of the actors involved in the air freight supply chain. The traditional view is of the actors involving airlines, and freight forwarders. The current state view is the discovery of a new actor into the domain which is known as the integrated carrier or integrator. Researchers such as Neiberger (2008) and others stress that there has been a new actor that has entered the arena and that is the integrators which found a niche in regards to the type of services they can provide the consignee and their development has followed as a result of them responding to the market conditions of deregulation and globalization to be best able to create effective solutions to their customers.
3 Methodology

This chapter outlines the methodology used in meeting the purpose of the thesis. The first part of the chapter focuses on the discussion of the research approach and the selection of a suitable approach along with the design of the research and strategy. This section is followed by a discussion of the ethical implications of the research method selected prior to a presentation of the data collection procedure and analysis. The chapter will close with dialogue on the credibility of the research.

3.1 Research strategy

The research process is one where each following step builds on the previous step in order to move towards the goal of a successful completed thesis. In Figure 3.1 from Saunders et al. (2009) the reader can see a visual representation of the steps that need to be followed in order for the research aims to be achieved. There are five main research strategies that can be used in conducting research according to Yin (2003); histories, case studies, archival analysis surveys and experiments. In order for the research to answer questions such as; who, how much, how many, where and what the research strategy can be based on archival analysis and surveys. Whilst if the aim of the research is to answer questions such as why and how the research strategy should be achieved through use of case studies, histories and experiments (Yin, 2003).

This thesis will analyze how supply chain networks that include air freight are being constructed in the region of Jönköping. Since the first type of question is the how type it leads its self towards the use of histories and case studies. What are the type of goods that are air
freight compatible in the Jönköping region?; and what is the buying behavior and selection process promotion aspects for air freight? The last two questions are what based questions which can lead towards archival analysis and questionnaires in order to interpret their answers for the thesis. This thesis will use the case study and archival analysis approaches in order to achieve the ability to answer the research questions and present the material in a coherent and effective manner.

3.2 Research Approach

Saunders et al. (2009) states there are two types of research approaches that can be chosen for research; research can either be quantitative or qualitative. Quantitative research is mainly focused on generating or using numerical research gathering of data as part of the research approach. Qualitative research methods mainly deal with non-numerical data such as interviews and smaller sample sizes than those used via the quantitative method (Saunders et al., 2009; Burns, 2000).

The research within this thesis will use a qualitative approach in order to answer the research questions. Marshall and Rossman (2006) discuss that many of the qualitative research studies conducted by researchers are descriptive and exploratory with those studies that are explicitly exploratory showing the relationships “between events and the meaning of relationships as they are perceived by the participants in the study” (p. 33). Qualitative research will enable us to examine the complexity that is beyond the surface (Gillham, 2000) and understand how the supply chain that includes air freight is constructed in the Jönköping region. It will allow us to be able to discover the actors, and allow us to dig deeper into their environment and how they relate to each other as well as how they view other actors within the environment.

3.3 Case Study

Case study is a research method that accentuates qualitative study of one or several cases (Ellram, 1996). Yin (2003) identifies six types of case studies based on a two by three matrix. The case study can be exploratory, explanatory or descriptive. An exploratory case study’s aim is to aid in the determination of the probability for use of that choice as an option in the research and is also expected to work towards defining the questions of the case study. Descriptive case study showcases an overall picture of a trend within the environment of the study topic. Whilst the explanatory case study works towards explaining how events occur within the context of the environment (Yin, 2003). A case study can be based on either a single or multiple case studies. A single case is mainly focusing on doing a single case study. Multiple case studies include more than one case within the same study topic. Table 3.1 presents the 2 x 3 Matrix and the case study techniques that will be used in this thesis.
A case study approach will enable us to convey through an in depth study how supply chains that include air freight transportation are constructed within the Jönköping region. A descriptive approach will be undertaken in order to describe how the environment is constructed. A multiple case study approach will be undertaken with this thesis in order to best discuss how the various actors in the air freight transport supply chain view their competitors and customers as well as how they view the Jönköping air port in relation to their environment, “…multiple case design should be used to either predict similar results among replications, or to show contrasting results…” (Ellram, 1996, p. 102). The research method case study and network theory complement each other (Gummesson, 2007) which is central for this thesis.

### 3.4 Data Collection Method

Data can be gathered through primary and secondary data (Bailey, 2007). This thesis will use both methods in order to gather data effectively. The following section will describe both methods and the manner in which both were collected for this thesis.

#### 3.4.1 Primary Data

Primary data can be gathered from having field work in order to gather information by the researcher (Bailey, 2007). The significance of research can be improved by the usage of real data and hence, empirical gathering as a method is increasing in relevance (Ellram, 1996). A majority of the primary data from our thesis will be derived from our interviews with subject matter experts within companies that will be outlined below.

#### 3.4.2 Interviews

There are three types of interview methods that can be used in research according to Bailey (2007) they include structured, semi structured and unstructured and is further explained in Table 3.2.

---

### Table 3.1. Case study matrix adopted from Yin (2003)

<table>
<thead>
<tr>
<th>Case Study Type</th>
<th>Single Case Study</th>
<th>Multiple Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploratory</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Descriptive</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Explanatory</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>
Table 3.2. Types of interviews and their usual characteristic (Bailey, 2007)

<table>
<thead>
<tr>
<th>Interview Type</th>
<th>Usual Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured</td>
<td>These types of interviews have questions which are set out ahead of time and have an interview guide or process that is closely followed. Our interviews with companies which fell into the integrator category and the airline industry followed the structured interview approach.</td>
</tr>
<tr>
<td>Semi Structured</td>
<td>Are interviews where a set of prepared questions are created but leaves room for dialogue between the interviewer and the interviewee. Our interviews with companies which fell into the integrator category and the airline industry followed the semi structured interview approach.</td>
</tr>
<tr>
<td>Unstructured</td>
<td>This type of interview technique is also known as an informal interview. It offers the most amount of flexibility in gathering data. It also allows for dialogue and provides an avenue for the interviewer to get the most information as it allows the conversation with the interviewee to be free flowing. This thesis had a number of unstructured interviews with the Jönköping airport management on two occasions during the beginning of the definition of research topic as well as the background gathering stage of the research process.</td>
</tr>
</tbody>
</table>

Various companies that are involved in the transport of air freight goods within the region of Jönköping were interviewed. The focus was on interviewing companies that were responsible for the transporting air freight goods into and outside of the region. A cross section of integrators, freight forwarders, airlines, manufacturers and the Jönköping airport management were interviewed in order to gather answers to our research questions of how the air freight supply chain was constructed in the Jönköping region; as well as to get background on the background of the Jönköping region and the current state of the region’s air freight transport system. The aim was to follow through the chain by contacting manufacturers, freight forwarders, integrators, airlines, and Jönköping Axamo airport for a coherent perceptive. We meet with the interviewees at their place of work for the geographically close locations. The others we contacted through phone and email. The process for the manufacturers and airlines was considerably smaller than that placed on the integrators and freight forwarders. We provided them with a copy of the interview questions prior to and during the actual interview for the locations were we were able to physically meet them as suggested by (Saunders et al, 2007). After each interview and data collection session the data was authenticated via the interviewees by us sending them a copy of the transcribed interview for them to verify the information was accurate and that their feedback was incorporated.

Table 3.3 outlines details of the interviews; position of the interviewee, date of interview and what category their company operates in. This outline is done along with the actors; freight forwarders, integrators, manufacturers, and airlines.
Secondary data is usually that which has been created by previous authors who utilized it for another reason (Bailey, 2007). Within this thesis secondary data was gathered from company websites, newspapers, and research articles related to networks, supply chains and air freight. Secondary data will be used to explain the background of the Jönköping transportation supply chain and development of the actors within the network.

