AIR CARGO TRAILER OPERATIONS BETWEEN FINLAND AND THE NETHERLANDS

Can Freight Frame Oy enter the competition?

Tatu Selin

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International Business
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ABSTRACT

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Air cargo trailer operations between Finland and the Netherlands.
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This research evaluates the possibility for Freight Frame to expand their business in the field of logistics. In more detail, the research analyses the possibility for Freight Frame to enter the market of air freight trailer operations between Finland and the Netherlands. The aim is to find out if the market entry is possible overall, it’s feasibility in a financial perspective, and what kind of new investments it would obligate from Freight Frame.

This thesis was carried out as a study for Freight Frame Oy in order to survey the air freight cargo operations in trailer traffic. These road feeder services could increase especially the turnover for the frigo-trailer –traffic, as the occupancy of southbound trailers is too low. The data for the research was gathered from Finnish supervisory authorities, such as Trafi, Finavia and the Customs, and from a personal interview at a major Finnish air cargo operator .

Theoretical basis for this research lies in Supply Chain Management, and in more detail in high-value and express air- and road freight services. The approach is from the transport company’s perspective. Could Freight Frame provide road feeder services for air freight operators in a financially feasible manner?

The result from the research is that it is possible to enter the market, but only at first as a subcontractor to a larger air freight road feeder service provider. This would also mean huge investments for Freight Frame and the need to have extensive negotiations with an existing road feeder service provider to achieve a contract.

The results indicate that in case of accomplishing a contract with an existing road feeder service provider, the investments would pay off in a couple of years. The results indicate also, that air freight operators, who buy these road feeder services, are willing to welcome new operators to the business, as the current prices are steep from their perspective.

This thesis includes confidential information that has been removed from the published version on the commissioner’s request.

Key words: air cargo, air freight, supply chain management, logistics, transportation, road feeder services, trailer traffic, Finland, Helsinki-Vantaa, Netherlands, Amsterdam-Schiphol, roller bed system, JIT, Freight Frame, Nabuurs.

FOREWORD

This research topic was given by Mr. Ami Seppälä at Freight Frame Oy. I would like to thank him for introducing me into this very intriguing and not so well known topic and for his help with setting up the meetings. I'm very grateful for his mentoring during the thesis. It really helped to see the study from the company's point of view.

Dr. Anasse Bouhlal was the supervisor of this thesis. Without the advice and guidance from Dr. Bouhlal this thesis would have not been possible.

CONTENTS

ABBREVIATIONS AND TERMS

Finavia	Operates Finland's airports and air navigation systems
Frigo-trailer	A hard-sided trailer for transporting high-value- or refrigerated goods. Loading from the back only
FTL	A Full Truckload
JIT	Just-In-Time
Lean	A practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful, and thus a target for elimination
LTL	Less than Truckload
Mega-trailer	A tarpaulin semi-trailer with a bigger loading capacity, than a normal one. The loading can be done from the side or above by removing the tarpaulin
PBS	Portable roller Bed System. Used in air-freight trailers
RFS	Road Feeder Service
RO-RO	Roll-On-Roll-Off. A type of ferry
SCM	Supply Chain Management
TEU	Twenty-foot Equivalent Unit
Trafi	Finnish Transport Safety Agency
ULD	Unit Load Device

1 INTRODUCTION

1.1 The Company

Freight Frame is a company in the logistics sector. It is offering freight forwarding and trailer transportation services, with its two offices. The head office is located in Cuijk, The Netherlands and the supportive one is in Tampere, Finland. The freight forwarding services are operated in whole Europe, as the own trailers are operated between Finland and Germany, The Netherlands, Belgium, and France. Transit cargo via Finland to Russia is one of the major operations, with the 50 frigo- and mega-trailers owned by the company. (Freight Frame: Home. 2013)

Freight Frame belongs to the Nabuurs Group, which is ranked among top 25 logistics service providers in The Netherlands. Nabuurs is one of the largest family-owned companies within the logistics service sector in Europe, with an annual turnover of almost 100 million euro. (Nabuurs: Organization. 2013)

The interest towards this topic of air cargo arose when I was working for the company from the beginning July 2012 to the end of December 2012 as the substitute for the Transport Operative Manager. During this period of time, I had several discussions with the head of the Finnish office, Mr. Ami Seppälä. In these conversations about possible future additions to the company’s trailer service portfolio, the mutual interest towards air cargo services arose. The possibility to transport air cargo in our trailers would potentially grow the company’s turnover and revenue in large amounts and attract new clients.

1.2. Research Objectives

Freight Frame wants to research how big the air cargo market in trailer operations is: What are the incoming- and outgoing volumes for air cargo in trailer traffic -sector between Helsinki-Vantaa –Airport in Finland and Amsterdam-Schiphol in The Netherlands? Are the volumes big enough for Freight Frame to grasp a slice of the market? How much revenues must be received from these future operations to cover the investments to acquire the approval of a regulated agent in the EU from Trafi and make the necessary amendments?

1.3. Research Method

The research will be based on statistical information from the Finnish Customs', Finavia's (responsible for Finland's airports and air navigation services), Trafi's (Finnish Transport Safety Agency) databases, and interviews of air cargo operators. The combination of using secondary data and qualitative research in the form of interviews will cover the questions that there are for this matter. All the facts aren't available for the public, so air cargo operating companies must be addressed to find out more about this market.

Figure 1. Air Cargo Transport trailer. (Articles to world: Expansion of the Emery express air freight)

2 SETTING THE BASE FOR RESEARCHING AIR FREIGHT

When talking about air freight, one must understand its position in the supply chain and its importance in logistics. For that reason this thesis first focuses on the basic supply chain concept and from there follows the path through sub-categories towards the air freight business.

2.1 Supply Chain Management

The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage, through to the end user, as well as the associated information flows. Materials and information flow both up and down the supply chain. Supply chain management (SCM) is the integration of these activities, through improved supply chain relationships, to achieve a sustainable competitive advantage. (Ballou 2004, 5)

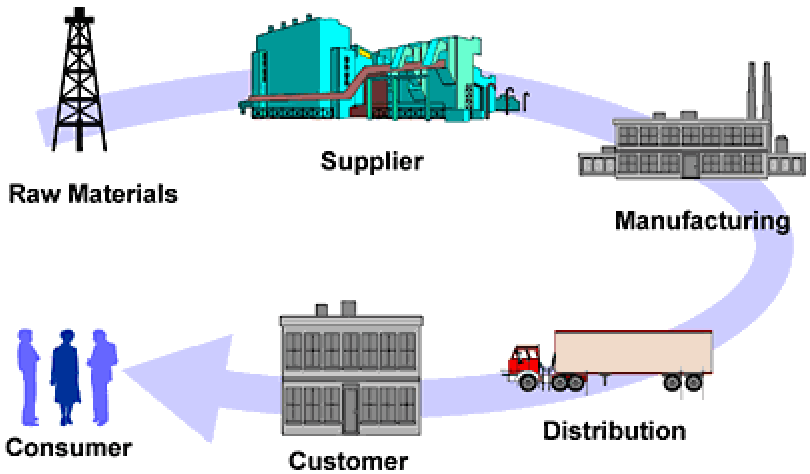

Figure 2. The Supply Chain. (Weber State University: Student association of supply chain management: Home)

When you manage a supply chain, you coordinate supply management, operations, and integrated logistics into a seamless pipeline to maintain a continual flow of products and services. You extend your reach beyond one firm's efforts to deliver products and services to include all firms involved, from the raw materials source to the final customer. SCM and its components merge into a service function.

The comprehensive model integrates many corporate functions – finance and accounting, human resource management, economics, and systems – into a structure that depends on marketing, operations (including engineering), integrated logistics, and supply management. Marketing links the customer, the departmental functions, and supply management itself. Marketing analyses changing trends, potential market volume, competitors' prices, and the like. Marketing then routes this information to other departments so they can determine how and when to meet customer demand.

These same departments – including supply management, operations, and integrated logistics – work to:

1. Coordinate the outsourcing of materials
2. Manage bottlenecks and reduce their impact on customers
3. Coordinate the smooth and continual flow of products and services into, through, and out of the firm.

SCM begins with intensive cost negotiations to obtain long-term agreements with tier 1 and tier 2 suppliers. SCM will classify suppliers as "approved", "preferred", or "alliances." In working with preferred and approved suppliers, supply chain managers may choose competitive quotes and price analysis as the best method to conduct business. This approach may require interaction only with first tier suppliers. Alliances require an in-depth approach working with both first and second tier suppliers.

The model implies two concepts: target pricing and cost design. Good marketing information helps set targets for working with suppliers. When suppliers contribute to product design early in the process, they can provide valuable data that may reduce overruns and other costs. The model also implies that a need to understand "total cost of ownership." It implies that the firms, as well as suppliers, have good cost information. Such information is crucial for selecting production locations as well as developing plans for buying from the suppliers.

