

Outsourcing Warehousing Operations

A Case Study Examining the Possibilities for an SME to
Partly Outsource its Warehousing Operations to a Third-
party Logistics Service Provider

Jacob Finne

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Author: Jacob Finne

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Supervisor(s): Mikael Ehls

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Abstract

This thesis is a case study about examining the possibilities for a SME named Nordic Lights located in the Western parts of Finland to outsource parts of its warehousing operations to a third-party logistic service provider. Nordic Lights is a manufacturer of working and driving lights for the heavy-duty industry. The aim with the thesis is to find out if 31 unique working lights models meant for the After-market sector produced by Nordic Lights can temporarily be stored at a third-party logistics service provider.

The theoretical framework in the thesis is about outsourcing in general but also about specific outsourcing of warehousing operations. The theory deals with warehousing functions and notions used in warehousing operations. Knowledge in these fields will help to understand the analyze and comparison that is done between the offers in the end of the thesis.

In total were five different third-party logistics service providers contacted with the hope to get an offer on 3PL services from all of them including inbound, storage and outbound services. At the end there were only two out of the five third-party logistics service providers interested to send offers on outsourced warehousing operations. All five third-party logistic service providers were given the same data and assumptions on the first contact. All meetings and additional data exchange is reviewed in the analyze in the end of the thesis. An extensive comparison between the different third-party logistic service providers that provided offers is done in the end of the analyze. These two offers were categorized to enable an easier comparison with each other. The comparison shows noticeable differences in prices for the inbound, outbound and storage services. One of the offers are noticeable lower in price but there are uncertainties and concerns that needs to be weighed into the final verdict and next steps. In this version are parts of the results restricted due to company policy. Based on the comparison and analyze will Nordic Lights management team take decisions on what will be the next step.

Language: English

Key Words: 3PL, Outsourced warehousing

EXAMENSARBETE

Författare: Jacob Finne

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Handledare: Mikael Ehls

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Abstrakt

I detta lärdomsprov undersöks möjligheterna för ett SME-företag att outsourca delar av sin lagerverksamhet till en tredjepartsleverantör av logistiktjänster. Lärdomsprovet görs på uppdrag åt företaget Nordic Lights som är en tillverkare av arbetsbelysning och körljus belägen i de västra delarna av Finland. Målet med lärdomsprovet är att undersöka möjligheten att använda sig av en tredjepartsleverantör av logistiktjänster för att lagrhålla 31 stycken unika arbetsljus ämnade för eftermarknadskunder.

Den teoretiska referensramen i detta lärdomsprov behandlar outsourcing i allmänhet, men även i detalj om att outsourca lagerverksamhet. I teorin tas det upp hur ett lagers funktioner ser ut och kring specifika begrepp som används inom lagerverksamhet. Kunskapen och vetskapen kring lagerfunktioner skapar en djupare förståelse för analysen och jämförelsen av offerter som görs i resultatdelen i slutet lärdomsprovet.

Totalt kontaktades fem stycken tredjepartsleverantörer av logistiktjänster med hopp om att få en offert för lagertjänster som inkluderar tjänster för inkommande gods, lagringstjänster samt tjänster för utgående gods. I slutänden var det två stycken tredjepartsleverantörer som ville offerera sina lagertjänster. Alla de fem tredjepartsleverantörerna av logistiktjänster som kontaktades fick samma grunddata och antaganden presenterad under den första kontakten med dem. Allt material från mötena och samtalen granskas i analysen. Efter analysen görs en grundlig jämförelse mellan de två offerterna som Nordic Lights slutligen fick. Offerterna kategoriserades för att förenkla jämförelsen. En av offerterna var märkbart förmånligare sett till kostnader, men där finns ännu en del oklarheter som behöver vägas in då beslut om nästa steg i processen ska göras. I denna version är detaljer kring resultatet utelämnade liksom namnet på tredjepartsleverantörerna i enlighet med företagets sekretessbestämmelser. Baserat på analysen och jämförelsen kommer Nordic Lights ledningsgrupp ta ett beslut hur företaget går vidare.

Språk: Engelska

Nyckelord: 3PL, Outsourcing av lagerverksamhet, tredjepartsleverantör av logistiktjänster

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1 Introduction

The focus on efficiency and core operations is pushing businesses to use third-party logistics service providers to an increasingly extent. Some of the more common elements to outsource is distribution, warehousing, and material handling services. In addition to increased efficiency and better focus on the core operations can outsourced warehousing operations help companies to get closer to their customers, both seen from geographical viewpoint and in terms of improved transport lead time. When using third-party logistics service providers to handle crucial operations in a company it's important that the corporate governance and communication is working frictionless. Targets and close follow up's are needed to gain a common understanding on the expectations from both parties, buyer, and supplier of the services.

In this thesis I will examine the possibilities for my current employer Nordic Lights Ltd to outsource parts of its warehouse operations to a third-party logistics service provider. Nordic Lights is a Finnish company with its head office located in the western parts of Finland. Nordic Lights was founded in 1992 and is producing working- and driving lights for heavy-duty industries such as mining, construction, forestry, material handling and agricultural industries. Nordic Lights has two production facilities: one at the head office in Pietarsaari and the other one in Suzhou, China. Nordic lights have their R&D department located in the same facilities as the production facility in Pietarsaari. *Nordic Lights (2022)* In the project that the thesis is building upon will I have a key role. All the research will be done on my own. I've been working in the company for a bit over two years. My current role in the company is Forwarding Manager.

1.1 Problem area

A key factor to why Nordic Lights needs to examine possibilities to outsource warehousing activities to a third-party logistics service provider lies in the upturn the company has experienced after the COVID-19 outbreak in the end of 2019. The first indication in the start of the COVID-19 pandemic showed a dip in demand but that didn't last for long. The upturn that followed has been keeping the demand on a high level. Almost all measures have been taken to try to supply the demand and shorten lead times, but Nordic Lights is forced to start looking for new ways of thinking to normalize the situation. With outsourced warehouse operations in a strategic place Nordic Lights would be able to benefit of both their production facilities in both Finland and in China in a more convenient way and be closer to the biggest customer markets.

Nordic Lights is currently not keeping any stock at all. Nordic Lights is a make to order production management. This means that all work lights and driving lights are produced based on actual customer orders which normally is a very cost-effective way when manufacturing high value products. With a stable growth and demand has this setup been working well, but with a steep increase in demand and growth in addition to component availability constraints has it caused challenges to keep up with the pace.

1.2 Purpose

The purpose of this thesis is to examine the possibilities to outsource parts of Nordic Lights warehousing operations to a third-party logistics service provider. The third-party logistics service providers will be contacted individually through arranged meetings and contact requests. All third-party logistics service providers will be given the same data to build their recommendations and possible offer upon. The data that will be given to the third-party logistics service providers will be based on historical sales statistics for the specific items that the warehousing operations are restricted to. The result from the interview and meetings will be analyzed and presented in the most convenient and comparable way to support Nordic Lights Management team in their strategical work.

1.3 Limitations

The project that this thesis is building upon involves in addition to outsourcing of warehousing operations also examination of transport to and from the outsourced warehouse facility, and production related challenges that needs to be addressed in both Nordic Lights China and Nordic Lights Finland. To limit the scale and size of the thesis I will focus on only the outsourcing of the warehousing operations and leave out the transport and production related issues. The outsourcing of warehousing operations will not affect all customers markets. The items that will be subject to outsource are products for the aftermarket customer segment in Western Europe.