### 3.5 Secondary Data

<table>
<thead>
<tr>
<th>Company</th>
<th>Category</th>
<th>Position</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axamo Airport</td>
<td></td>
<td>CEO and Marketing manager</td>
<td>February 9th</td>
</tr>
<tr>
<td>Jönköping University</td>
<td></td>
<td>Professor</td>
<td>February 21th</td>
</tr>
<tr>
<td>Company A</td>
<td>Integrator</td>
<td>District Manager</td>
<td>March 7th</td>
</tr>
<tr>
<td>Company B</td>
<td>Integrator</td>
<td>Responsible, Jönköping Office</td>
<td>March 9th</td>
</tr>
<tr>
<td>Company C</td>
<td>Integrator</td>
<td>Chief Operations</td>
<td>March 15th</td>
</tr>
<tr>
<td>Company D</td>
<td>Manufacturer</td>
<td>Transport Manager</td>
<td>April 5th</td>
</tr>
<tr>
<td>Company E</td>
<td>Integrator</td>
<td>Assistant Product Manager</td>
<td>April 7th</td>
</tr>
<tr>
<td>Company F</td>
<td>Integrator</td>
<td>CEO</td>
<td>April 7th</td>
</tr>
<tr>
<td>Company G</td>
<td>Airline</td>
<td>Sales developer</td>
<td>April 7th</td>
</tr>
<tr>
<td>Company H</td>
<td>Integrator</td>
<td>Manager Systems and Processes</td>
<td>April 11th</td>
</tr>
<tr>
<td>Company I</td>
<td>Freight Forwarder</td>
<td>Managing Director</td>
<td>April 11th</td>
</tr>
<tr>
<td>Company J</td>
<td>Airline</td>
<td>Regional Head of Sales</td>
<td>April 11th</td>
</tr>
<tr>
<td>Company K</td>
<td>Freight Forwarder</td>
<td>Global Air Freight Director</td>
<td>April 19th</td>
</tr>
</tbody>
</table>

### 3.6 Analysis of Data

After data is gathered then data analysis is the next step in the thesis writing process. Zikmund (2000) states that data analysis is important and can be achieved through the rearrangement and summarization of data into a form that can be used to make interpretations.
3.6.1 Interview Analysis

Each interview was followed by the interview team transcribing the information gathered from the interview. The initial interviews with the airport management team at Jönköping were aimed towards seeking out background and current state of the air freight market. That interview and subsequent interviews were recorded so that it would aid in the transcription of post interviews and aid in dissemination and presentation of data in a coherent manner. The other interviews with the other actors such as the freight forwarders, integrators, airlines and manufacturer followed a similar process of transcription and analysis within this thesis.

There are several suggestions as to how to transform data from its raw state to a usable form where interpretations can be achieved. Miles and Huberman’s (1984) advocate a three activity flows process of data reduction, display of data and wrapping up/ authentication.

Table 3.4. Three activity flows of data analysis (Miles and Huberman, 1984)

<table>
<thead>
<tr>
<th>Activity Flow</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Reduction</td>
<td>Within this phase data is sorted through, reviewed, simplified and moved from “raw” data towards information.</td>
</tr>
<tr>
<td>Data Display</td>
<td>This allows for the re formulated “raw” data being displayed. Once we had reviewed, simplified and reformulated the “raw” data we displayed it through charts, matrices and various other forms in order to direct our research towards completion.</td>
</tr>
<tr>
<td>Wrapping Up/ Authentication</td>
<td>Wrapping up can be achieved through proper explanation of what things mean though a logical thought pattern. Within this thesis we used tables, charts, and diagrams in order to expound on our conclusions. Whilst Authentication was achieved through testing of our conclusions for validity and</td>
</tr>
</tbody>
</table>

3.7 Research credibility

Research that involves any type of data collection needs to be defended by the study authors if we are to go by Robson (2007) who emphasises that any type of data collection approach must be supported by the authors. The study needs to be able to be believable and hold credibility and lay out the process adopted by the writers to achieve their results. This will aid the reader to be able to understand what was done and why it was done in that specific manner.
3.7.1 Reliability

Reliability acts as a check that works to reduce the amount of errors that can occur in the research (Yin 2003). Reliability is needed in order to ensure that the research outcomes or results are to be replicable every time the research takes place under similar conditions (Robson, 2007). Human behavior is not static and therefore it can be problematic to receive the same results of a study at a new attempt when conducting qualitative research (Merriam, 1994). This matter has been addressed by a broad methodology section and appendix. In the appendix the survey protocols are available; questionnaires for the integrators and freight forwarders and questions that were formulated for the airlines and the manufacturer. According to Kvale (1996) “...the concept of reliability is irrelevant in qualitative research...” (p. 601) since the aim of a qualitative study is to create an understanding as opposed to a quantitative study where the purpose is to explain. However, Kvale (1996) maintains that reliability has an importance for the quality of a research paper and those terms such as credibility; neutrality/conformability, consistency/dependability, and applicability/transferability are criteria’s for quality. The aim during the interviews was to have the same start off point with the questions that were asked the integrators and the freight forwarders. The questions for the manufacturer and the airlines were different due to their placement in the logistic supply chain. According to Lincoln and Guba (1985) “...since there can be no validity without reliability, a demonstration of the former (validity) is sufficient to establish the latter (reliability)” (p. 316). In a case study approach reliability can be achieved by a case study protocol (Ellram, 1996). Appendix A, B and C includes the interview guide by providing the questions that were used during contact with the companies. The questionnaire found in Appendix A was sent to the tutors for a review before the interviews were conducted.

3.7.2 Validity

There are three types of validity; **internal validity, construct validity** and **external validity**. Internal validity is focused on the degree to which the research approach enables the thesis writer to be able to interpret relationships between variables. Construct validity aims to seek out how much the outline of the survey is able to represent what is being studied. More generally; if the research has captured what was intended to be studied? (Gumnesson, 2007). External validity looks to see how much the sample that is being investigated is representative of the overall population. Saunders et al. (2007, p. 614) define validity as “the extent to which data collection methods accurately measure what they were intended to measure”. Triangulation is a method for enhancement of reliability and validity of a study and implies the usage of multiple sources (Kvale, 1996). The generalizability of case studies has received criticism for not being sufficient enough. Since external validity is connected to the generalizability of results it is important to replicate case studies to verify the outcomes (Ellram, 1996). This thesis has contacted a number of players to recognize patterns.

This thesis furthermore intended to ensure validity by making sure the right person was interviewed. We also made sure that both our primary and secondary data sources were accurate, verified and reviewed against that of studies created previously to our study by utilizing previous interview techniques to ensure validity of our thesis.
4 Results of the empirical study

This section presents the results of the empirical study by presenting the outcomes from the conducted interviews. Firstly there is a section on Jönköping Axamo airport and the shift from nationalized to privatized airports. Secondly the companies taking part by providing the necessary interviews are categorized and briefly introduced. The outcomes from the interviews held are presented in text, figures and tables.

4.1 Introduction of Jönköping Axamo airport

Jönköping Axamo airport was established in 1961 and has the yearly capacity of 700,000 passengers. The runway is about 2200 meters long and 45 meters wide. This is large enough to fit the requirements for both small and medium sized airplanes. There are scheduled flights, general aviation and air taxi being handled by the airport. The scheduled flights are flown by the airlines Skyways and Flyglinjen with the destinations; Stockholm Arlanda, Stockholm Bromma, and Berlin. The charter flights are arranged by the travel organizations; Ving, Fritidsresor, and Apollo with the destinations Antalya Turkey, Las Palmas Gran Canaria, and Crete. When it comes to the cargo handling facilities, the cargo terminal is run by the airport and has been extended and renovated. The cargo terminal offers handling of palletized deliveries, loose deliveries and special cargo. Consolidation, import/export services and distribution within Scandinavia is additionally offered. Today the airport is one of the major shipping hubs in Sweden partly due to the strategic location, near highways that connect to Stockholm, Göteborg and Malmö/København.