When you fully apply the SCM model, you minimize fragmentation and sub-optimization of product/service flows. Fragmentation occurs when the various activities of an operation are split up and controlled and/or managed by a number of different managers or functions. Suboptimization refers to activities not performing up to their full potential because they are not managed as one system but instead as individual systems. When you work with other supply chain members to create this seamless pipeline, you can add value to SCM. Tactics to implement SCM include:

- Developing strong relationships with supply chain management members
- Developing high-quality products and services
- Sharing information among supply chain management members
- Reducing the order cycle time
- Minimizing inventory levels across the supply chain
- Reducing the number of suppliers and carriers
- Building commitment to supply chain management

If properly implemented, SCM moves products/services more quickly to the end user, thus increasing the perceived value of the system to the end customer. It can create a sustainable, competitive, strategic advantage. (Bloomberg, LeMay and Hanna 2002, 1-3)

2.2 Lean logistics

Logistics, in contrast to supply chain management, is the work required to move and position inventory throughout a supply chain. As such, logistics is a subset of and occurs within the broader framework of a supply chain. Logistics is the process that creates value by timing and positioning inventory; it is the combination of a firm's order management, inventory, transportation, warehousing, materials handling, and packaging as integrated throughout a facility network. Integrated logistics serves to link and synchronize the overall supply chain as a continuous process and is essential for effective supply chain connectivity. (Bowersox, Closs, and Cooper 2002, 4)

Lean logistics refers to the superior ability to design and administer systems to control movement and geographical positioning of raw materials, work-in-process, and finished inventories at the lowest total cost. To achieve lowest total cost means that financial and human assets committed to logistics must be held to an absolute minimum. It is also necessary to hold direct operational expenditures as low as possible. The combination of resources, skills, and systems required to achieve lean logistics are challenging to integrate, but once achieved, such integrated competency is difficult for competitors to replicate.

Creating logistics value is costly. The annual expenditure to perform logistics in the year 2000 in the United States was approximately 10,1 per cent of the $9,96 trillion Gross National product. The transportation expenditure was $590 billion, accounting for 58,6 per cent of total logistics cost.

Despite the sheer size of logistical expenditure, lean logistics is not cost containment or reduction, but understanding how select firms use logistical competency to achieve competitive advantage. Firms that have developed world-class logistical competency enjoy competitive advantage as a result of providing important customers superior service. Leading logistical performers typically implement information technology capable of monitoring global logistical activity on a real time basis. Such technology identifies potential operational breakdowns and facilitates corrective action prior to delivery service failure. If corrective action cannot be performed, customers can be provided advance notification of developing problems, thereby eliminating the surprise of an unavoidable service failure. When working in collaboration with customer and suppliers, corrective action can be taken to prevent operational shutdowns or costly customer service failures. By performing at above industry average with respect to inventory availability, speed and consistency of delivery, and operational efficiencies, logistically sophisticated firms are ideal supply chain partners. (Bowersox, Closs, and Cooper 2002, 32-33)

2.2.1 Logistics service benefits

Creation and basic logistical performance is measured in terms of availability, operational performance, and service reliability. The term **Basic logistics service** describes the level of service a firm provides all established customers.

Availability involves having inventory to consistently meet customer material or product requirements. The traditional paradigm has been the higher inventory availability, the greater is the required inventory amount and cost. Information technology is providing new ways to achieve high inventory availability for customers without correspondingly high capital investment. Information that facilitates availability is critical to achieving lean logistics performance.

Operational performance deals with the time required to deliver a customer's order. Operational performance involves delivery speed and consistency. Naturally, most customers want fast delivery. However, fast delivery is of limited value if inconsistent from one order to the next. A customer gains little benefit when a supplier promises next-day delivery, but more often than not, delivers late. To achieve smooth operations, firm typically focus on service consistency first and then seek to improve delivery speed. Other aspects of operational performance are also important. A firm's operational performance can be viewed in terms of its flexibility to accommodate unusual and unexpected customer requests.

Another aspect of operational performance is frequency of malfunction and, when such malfunction occurs, the required recovery time. Few firms can perform perfectly all the time. It is important to estimate the likelihood of something going wrong. Malfunction is concerned with the probability of logistical performance involving failures, such as damaged products, incorrect assortment, or inaccurate documentation. When such malfunctions occur, a firm's logistical competency can be measured in terms of recovery time. Operational performance is concerned with how a firm handles all aspects of customer requirements, including service failure, on a day in and day out basis.

Service reliability involves the quality attributes of logistics. The key to quality is accurate measurement of availability and operational performance. Only through comprehensive performance measurement is it possible to determine if overall logistical operations are achieving desired service goals. To achieve service reliability, it is essential to identify and implement inventory availability and operational performance measurements. For logistics performance to continuously meet customer expectations, it is essential that management is committed to continuous improvement. Logistical quality does not come easy; it's the product of careful planning supported by employee training, operational dedication, comprehensive measurement, and continuous improvement. To improve service performance, goals need to be established on a selective basis. Some products are more critical than others because of their importance to the customer and their relative profit contribution.

The level of basic logistical service should be realistic in terms of customer expectations and requirements. In most cases, firms confront situations wherein customers have significantly different purchase potential. Some customers require unique or special value-added services. Thus, managers must realize that customers are different and that services provided must be matched to accommodate unique requirements and purchase potential. In general, firms tend to be overly optimistic when committing to average of basic customer service performance. Inability to consistently meet an unrealistically high basic service target might result in more operating and customer relationship problems than if less ambitious goals had been attempted from the outset. Unrealistic across-the-board service requirements can also dilute a firm's capability to satisfy special requirements of high potential customers. (Bowersox, Closs, and Cooper 2002, 35-36)

2.2.2 Logistics cost minimization and total costing

The focus of lean logistics can be traced to relatively recent developments of total costing theory and practice. In 1956, a classic monograph describing airfreight economics provided a new perspective concerning logistical cost. In an effort to explain conditions under which high-cost air transport could be justified, Lewis, Culliton, and Steele conceptualized the total cost logistics model. Total cost was positioned to include all expenditures necessary to perform logistical requirements. The authors illustrated an electronic parts distribution strategy wherein the high variable cost of direct factory-to-customer air transport was more than offset by reductions in traditional inventory and field warehouse costs. They concluded that the least total cost logistical way to provide the desired customer service was to centralize inventory in one warehouse and make deliveries using air transportation.

This concept of total cost, although fundamentally basic, had not previously been applied to logistical operations. Probably because of the economic climate of the times and the radical departure in suggested practice, the total cost proposition generated a great deal of debate. The prevailing managerial practice, reinforced by accounting and financial control, was to focus attention on achieving the lowest possible cost for each individual function of logistics with little or no attention to integrated total cost. Managers had traditionally focused on minimizing functional cost, such as transportation, with the expectation that such effort would achieve the lowest combined costs. Development of the total cost concept opened the door to examining how functional costs interrelate and impact each other. Subsequent refinements provided a more comprehensive understanding of logistical cost components and identified the critical need for developing functional cost analysis and activity-based costing capabilities. However, the implementation of effective logistical process costing remains a new millennium challenge. Many long-standing practices of accounting continue to serve as barriers to fully implementing total cost logistical solutions. (Bowersox, Closs, and Cooper 2002, 36)

2.3 Just-In-Time

Just-in-time (JIT) scheduling is an operating philosophy that is an alternative to the use of inventories for meeting the goal of having the right goods at the right place at the right time, says Ballou (2004, 428). Waters (2009, 285) adds that all the activities are not to be done too early, which could leave materials hanging around until they are actually needed. The activities can't be executed too late either, as it would lead to poor customer service. You can see this effect when you order a taxi to collect you at 8:00. If the taxi arrives at 7:30 you are not ready and it wastes time sitting and waiting; if it arrives at 8:30 you are not happy and will not use the service again.

JIT is a way of managing the materials supply channel that was first made popular by the Japanese, perhaps because of particular economic and logistical circumstances that have prevailed in that country in the last 40 years. JIT scheduling may be defined as
a philosophy of scheduling where the entire supply channel is synchronized to respond to the requirements of operations or customers.