1.4 Scope

In next chapter, chapter two, will the theoretical framework be presented. Outsourced logistics and more specifically outsourced warehouse operations will be explained in detail. In addition to that will also the notion 3PL or third-party logistics service provider be presented. The last subchapter in the theoretical framework describes what an SLA or Service Level Agreement is.

In the third chapter will the methods used in the thesis be described. The first subcategories are about background and current situation at Nordic Lights. Next subcategories describe how the collection of documents and selection process of the third-party logistics service providers were carried out. The last two subcategories in the third chapter deals with the analysis of data and the credibility and authenticity of the thesis.

In Chapter four will the results be presented. All five third-party logistic service providers contacted will be presented in individual subcategories. In the end of the chapter will a comparison be done between the third-party logistic service providers that provided an offer on warehousing services to Nordic Lights.

The thesis will be summed up in the fifth chapter. Reflections about reaching the purpose and suggestions on future research will be presented after in individual subcategories.

The final subcategory in chapter five is a conclusion.

2 Outsourced logistics

In this chapter will the theoretical framework be presented. The theoretical framework that is presented in the chapter gives the required knowledge to understand what outsourcing is in general. In addition to general information about outsourcing will this chapter also describe outsourced logistics and more in detail how the outsourced logistics can be differentiated into different levels of outsourcing. There will also be theory about Warehousing operations and the basic function of a warehouse in this chapters. Knowledge about these topics is needed to be able to understand the analyze and comparison of the offers from the third-party logistics service providers. The third-party logistics service provider notion will be described more in detail to give insights how companies offering 3PL services works and what kind of services they offer. The companies contacted that will provide offers belongs to the 3PL level of outsourcing. The last subcategory deals with Service level agreement which is an agreement that needs addressed since the offers from the third-party logistic service providers is addressing responsibility as well as quality and performance related matters.

2.1 Outsourced logistics

The increasing pressure to keep up with rapid changes and internationalization are forcing companies to stay on their toes and constantly come up with more efficient and innovative ways of working. The focus has traditionally been on cost and quality but is now also including environmental and social dimensions of sustainability. By focusing on the core business and let niched companies specialized on a specific product or service take care of parts of the organization can help to keep profit on high levels and increase competitive advantages. A company specialized in a specific service or product will possess a high coordination ability which enables them to find skilled and reliable partners and sub-contractors. (Costantino et al 2015). The key elements to outsourcing logistic activities are to ensure economical, efficient, and reliable logistic operations. (Vasiliauskas and Jakubauskas 2007)

Problems in logistics can cause bottlenecks throughout the whole organization. Customers are nowadays requiring more information in advance and complex solutions that usually requires large investments and flexibility. Logistic investments such as building/acquiring warehouse facilities requires much capital. Avoiding high capital investments is lowering financial risks. (Vasiliauskas and Jakubauskas 2007) The outsourcing of logistic operations enables companies to use more advanced service setups, products, processes, and technology without the need of investing in infrastructure.

To which extent the logistics operations in a company is outsourced can be described through the supply chain that is described in the PL pyramid in figure 1. A Supply chain is a network where various organizations are involved in different kinds of activities and processes. (Lambert and Cooper 2000) The third-party logistics service providers are in the middle of the PL pyramid with focus on effective logistics solutions. The forwarders, 2PL, take care of the coordination of the logistics and is working closely with both haulers, 1PL, and the 3 PL. The haulers are taking care of the physical transportation from/to the sender and receiver. The third-party logistics service provider is usually a forwarder that has extended its services to include in addition to transportation also other logistic service activities. These additional services that segregates 2PL's between 3PL's are usually added value services such as transport planning, information technology integration, warehousing, logistics consulting, application solutions and financial services. (Vasiliauskas and Jakubauskas 2007)

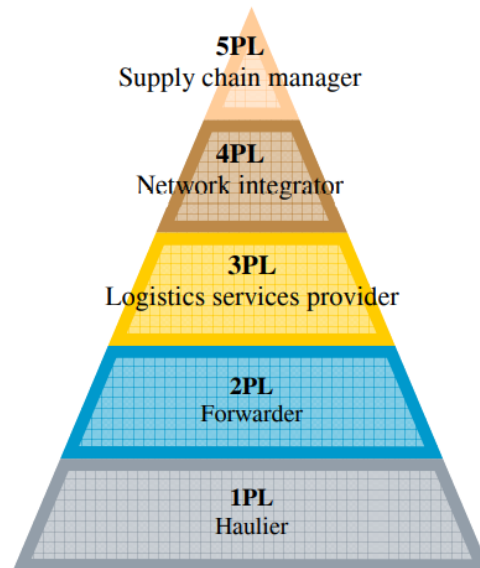


Figure 1 – PL pyramid (Vasiliauskas and Jakubauskas 2007: p3)

If a company choose to widen its level of outsourcing to an even greater extent is the next step up in the pyramid to hand over the technical and IT related of the logistics to a network integrator, 4PL. The network integrator needs to have strong IT capabilities and knowledge in logistics since they will be responsible to make all connections and data exchange work between the different levels in the PL Pyramid. In the top of the pyramid is the Supply Chain Manager, or 5PL. This is when a company is outsourcing all its logistic activities to an external logistics service provider. The more integrated the external service provider is in the company outsourcing, the bigger understanding it will have of the operations. The relationships in the PL pyramid plays a crucial role to maintain high performance on all levels, especially the role of 5PL requires a close, collaborative, and well-coordinated contact throughout all levels to keep the logistic activities highly competitive.

To understand the structure and the differences between the layers in the PL pyramid is important to be able to get an overview of how outsourced logistics can look like. The understanding and ability to categorize logistics services to a specific level in the PL pyramid makes the analyze and comparison of the offers from the third-party logistics providers easier to grasp. When examining the possibilities to outsource logistics there needs to be a knowledge base within outsourced logistics

2.1.1 Third-party logistics service provider

3PL or third-party logistics provider is a concept that got its start from the deregulation of the freight transport industry in the 1980s in combination with the development and progress of information technologies. (Skjoett-Larsen 2000). At that time did transport companies want to start extending their transportation services to customers in a more structural way. Third-party logistics service providers offer outsourced transport and logistics solutions without being consignor or consignee. Third-party logistics service providers focus on logistic solutions and strive to optimize the available assets in the most effective way as possible. The third-party logistics service provider gets their guidance, instructions and framework from the company outsourcing its logistics activities. The advantages of using a third-party logistics service provider are their merits from large transport fleets and warehouses capabilities. Companies can through these economies of scale increase net value by reducing costs. (Vasiliauskas and Jakubauskas 2007)

There are always risks handing out information to a third-party and a third-party logistics service provider is no exception. The rules and framework of sharing information needs to be clearly set. Wrong information leaking out risks to have a negative impact. Other risks when outsourcing logistics activities to a third-party logistics service provider are financial risk, Inventory risk and demand risk. The financial risks can come in the form of substandard services, defective processes, or actions that isn't legal and will result in fines or legal fees. The inventory and demand risk are linked together in the sense that demand for products can drop and lead to higher inventory and lower warehouse turnover. Despite the downturn in demand there will be same costs, or even higher if the change in demand isn't noticed quickly enough.

3PL service providers must show their customers a benefit in financial and operational terms by leveraging exceptional expertise and ability in the areas of operations, negotiations, and customer service in a way that complements its customers pre-existing physical assets. (Vasiliauskas and Jakubauskas 2007)

The knowledge of what kind of services a third-party logistics service provider offers and what segregates a third-party logistics service provider between haulers, network integrators and forwarders are needed to be able to understand the comparison of the offers that will be done in chapter four dealing with the results. The companies that will be contacted in the empirical part of the thesis will be offering 3PL services so therefore are insights and background about what a third-party logistics services providers are and how their business model looks like.