4.2 State responsibility for and privatization of the airports in Sweden

In Sweden the airports have historically been state owned. In 1939 all civilian air traffic was nationalized and gathered in one organization. This organization was later on named Luftfartsverket and in the 1970’s regulated both the civilian and the military air traffic services in Sweden (Luftfartsverket, 2011). The state has a role in developing and monitoring the rules governing the airports but does not need to own and run these airports as long as the first two conditions are met. There are several models that can be adapted when it comes to the responsibilities for the airports infrastructure:

- All airports are owned and operated by the state
- Strategic airports are owned and operated by the state, the others are owned and operated by communes, regions, and private stakeholders
- Larger airports are partly or fully owned by and run by private stakeholders
• Smaller airports are owned and operated by private stakeholders
• All airports are owned and operated by private stakeholders
• Ownership and operations of airports are divided and these divisions are then owned and operated by the state and/or other actors

(Statens Offentliga Utredningar, SOU 2007:70).

These above mentioned options are being used in different countries today. For Sweden the options are as follows:

• Coherent state system
• Dual ownership by the state and private stakeholders
• Large airports owned by the regions/communes/private stakeholders
• Partition of infrastructure and operations of the airports

(Statens Offentliga Utredningar, SOU 2007:70).

In 1989 there was a model by an airport investigation suggesting that the airports Arlanda, Landvetter, Luleå and Malmö would remain fully state owned due to cost effective reasons. The rest of the airports would be partly owned by the state and partly by the communes. The criterion was a passenger quota of no less than 100,000 passengers per year to be economically profitable. The state chose not to proceed with the suggestions from the investigation (Statens Offentliga Utredningar, SOU 2007:70). In 2010, however, there was a shift towards privatization of the air traffic services. Luftfartsverket was responsible for the air navigation services and the company Swedavia was responsible for the remaining state airports (Statens Offentliga Utredningar, SOU 2007:70). Sweden has a number of airports where some of them are privatized and some of them are nationalized. Figure 4.1 is a map of Sweden showing flight management centers (yellow), Swedavia airports (National Owned Airports, blue) and airports in other operation (Private owned airports, red) (Air Navigation Services of Sweden, 2011). Table 4.1 gives an overview of the Swedish airports. After the shift towards privatization there are ten airports that still remain nationalized.
The differences between a fully owned and party owned system are several. There is less control, from the state, in a partly owned company. The economic consequence with a partly owned company is that the state no longer has full responsibility to provide returns to the state. When it comes to efficiency state ownership would most likely mean a clear regulatory framework for more efficient operations; whereas private stakeholder interests are on profit maximization. Furthermore there are differences in competency and specific objectives. With a private stakeholder there is external competency but when they try to
reach a specific objective all the stakeholders involved need to agree (Statens Offentliga Utredningar, SOU 2007:70).

4.3 Introduction of the companies

4.3.1 Integrators

Company A was established in 1979 in Kuwait and is today one of the world’s leading providers of integrated logistics with operations in about 100 countries. The main line of business is international transportation. For the Jönköping region the company is mainly working with sea transport, road transport, and air transport as well as some charter solutions, insurances and customs. For air freight the product range is; Expedited (1-2 days), Premier (3-4 days) and Value (5-7 days). Special cargo needs are able to be met such as temperature control, insurance, packaging/repacking, storage/warehousing, merge in transit, and real time tracking.

Company B was established in Sweden and is present in the Nordic countries with strong market positions in both Sweden and Norway. The service being offered is same day door-to-door express delivery within 12 hours. The modes used by the company are air and truck. The company has a Nordic network of around 140 locations and access to 700 vehicles and about 2500 daily flight departures.

Company C is commissioned by the Swedish State and handles over 20 million pieces of mail, in Sweden and internationally. The main line of business includes a range of products from single mail-pieces to major logistics solutions. Some of the service offerings include mail distribution, periodical distribution and premarket/aftermarket services. Company C’s logistics solutions offer services such as pallets, parcels and express delivery, and over-night transportation.

Company E was established in Austria over a century ago and is today part of a global network. Company E in Sweden offers land transportation by road and rail, global ocean and air freight as well as consulting, storage and logistics solutions. Some of the service offerings include door to door solutions, or somewhere in between. In air freight the company offers several options; sky, jet cargo, aero parts, marine parts, sky bridge, jet cargo fresh.

Company F was established in 2006 in Sweden and the main line of business is air freight, freight between airport terminals. The company conducts air and expresses shipments. The company operates in Scandinavia and offers transportation services where the transportation is conducted by picking the goods up from the client’s place of business and delivering the goods at the client’s place of business.

Company H is a global express transportation company that was established in 1946 in Australia. The company is operating in around 200 countries. Some of the service offerings include both collection and delivery of goods. The company activities can be divided into; Express (same day, next day, and delivery on a specific day) and Mail (a range from addressed mail and personalized stamps to direct mail campaigns for businesses).
4.3.2  Freight Forwarder

*Company I* was established in 2007 in Sweden and operates in Sweden, Finland and the Baltic. The company is a general sales agent for two airlines. One of the main services is arranging charter solutions for larger shipments. Customers submit their goods for shipment at an airport where Company I takes over and arranges the air transportation from there. The solutions are tailor made and have worldwide reach.

*Company K* was established in 1994 in Sweden and today has 140 employees and offices in Göteborg (headquarters), Helsingborg, Jönköping, Karlstad, Norrköping, Luleå, Malmö, Skellefteå, Stockholm, Sundsvall and Örebro. Company K is also present in China, Denmark, Estonia, Finland, Latvia, Lithuania, Norway and Ukraine. The main line of business is international transportation of cargo by air, road, and sea. Company K is an independent forwarder meaning that they are choosing from a range of transport solutions for every shipment. Some of the service offerings include virtual warehouse (possibility to wait with the payment of duty and VAT until the goods are sold or waiting with the payment of duty and VAT in the case the goods are being re-exported), heavy and wide goods handling, speed and precision for retail, and beverage logistics.

4.3.3  Manufacturer

*Company D* was established in 1989 in Sweden and operates today in a wide range of countries, including Sweden (Europe, Asia/Pacific, Americas). The company is manufacturing products both for the public and professionals and the products offerings range from chainsaws, trimmers, lawn mowers, garden tractors, sprinklers and construction products such as drilling equipment.

4.3.4  Airlines

*Company G* (Cargo section) was established in 1926 in Germany and currently operates globally. The company is one of the leading cargo carriers in the world, offering around 300 destinations in about 100 countries. The company uses both freighter aircrafts as well as passenger aircrafts operated by themselves and another airline. Trucking services are yet another part that Company G utilizes for the routes. The solutions that are being offered are tailor made to fit demanding needs for heavy cargo as well as temperature sensitive cargo.

*Company J* (Cargo section) was established in 2001 in Sweden as a subsidiary to the main airline that was established in 1946 with a Danish, Swedish and Norwegian parent airline. There is a cargo group that is managing the sales and operations for Denmark, Sweden and Norway. The main market for this company and the group, it is part of, is the Nordic region. This carrier is leading in traffic to, from and within Scandinavia. The company is covering several destinations in Europe and a few in North America and in Asia. Company J Cargo is offering three products; Priority Cargo, General Cargo and Air Mail. The group also uses a number of partners (subsidiary and affiliated airlines) that facilitate the coverage of the routes.
4.4 Air freight compatible goods

The question of what type of goods that are air freight compatible in the Jönköping region was asked in order to determine if the type of goods that are typically transported by air have been evolving over time. There was a cross section of companies interviewed in order to observe if the type of air freight goods they arranged air transportation for matched that of the goods presented within the theoretical portion of this thesis. Furthermore the companies interviewed were asked about the place of origin and destination points for these goods. Their responses are presented within this section and are divided into a number of different categories presented in Figure 4.2 and Figure 4.3.