It is characterized by

- Close relationships with a few suppliers and transport carriers
- Information that is shared between buyers and suppliers
- Frequent production/purchase and transport of all goods in small quantities with resulting minimal inventory levels
- Elimination of uncertainties whenever possible throughout the supply channel
- High-quality goals

Economical replenishment quantities are driven toward single units as production setup and purchase-ordering costs are reduced to insignificant levels. Where there are economies of scale in purchasing or production, these economies are exploited to the maximum by using a few suppliers that are usually located in close proximity to the buyer's demand points. A close working relationship is developed with relatively few suppliers and carriers. Information from the buyer, mainly in the form of the production/operating schedule, is shared with the suppliers so that they might anticipate the buyer's needs, thereby reducing response time and its variability. The few selected suppliers are expected to perform with little variance in providing on-time deliveries. The overall effect of scheduling under a just-in-time philosophy is to create product flows that are carefully synchronized to their demands. Although more effort is likely to be expended in managing the supply channel under a JIT philosophy than with a supply-to-inventory philosophy, the benefit is to operate the channel with minimal inventory and with the attendant savings and/or service improvements. However, some of these benefits realized by the manufacturer may be a result of shifting costs and inventory onto the suppliers upstream in the supply channel. (Ballou 2004, 428-429)

The concepts embodied in the JIT supply scheduling can also be applied to the physical distribution channel. Compressing the time between when customer orders are placed and when they are received can be a competitive advantage. This quick response is based on many of the same ideas behind JIT scheduling. That is, use information to reduce uncertainties and substitute for assets, namely inventories. Use electronic information transmission to reduce the order-cycle time. Use computer technology to speed the production and/or filling of customer orders. Careful application of these concepts to the distribution channel can improve customer service and lower costs. (Ballou 2004, 442)

2.3.1 Demand pull

It is easy to say that operations must be done exactly the time they are needed, but we need some way of arranging this. JIT is successful because it gives a method for achieving this by "pulling" materials through the operations.

In a traditional process and material resource planning (MRP), each operation has a timetable of work that must be finished at a given time. Finished items are then "pushed" through to the next operation. But this ignores what the next operation is actually doing. It might be working on something completely different, or be waiting for a different item to arrive. Whatever is happening, the new material is added to stock of work in progress (WIP) to wait until the second operation is ready to work on it. The result is high stocks of WIP and interruptions to the flow of materials.

JIT uses another approach to “pull” materials through the process. When one operation finishes work on a product, it passes a message back to the preceding operation to say that it needs another unit to work on. The preceding operation only passes materials forward when it gets the request. This means that earlier operations don’t **push** work forwards, but later operations **pull** it through. You can see the difference in a take-away sandwich bar. With the traditional push system, someone makes a batch of sandwiches and delivers them to the counter where they sit until a customer buys them. With a JIT pull system, a customer asks for a particular type of sandwich, and this is specially made and delivered – thereby eliminating the stocks of WIP.

In reality, there is inevitably some lead time between operations requesting material and having it arrive, so messages are passed backwards this lead time before they are actually needed. The materials are usually delivered in small batches rather than individually, so JIT still has some stock of WIP, but these are as small as possible. (Waters 2009, 288)

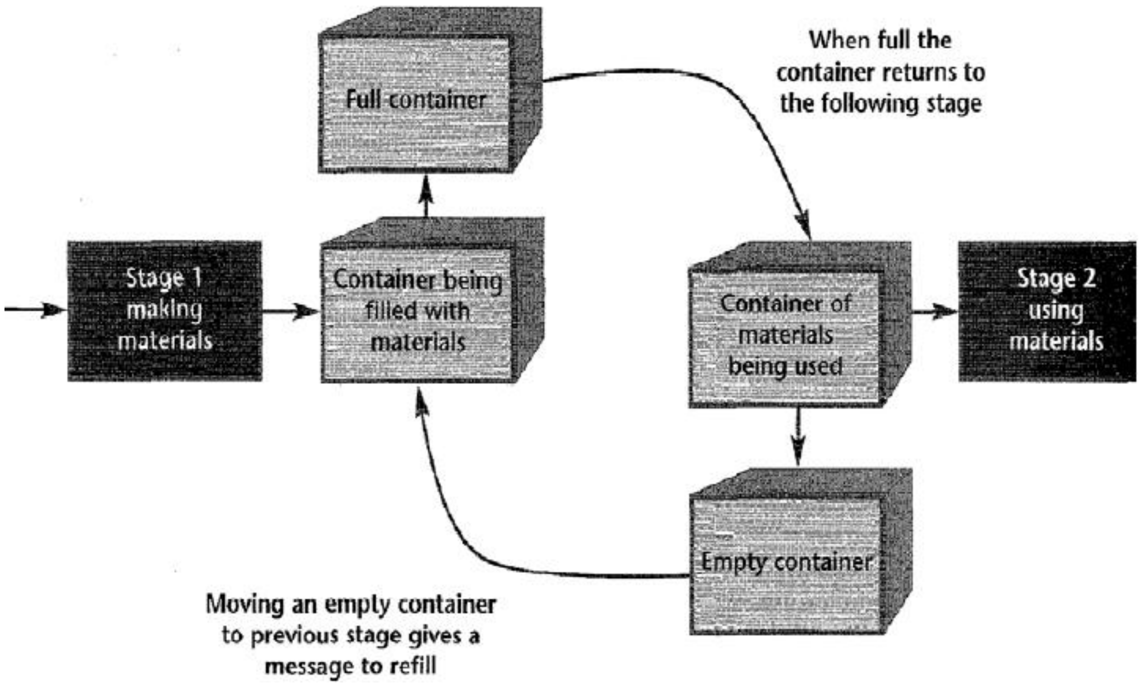

Figure 3. The simplest type of message for JIT. (Waters, Donald. 2009. Supply chain management: an introduction to logistics. Page 198)

2.3.2 KANBAN

KANBAN is Toyota’s production scheduling system and is perhaps the best-known example of just-in-time scheduling. KANBAN itself is a card-based production control system. A KAN card instructs a work center or supplier to produce a standard quality of an item. The BAN card requests a predefined standard quantity of a component part or subassembly be brought to a work center. These cards are used as triggers for the production and movement of items.

The KANBAN/JIT scheduling system uses the reorder point method of inventory control to determine standard production-purchase quantities and involves very low setup costs and very short lead times. Several additional characteristics make it effective as a JIT system. First, models in the master production schedule are repeated frequently and compared with a schedule built to take advantage of economies of scale. That is, a schedule of product models A and B that would exploit economies of scale and reduce setup costs might be “AAAAAAABBBBBBAAAAAAABBBBBB”
However, the KANBAN schedule might look like this: ABABABABABABABABAB.

Second, lead times are highly predictable because they are short. Suppliers are located near the site of operations and deliveries can be made frequently, often once an hour, without incurring great transportation expense.
Third, order quantities are small because setup and procurement costs are kept low. Since order quantities are related to setup or procurement costs, they become the target for cost reduction. Small order quantities mean low inventories. The classic reorder point method of inventory control is used to set the replenishment quantities.
Fourth, few vendors are used, with correspondingly high expectations of them. A high level of cooperation between the manufacturer and vendor is developed to assure that the desired level of product and logistical performance is achieved. (Ballou 2004, 430-431)

2.4 Transportation

Transportation plays a key role in economic success by allowing for the safe and efficient distribution of goods and services throughout the supply chain. It links the various integrated logistics activities. Without transportation, the integrated logistics system breaks down. Without the transportation links, raw material cannot flow into the warehouses and plants, nor can the finished product flow out of the plant to field warehouses and finally to the customer. (Bloomberg, LeMay and Hanna 2002, 94)

An efficient and inexpensive transportation system contributes to greater competition in the marketplace, greater economies of scale, and reduced prices for goods. Repeated surveys have shown that average delivery time and delivery time variability rank at the top of the list as important transportation performance characteristics. Delivery (transit) time is usually referred to as the average time it takes for a shipment to move from its point of origin to its destination. Variability refers to the usual differences that occur between shipments by various modes. All shipments having the same origin and destination points and moving on the same mode are not necessarily in transit for the same length of time due to the effects of weather, traffic congestion, number of stop offs, and differences in time to consolidate shipments. Transit time variability is a measure of the uncertainty in carrier performance.

Over long distances, rail and air shipments approach constant average transit times, whereas truck transit times continue to increase. Of course, on the average, airfreight is the fastest mode for distances more than 600 miles, with truck and rail following, respectively. For distances less than 600 miles, air and truck are comparable. In terms of variability, the transport services can be roughly ranked as they were for average delivery time. That is, rail has the highest delivery time variability and air has the lowest, with truck service falling between these extremes. If variability is viewed relative to the average transit time to the transport service, air can be the least dependable and truckload the most dependable. (Ballou 2004, 165-169)

2.4.1 Loss and Damage

Because carriers differ in their ability to move freight without loss and damage, loss and damage experience becomes a factor in selecting a carrier. Product condition is a primary customer service consideration. Common carriers have an obligation to move freight with reasonable dispatch and to do so using reasonable care in order to avoid loss and damage. This responsibility is relieved if loss and damage result from an act of God, default by the shipper, or other causes not within control of the carrier. Although carriers, upon proper presentation of the facts by the shipper, incur the direct loss sustained by the shipper, there are certain imputed costs that the shipper should recognize before making a carrier selection.