2.1.2 Outsourced warehousing operations

In supply chains is the function of warehousing critical as it acts as a linkage of material flows between customers and suppliers. The main function of a warehouse is to consolidate products, reduce transportation costs, achieve economies of scale, and shorten lead time. (Ramaa et al. 2012) There are different types of warehouses depending on the company operations, e.g., production warehouses, distribution warehouses, raw materials warehouses, and value-added service warehouses. These different types of warehouse types share the same type of setup and processes despite the difference in their name and main function.

Like other logistic operations has warehousing gone through many changes when customer demands, and technology is changing in a rapid pace. Supply chains are getting more globalized and shorter all the time, especially when the environment and sustainability concepts are getting more rooted in customer and consumers mindset all the time. To keep up with these changes are more and more organizations implementing outsourced warehousing operations.

A WMS or a warehouse management system is database driven application used to control the movement and storage of materials within a warehouse. (Ramaa et al. 2012) A WMS is not something that needs to be done by an external part when outsourcing warehousing operations. In many cases when a company is outsourcing it's warehousing operations can the third-party logistics service provider use the ERP and WMS of the client. The basic functions will still remain same. The warehouse management system is used to optimize the warehouse operations in the most efficient way by directing cutaways and recording warehouse transactions. The functions of the WMS will keep stock inventory accurate and minimize errors. Depending on how advanced WMS and it's integration level can real-time information about stock levels and warehouse utilization be monitored.

The warehouse management system acts as a host to the control function and handling of information within the warehouse. The control function role is to make information and data to follow with warehouse events. Retyping and repeated work is avoided through the control functions. The warehouse control functions are used to manage processes, people, and equipment on an operational level. To be able to analyze the offer from the third-party logistic service providers there is a need to have knowledge about the basic warehouse functions. The specifications and assumptions in the offer from the third-party logistics service providers will be based on historic data and estimates that is linked to the volumes and ultimately pricing within some of the warehouse functions

The traditional transactions within a warehouse can be seen in figure 2 below. The replenishment or inbound process is when products from the supplier is arriving to the warehouse. Upon arrival are the products inspected and received. If the inspection looks okay can the products be shipped out straight away. This is called Cross docking. If there is no need to ship the items directly after inspection will the items be moved to a storage area. Items are stored in the warehouse storage area until there is a customer demand. When products are taken from the warehouse shelves, they are sorted and arranged according to a customer order or specification. When all picking and packing is done can the products be shipped out to the customer. The process when goods are processed based on customer orders and prepared to be shipped out is called outbound.

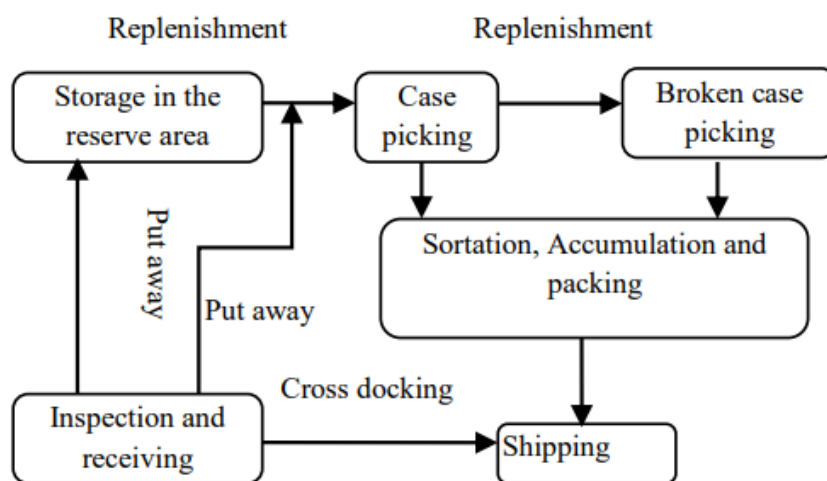


Figure 2 – warehouse functions (Ramaa et al. 2012: p1)

In the possible offers from the third-party logistics service providers will many specifications be dealing with warehouse functions and processes. In addition will the comparison be based on warehouse operation specific notions. Therefore, are insights in outsourced warehousing operations needed to keep up and be able to understand the empirical part of the thesis.

2.2 Service level agreement

To measure service levels and performance is complex. Results from empirical studies shows that intended performance outcomes of outsourcing are not easy to measure (Ellram, Tate, & Billington, 2008; Handley & Benton, 2013; Stouthuysen, Slabbinck, & Roodhooft, 2012) When following up specific areas of interests in logistic operations with a third-party logistics service providers it's recommended to use an SLA or Service Level Agreement. An SLA covers and establishes responsibility within service performance and quality but also in priority matters. An SLA is commonly including KPI or Key Performance Indicators. The KPI's are used to monitor and improve performance and quality metrics of business processes. The KPI's promote collaboration and is developing the buyer-supplier relationship. The KPI composition may be considerably variable depending upon specifics of the logistic activities. The measurable data may often be coproduced or interconnected with each other which makes an independent measurement difficult in some cases. (Narayanan, Jayaraman, Luo, & Swaminathan, 2011).

KPI's specifically for outsourcing of warehousing operations should be linked the inbound process, storage process, outbound process and general KPI's looking at the big picture. KPI's within these different categories have in common that they follow-up both the performance and quality. An example of a performance KPI linked to the inbound process is Dock-to-Stock. This KPI is measuring the time between the arrival of inbound until the goods are available in the WMS. There is usually a time limit that is used as a reference. This time is called dock to stock time. The dock to stock time can for example be 12 hours which means that the goods need to be available in the WMS within 12 hours from the arrival. If that time is exceeded, it impacts the KPI negatively. If all inbounds, make it within 12 hours the measurement is 100%. If one out of 100 inbounds exceeds the time the measurement is 99%. Inventory accuracy is a quality KPI linked to the storage process. The inventory accuracy KPI is measuring the net variations in units to total quantity in units. The difference is presented in percentage. No variations equal to 100%.

Orders shipped on time is a performance KPI in the outbound process that describes the total number of outbound orders dispatched within an agreed lead-time. The lead-time is based on the time between order receipt to when the order is dispatched. If all orders are dispatched within the agreed lead-time is the measurement 100%. General KPI's can be total errors done within all outsourced warehouse functions in a specific time frame. Another common general KPI is general costs where the combined costs from all outsourced warehouse functions is listed. All these KPI's are usually followed up on a monthly base. If the measurement is below what has been agreed in the SLA, they can be followed up even more frequently basis than monthly.

Specific tolerances or maximum and minimum levels of the Key performance indicators is a good starting point when setting up a service level agreement. Once the appropriate service levels and specific indicators are agreed should also a continuous evaluation of the measurements be taken into use. There is a need to change the measurements often in a highly dynamic environment. When the strategy changes should the measurements and indicators also be changed. In addition to choose correct measurement should also the number of indicators be on the correct level, not too few nor to many. The indicators chosen needs to be evaluated so that their input and information is useful.

Knowledge about what a service level agreement is about and what it should deal with is important when evaluating offered services from third-party logistics service providers. Certain details about quality and performance related KPI's can be included in the offer and therefore there needs to be an understanding what the KPI means. The measurement and final tolerances should be discussed and decided between the buyer and supplier of the service and be added in a separate SLA. A higher level or higher minimum levels results in higher quality or performance commitment from the 3PL.