Incoming air freight goods into the Jonkoping region are spare parts, finished machines, bolt systems, give aways & product samples, animal specimens, dairy test products, documents, clothing & textiles, clinical/medical products, fresh food, other products for and from mechanical industry, and packages of unidentified content. The latter being packaged by the shippers themselves and is mainly regarding Company C. The particular air freight goods that are transported out of and into the Jönköping region are presented in Figure 4.2 in a pie chart corresponding to the inputs from freight forwarders and integrators.

Figure 4.2. Logistics service providers and integrators responses to question about what are the three types of air freight goods that are coming into the Jonkopling region.
Outgoing air freight goods from the Jonkoping region include spare parts, finished machines, playground equipment, giveaways & product samples, documents, other products for and from mechanical industry, and packages of unidentified content, presented in Figure 4.3.

![Outgoing goods chart](chart.png)

Figure 4.3. Logistics service providers and integrators responses to question about what are the three types of air freight goods that are going out of the Jönköping region.

### 4.5 Transportation mode substitution

The interviews revealed that 62% of the shipments handled by the logistics providers were transported by road, 18% were handled by air, 12% by sea and 8% by rail. The handling percentage is presented in Figure 4.4 and includes the freight forwarders and the integrators total handling. These numbers address the total handling in the areas these logistic providers operate in.
On the question *if there are any substitution of modes possible* Company I answers that even though they solely offer air freight options, they are aware of the fact that road transportation has been made easier by the European Union. In addition, Company I, discusses that for the short distances within Europe shippers (producers) often are able to wait for truck shipments. This since the time gained on shorter distances by air freight in some cases are insufficient for shippers to choose air freight. The speed of delivery is stated as essential with the transportation of the goods being conducted in a fast, almost panicked manner. Company C states that their customers choose the option that fit their needs, hence the question on substitution of transportation modes is dependent on the number of similar shipment solutions available. Company A’s view on substitution of transportation modes is that the goods they transport by air are in general emergency goods and air is to prefer in those situations.

### 4.6 The buying behavior and solution costing aspects of air freight

The two airlines interviewed for the purpose of this thesis both work towards retailers (integrators and freight forwarders) as opposed to directly towards direct customers (manufacturers). The air transportation mode is about selling speed and the sales are targeted towards the integrators and freight forwarders aviation departments. The airlines
are additionally promoting air freight by offering punctuality, reliability, regularity and security.

One of the two airlines that were interviewed, Company J, is based in Sweden and has frequent flights to and from Sweden. Daily flights to the destinations offered indicate that there is a possibility for goods such as spare parts to be ordered when needed as opposed to kept in stock. Additionally Company J has little or no transshipments. Short operating distances mean that there is a higher importance of punctuality. There has to be a clear benefit from shipping the goods by truck where shorter distances have the ability to be promptly shipped by truck as well. Since the airlines are focusing on the logistic providers there is no real need to promote air freight. If the airlines were targeting manufacturers, the focus would be on stressing the benefits for the individual manufacturing firm. Airlines are frequently dealing with integrators and freight forwarders who approach the airlines themselves, already having an understanding and a need for air freight. When asking the two airlines if they have calculation tools where benefits with air freight as opposed to other modes of transportation were pointed the answer was not many. An example of that is one of the airlines, Company J, that in the past had an online calculation tool; Cargo Nomics. Cargo Nomics made it possible to calculate several cost aspects such as lead times and the binding of capital. Currently, the remaining function available is one on carbon dioxide emissions. The other airline, Company I, did not have any calculation tools available for customers where different calculations could be made. As manufacturing companies turn to integrators and freight forwarders when they are in need of transportation, it is the shippers that guide the customers into the right mode of transport.

There is a difference between the integrators interviewed when it comes to the way they are promoting air freight and relating it to cost aspects. However there are more similarities between them. The differences between the integrators are mainly observed when it comes to those integrators that are focused on express shipments. They are promoting air transportation with arguments such as delivery guaranteed within 12 hours including door-to-door solutions. For these companies the shipments are small in size and weight with the costs involved often being high. These express integrators are however, like the other integrators, promoting air transportation in a coherent way. The aspects that are pointed out as the main are similar to the arguments from the airlines; high value goods that are in need of urgent transportation. The cost depends on where the goods are coming from or going to and the volume. In addition to this, the speed of delivery will affect the final price. Company K, amongst others, stated that the faster the shipment the higher the cost. There was a general perceptive that the speed of delivery is essential for certain customers. For Company B the speed of delivery was the core reason for their customers selecting them as their freight provider. This was the case in particular for express deliveries where customers would like the delivery as fast as possible. In other slower alternatives, such as economy delivery, where the customer has chosen a longer run time and is hence expecting as fast delivery as this alternative allows for. Questions such as “Is it an emergency or not?” and “How fast does it need to reach the final destination?” are indicators to whether or not the goods need to go by air. Several of the integrators and freight forwarders have internal calculating systems that take in consideration the start off point and final destination as well as the volume. These systems provide a couple of different transportation options that are dependent on the speed of delivery. Company E states that it is difficult to come down in price with air freight. If a customer has the time most often they choose another means of transport (maritime and land transport). Company E argues that most likely the air-freight of cargo will not have the same development as passenger transportation by air had, with low cost flights development. The air-freight cargo adapts the capacity to market demands. Company A gives a
price overview on a shipment from the Far East (Shanghai) to Jönköping. By air the cost would be between 30-40 SEK/kg (not included customs clearing, forwarding fees, terminal handling, delivery in Sweden) compared with 1-3 SEK/kg for a shipment by sea. However the sea transportation takes about 50 days (including handling), to be compared with air shipment that takes 3-4 days. The cost associated with the shipment is acceptable in those cases where there is a lack of other transportation options that meet the requirements. If the goods could go by a low-priced mode they probably would. An example given by Company I was fresh fish which would be frozen if it was to be shipped by boat. Another example are delayed deliveries or production stand stills, in which case it might be vital to neglect the higher transportation costs instead of paying delay fees or regress on a stand still production. Company C has volume as a high indicator; how the goods are going through the entire production system and all costs are based on volume where estimates of this are done once a year. Company B has a system on which customers can log on and track their shipments.

Company H states that dependent on the end destination, there might be interests from prospective customers for an improved transit time. Within Europe the transportation is quick already with next day deliveries. Improvements could then be made for certain parts of Americas and some African countries. All integrators and freight forwarders have been asked questions on cost outcomes of a tardy delivery and a delivery that is ahead of time. The general understanding is that a delivery ahead of time is no more acceptable than a tardy delivery. The cost outcomes for a tardy delivery are many times dependent on what type of service that has been purchased (Company C, Company H, Company I, and Company K). Company I states that their priority products are 2-3 times more expensive than regular air freight. That option guarantees the highest priority with the possibility of the return of money in case of a delay. Company H focuses on service performance measurements to tackle the issues to prevent similar future events. Furthermore, Company H has a proactive customer service system where the company has a dialog with the customer providing up to date information about the shipment. Company B states that there would be a discount on the price in the case of a tardy delivery. The deliveries that are ahead of time are in Company I’s case, usually during longer distances where it is estimated that the goods should be loaded on a given flight, but where the goods were able to be loaded on an earlier flight than expected. These earlier deliveries tend not to lead to any consequences. Company H and Company K state that in case of early deliveries the cargo might be held an extra day at the destination or the transit hub. Company F has an open dialogue with their customers where they inform about the exact delivery time. Company E announces both tardy and early deliveries on time. Insurances that can be added do not cover transportation time, but damages incurred during shipment.