Potentially the most serious loss that the shipper may sustain has to do with customer service. The shipment of goods may be for replenishing a customer’s inventory or for immediate use. Delayed shipments or goods arriving in unusable condition means inconvenience for the customer or possibly higher inventory costs arising from a greater number of stock outs or back orders when anticipated replenishment stocks are not received as planned. The claims process takes time to gather pertinent facts about the claim, takes effort on the part of the shipper to prepare the proper claim form, ties up capital while claims are being processed, and sometimes involves a considerable expense if the claim can be resolved only through court action. Obviously, the fewer the claims against the carrier, the more favorable the service appears to the user. A common reaction of shippers to a high likelihood of damage is to provide increased protective packaging. This expense must ultimately be borne by the user as well. (Ballou 2004, 169-170)

2.4.2 Transport Cost Characteristics

The prices a logistician must pay for a transportation services are keyed to the cost characteristics of each type of service. Just and reasonable transportation rates tend to follow the costs of producing the service. Because each service has different cost characteristics, under any given set of circumstances there will be potential rate advantages of one mode that cannot be effectively matched by other services. Many transportation costs are although invisible. Many shipments in different sizes and weights move jointly in the same haul. How much of the cost should be assigned to each shipment? Should the costs be assigned based on shipment weight on total load, on the proportion of total cubic meters used, or on some other basis? There is no simple formula for cost allocation, and production costs on a per-shipment basis remain a matter of judgment.

The back haul that all carriers experience, is a case in point. Carriers rarely can perfectly balance the traffic between the forward movement and the return (back haul) movement. By definition, the forward haul is the heavy traffic direction and the back haul is the light traffic direction. Shipments in the back haul may be allocated their fair share of total costs of producing the back haul. This makes the cost per shipment high compared with the forward haul. The back haul may be treated as a byproduct of the forward haul because it results from producing the forward haul. All, or most of the costs, are then allocated to forward haul shipments. Back-haul costs would be considered zero, or assigned only the direct costs to move a shipment in the back-haul direction.

There are several dangers to the latter approach. For one, rates on the forward haul may have to be set at a level that would restrict volume in this direction. In addition, back-haul rates could be set so low to help cover some fixed expenses. The effect may be that the back haul gains significantly in volume and possibly surpasses the forward-haul volume. A carrier then may find itself not meeting its fixed expenses and facing rate adjustments that could greatly alter the traffic balance. The by-product has now become the main product. In addition, a significant difference in cost allocation and in rates that follow these costs may lead to questions of rate discrimination between forward-haul and back-haul shippers. The key to discrimination is whether the service in both directions is judged to be under essentially the same conditions and circumstances. (Ballou 2004, 184-187)

2.4.3 Transport Service Selection

When transportation service is not used to provide a competitive advantage, the best service choice is found by trading off the cost of using a particular transport service with the indirect cost of inventory associated with the performance of the selected mode. That is, speed and dependability affect both the shipper’s and the buyer’s inventory levels (both order quantity stock and safety stock) as well as the amount of inventory that is in transit between the shipper's and the buyer's locations. As slower, less reliable services are selected, more inventory will appear in the channel. Inventory-carrying cost may be in trade-off with lower cost for the transportation service. Given alternatives, the favored service will be the one that offers the lowest total cost consistent with customer service goals while meeting customer service objectives. The effects of transport performance, similar to those on inventory, can be seen on production scheduling. Production systems operating with little or no raw material inventories are highly vulnerable to delays and shutdowns from transport performance variability.

The selection of a transport mode may be used to create a competitive service advantage. When a buyer in a supply channel purchases goods from more than one supplier, the logistics service offered, as well as price, influences supplier selection. Conversely, if the suppliers select the transport mode to be used in their respective channels, they can control this particular element of the logistics service offering and thus influence the buyer's patronage. To the buyer, better transport service (lower transit time and transit-time variability) means that lower inventory levels can be maintained and/or operating schedules can be met with greater certainty. In order to encourage choice of the most desirable transport service, and thereby lower its costs, the buyer offers to the supplier the only thing that it can – patronage. The buyer's action may be shift to its share of purchases toward the supplier offering the preferred transport service. The profit from this increased business may defray the cost associated with a more premium transport service and encourage a supplier to seek the transport service that is appealing to the buyer rather than simply the offering the lowest costs. (Ballou 2004, 220-222)

2.5 Transport Modes

Let's take a closer look at each one of the five major modes of freight transportation.

2.5.1 Rail

Railroads transport a significant amount of domestic freight. Railroads haul high-density, low-valued freight over long distances at rates lower than trucking and air, but higher than water and pipeline. Products hauled include coal, stone, sand, metals, grain, and automobiles. Their primary competitors include domestic water carriers for large, bulk products and motor carriers for higher-valued goods. Railroads can handle a wide variety of goods, but generally have not. They lack flexibility and high-speed delivery in their standard operation. (Bloomberg, LeMay and Hanna 2002, 104-105)

The capability to efficiently transport large tonnage over long distances is the main reason railroads continue to handle significant intercity tonnage. Railroad operations have high fixed costs because of expensive equipment, right-of-way and tracks, switching yards, and terminals. However, rail enjoys relatively low variable operating costs. The electrification of trains is providing huge reductions in the variable cost per ton-mile. (Bowersox, Closs, and Cooper 2002, 341)

Rail service exists in two legal forms, common carrier or privately owned. A common carrier sells its transportation services to all shippers and it is guided by the economic and safety regulations of the appropriate government agencies. In contrast, private carriers are shipper owned with the usual intent of serving only the owner. Because of the limited scope of the private carrier’s operations, no economic regulation is needed. Nearly all rail movement is of the common carrier type and full carloads. (Ballou 2004, 172)

To provide improved service to major customers, progressive railroads have concentrated on the development of specialized equipment. These technologies are being applied by the railroads to reduce weight, increase carrying capability, and facilitate interchange. (Bowersox, Closs, and Cooper 2002, 342)

Rail has regained some freight lost to motor carriers through increases in intermodal operations – trailer on flatcar (TOFC) or piggyback and container on flatcar (COFC). The use of standardized containers that can be removed from a ship and placed directly on a railcar for surface transportation has helped rail carriers regain market share. Railcars have also been adapted to meet intermodal needs. (Bloomberg, LeMay and Hanna 2002, 105) **Articulated cars** have an extended rail chassis that can haul up to 10 containers on a single flexible unit. The concept is to reduce weight and time required for interchanging railcars. **Double stack railcars**, as the name implies, are built to transport two levels of containers on a single flatcar, thereby doubling the capacity of each railcar. (Bowersox, Closs, and Cooper 2002, 342)

Railroads currently perform a highly focused and important role in the transportation structure as the intermodal leaders of the 21st century.

2.5.2 Pipeline

The main users of pipelines are oil and gas – together with the utilities of water and sewage – where they form the only feasible method of transport and distribution. They can also be used for some other movements such as pulverised coal in oil, and clay slurries. In the EU there are about 35 000 km of oil pipeline handling 135 billion tonne-kilometres a year (about 5% of the total). The USA moves more through its long pipelines in Alaska at 835 billion tonne-kilometres. (Waters 2009, 417)

Many pipelines are built by private entities for private use. Pipeline companies operating as common carriers do exist. Different types of liquid can be shipped through a pipeline at the same time, separated by a batching plug. A batching plug is a mechanism designed to allow for continuous flow through the pipeline while maintaining the integrity of each individual product. The primary competitors of pipelines are water carriers and rail carriers. (Bloomberg, LeMay and Hanna 2002, 104)

Pipelines have the advantage of moving large quantities over long distances, working continuously without a break, with very low operating costs, reliably with very few accidents or breakdowns, largely unaffected by environmental conditions, and with small workforces. On the other hand, they have the disadvantages of being slow (typically moving at less than 10km per hour), inflexible (only transporting between fixed points), vulnerable to attack in politically unstable areas, and only carrying certain types of liquid. (Waters 2009, 417-418)

Pipeline costs are predominantly fixed. Pipelines must build their own right-of-way, an extremely expensive undertaking. Pipelines most often move large quantities of a liquid product from a fixed origin to a fixed destination. The construction of a pipeline becomes cost-effective only when the high initial fixed cost can be spread over enough volume to keep the unit transportation cost competitive with other modes. (Bloomberg, LeMay and Hanna 2002, 104)

2.5.3 Water

Most supply chains use shipping to cross the oceans at some point, and over 90% of world trade is moved by sea. (Waters 2009, 414) There are three types of water transport: inland waterways (through rivers and canals), coastal shipping (within the same coastline) and ocean transport (to cross major seas). All water transport is dependent on geography, and some in some areas it can be used more than in others. For example, as Rotterdam is located at such a convenient spot on the coast of the Netherlands it is the biggest port in Europe. With its connections to the Rhine–Meuse–Scheldt delta, the majority of freight can be moved to inland shippers and so distributed through waterways.