3 Method

In this chapter will the background to the subject of thesis be presented. The current situation at Nordic Lights with high demand and volatility has led to the project that this thesis is building upon. The idea to look into to partly outsource warehouse operations to a third-party logistics service provider was originally a suggestion from the sales department at Nordic Lights. The main reason why there was an interest to evaluate the possibilities to partly outsource warehouse operations to a third-party logistics service provider lies in the high demand for Nordic Lights products which results in a high pressure on production and long lead times. The outsourced warehouse operations for 31 items sold to the aftermarket customer segment would be closer to the market which would improve the lead time a bit. Secondly it would be replenished from Nordic Lights China production facility which eases the pressure on Nordic Lights Finnish production factory. Not only will some of the volumes be moved to Nordic Lights China production facility but it will also help to optimize the production batches in Nordic Lights Finland's production facility. With offers received from the third-party logistics service providers will Nordic Lights have a cost reference on the outsourcing and also know which alternatives there is on the 3PL market.

In this chapter will also the data collection process be described as well as the selections criteria of the third-party logistics service providers. In the end of the chapter will details about the data analyze and the credibility and authenticity be addressed. The relevance and truthfulness of each document has been assessed before it has been used.

3.1 Current situation at Nordic Lights

The text in this subchapter has been classified due to company policies at Nordic Lights.

3.2 Collection of documents and data

The collections of data are carried out according to the recommendations there is for a qualitative case study. The notion case study means that the researcher is using several information channels to create a deep understanding about the research material (Saunders 2007). The theoretical framework has been found through research within the fields of outsourcing and specially outsourcing logistics with focus on outsourced

warehousing operations. When researching about outsourced warehousing was the notion SLA or Service Level Agreement frequently mentioned. SLA is a common recommendation to use when setting up cooperation between a company and a third-party logistics service provider so that's why it's used in the theoretical framework.

The data that the offers build upon is gathered by Nordic Lights sales department but also by the author. The data that is presented in appendix 1 is mainly historical sales and customer data from 2021 retrieved from Nordic Lights ERP system. In figure 4 below is an example where AM customers ordering any of the 31 items are compiled based on location. Additional details from the discussions with the third-party logistic service providers is presented in the next chapter, chapter four. The additional data is mainly volumes presented in a more specified way. This additional data has also been collected through Nordic Lights ERP system based on historical data. Minor details have been assumed but these will be reviewed on a regular basis if any of the possible offers leads to a deal. No meetings with any third-party logistics service providers have been recorded.

	A	B	C	D	E	F	G	H	I	J
1	Subtotals	Delivery Country	Pack.Qty	Gross Wght	Volume	Dest.	Postal code	# shipments	AVG weight / shipment	AVG volume / shipment
31	DE	DE	1057	53562,58	311,819488			370,00	144,76	0,84
32	DE	12	268,36	0,864		49401	4,00	67,09	0,22
33	DE	27	413	0,7776		63843	9,00	45,89	0,09
34	DE	39	1298,616	3,4464		84085	14,00	92,76	0,25
35	DE	248	38854	260,29555		76646	87,00	446,60	2,99
36	DE	10	121,222	0,4487		59439	3,00	40,41	0,15
37	DE	5	71,368	0,24774		89177	2,00	35,68	0,12
38	DE	27	851,256	3,2227		73614	9,00	94,58	0,36
39	DE	12	127,2	0,46035		59387	4,00	31,80	0,12
40	DE	17	173,892	0,74779		89134	6,00	28,98	0,12

Figure 4 – Collection of geographical spread base on Nordic Lights historical sales

3.3 Selection of third-party logistics service providers

According to Vasiliauskas and Jakubauskas (2007) it is crucial for a company that is looking to outsource its warehousing operations find a reliable 3PL partner. It's up to company outsourcing to make sure that the third-party logistics service provider can provide a cost-effective and reliable partnership. To succeed with a successful partnership there are two crucial steps to do; The third-party logistics service provider selection should be based on data-based selection criteria's and contract signing when an agreement has been done. If the selection criteria's doesn't reflect the reality or no agreement is signed the company outsourcing might suffer economic losses.

The selection criteria used is based on market position, size, and reputation. At Nordic Lights there is no previous experience of outsourced warehousing operations so the first step of finding candidates to the third-party logistics service providers analyze was to start looking for companies offering 3PL-services. Via transportation services does Nordic Lights have a good knowledge about the quality of some logistic companies. A lot of these companies is also offering third-party logistics services. In general, there is many of the transportation companies Nordic Lights is using operating over the whole world and offering the whole PL-pyramid; Hauler service, forwarding service, Third-party logistics services, network integrator services and supply chain manager services. The logistic service companies with a broad product portfolio have a good benefit since their market position, size and services supply reveals a lot of knowhow and wide experience of logistic operations. The knowledge about that these international logistic firms are able to upgrade the service to 4PL and 5PL in the future is working in their favor.

Nordic Lights needs to investigate the ability of the third-party logistics service providers to perform. The performance evaluation will be done through deciding upon warehousing specific key performance indicators, KPI's. Prior to any selection should a determination of service levels through an SLA and offers from the third-party logistics service providers be analyzed. Nordic Lights must make sure that the third-party logistics service provider can provide good service and be reliable. Risk management should be addressed when selecting third-party logistics service providers. The SLA must ensure the commitment of both parties. The SLA needs to treat financial risk, Inventory risk and demand risk and who will bear these risks.

Further analyze about reliability and ability to perform will be done through meetings and discussions with the third-party logistics service providers. The contact with the third-party logistics service providers will be done through online meetings and/or contact requests. The meetings will be held online due to the due to the COVID-19 pandemic restrictions. All third-party logistics service providers will be given the same data to build their recommendation and possible offer upon. See appendix 1. The data that will be given to the third-party logistics service providers is historical sales statistics and customer data of the specific items that the warehousing operations are restricted to. Ultimately will the offer be the most important item to decide upon. The offer in combination with the service, understanding and trust will make up to a final verdict of which third-party logistics service provider Nordic Lights will continue its discussions with.

3.4 Data analysis

All third-party logistics service providers will be given the same assumptions and historical data about the items that will turn in the outsourced warehouse. See appendix 1. There will be made assumptions that is needed by the third-party logistics service provider to base their offer upon. These assumptions will be presented more in detail in chapter 4. By keeping the conditions same to all third-party logistics service providers makes it easier to analyze the results. Axial coding will be used to categorize results from the contact request/meetings. The offers will most likely look different even though the data to base them upon is the same. To categorize the offers and response in a more structural way will the result be presented in at least three different categories; inbound, storage and outbound. With these three categories is the result easier to understand and read. The categorization will also make it easier to see parallels between the offers.

3.5 Credibility and authenticity

Some of the data that the third-party logistics service providers are given is based on assumptions. With assumptions and self-assessment there is always a risk that the credibility and authenticity can be jeopardized. When self-assessment is done, it should strive to use measurements of processes, behaviors, and attitudes instead of own capabilities and reflections. (Biazzo, S. and Bernardi, G. 2003) Education and work experience has proven to have impact on the self-assessment, especially reflection and objectivity. More work experience contributes to make self-assessment more trustworthy. (Baruch 1996)

4 Results

In this chapter will the results from selection process of the third-party logistics service providers be presented. All five of the selected third-party logistics service providers will be presented in separate subchapters below. In the end of the chapter there will be a comparison between the available alternatives. This is a restricted version, so the real names and rates of all third-party logistics service providers are removed. The third-party service providers will be called Third party logistics service provider A, B, C, D and E. The figures with rates will be converted to a percentage instead of euros due to the restriction.