4.7 Air freight Actors

4.7.1 Integrators

Company interviews provided a wealth of information in regards to their business area of focus, solution options offered to their customers along with presentation of the situations which would warrant the need for air freight to be selected as an option by their customers. Their responses were further divided into the type of firm dependant on the type of focus they had. This was in order to determine their position within the air freight supply chain
and to help map out how their activities and resources were used in the solution offering of air freight within the supply chain. Table 4.2 indicates visually the information provided by the companies for our interviews and is presented within this section.

4.7.1.1 Solution options

The cross section of actors that were categorized into the integrator dimension provided a depth of information in regards to the types of solution options they offered their customers. Some of the companies offered their customers a standard list of options they could select from, whilst others still offered customizable options to meet their customers need to transport their goods by air. The interviewed companies showed that the type of solution options offered were set in a way in which they worked towards differentiating themselves and they attempted to do it by offering larger solution options, more services and trying to create a product that made them stand out from the competition.

A number of the types of solution options they provided their customers are in regards to Company C parcel, express service guarantees, and overnight transport of their goods to ensure they arrive against the guaranteed time frames set out. Company’s solutions are their door to door movement from their customer’s locations to the goods final destination. As well they provide added consulting services to assist their customers in setting up processes which will enable them to be more efficient and effective with their consulting service options. Company F emphasizes that their focus is on the movement of air freight within the Nordics and Scandinavia making them a great service provider for customers interested in transporting their goods within the domestic market as opposed to the international market.

Table 4.6 shows that in order to differentiate themselves companies such as Company F, Company H, and Company B were marketing themselves as solely Express providers whose main market is the Scandinavian region. Company C moved from being mainly a mail carrier into an integrated logistics solutions provider. Company A, in regards to air freight, mainly focuses on transporting goods internationally and does not have a large focus on domestic movement of air freight.

4.7.1.2 Activities

The type of activities these companies took part in are varied such as freight consolidation, co-loading of air freight, customer consultations on needs, movement of goods from customer location until final destination with packaging, pallet creation, paper work to enable the movement of those goods as well as visibility into location of goods at all times as well as issue resolution.

There were a number of companies which indicated that they did not use the Jönköping airport. Those companies indicated that the reason they did not use the Jönköping airport was that depending on the destination of their goods it would make more sense to load a truck and drive to Göteborg, Stockholm, and Köpenhamn unload their load and on load it onto an airline or air freight carrier that would be flying directly from that airport to their main cargo hub where it would be then flown to the final international destination. A
number felt that the Jönköping airport did not offer them a large enough selection of options as to airlines that were flying out of the region and not that much variety in regard to destinations they were flying to. A few gave an example that if they were to use the Jönköping airport they would have to take a flight that goes to Stockholm and then from there off load and on load and then another flight to the hub that would take their goods to the final international destination. A number of integrators also emphasized that their airline partners were the ones which decided upon the airport they could use to transport their goods depending on the weight or specifications. Shorter distances within Sweden would warrant the use of their trucks to transport their goods to final destinations. Whilst for international destinations outside of Europe they would select other airport hubs such as Göteborg, Stockholm and Köpenhamn.

The majority of companies indicated that the reason their customers would contact them and indicate they needed to utilize their air freight movement abilities was due to either emergency situations where forecasts were inaccurate leading towards production delays and because their customers had time constraints. These constraints on their customers created a need to engage in the use of airlines or air cargo carriers in order to get their goods to their customer in order to fulfill their contract obligations.

From the type of goods that were selected for air freight the type of customers were determined. A large number of the goods that are transported into the Jönköping region by the various integrators are in the form of spare parts for the industrial sector, manufacturing, agriculture and retail customers. Some of the companies were able to provide access to the names of those companies while a larger portion was unable to provide that kind of information due to confidentiality restrictions.
### Table 4.2. Integrators Interview Summaries

<table>
<thead>
<tr>
<th>Integrators</th>
<th>Focus</th>
<th>Solution Options</th>
<th>How solution is selected</th>
<th>Why Select Air?</th>
<th>Airport Used</th>
</tr>
</thead>
</table>
| Company A   | • Mainly international transport (Air/Sea)  
• Trucking in Europe  
• Hubs located in Helsingborg  
• Air  
• Sea  
• Truck | • Freight consolidation in Helsingborg  
• Truck (LTL, FTL, Groupage)  
• Sea (FCL, LCL)  
• Air (Co-load) | • Assess Risk level associated need for (set up, investments, ease of implementation)  
• Customer needs assessment | • Not usually customers first choice  
• Emergencies  
• Wrong forecasts  
• Customer in bad situation due to delay in suppliers issues | • Göteborg  
• Jönköping  
• Köpenhamn  
• Malmö  
• Stockholm |
| Company B   | • Express transport  
• Time  
• When urgent  
• Scandinavia | • Packages  
• Documents | • Based on distance and time requirements  
• System self selects price, location to fly from | • Time constraints are important for their customer | • Jönköping (for packages less than 30kg, 90% of shipments)  
• Göteborg (10% of shipments) |
| Company C   | • Initially mail Carrier  
• Logistics solutions | • Pallets  
• Parcels  
• Express delivery  
• Night transport | • Solutions set customer selects from available selection | • Size, time frame and cost | • Göteborg  
• Jönköping  
• Malmö  
• Stockholm  
• Sundsvall-Flamsbund  
• Umeå |
| Company E   | • Door to door service  
• International air transport | • Truck  
• Global Sea  
• Rail  
• Air  
• Consulting, storage and logistics solutions | • Air selection based on time factor  
• Scheduled air flights | • Malfunction in production  
• Unexpected and Emergency situations  
• Wrong forecasts  
• Time Sensitive | • Frankfurt (mainly)  
• Stockholm  
• Göteborg |
| Company F   | • Movement of air freight within Scandinavia | • Air  
• Truck | • Consultation with customer including needs assessment and pricing | • Time sensitivity  
• Wrong forecasts  
• Emergency situation | • Göteborg  
• Jönköping  
• Malmö  
• Stockholm |
| Company H   | • Express Transport  
• Collection and Delivery of goods | • Air | • Standard solutions which customer can select from (economy and express) | • Speed | • Göteborg  
• Jönköping  
• Malmö  
• Västerås  
• Örebro |

### 4.7.2 Forwarders

#### 4.7.2.1 Solution Options

The forwarders interviewed for this thesis were Company K and Company I accessible in Table 4.3 Company I’s differentiation emphasized customized options created in consultation with customers and charter solutions which are non scheduled solutions. Company K also provided solutions that involved selection of airport from which to move goods from.
These forwarders were more responsible for the coordination activities needed to move their customer goods. The majority of their air freight was transported from the other larger airport hubs within Sweden. They also mentioned that the reasons their customers sought them out was due to the urgent nature of the goods that needed to be delivered by their customers.

### 4.7.2.2 Activities

The forwarders activities included coordination of goods, planning of transport routes, virtual warehouse services (Company K), charter solutions and tailor made solutions (Company I). Their customers were mainly coming from the industrial sector within the Jönköping region.