There are different types of ships that are used in water transportation, depending on transported goods.
General cargo ships are the standard design, with large holds that carry any type of cargo. Most of these are loaded by crane, although some have side doors that allow vehicles to drive on and off. Many ports around the world don’t have facilities to handle more specialised ships, so these general-purpose vessels are very widely used.
Bulk carriers carry large quantities of cheap bulk materials in large holds, such as grain and ores.
Tankers carry any liquid, but by far the biggest movements are oil and natural gas.
Container ships are specially designed to carry standard containers and their capacity is rated in TEUs (20-foot equivalent units). A typical container ship is up to 5000 TEUs, with the biggest around 14 000.
Ferries are usually RO-RO (roll-on-roll-off) vessels that carry road vehicles over relatively short distances. However, there are some longer RO-RO routes between, say, Europe and America.
Barges are towed behind ocean going tugs. These are used for shorter routes where sea conditions are fairly reliable, such as between USA and Puerto Rico. They have the advantage of being cheaper to run than normal ships.

Many ships are designed for special purposes, often combining different kinds of operation. Examples of such **combination ships** are the RO-RO/container ships that carry vehicles imported to the USA and return with bulk grain to Japan, and the oil-bulk vessels that carry oil from the Middle East and return carrying ores. (Waters 2009, 415)

Figure 4. Finnlines RO-RO ferry. (Yle News archives)

The water carriers are also classified as **tramps** or **liners**.
Liners have fixed sailing times and fixed routes, while tramps sail when they reach capacity. Since liners must sail at a specific time, they are not always filled to capacity. Tramps usually offer a lower rate because their asset utilization rate is higher than a liner's. Tramps are usually the better choice when service dates and times are not critical, and liners are the better choice when these criteria are critical. (Bloomberg, LeMay and Hanna 2002, 107)

Water transport ranks between rail and motor carrier in terms of fixed costs and, as stated by Waters (2009, 414), it needs expensive port facilities and then, like rail, pipeline and air, it is limited to terminal-to-terminal routes with intermodal facilities at each end.

2.5.4 Road

Road is the most widely used mode of transport and it appears in virtually every supply chain. It is the standard mode of transportation in most regions of the world, and accounts for more than 70% of freight moved within the EU measuring by tonne-kilometre. The main benefit of road transport is its flexibility, as it can reach almost any location. Although the maximum speed on roads is limited, the ability to give a door-to-door service avoids transfers to other modes and can give shorter overall journey times. (Waters 2009, 409-410)

The flexibility of road transport, Waters (2009, 410-411) continues, comes from its use of extensive public road networks that already exist – unlike railways that have to build, or at least maintain, their own tracks. Within the EU there are more than 5 million kilometres of road, including 62 000 km of motorway. This compares with the USA's 6,5 million kilometres of roads and 195 000 km of motorway. As roads can handle more vehicles than rails, their timetables are more flexible, and they can go on journeys at short notice and with little planning.

Motor carriers can be classified as FTL (full truckload) and LTL (less-than-truckload) carriers. Like their names state, LTL carriers accept less-than-truckload amounts, as FTL carriers ship full truckloads. LTL operations are more costly to establish. These entities accept small packages, transport them to a consolidation facility, consolidate the small packages of freight into one large shipment, move the large shipment to another facility, and break it back down to small packages for delivery. These operations are more asset-intensive than FTL operations because LTL carriers require more motor carrier equipment, an extensive information network, and consolidation facilities. Therefore, LTL carriers typically charge a higher rate per hundred weight (cwt). However, for small shipments it is more practical for a shipper to pay a higher cwt rate to ship their package than to pay for an entire truckload. FTL operators usually take shipments that fill the majority of the trailer space available. FTL operations are much less asset-intensive, requiring only motor carrier equipment and a way to receive customer requests for transportation services. Therefore, if a shipper has enough freight to fill up an entire truck, this type of carriage is often the least expensive motor carrier choice. (Bloomberg, LeMay and Hanna 2002, 107)

In road transport, goods are usually packed on top of pallets. The most commonly used pallets in Europe are the EUR-pallet and the EUR2 – or also named FIN – pallet. (See Figure 5)

Figure 5. EUR- and FIN -pallets. (Orlava: Tuotteet: Standardilavat)

The EUR –pallet's dimensions are 1200×800×144 mm, and the FIN – pallet's 1200x1000x144 mm. Both are four-way pallets made of wood. They can easily be moved around, loaded and unloaded with a forklift, or a pallet jack. Palletizing makes moving of the goods easier and faster.

The most commonly used road vehicles and their characteristics:

Delivery vans are the small delivery vehicles which can carry a tonne or two in a sealed body. Smaller vans are based on car design, while larger ones – such as Luton Box vans – are like small removal lorries.

Flat-bed lorries are basic, rigid lorries with two or three axles, and a flat platform. Materials are stacked and tied on to the platform, or small sides are added.

Box bodied lorries are like the flat-beds, except they haven enclosed bodies to give more protection to their loads. Traditionally, access to the interior was through the doors at the back, but the 1970's Boalloy added curtain siding to give easier access from the sides.

Articulated lorries are more maneuverable than rigid ones, so they can be bigger – up to the legal weight limit, which is typically 44 tonnes. There are several variations on articulated lorries, usually with a two- or three-axle truck and a two- or three-axle trailer. These form the standard heavy goods vehicles that deliver materials through most supply chains.

Lorry and trailer combine a rigid lorry pulling a two-axle trailer. This gives greater capacity than an articulated lorry, but maintains some of their maneuverability. (Waters, 2009, 411)

Figure 6. Freight Frame semitrailers (Articulated Lorries) at loading dock.
(Facebook: Group: Freight Frame)

Road transport is not without its problems, including rising costs of equipment and fuel, shortages of skilled drivers, regulations on driver hours, restricted access to cities and sensitive areas, limits on exhaust emissions, traffic congestion, driving empty on return trips, and so on. The result is that road transport can be relatively expensive, so it is generally used for shorter distances. The average length of a truck journey in Europe is around 350 km. Beyond this it becomes more economical to use rail for heavy goods and air for light ones, Waters (2009, 411) ends his analysis.

2.5.5 Air

The newest but least utilized mode of transport is airfreight. The significant advantage of airfreight lies in the speed with which a shipment can be transported. A coast-to-coast shipment via air requires only a few hours contrasted to days with other modes of transport. (Bowersox, Closs and Cooper, 2002, 345)

Waters (2009, 417) gives an example of a case: For instance, if you run a factory in Argentina and a critical machine breaks down, you do not want the spare part to be put on the next scheduled ship from Japan, which will arrive in five weeks' time. Then the only feasible alternative is air transport. However, it is rare for the speed of delivery to be so much more important than the cost – and air freight limited to small amounts of expensive materials, such as jewellery, pharmaceuticals, flowers, and documents.

Airlines offer terminal-to-terminal movements and they rely on road transport for the initial movement from supplier to airport, and the final movement from airport to customer, Waters (2009, 417) continues. Many facilities have grown around airports for organizing these moves, but the transfers take time especially with increased concerns about security. It often takes longer to get through the security checks than to make the flights, and this considerably reduces the benefits of air travel.

Figure 7. Loading pallets into a cargo airplane. (Air Cargo World: LH Cargo posts record 2011 despite ‘gloomy’ early 2012)

Airlines transport small volume shipments rather than large volumes, and packaged products rather than heavy, bulk commodities. The physical configuration and cost of air service also limit the variety of products shipped by air. Measured by weight, airlines transport very little freight. The percentage of total freight dollars shipped by air is relatively small, although the revenue growth rate is promising. (See Figure 8)

As customer service expectations increase, so does the demand for shorter transit times. As a result, many shippers have turned to air transportation. (Bloomberg, LeMay and Hanna, 2002, 101) Although air freight continues to grow, it only accounts for 1% of all freight movement.

Figure 8. Boeing current market outlook 2013. (Boeing: Current Market Outlook 2013)

As well as in road transport, air cargo is also being palletized. In air transport, the pallets are different from the road ones, and called ULDs (Unit Load Devices). The ULD is a pallet or container used to load luggage, freight, and mail on aircraft. It allows a large quantity of cargo to be bundled into a single unit. Since this leads to fewer units to load, it saves ground crews time and effort and helps prevent delayed flights. Each ULD has its own packing list (or manifest) so that its contents can be tracked.