4.1 Third party logistics service provider A

The first third-party logistics service provider that was contacted is third-party logistics service provider A. Third-party logistics service provider A is transport and logistics company with services globally. Nordic Lights has a lot of experience from the transport services that third-party logistics service provider A offers, mainly road services. One of Nordic Lights biggest customers cooperates with third-party logistics service provider A which makes Nordic Lights to an indirect customer. Third-party logistics service provider A offers logistical solution with focus on efficiency. Everything from design to delivery. Third-party logistics service provider A controls hundreds of facilities all over the world.

The first contact with Third-party logistics service provider A was done through a web form via their webpage on 4th of November 2021. Third-party logistics service provider A was given the same data as all other third-party logistic service providers to build their recommendation and possible offer upon. See appendix 1. As mentioned earlier is the data based on historical data of the specific items and customer data that the warehousing operations are restricted to. I received a call the same day as I sent the contact request, on 4th of November, from the Finnish division of third-party logistics service provider A. During the call we went through the historical data and estimated volumes of the items that Nordic Lights planned to temporary store.

During the call I noticed that Third-party logistics service provider A wasn't so keen on the volumes, but they promised to check the possibilities with their colleagues in Southwestern Europe. The day after, 5th of November, I received an e-mail from third-party logistics service provider A where they confirmed my suspicions. The volumes, stock of 80 pallet or a 260 pallets turnover on a yearly level was too little for the logistic solutions they provide. Hereby was Third-party logistics service provider A no longer an 3PL alternative to examine further.

4.2 Third party logistics service provider B

Next company that was contacted was third-party logistics service provider B. Third-party logistics service provider B has got operations all over the world. Like Third-party logistics service provider A is third-party logistics service provider B and their freight services well known at Nordic Lights. Third-party logistics service provider B is offering transport services within sea freight, air freight, road freight and rail freight.

A contact request was filled in on third-party logistics service provider B's website. The contact request was filled in and sent to third-party logistics service provider B on the 4th of November 2021. Third-party logistics service provider B were given the same data as all other third-party service providers to build their recommendation and possible offer upon. See appendix 1. Third-party logistics service provider B called back the next day, 5th of November. Third-party logistics service provider B explained quickly in the call that the volumes are not enough for warehousing services at any of their locations in Southwestern Europe. Instead of warehousing in Southwestern Europe did Third-party logistics service provider B suggest having it in the southern part of Finland due to smaller minimum volumes. The items planned for the outsourced warehousing will be sold to mainly Southwestern Europe and replenished mainly from Nordic Lights production facility in China so the benefits of having it in Finland would be very low. Third-party logistics service provider B were not able to provide any solution for Nordic Lights volumes so no further discussions were held after the phone call on 5th of November 2021.

4.3 Third party logistics service provider C

Next company contacted about 3PL services was third-party logistics service provider C. In addition to 3PL logistics services is third-party logistics service provider C offering transportation services such as road freight, sea freight, air freight and rail freight.

Nordic Lights haven't had any cooperation with third-party logistics service provider C previously but there have been discussions lately about their transportation services. The 3PL service was brought up during a discussion on 8th of November 2021. Third-party logistics service provider C promised to check and come back to Nordic Lights. During a follow up discussion via Microsoft Teams on 5th of January 2022 was it made clear that the volumes were not enough to enable third-party logistics service provider C to build an offer upon. Hereby was Third-party logistics service provider C no longer an 3PL alternative to examine further.

4.4 Third party logistics service provider D

On the 4th of November was the next third-party logistic service provider contacted. Third-party logistics service provider D was contacted through a contact request via their website. Third-party logistics service provider D was given the same data as all other third-party logistic service providers to build their recommendation and possible offer upon. See appendix 1. Third-party logistics service provider D has got operations over the whole world. The first response from Third-party logistics service provider D was received on 5th of November 2021. Third-party logistics service provider D were in contact and wanted to verify data that can be found in appendix 1 and also build on additional assumptions about volumes for inbound, storage and outbound. Before the call ended third-party logistics service provider D promised to come back after checking with colleagues in the BNL region. On the 15th of November 2021 third-party logistics service provider D sent an e-mail with contact details to colleagues in Benelux region. Third-party logistics service provider D wanted to clarify more details and suggested to have a Microsoft Teams meeting. The day after, 16th of November 2021, was a Microsoft Teams meeting scheduled with the contact person from third-party logistics service provider D located in The Netherlands.

On the 22nd of November 2021 was the first meeting with Third-party logistics service provider D located in Benelux held on Microsoft Teams. During the meeting we went through the historical data and assumptions found in appendix 1. Additional assumptions regarding average order size and replenishment pattern were done based on historical data found in appendix 1. Third-party logistics service provider D requested a list of volumes sent to specific countries and postal codes from year 2021.

Volumes per country and postal code was sent to Third-party logistics service provider D on the 29th of November 2021. It was pointed out to third-party logistics service provider D that the volumes include only Nordic Lights aftermarket customer segment volumes, all OEM customers are excluded as mentioned in the limitations. As a response on this third-party logistics service provider D asked for additional details for the volumes per country and postal code on 2nd of December 2021. To be able to give the most realistic and up to date offer did third-party logistics service provider D want item specific packaging data where volumes, dimensions, and weights for both full transport boxes and full pallets were included.

The next response from third-party logistics service provider D was received on the 10th of December 2021. Third-party logistics service provider D informed that they were currently looking into the IT structure of the Warehouse Management System. Third-party logistics service provider D presented three options: 1. Start with Nordic Lights Warehouse Management System – would enable a quick start. 2. Third-party logistics service provider D WMS light – Cost efficient and quick start. No integration. Manual data entry. 3. Third-party logistics service provider D EFN – Higher costs: including standardized integration, which will result in longer lead-time. The Integration is also dependent on Nordic Lights resource availability. Efficiency of the EFN WMS is high due to less manual data entries. Since Nordic Lights is looking for a third-party logistics service provider and doesn't want to extend the level of outsourcing to 4PL was Third-party logistics service provider D alternative 1. the way to go. The level of outsourcing can easily be raised to 4PL and 5PL if needed in the future according to Third-party logistics service provider D. A new meeting was scheduled to the 14th of December 2021.

Next meeting was held via Microsoft Teams on the 14th of December 2021. The main topic of the meeting was to discuss the Warehouse Management System structure further. Third-party logistics service provider D was keen on involving our IT department and start looking at how the IT related solutions linked to the warehousing should be done. Internally at Nordic Lights it was decided that no IT resources will be allocated before we have an approved offer from the board of directors. Third-party logistics service provider D pointed out that this will increase the risk and have a cost impact in the offer. The more uncertainty and estimates will push pricing upwards. Third-party logistics service provider D was finalizing the offer and promised to come back as soon as it's ready.

On the 22nd of December 2021 Third-party logistics service provider D were in contact via e-mail and wanted to clarify additional details before the offer could be finalized. The WMS is provided by Nordic Lights which means that no real time location management will be available in Nordic Lights WMS. The location management will be performed by third-party logistics service provider D Supply Chain Benelux separately. Bookings will be done in Nordic Lights WMS to enable log over transactions and current balance information. Unique order ID on both inbound and outbound will be available. No investments in IT-hardware are needed by Third-party logistics service provider D since Nordic Lights computers will be used. No seasonality in the volumes were assumed so the inbound and outbound should be on steady level.