#### Table 4.3. Forwarders interview Summaries

<table>
<thead>
<tr>
<th>Forwarder</th>
<th>Focus</th>
<th>Solution Options</th>
<th>How solution is selected</th>
<th>Why Select Air?</th>
<th>Airport Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company K</td>
<td>International Transport (Air, Road and Sea)</td>
<td>Virtual warehouse services, Retail and Beverage logistics</td>
<td>Consultation with customer to select best option, Airline selection is done by Company K</td>
<td>Urgent need of goods, High Value of Goods</td>
<td>Amstredam, Frankfurt, Göteborg, Köpenhamn, Stockholm</td>
</tr>
<tr>
<td>Company I</td>
<td>Charter (air, the customers submit the goods at the airport)</td>
<td>Charter solutions, Tailor made solutions</td>
<td>Set solutions for customers to choose from</td>
<td>Expensive goods, High value goods, Emergency goods</td>
<td>Göteborg, Jönköping, Stockholm</td>
</tr>
</tbody>
</table>

### 4.7.3 Manufacturer

Company D accessible in Table 4.4 was one of the manufacturing companies interviewed. They indicated that they outsourced the transportation of their goods and as such were not using air freight. The interesting thing about this company was that a number of the integrators interviewed indicated a number of contracts implemented for this customer did use air as the main transportation avenue.
### Table 4.4. Manufacturer interview Summary

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Focus</th>
<th>Solution Options</th>
<th>How solution is selected</th>
<th>Why Select Air?</th>
<th>Airport Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company D</td>
<td>•Production of goods for end consumer</td>
<td>•Outsource logistics aspects to focus on core competency</td>
<td>•Lead time, airport</td>
<td>•Right now is not an option •Our Service providers handle choice of transport mode</td>
<td>•N/A</td>
</tr>
</tbody>
</table>
This chapter will analyse the empirical findings with the theoretical framework. The chapter is divided into air freight network actors, air freight compatible goods, the buying behaviour and selection process for air freight. These three sub headers are directly focused on the research questions presented in the introductory chapter of this thesis.

5.1 Airfreight Network actors

The Actors, Resources and Activities (ARA) model presented in the theoretical framework section 2.4 forms part of the basis to enable us to answer our first research question which is the following:

5.1.1 RQ1. How are the supply chains and networks that include the transportation of air freight goods and services constructed in the region of Jönköping?

![ARA Model Analysis](image)

Figure 5.1. ARA Model Analysis.

A network involves a net of actors or firms who are interconnected through their business activities and resources that are involved in working towards providing both products and
services to the final customer as argued by Håkansson & Persson (2004). One of our research aims was to discover the actors that were operating within the air freight sector in the Jönköping region. We found that the actors interviewed fit the new integrator class as defined by Neiberger (2008) and Zhang et al. (2004). The actors that were discovered in our empirical section were airlines, freight forwarders, manufacturer and integrators working towards the transportation of air freight within the Jönköping region.

The ARA model focuses on Activity links, Resource ties and Actor bonds. Ford et al. (2006) stress the model is useful in analyzing how firms interact with other actors in a network through the bonds that ties them together along with the resource ties and activity links which involve each firm working together to enable their activities to be completed. These activities can be completed either interdependently or through their interconnected relations of other actors in the network. The purpose behind the selection of the ARA model being used as a framework was to enable us to analyze and determine the actors, resources and activities that make up the network of air freight transporters of goods within the region of Jönköping. The main focus was on determining how those actors interacted in terms of resource ties and activity links in order to be able to ensure the network of transportation of air freight would be successful. The industrial network definition presented by Hertz (1996) also focuses on the interdependence of firms and their interconnected relationships along with an added factor; that being innovation from the evolution that takes place as their relationships grows and changes over time.

Zhang et al. (2007) argue that there has been a shift in the type of firms that are providing transportation activities to companies that seek those services due to increased deregulation and globalization leading to companies outsourcing a large number of their non core activities to enable them to focus on their core competencies. Deregulation created an environment that allowed for greater ease of entry into the transportation market and these new market entrants discovered that in order to compete they would need to create more diversified solution offerings in order to gain greater market share. Previous actors involved in the transport of goods via air were air cargo forwarders and airlines. The opening up of the market created avenues for the introduction of a new emergent competitor; the integrator which was an actor that provided door to door service and additional services which the other two did not. The new integrators as described by Zhang et al. (2004) were shown through our interviews to continually focus on seeking to provide services that are both specialized and customized in order to meet their customer needs. The companies we interviewed within the Integrator Table 4.2 discussed the various types of services and activities they present to their customers on a situational and regular basis in regards to the transportation of goods by air. The integrators further depending on their focus and facilities were able to engage with the airlines to determine the airport they would need to get to in order to transport their customer goods for transport by air to the correct destinations. Previously forwarders were said to be the only ones that would work with the airlines in order to coordinate the movement of the air freight goods to be transported. Our interviews confirmed that the shift as described by Neigerger (2008) and Zhang et al. (2004) is accurate and it is no longer forwarders who have the only relationship bonds with the airline and consignee rather the integrators have circumvented the forwarders in some respect.

An important aspect with the industrial network is that it also takes into account the social exchange factor which could be compared to Anderson et al. (1994) need to take the environment in which firms operate into consideration. Halinen & Tornross (1996) further build up on that with their view that firms and the resulting networks they form are both
socially and historically created in that there is both a social aspect of network creation along with an evolution of the relationships within the network. Much of the network literature focuses on the various levels of interconnectedness of relationships between the firms along with the level of influence firms have on others within the network.

The activities the integrators were involved in within the Jönköping region included such varied activities as co-loading of freight, customized and structured solutions, movement of goods from door to door, pallet packaging, tracking of goods at all points of the journey as well as incident management. These activities also matched those of as outlined by Neiberger (2008) in regards to the diagram presented in Figure 2.5 where the traditional actors involved with air freight and the current state showcasing the different actors and touch points that occur with the movement of air freight goods within the current business environment.

Neiberger (2008) argues that “…the integrators connect the entire air freight chain for the transport of parcels in one enterprise by providing door-to-door services, saving transaction costs as well as production costs along with their above door-to-door services…” (p. 250). A number of the integrators discussed that their main areas of business was providing door to door service. They achieved this by transporting goods overnight and by coordinating activities with the airlines to ensure that the goods were taken to the correct airport and transported to the consignee in an effective and efficient manner. Anderson et al. (1994) believe the environment in which firms work in need to be described in terms of the characteristics which comprise the environment along with the selection of a focal firm and analyzing the way in which their relationship with another firm is constructed and operated.

Forwarders in the literature (Neiberger, 2008; Zhang et al. 2004) are shown to traditionally be the middle man responsible for communicating and interacting with the customer (sender) along with the airline in order to arrange for the movement of goods from the sender to the consignee without the customer ever coming in contact with the airline. Currently forwarders are facing increasing competition with the integrators in regards to how goods are moved around especially in the air freight market. The empirical results indicated that there are fewer forwarders within the Jönköping region and that the type of services they provide are still the coordination activities needed to move air freight within Sweden. Table 4.3 showed their main business area focuses along with the fact they also offered custom and structured solution options to their customers showing the trend towards being able to create more value added services in order to compete with the integrators for market share within the air freight market in Sweden.

The other actor involved is the network for the transport of air freight is the airline in this respect we discovered that the airlines which transported a majority of the air freight were located outside of Jönköping within the surrounding city of Göteborg. They were connected with the integrators that were located within Jönköping. Their activity links was in the form of their communication activities with the integrators and the selection of airport from which to transport the goods dependant on the final destination the firm needed the good to be transported to.
5.2 Air freight compatible goods

The previous research question pointed out the importance of understanding the supply chain and network of air freight transportation in the region of Jönköping. For a further understanding of air freight transportation in the region it is of interest to note the type of commodities that are being transported. Wang (2007), Gentry (1952), Kay (2005), and Kasarda (2007) provide the theoretical framework that enables us to answer the second research question;

5.2.1 RQ2. What are the type of goods that are air freight compatible in the Jönköping region?

According to Wang (2007) goods transported by air are low-volume, light-weight and time-sensitive. Gentry (1952) outlines factors such as the density, fragility, perishability and value of the good as indicators for goods that would need transportation by air. An additional factor as to why the goods would be transported by air, according to Gentry (1952), is if there is an emergency or urgent reason behind the need of transportation. Kay (2005) and Kasarda (2007) give examples of these high value, time-critical products as being high-technology products, pharmaceuticals, just-in-time inventories, urgent documents, electronic components, cellular telephones, aircraft parts, high-fashion apparel, jewellery, footwear, seasonal toys and time and temperature critical perishables. These authors’ statements correspond well with the empirical findings concerning both the incoming air freight goods as well as the outgoing air freight goods.