ULDs come in two forms: pallets and containers. ULD pallets are rugged sheets of aluminum with rims designed to lock onto cargo net lugs (See Figure 7). ULD containers (See Figure 9), also known as cans and pods, are closed containers made of aluminum or combination of aluminum (frame) and Lexan (walls). (Imperial Air Cargo: Containers Information. 2013)

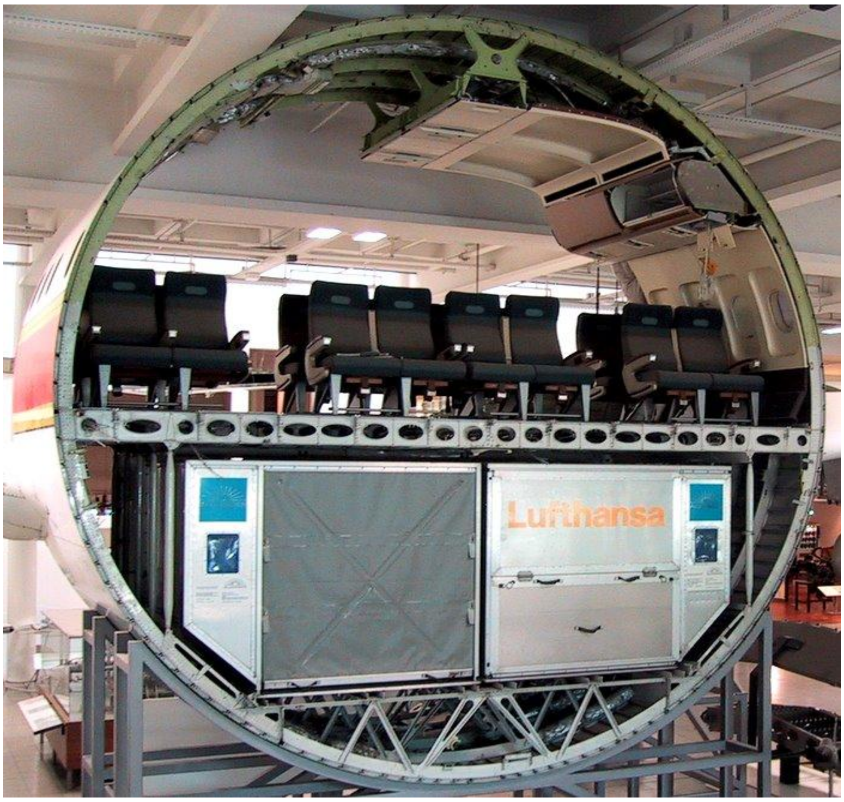

Figure 9. Cross-section of an Airbus A300 with ULD containers on the lower deck. (Imgur: Cool cross-section of an Airbus airplane)

Waters (2009, 417) lists the three main types of operation for air freight.
The first uses **scheduled passenger services**, where major airlines use the cargo space that is not needed for baggage. The second is a cargo service, where operators run **cargo planes on regular schedules**. These are public carriers, moving goods for any customers. The third type has **charter** operations, where a whole aircraft is hired for a particular delivery.

Traditionally, intercity airfreight was transported on scheduled passenger flights. While the practice was economically justified, it resulted in a limited capacity and flexibility of freight operations. The high cost of jet aircraft, coupled with the erratic nature of freight demand, served to limit the economic commitment of dedicated aircraft to all-freight operations. However, the advent of premium air carriers introduced dedicated global airfreight service. While such premium service was originally targeted at high-priority documents, it has expanded to include package freight. For example, premium carriers have integrated their service to include overnight parts delivery from centralized distribution centers located at their air hub. Overnight air delivery from a centralized warehouse is attractive to firms with a large number of high-value products and time-sensitive service requirements. (Bowersox, Closs and Cooper 2002, 345)

Airlines use hubs as transfer points to get the cargo into the desired destination. If the goods were to be transported e.g. in a system with 8 destinations, the spoke-hub system requires only 7 routes to connect all destinations. If they used only a point-to-point system, they'd need 28 routes. As there are less routes, which all fly through the specific hub, this leads to more efficient use of transportation resources. With the hub-system, aero planes can usually be filled all the way up and are also able to operate the same routes many times a day. For example, Finnair uses Helsinki-Vantaa –Airport as their hub and fly their routes through it to maximize their efficiency.

The used fleet restricts the goods that can be transported on specific routes, or overall. Some airlines have a fleet with bigger total cargo capacity and volume than the others. For example, Finnair's fleet (See Figure 10) allows them to transport maximum 2.59 by 3.55 m goods in their aircraft as these are the measures of the side cargo door in MD-11, from which the goods are loaded into the plane. (Measures from: Etihad Cargo: Aircraft illustration)

Figure 10. Finnair's fleet. (Finnair Group: Fleet)

If the goods exceed these size limits, they must be transported by other means, e.g. by truck, or then sub-contracted to an airline-operator with bigger loading capacity.

As an example, to view the air freight chain, let's say there is a shipment that is travelling from Tokyo to Amsterdam via Helsinki with Finnair. There is not always traffic with bigger, freighters, like MD-11, so goods are loaded to passenger planes.
First in Tokyo, goods are loaded into an A330, where it cannot exceed the size of 2.04 by 2.70 m (the measures of the forward compartment door). Then, in Helsinki, from

where it is transshipped into an A319, it cannot exceed the size of 1.236 by 1.817 m (the measures of the forward compartment door). This is because the routes are operated with different planes, that suit the demand, and so the sizes vary. If the air freight cannot fit into the measurements of a plane, it must be transported by other means. (Measures from: Etihad Cargo: Aircraft illustration)

3 CASE FREIGHT FRAME

3.1 Why transport air freight in trailers?

Air transportation is being considered by increasing numbers of shippers for regular service, even though airfreight rates exceed those of trucking by more than two times. The appeal to air transportation is its unmatched origin-destination speed, especially over long distances. The average length of a freight haul is 1001 miles. Commercial jets have cruising speeds between 545 and 585 miles per hour, although airport-to-airport average speed is somewhat less than cruising speed because of taxi and holding time at each airport and the time needed to ascend to and descend from cruising altitude. But this speed is not directly comparable with that of other modes because the times for pickup and delivery and for ground handling are not included. All these time elements must be combined to represent door-to-door air delivery time. Because surface freight handling and movement are the slowest elements of total door-to-door delivery time, overall delivery time may be so reduced that a well-managed truck can match the schedule of air. (Ballou 2004, 173)

3.2 The schedule for air freight

Confidential. Not published.

3.3 The volumes of air freight in trailer traffic

Confidential. Not published.

3.4 Requirements for the trailers and safety

Confidential. Not published.

3.5 Acquiring the approval of a regulated agent

'Regulated agent' refers to a freight agent or Transport Company that carries out security controls of air cargo or air mail as approved or required by the aviation authority. The approval of security measures gives the company a defined security status, which provides added value also to its cooperation partners and interest groups. The approval is valid throughout the European Union. (Trafi: Air Cargo: Regulated Agents. 2013)

Many air cargo companies appreciate this approval very much. It allows smooth transportation of goods through the hubs and terminals, without the need to perform a security scan for all the goods every time they are handled. If all the companies – including the senders, transport companies and terminals – that are involved in the transport chain have either valid status of a known consignor or a regulated agent, there is no need to screen the goods at any point. If there is even a single shipment from a company with no valid status of a known consignor, the whole FTL must be screened. If the transport company hasn't got the status, all the goods must be screened after every delivery, too. Screening is expensive and time consuming, so these statuses are in high demand.

3.5.1 How to apply for approval as a regulated agent

The application can be submitted to Trafi in free form. The company, following more specific instructions provided by Trafi, will then compile a security programme describing how the security measures will be carried out in all locations covered by the approval. The company must appoint a person in charge of security, who will be responsible for implementing the security requirements. This person must be familiar with the export practices of the company, and he/she will be subjected to a background check. Moreover, this person must have completed the cargo security training in accordance with Aviation Regulation SEC M1-1, section 9.

Once the security programme meets the requirements, Trafi will inspect the company's operations and facilities. Trafi will issue a certificate of approval, which will be confirmed by entering the company's details in the EU database of known consignors and regulated agents.

In order to maintain the approval, Trafi inspects the companies at least every five years. The fees charged for Trafi's approval are determined in accordance with the current Decree on Trafi's service fees. (Trafi: Air Cargo: Regulated Agents. 2013)

3.5.2 Training of persons responsible for cargo security

As stated in Trafi’s Aviation regulation: SEC M1-1, section 9, 2011: Persons responsible for cargo security shall have received the training specified in paragraph 11.2.5 of the Implementing Regulation:

Specific training for persons with general responsibility at national or local level for ensuring that a security programme and its implementation meet all legal provisions (security managers)

Specific training of security managers shall result in the following competencies:

(a) Knowledge of the relevant legal requirements and how they should be met;
(b) Knowledge of internal, national, Community and international quality control;
(c) Ability to motivate others;
(d) Knowledge of the capabilities and limitations of security equipment or screening methods used. (Commission Regulation (EU) No 185/2010)

Provisions on recurrent training of persons responsible for cargo security are laid down in paragraph 11.4.2 of the Implementing Regulation:

Persons performing tasks as listed under point 11.2 other than those referred to in point 11.4.1 shall undergo recurrent training at a frequency sufficient to ensure that competencies are maintained and acquired in line with security developments.

Recurrent training shall be conducted:

(a) For competencies acquired during initial basic and specific training, at least once every 5 years or, in cases where the competencies have not been exercised for more than 6 months, before return to security duties; and

(b) For new or extended competencies, as required to ensure that persons implementing, or responsible for implementing, security controls are promptly made aware of new threats and legal requirements by the time they have to be applied.

The requirements under (a) shall not apply to competencies acquired during specific training which are no longer required for the person's designated tasks.

3.6 Profitability and feasibility

Confidential. Not published.