Workdays at the warehouse will be Monday – Friday during 08:30 – 17:00. Weekend work is possible on request but will not be included in the current offer. On average will 25 pallets be replenished each month. Inbound orders will contain on average 6 pallets and the pallets will contain on average 20 boxes. The inbound to the warehouse will be close to 100% air freight from Nordic Lights production facility located in China. 75% of the inbound pallets will be mixed and the rest, 25%, will be single 1 SKU pallets. The mixed pallets will contain max 5 SKUs, but average will be 3 SKU's. All inbound will be received via truck-on-dock delivery on only euro pallets. No exchange of pallets will be done. The receiving and put-away calculations are based on 850 put-aways per year and 3000 boxes to be repalletized. Inbound orders per year is calculated to be 50 orders per year.

Administration per order assumed to be 30 minutes. During the meeting were also assumptions regarding storage in the warehouse done. In average were assumed that 80 pallets with about 40 SKUs be stored in average. The rates in the offer will be reviewed 2 months after start and rebalanced based on actual characteristics.

The location of the outsourced warehouse was discussed on 28th of December. Third-party logistics service provider D had created a shipment profile based on the assumptions and geographical customer spread. Based on the shipment profile did Third-party logistics service provider D suggest a non-bonded Warehouse the Netherlands. The facility in The Netherlands is a multi-client campus which offers and integrated end-to-end solution for multiple markets. The warehouse facility is located in a logistic hotspot close to Rotterdam harbor and Shiphof airport.

On the 13th of January 2022 Nordic Lights received the offer from Third-party logistics service provider D and also the Logistic Service Conditions which govern all offers, agreements, and de facto acts regarding logistics activities to be performed. The details of the offer will be presented and compared in chapter 4.6. Before next steps are taken will the management team of Nordic Lights discuss and analyze the offer.

4.5 Third party logistics service provider E

The final third-party logistics service provider contacted was Third-party logistics service provider E. Third-party logistics service provider E is serving customer worldwide. Third-party logistics service provider E is well known at Nordic Lights. Nordic Lights uses their transport services frequently. Third-party logistics service provider E is offering forwarding, ground freight, brokerage, logistics and distribution.

The first step with Third-party logistics service provider E was as with the previous 3PL alternatives a contact request via third-party logistics service provider E's website where additional information about historical data and assumptions were provided. See appendix 1. The contact request was filled in on the 4th of November 2021. The day after, 5th of November 2021, Nordic Lights was phoned by the Finnish division of third-party logistics service provider E. During the call we briefly discussed the warehousing needs of Nordic Lights and scheduled a Microsoft Teams meeting to discuss our warehousing needs more in detail where also a representative from third-party logistics service provider E Western Europe division would attend. On the 10th of November 2021 was the Microsoft Teams meeting held as planned.

The warehousing project was from now on managed by from third-party logistics service provider E colleagues in the Netherlands instead of third-party logistics service provider E division in Finland. During the meeting we did go through all the historical data and assumptions found in appendix 1. In addition to the data provided did third-party logistics service provider E need further information to be able to precise their offer and scale the project correctly. The additional data needed by Third-party logistics service provider E was about the inbound profile, storage profile and also about our outbound profile. Based on the historical data and assumptions could third-party logistics service provider E create a shipment profile with information about the inbound/Outbound ratio, inventory turns per year and average weight and size of both parcels and pallets. The additional data were not given straight away on the meeting. Instead, we decided to schedule a new meeting after Nordic Lights had provided the needed additional information. Based on Nordic Lights shipment profile did Third-party logistics service provider E suggest a non-bonded warehouse in the Netherlands.

The file with additional data was sent to Third-party logistics service provider E on the 18th of November 2021. A new Microsoft Teams meeting was scheduled to the day after, 19th of November. On the Microsoft Teams meeting on the 19th of November 2021, we reviewed the additional information together with third-party logistics service provider E. The next step after the review of data was to provide Third-party logistics service provider E with the detailed geographical spread of the outbound. In the previous discussions about inbound and outbound we had only discussed total and average volumes.

On the 17th of December 2021 we had a follow up call where we went through the geographical distribution of our outbound together with Third-party logistics service provider E. When the geographical spread had been analyzed and discussed didn't third-party logistics service provider E have any additional requirements before they could present their offer. Nordic Lights received an offer from Third-party logistics service provider E on the 20th of December 2021. Third-party logistics service provider E were informed that before next steps can be taken will the management team of Nordic Lights discuss and analyze the offer.

4.6 Comparison

When Third-party logistics service provider A,B and C informed that Nordic Lights volumes were too small it started to get exciting. In the worst scenario this would be the same answer and feedback from all the third-party logistics service providers. Luckily, this concern was proven wrong and Nordic Lights ended up with two offers from two well renowned companies with a lot of experience in warehousing activities. Even though two offers are easier to compare against each other than five offers it's noticeable that both third-party logistics service providers D and Third-party logistics service provider E have tried to distinguish their offers and make a comparison difficult. Even though both third-party logistics service providers received the same historical data and assumptions to build their offers upon did the layout of the offer have many differences. The reason why the offers are being categorized and compared is to enable Nordic Lights management team to easier get an overview and help them decide next actions in the project.

The categorization of the warehousing offers is divided into four main categories with several subcategories. In the end of the comparison there is also a sum up of all categories compared together. The sums that are presented are the annual indicative rates. The main categories are Inbound, Storage, Outbound and Other. The inbound rates consist of subcategories: Receiving and put away – pallet handling, and inbound administrative handling. The pricing and calculations are based on 850 put-away pallets annually. Third-party logistics service provider D also included 3000 boxes to be repalletized annually in their rates. The rates for administration handling correspond to a total of 18 inbounds annually which is 1,5 inbounds per month. Third-party logistics service provider D had a fixed time per order to 30 minutes. In figure 5 below is the inbound comparison visualized. The difference in inbound is significant between Third-party logistics service provider E and Third-party logistics service provider D Supply.