The empirical findings from the interviews conducted show the incoming air freight goods into the Jönköping region as spare parts, finished machines, bolt systems, give aways & product samples, animal specimens, dairy test products, documents, clothing & textiles, clinical/medical products, fresh food, other products for and from mechanical industry, and packages of unidentified content. The air freight goods that are outgoing from the Jönköping region include spare parts, finished machines, playground equipment, give aways & product samples, documents, other products for and from mechanical industry, and packages of unidentified content.

In the columns of Table 5.2 there are six factors presented by the literature indicating those characteristics goods transported by air possess. The six factors indicate that goods transported by air are of high value, low volume, light weight, time sensitive (perishable, seasonal, JIT), fragile, and urgent (emergency goods). The incoming and outgoing goods in the Jönköping region, within the empirical results, are represented in line with the table. Spare parts, bolt systems, clinical/medical products, and other products for/from the mechanical industry are, described from the empirical findings to be, of high value, time sensitive, fragile and urgent goods. Finished machines are of high value, time sensitive and fragile. Give aways & product samples are often light weight goods, such as logo pens, and time sensitive since they might be needed for a promotion or events. Animal specimens and dairy test products are similar by being low volume, light weight, time sensitive and fragile. Additionally, dairy test products might be urgent due to a necessity for a re-test. Documents are of high value, low volume, light weight, time sensitive and often urgent. Clothes & textiles as well as fresh food are time sensitive goods by being respectively seasonal and perishable. Playground equipment was transported by one company interviewed and does not necessarily fit the six factors presented by literature indicating goods characteristics that would
be suitable for air transportation. Playground equipment might be a new product group transported by air.

The empirical research shows that the goods transported in the region of Jönköping go in line with what different researchers (Wang, 2007; Gentry, 1952; Kay, 2005; Kasarda, 2007) suggest as being suitable goods for air freight. One exception is playground equipment which does not fulfill any of the suggested air freight cargo characteristics. Most of the goods presented in Table 5.2 correspond to one or a few characteristics presented in the literature. However the incoming and outgoing air freight goods do not inevitably fit all the

Table 5.2. Goods characteristics matrix

<table>
<thead>
<tr>
<th></th>
<th>High Value</th>
<th>Low Volume</th>
<th>Light Weight</th>
<th>Time Sensitive</th>
<th>Fragile</th>
<th>Emergency/Urgent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare Parts</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Finished Machines</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Bolt Systems</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Give Aways &amp; Product Samples</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Animal Specimens</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Dairy Test Products</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Documents</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Clothes &amp; Textiles</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical/Medical Products</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fresh Food</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products for/from the Mechanical Industry</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Playground Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
characteristics presented in literature; spare parts are not necessarily of low volume and light weight, depending on their nature.

The empirical results showed that the freight forwarders and the integrators handled 62% of the shipments by road, 18% were handled by air, 12% by sea and 8% by rail (Figure 4.4). Research indicates air freight typically is dealing with the lowest volumes of the transportation modes. However the findings from the interviews conducted place air freight as second largest, right after road transportation. Reasons for this outcome could be that a few of the companies interviewed, mainly freight forwarders, dealt to a high extent with air freight.

5.3 Buying behavior and selection process for air freight

In order to analyze how air freight is chosen this thesis looks at the buying behavior as well as the selection process. Several authors, presented in the theoretical framework and in this section, enable us to answer our third research question which is the following:

5.3.1 RQ3. What is the buying behavior and selection process for air freight?

Ford et al. (2006) discuss the continual price reduction of goods and services that companies are forced to work towards as a creation of a ripple effect throughout the network. Several companies interviewed state that a company initially does not plan nor want to discuss air freight options. Nevertheless, there are situations that these companies find themselves in situation where they have to transport by air. It is worth mentioning, that there are scheduled air shipments as well, in sectors like technology and electronics. Whiteing et al. (2008) argues that uncertainty, by increased outsourcing and geographical dispersion within the supply network lead to an increase in total cost. In addition there is pressure on companies to reach out with their products in a timely fashion. Neiberger (2008) talk about shorter product cycles and the continuous drive towards responding and adapting to the ever-changing customer needs. Gentry (1952) takes this a step further and points out that the decision to transport goods via air usually depends on the emphasis put on time being of greater importance to that of overall cost of moving the goods by air. The empirical results show that in most cases if the customer has the time to wait, they will go for an alternative that is slower but cheaper. Neiberger (2008) states that the transportation of goods via air could facilitate the introduction of new products and technologies into the market. The need to reach out with products in a timely fashion is something that is also established in the empirical findings of this thesis.

Several interviewed integrators and freight forwarders provided examples where air transportation of cargo was extensively used when the transportation need was urgent. The high costs of using air freight are compensated for, by amongst others, higher service levels and inventory reductions (Lillie & Sparks, 1993). The airlines had a similar view by stating that the air transportation mode mainly is about selling speed. The focus of the airlines was hence; punctuality, reliability, regularity and security. This focus was to enable goods to be ordered upon need as opposed to keeping them in stock.
The airlines stated that since they are focusing on the integrators and freight forwarders they are not promoting air freight over other modes of transportation. It is instead the shippers that guide the customers into the right mode of transport. Coyle et al. (1999) state the following factors as affecting uncertainty; transit times, schedules, volume and transport mode. The integrators have internal cost systems that can give their customers different prices for shipments dependent on how quickly they need the shipment. By typing in the time frame, start and destination points as well as the volume, the right transportation solution for the customer is provided. Often the differences between the modes offered are the time aspect and the final destination of the goods. If the final destination of goods from the south of Sweden is to be delivered to the north of Europe the time difference between transportation by truck or by air is a difference of a day or so. For longer distances, however, it is the time aspect that is one of the main decision making attributes. Internal calculation systems can produce an alternative with sea shipment, one with sea/air shipment and one with air shipment (for shorter distances it can be about air/truck). The customer can then choose the alternative that best suits their specific circumstance. Hence, the high costs involved in shipping by air are most times accepted by the customers in situations where there is no other option.

From the interviews conducted with the integrators it became clear that the shippers do not pay particular interest in the transportation route of a shipment. A shipper tends to clarify the start and end destinations, the volume, and the timeframe within the goods need to reach their place of destination. From the interviews conducted there are no indicators that the shippers would prefer a certain route. This observation goes well with the literature presented in the theoretical framework of this thesis. Shippers and freight suppliers differ in the choice of purchasing criteria for freight transportation services. Criteria such as carrier characteristics, timing, and pricing are vital for shippers (Matear & Gray, 1993). The airlines stated that their understanding on the views of freight suppliers is that they have an understanding of the air freight mode and of what services they are in need of. Airlines are focusing on promoting air freight as being punctual, reliable, regular and secure. This is supported in literature by; Matear & Gray (1993) that state that criteria such as scheduling, space, price, and frequency are essential for freight suppliers in their buying process of air transportation services.
6 Conclusions

This chapter will summarize the results of the analysis and aims to answer the purpose and the research questions that outline this thesis. This chapter is closed off by a contribution section.

The purpose of our research was to discover the type of supply chains and networks that are in place for the transportation of air freight within the region of Jönköping. We discussed the usefulness of the ARA model in creating a representation of the Actor bonds, Resource ties and Activity links that are in play within the network of transporters of air freight within the Jönköping region. Neiberger (2008) presented an evaluation of the actors involved in the transportation of air freight goods with an argument that the integrator have developed to address the need for coordination of resources and linking their activities with that of the airlines in order to address the transportation need of air freight. Network literature (Anderson et al, 1994; Neiberger, 2008; Zhang et al, 2004) also assisted in the determination of how to analyze the network in terms of various actors’ interaction with each other in the coordination of activities, resources and the level of relationship they have with their customers and suppliers.