4 CONCLUSIONS

The thesis concentrated on Freight Frame's possibility to enter the field of road feeder services in air cargo operations between Helsinki and Amsterdam. The study also indicated what kind of opinions the possible entry would bring up in current customers. The results indicate that air freight operators, who buy these road feeder services, are willing to welcome new operators to the business, as the current prices are steep from their perspective and want more price competition.

The study was focused mainly on Finnair – and not for example KLM – because Finnair is based in Finland, and they were willing to discuss these matters openly. Finnair makes their decisions in Finland, but KLM makes them in the headquarters in the Netherlands. The meeting would have been hard to arrange, and because of the language barrier of not being able to discuss with one another's native language, it would have not been as fluent and casual as in Finland with Finns.

In the future, if the market entry shall be decided, the people from Freight Frame's Dutch office will have a better base for discussing freight contracts as they are natives and also know the business culture there. Also, the volumes of Finnair can be handled in total with current frigos, as KLM assumedly has greater volumes to and from their main hub in Schiphol.

The results from the research indicate that it is possible to enter the market, but only at first as a subcontractor to a larger air freight road feeder service provider. This would also mean a huge investment for Freight Frame's vehicles and for licenses. There would also be a need to have extensive negotiations with an existing road feeder service provider to achieve a contract.

The results indicate that in case of accomplishing a contract with an existing road feeder service provider, the investments would pay off in the pessimistic calculus in the 3rd quarter of the 3rd operating year – and in the optimistic calculus in the 1st quarter of the 2nd operating year – according to current estimates. Possibly, when achieving a contract, Freight Frame could receive greater volumes than the ones used in calculations. But, even through these numbers, the investment would be feasible.

Installing the PBS to Freight Frame's frigo-trailers, training the Safety Manager, and acquiring the licenses will take approximately 3 weeks in total. When accomplishing a contract with a RFS-operator, Freight Frame would have enough time to execute these amendments in time with ease.

Freight Frame Oy sees the calculations promising. Although they are only for illustrative purposes, they find the estimates very promising even with lower volumes. If the decision to enter the RFS-market would be positive, the wanted volumes would exceed the 3 weekly southbound loads. The Dutch office should negotiate with Dutch operators for driving northbound trucks, and thus increasing volumes and turnover, and furthermore utilize the new capabilities brought by roller beds.

The entry into air freight would mean a great leap in Freight Frame's operations and increase the service orientation. It would create a possibility to load more high-value goods and gain more turnover and profit, as air cargo loads are almost two times better paid as normal cargo. All in all the market seems to be ready for a new entry.
Now Freight Frame only needs to take advantage of this.

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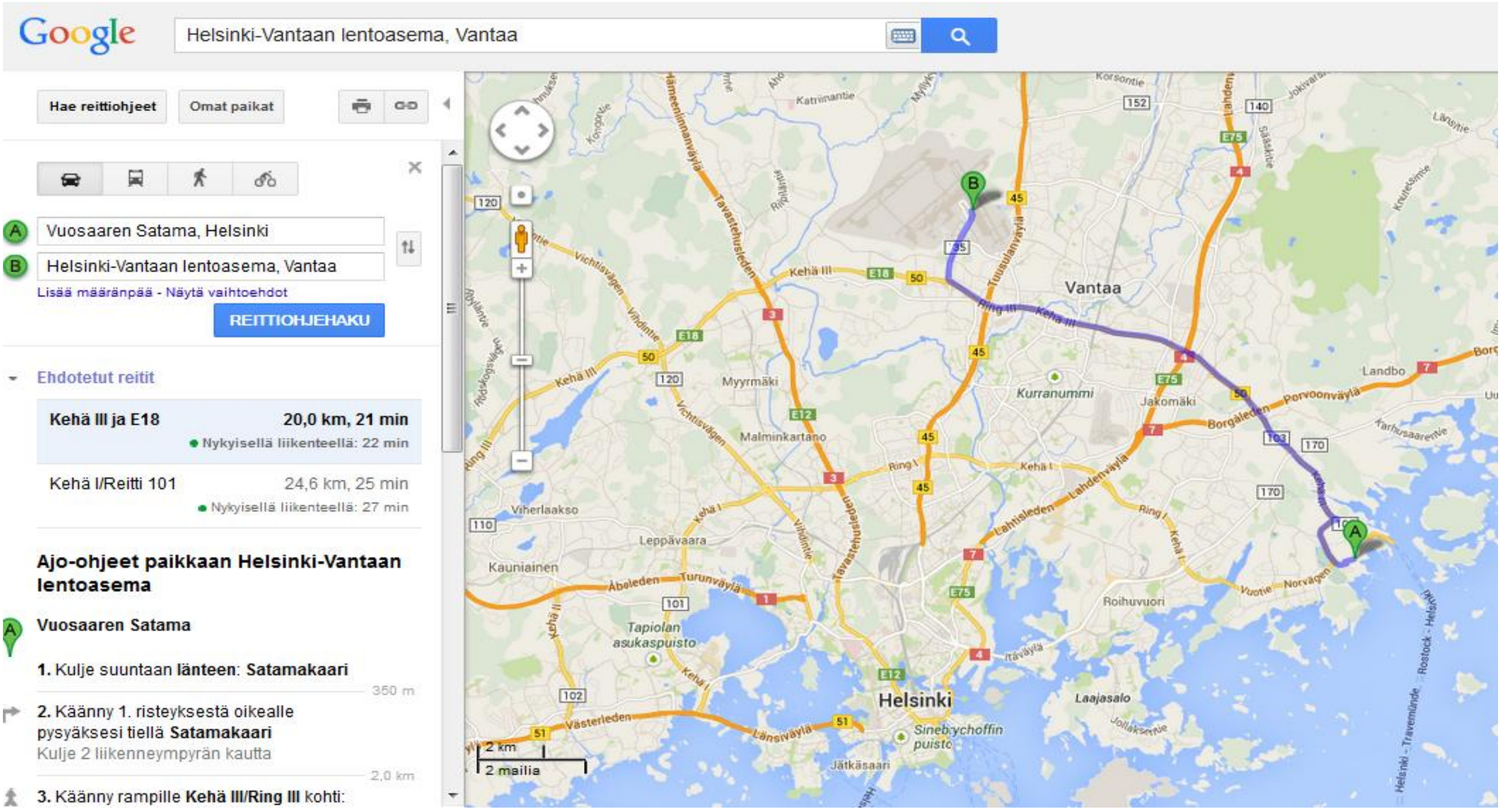
6 APPENDICES

Appendix 1. The route from Vuosaari Harbour to Helsinki-Vantaa –Airport

A Screenshot from Google maps. (http://goo.gl/maps/I5Flf)



Appendix 2. Finnlines sailing schedule on week 48, Vuosaari – Travemünde

A screenshot from the Finnlines online service for registered users (https://access.finnlines.com)

Finnlines | INFO | BOOKING | TRACKING | SCHEDULE

Schedule search

Vessel	*	**ETS from/to**	25.11.2013 – 01.12.2013
Loading port	HELSINKI	**Discharge port**	TRAVEMUENDE
Loading harbour	*	**Discharge harbour**	*
Weekday	*		