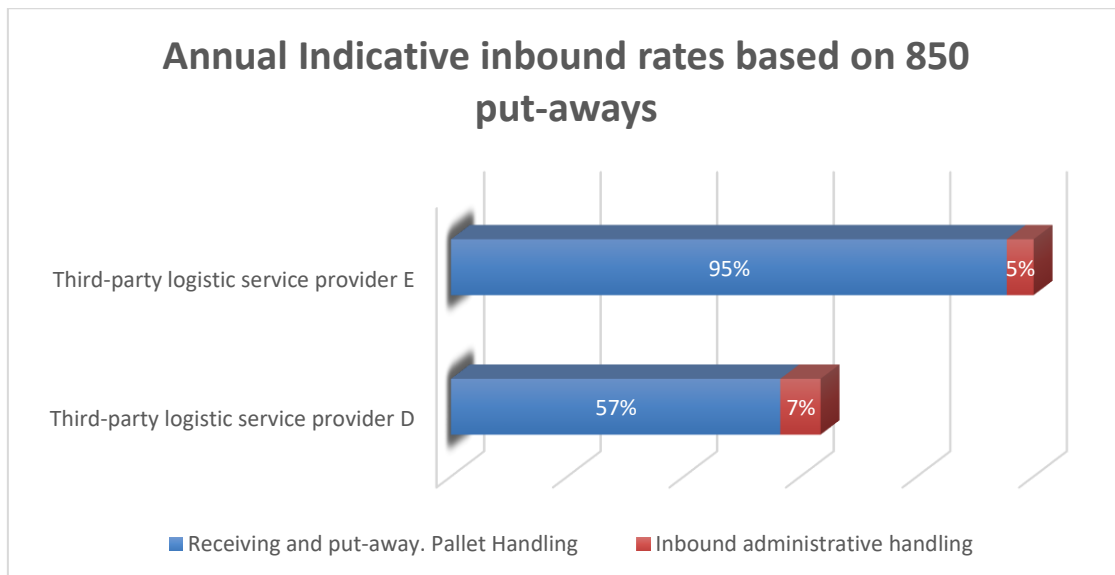


Figure 5 – Annual indicative inbound rates comparison

The Storage category describes all costs related to storage, cycle counting and management. The storage rates are divided into five different subcategories. Third-party logistics service provider D has an own subcategory for 1. Floor space for staging, order creation and packing and 2. cycle counting. Third-party logistics service provider E has these two included in their management costs. Third-party logistics service provider D points out that the floor space does not have racking and is meant for stage, handling, labeling, and checking goods upon arrival/dispatch. On item level have third-party logistics service provider D distinguished parcel storage and pallet storage. Third-party logistics service provider E has only got pallet storage which is on the same level as third-party logistics service provider D. The rates for pallet storage are based on an estimation of 80 pallets in average per month. Cycle counting is done on all inventory every second week in Third-party logistics service provider D offer. In Third-party logistics service provider E offer is the cycle counting done on an ABC basis. A-movers are counted four times per year, B-movers two times per year and C-movers once a year. Additional cycle counting is done at an hourly VAS rate. The sum of the storage rates also gives significant lower cost for Third-party logistics service provider D storage activities. See figure 6 for storage specific comparison for all subcategories for both Third-party logistics service provider E and Third-party logistics service provider D.

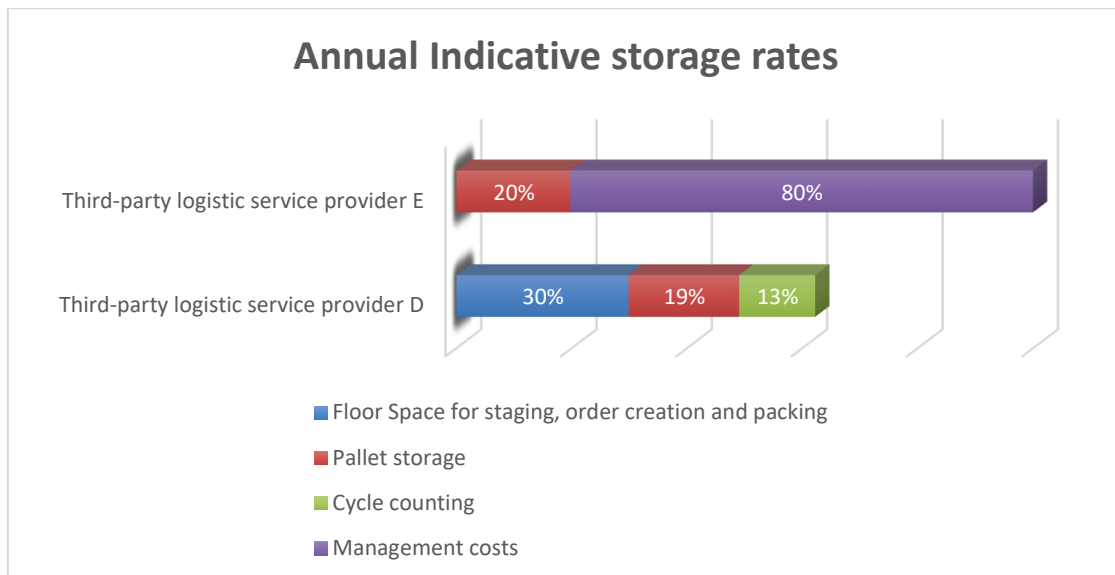


Figure 6 – Annual indicative storage comparison

Next category in the comparison is outbound. None of the subcategories of third-party logistics service provider D or Third-party logistics service provider E were directly comparable. Third-party logistics service provider D presented the outbound with a more general approach with picking, packing, labelling, and loading per order and administration per outbound order when third-party logistics service provider E instead gave rates per carton, per pallet and per item. The total volume of the outbound were despite that based on the same annual order quantity, 2880 orders, with similar average order size, about 2,5 packages per order. Third-party logistics service provider D assumed the same amount of time to administrate outbound orders as inbound orders, 30 minutes. Third-party logistics service provider E didn't specify the time for nor inbound or outbound orders.

In the figure 7 there is only one cost for third-party logistics service provider E since there was nothing more detailed to compare against in third-party logistics service provider D offer. The outbound costs are significantly higher in third-party logistics service provider D offer compared to third-party logistics service provider E offer.

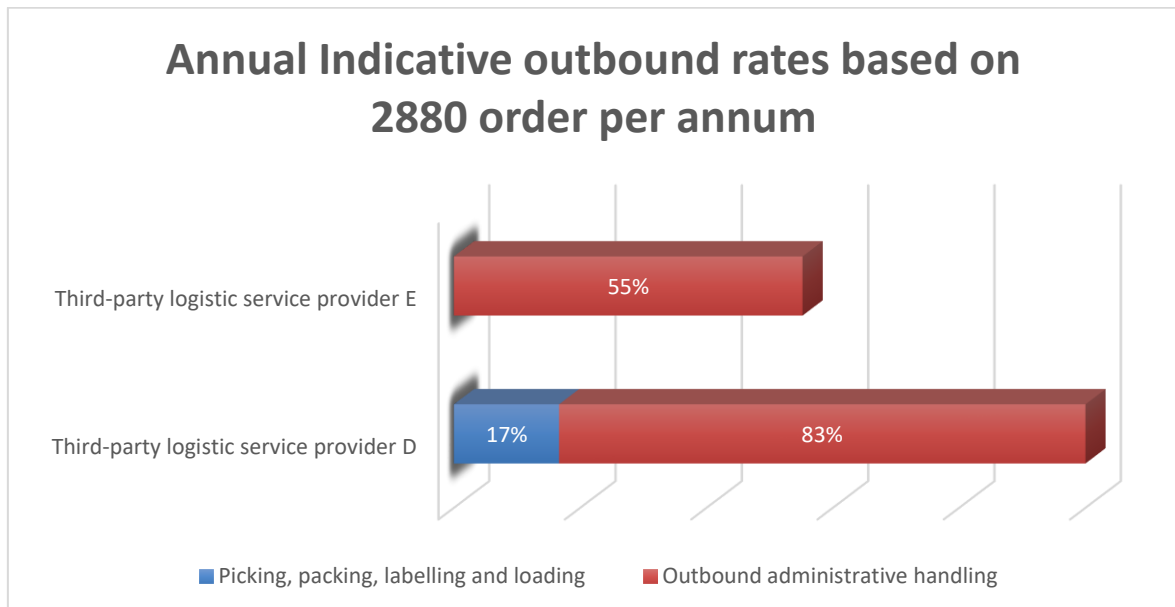


Figure 7 – Annual indicative outbound rates

When summing up these costs it becomes clear that Third-party logistics service provider E has the cheaper offer when almost all fixed costs are included. See figure 7 below where inbound, storage and outbound is summed up for both third-party logistic service provider E and third-party logistic service provider D.