The type of goods that are air freight compatible in the Jönköping region are; spare parts, finished machines, bolt systems, give aways & product samples, animal specimens, dairy test products, documents, clothes & textiles, clinical/medical products, fresh food, products for/from the mechanical industry, and playground equipment. These goods are all, except from one, in line with what different researchers (Wang, 2007; Gentry, 1952; Kay, 2005; Kasarda, 2007) suggest are suitable goods for air freight. Playground equipment was mentioned by one of the companies interviewed as air freight requested by manufacturer. However playground equipment does not fully meet any of the suggested air freight cargo characteristics presented by different researchers. Most of the goods being transported by air in the Jönköping region match the theoretically accepted view on what air freight typical goods are. The fact that playground equipment does not meet these air freight characteristics might mean that the air freight compatible goods are not strict to the definition per say.

The buying behavior and selection process for air freight can integrate cost aspects. The cost aspects included in the promotion of air freight are related to the need to reach out with products in a timely fashion; thus acting as a justification for the choice of air freight over other modes. The promotion of air freight over other modes of transportation is mostly done by the integrators but both integrators, freight forwarders and airlines are promoting air freight as an option for time sensitive goods. The key words used to promote air freight as a transportation mode were; punctuality, reliability, regularity and security. The integrators use internal cost systems that provide their customers with different prices for shipments dependent on the time frame. The internal systems produce alternatives with different time aspects and cost outcomes. Hence, the shorter the transit times the higher the cost of the shipment. A common understanding amongst the companies interviewed was that air shipments many times were not their client’s first choice due to the higher transportation costs involved in contrast to other modes of transportation. The costs connected to shipping by air are accepted by customers when there is a need for speed. There are however also scheduled air shipments, in sectors like technology and electronics.
There is a difference in shippers and freight supplier’s criteria for the choice of purchasing freight transportation services. For shippers, criteria such as carrier characteristics, timing, and pricing are of interest whereas freight suppliers find scheduling, space, price, and frequency of interest in the buying process of air transportation services (Matear & Gray, 1993). The fact that there are different criteria being used by the shippers and freight suppliers can help in highlighting the areas on which purchasing decisions are based and hence provide clarity for competitiveness.

We hope our research has added to the usability of the ARA model towards exploring a network in terms of who the Actors are; the resources and activities the actors engage in towards the transport of air freight within a region the size of Jönköping. We also feel our review of the type of goods that are being transported into and outside of the region are of use as they confirm that the type of goods that are being transported are similar to those presented by previous researchers (Wang, 2007; Gentry, 1952; Kay, 2005; Kasarda, 2007). In terms of the buying behavior and sales arguments presented to justify the use of air freight our findings provide a great launching pad for others. The foundation provided a way in which to understand how to present transportation through air as an attractive way in which to address the time and reliability issue firms are encountering. This in order to address the secure need for speed in freight services.
Further studies could investigate how the networks of other regional areas within Sweden compare to each other. It would be interesting to see the differences amongst the makeup of the integrators, freight forwarders, manufacturers and airlines interact in regards to how they work towards the successful transportation of air freight goods. Maybe if the study was conducted in the next ten years they would be able to see if there has been an evolution of the network actors or dissolution and new actors into the network.

It could be of interest to conduct further research on the types of goods that are air freight compatible in a comparison of regions. Furthermore it could be of interest to find out if these goods are ever changing. The fact that playground equipment was transported by air in the Jönköping region indicates that the types of goods compatible for air freight are not static. However a larger study with the focus on air freight compatible goods could possible predict future trends and provide further knowledge of the air freight cargo characteristics.

This chapter will provide some suggestions as to what might be of interest for further research.
List of references


List of references

Kluwer, Boston.


List of references


List of references


Kodali, R., & Soni, S. (). A Critical Analysis of Supply Chain Management Content in empirical Research.


List of references


Monczka, R., Trent, R. and Handfield, R. (2005), Purchasing and Supply Chain Management, Thomson South-Western, Mason, OH.

Morton, R., (2001). World air cargo: airports are linking the chain. Transportation and Distribution 42 (8), pp16-27


List of references


List of references


Appendix A: Questionnaire (Integrators, Freight forwarders)

Introduction Based Questions

1. Where do you place yourself in the Logistics Services market?

________________________________________________________________________

________________________________________________________________________

2. What would you say is your main line of business?

________________________________________________________________________

________________________________________________________________________

3. What are some of your service offerings to customers/clients?

________________________________________________________________________

________________________________________________________________________

4. How do you set up your logistics solutions?

4.1 What are some glaring factors you use in deciding on how to formulate a solution for your client?

________________________________________________________________________

________________________________________________________________________

4.2 What is important to set up solutions?

________________________________________________________________________

________________________________________________________________________

4.2.1 What are the modes of transport that you focus your solutions on?

________________________________________________________________________
4.2.2 Especially for high value, time sensitive goods?

4.2.2.1 What about air freight? Under which barriers would it warrant a move towards using air freight?
5. What goods are transported to/from the region of Jonkoping that are classified by us as time critical, low volume, high value goods (goods that could be possible for air freight)?

6. Tell us about 3 of these goods shipments. (incoming goods)

6.1 What goods are they

6.2 Where is their starting point?

6.3 What mode/modes does it go by?

6.4 Where is the end destination?

6.5 What is the cost for each step and/ or how can the costs be divided?
6.6 What is the reason behind this route option for this type of good and company?

6.7 Would You say that this is a specific modes product?

7. Tell us about 3 of these goods shipments. (out-going goods)

7.1 What goods are they?

7.2 Where is their starting point?

7.3 What mode/modes does it go by?

7.4 Where is the end destination?

7.5 What is the cost for each step and/or how can the costs be divided?

7.6 What is the reason behind this route option for this type of good and company?
Appendix

7.7 Would You say that this is a specific modes product?

8. Have You ever considered air transport for those type of goods?

9. Is the decision of the flow of the goods done together with the customers?

10. What type of storage solutions/options do you offer your customers?

11. How much in general of the cargo is being transported by road, rail, air, sea?

<table>
<thead>
<tr>
<th>Mode</th>
<th>Distance Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>&lt;500 km, 500-1000 km, &gt;1000 km</td>
</tr>
<tr>
<td>Rail</td>
<td>&lt;500 km, 500-1000 km, &gt;1000 km</td>
</tr>
<tr>
<td>Air</td>
<td>&lt;500 km, 500-1000 km, &gt;1000 km</td>
</tr>
<tr>
<td>Sea</td>
<td>&lt;500 km, 500-1000 km, &gt;1000 km</td>
</tr>
</tbody>
</table>

12. How important is the speed of delivery for this company who is having these goods shipped
13. What would be a cost outcome for an improved transit time?

14. What would be a cost outcome of tardy (late) delivery?

15. What would be a cost outcome of a delivery that is ahead of time (early)?

16. Are there any substitution of mode chosen possible for all or some part of the transportation distance/route?
Appendix B: Questions (Airlines)

1. Who are your customers?
2. What cost calculation comparison tools are offered, where benefits with air freight as opposed to other modes of transportation are pointed out?
3. How is air freight promoted?
Appendix C: Questions (Manufacturer)

1. Is air freight being used for goods such as critical spare parts, wrong planning of production, unforeseen situations or are there scheduled volumes that are transported by air?

2. What airports are these goods flown from and what is the choice of airport based on?

3. Previously Company D has had goods flown from Jönköping Axamo airport. Which conditions are met by the new airport/airports being used?

4. Is the decision of airport taken by Company D, together with another party or by another party?
Appendix D: Employees and net sales in transport sector

Number of employees and net sales (SEK million) in transport sectors (2007)