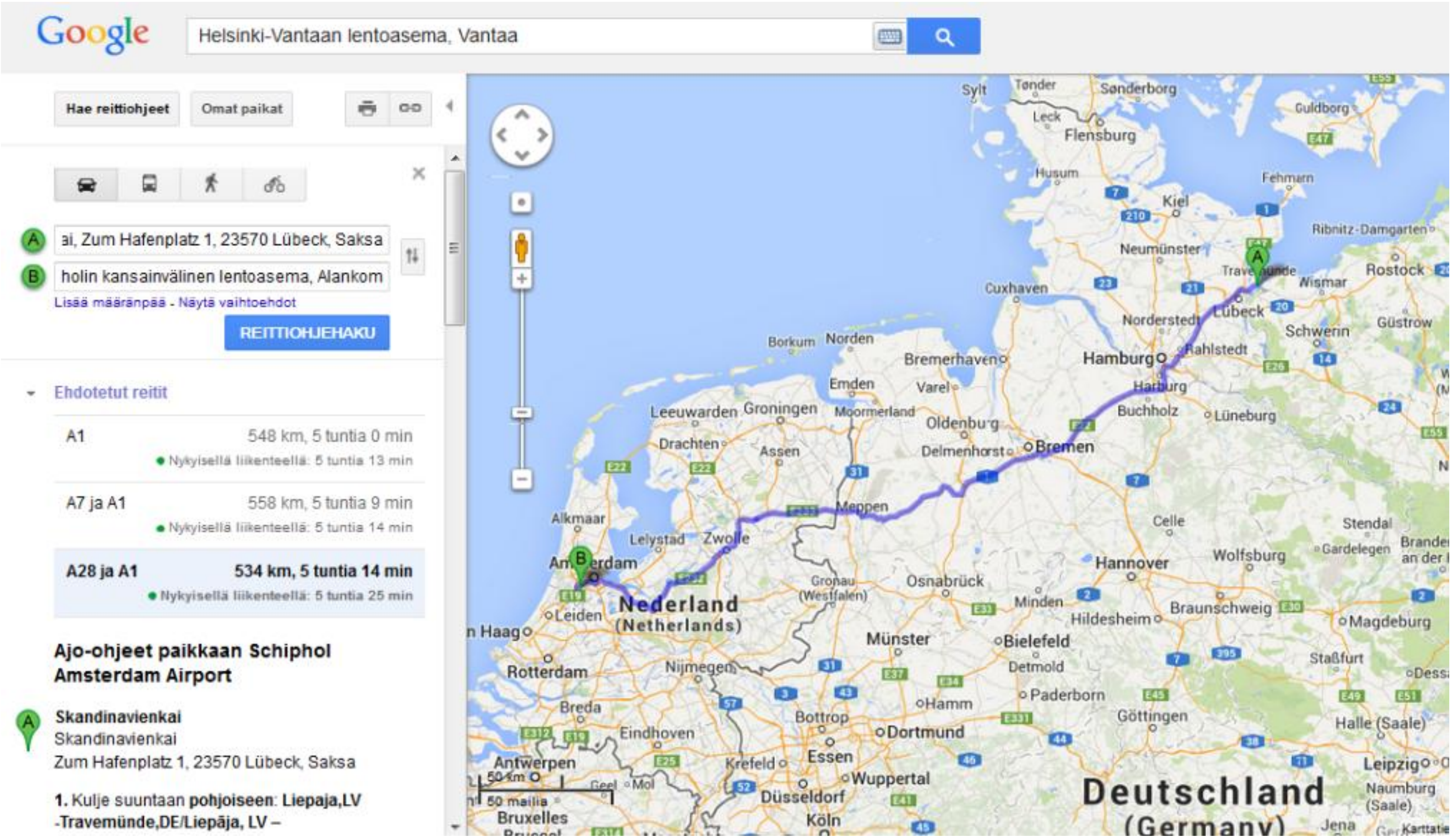
Search Reset

Search result: (1 - 6) from 6 < 1 >

Vessel	Port of Loading	Loading harbour	Est. sailing date	Port of Discharge	Discharge harbour	Est. arrival date
FINNLADY	HELSINKI	VUOSAARI	MON 25.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	TUE 26.11.13 21:00
FINNMAID	HELSINKI	VUOSAARI	TUE 26.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	WED 27.11.13 21:00
FINNSTAR	HELSINKI	VUOSAARI	WED 27.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	THU 28.11.13 21:00
FINNLADY	HELSINKI	VUOSAARI	THU 28.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	FRI 29.11.13 21:00
FINNMAID	HELSINKI	VUOSAARI	FRI 29.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	SAT 30.11.13 21:00
FINNSTAR	HELSINKI	VUOSAARI	SAT 30.11.13 17:30	TRAVEMUENDE	SKANDINAVIEN KAI	SUN 01.12.13 21:00

Appendix 3. The route from Travemünde Harbour to Amsterdam-Schiphol – Airport

A Screenshot from Google maps. (http://goo.gl/maps/g3Lnq)



Appendix 4. Finnlines sailing schedule on week 48. Travemünde – Vuosaari

A screenshot from the Finnlines online service for registered users (https://access.finnlines.com)

INFO | BOOKING | TRACKING | SCHEDULE

Schedule search

Vessel *
Loading port TRAVEMUENDE
Loading harbour *
Weekday *
ETS from/to 24.11.2013 01.12.2013
Discharge port HELSINKI
Discharge harbour *

Search Reset

Search result: (1 - 8) from 8 < 1 >

Vessel	Port of Loading	Loading harbour	Est. sailing date	Port of Discharge	Discharge harbour	Est. arrival date
FINNLADY	TRAVEMUENDE	SKANDINAVIEN KAI	SUN 24.11.13 03:00	HELSINKI	VUOSAARI	MON 25.11.13 08:00
FINNSKY	TRAVEMUENDE	SKANDINAVIEN KAI	SUN 24.11.13 18:00	HELSINKI	VUOSAARI	TUE 26.11.13 06:45
FINNSTAR	TRAVEMUENDE	SKANDINAVIEN KAI	TUE 26.11.13 03:00	HELSINKI	VUOSAARI	WED 27.11.13 08:00
FINNLADY	TRAVEMUENDE	SKANDINAVIEN KAI	WED 27.11.13 03:00	HELSINKI	VUOSAARI	THU 28.11.13 08:00
FINNMAID	TRAVEMUENDE	SKANDINAVIEN KAI	THU 28.11.13 03:00	HELSINKI	VUOSAARI	FRI 29.11.13 08:00
FINNSTAR	TRAVEMUENDE	SKANDINAVIEN KAI	FRI 29.11.13 03:00	HELSINKI	VUOSAARI	SAT 30.11.13 08:00
FINNLADY	TRAVEMUENDE	SKANDINAVIEN KAI	SAT 30.11.13 04:00	HELSINKI	VUOSAARI	SUN 01.12.13 09:00

Appendix 5. Finnish Customs' data on air freight to and from Netherlands (2012)

Received directly from the Finnish Customs via e-mail.

SITC JA KULJETUSMUOTO

	Tuonti alkuperämaittain			**Vienti määrämaittain**		
	Kum. tilastoarvo (euro) vuoden alusta	**Kum. muutos%**	**Kum. paljous (kg)**	**Kum. tilastoarvo (euro) vuoden alusta**	**Kum. muutos%**	**Kum. paljous (kg)**
0-9 (2002--.) KAIKKI RYH-MÄT						
201212 NL (2002--.) Alankomaat						
4 Lentokulje-tus	54 302 188	-11	1 505 910	44 150 960	-19	458 476

Alaviite:

Tilastoitava aineisto sisältää myös korjaustavarat.

Appendix 6. Air freight tonnage between Helsinki-Amsterdam-Helsinki (2012)

Received directly from Finavia via e-mail.

Tavaraliikenteen tonnit välillä Helsinki-Amsterdam-Helsinki 2012

Helsinki

Tonnia	Amsterdam Schiphol						
	Rahti			Posti			Yhteensä
	Lähtevä rahti	Saapuva rahti	**Rahti**	Lähtevä posti	Saapuva posti	**Posti**	
01/12	33	36	**68**	8	37	**46**	**114**
02/12	27	43	**71**	8	45	**54**	**125**
03/12	39	44	**83**	8	61	**69**	**151**
04/12	31	57	**87**	6	39	**46**	**133**
05/12	37	52	**89**	9	39	**48**	**138**
06/12	46	54	**100**	7	43	**50**	**150**
07/12	42	45	**87**	6	40	**46**	**133**
08/12	57	42	**99**	7	38	**45**	**145**
09/12	47	51	**98**	8	43	**51**	**149**
10/12	38	56	**94**	8	41	**50**	**144**
11/12	27	49	**76**	11	53	**65**	**141**
12/12	59	55	**114**	17	74	**91**	**205**
YHTEENSÄ	**484**	**584**	**1 068**	**105**	**554**	**659**	**1 727**

6.11.2013/Finavia Laura Merivirta

Appendix 7. Personal memos of the meeting with Harri Salmi at Finnair Cargo

Confidential. Not published.

Appendix 8. Finnair Cargo Road Feeder Service HEL-AMS-HEL

Source: http://www.finnaircargo.fi/file/1809/RFSlist_updated251013.pdf.html

Finnair Cargo Road Feeder Services (updated 28OCT2013)

ARPT FROM	ARPT TO	FLIGHT NUMBER	OPERAT DAYS	DEP TIME	ARR TIME	ACT TYP
AMS	HEL	AY9302	1234 67	1600	1100+3	RFS
AMS	HEL	AY9302A	1234567	1600	1100+3	RFS
AMS	HEL	AY9302B	1234567	1600	1100+3	RFS
AMS	HEL	AY9302C	1234567	1600	1100+3	RFS
AMS	HEL	AY9302Y	1234 67	1600	1100+3	RFS
HEL	AMS	AY9301G	123456	1630	0900+2	RFS
HEL	AMS	AY9301D	123456	1630	0900+2	RFS
HEL	AMS	AY9301H	123456	1630	0900+2	RFS
HEL	AMS	AY9301O	123456	1630	0900+2	RFS
HEL	AMS	AY9301P	123456	1630	0900+2	RFS
HEL	AMS	AY9301R	123456	1630	0900+2	RFS
HEL	AMS	AY9301W	123456	1630	0900+2	RFS
HEL	AMS	AY9301Y	123456	1630	0900+2	RFS
HEL	AMS	AY9301S	123456	1630	0900+2	RFS
HEL	AMS	AY9301	123456	1630	0900+2	RFS

Appendix 9. Email conversation of quotations for PBS with Arjan Nobel, Joloda BV, and the proposal.

Confidential. Not published.

Appendix 10. Finnlines Ferry costs Trave-Hki/Hki-Trave.

Confidential. Not published.