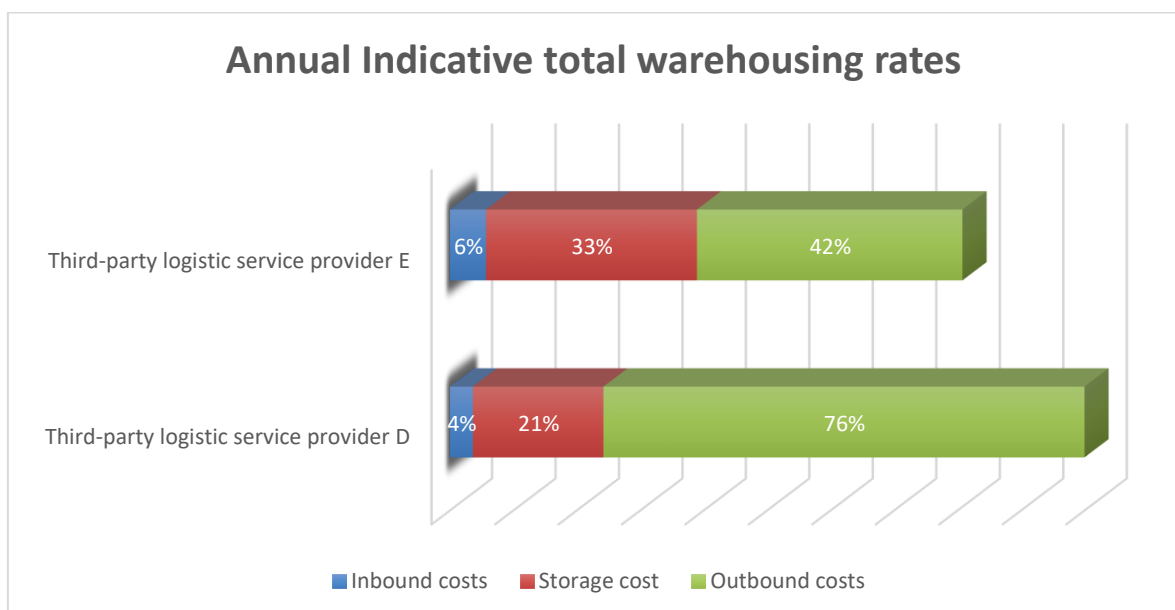


Figure 8 – Annual indicative total warehousing rates

In addition to the inbound, storage and outbound costs there are also an extra category of more variable costs. In general, it seems like third-party logistics service provider D has got a more detailed and fixed pricing compared to third-party logistics service provider E, but despite that is third-party logistics service provider D offers on inbound, storage and outbound services significantly higher. In the figure 9 below there is a comparison between the costs categorized as “other”. The most remarkable is the difference in pricing for the implementation of the warehousing project. Third-party logistics service provider D continues their detailed cost list while Third-party logistics service provider E is referring most of the process deviations and project setup to the VAS, Value added services, hourly rate. The 5% higher costs on management fee for consumables and other cost are worth to mention but the post should be relatively small since most of the costs needs to be requested and aligned with Nordic Lights before applied. See figure 10 below for detailed list. Third-party logistics service provider D has distinguished the hourly rates between different types of work in the warehouse, but Third-party logistics service provider E is sticking to the same value-added service hourly rate with all work the deviates from the offer. The hourly rates in Third-party logistics service provider D offer are about 30-40% higher compared to Third-party logistics service provider E.

	Third-party logistic service provider D	Third-party logistic service provider E
Other		
Hourly rate		
Administration	100 %	63 %
Warehouse	100 %	77 %
Consumables	cost plus 10% mgt fee	cost plus 15% mgt fee
Other Cost	cost plus 10% mgt fee	cost plus 15% mgt fee
Rush Orders, additional fee per order	100 %	71 %

Figure 9 – Costs categorized as other

The comparison between the offers from Third-party logistics service provider D and Third-party logistics service provider E has this far been just about data and numbers. Another important dimension in the comparison is the impression one gets when discussion with a company and working on a project with a clear goal. Third-party logistics service provider D was the company that worked in a more professional manner, and it felt like they had more control on the situation. Fairly early in our discussion we had the warehouse manager for the planned warehouse location joining the meetings and also a system architect. It felt like a lot more effort was put in to actually understand our business and our needs compared to third-party logistics service provider E. The meeting frequency and also the questions and concerns with third-party logistics service provider E were a lot lower compared to Third-party logistics service provider D. It feels like the third-party logistics service provider E might come with some surprising costs even though everything essential should be covered in the offer. The amount of VAS hours remains difficult to estimate compared to the more detailed fixed pricing received from third-party logistics service provider D.

The financial incentives to move over to an organization structure where a third-party logistics service provider would take care of parts of the logistic operations is difficult to take a position in at this stage. The cost level for current volumes to a restricted customer base is at least now known but to be able to see the whole picture there need to be involved transportation cost to and from the warehouse as well as all administration and production cost linked to the project in both Nordic Lights facilities in Finland and China. It's at least certain that letting a company specialized in 3PL services it would mean possibility to scale without huge investments and access to the latest and most effective solutions for material handling to algorithm optimization. Both offers from contained several pages about new technology with endless functions that was involving robots and smart operations. The actual quality and performance improvements for this new technology is unknown and difficult to weigh into the analyze.

With an international 3PL company located in Southwestern Europe there is a lot easier to reach bigger markets and improve the presence closer to customers compared to Finland. Lead times can be cut down which has a positive effect on freight costs when incoterms start with a C or D. To be closer to the market is especially important in these times when the environment and sustainability becomes more important for customers.

A reflection that came early after all meetings with the third-party logistics service providers had been performed was that it would have been good to record the meetings. By recording the meetings and transcript the meetings it would have lowered the risk of misunderstandings and any possible misinterpretations. To render a meeting a few weeks or months after it was carried out is difficult even though frequent notes of key points have been noted. Still, a lot of the communication and action points has been included in both e-mail and for two of the third-party logistic service providers also in an offer. Many of the statements, data and assumptions have been double verified. It felt like that the third-party logistic service provider followed a routine for the follow up and double check all material the Nordic Lights provided. A small mis assumption can have a big impact.

It would have been better and more interesting for the comparison if all five of the third-party logistic service providers had seen the potential in Nordic Lights and wanted to give an offer based on the current volumes on the 31 items to the after-market sector. Two offers from two of the giants in logistic services is still a very good reference point but the additional warehousing rates would have been interesting to see, and such additions would have strengthened and made the comparison even more reliable. Now afterwards it might have worked better to show on the growth last year and trends to convince the third-party logistic service providers that didn't think that the volumes were enough. Another alternative would have been to continue searching for additional third-party logistic service providers until more offers were received. The five third-party logistics service providers that were contacted belongs to the biggest and most experienced companies in the field so I'm a bit doubtful that a small company offering 3PL services would have led to something good. A comparison between a smaller 3PL compared to one of the biggest would probably not give a good overview of the situation neither.

5 Discussion

The purpose of this thesis was to examine the possibilities to outsource parts of Nordic Lights warehousing operations to a third-party logistics service provider given restrictions in the product range and customer segment. There were no difficulties to get in touch with any of the five third-party logistic service providers and the response from all of them was fast. The same historical data and assumptions were given to all third-party logistics service providers during the first contact with them. The most convenient way to be in contact with the third-party logistics service providers were through contact requests on their websites. Apparently, this is the preferable channel bigger logistics companies want potential customers to contact them through. Five unique third-party logistics service providers were selected based on specific selection criteria. After the first sort there were only two third-party logistics service providers left that were interested in offering outsourced warehousing operations. Based on additional discussions and meetings Nordic Lights finally ended up with offers from both these companies offering 3PL services. This means that the main purpose of the thesis was reached. Nordic Lights volumes is enough to outsource parts of its warehousing operations to a third-party logistics service provider that is offering outsourced warehousing services.

To enable an easy overview were both the offers from the third-party logistics service providers categorized and compared. In the comparison were the warehousing services categorized in inbound, outbound, storage and other. Based on the results when both fixed and variable costs were added was the cheapest offer received from third-party logistics provider E. Despite their remarkable less costly offer did third-party logistics provider E have many costs that were referred to an hourly rate which in the end can lead to different actual costs. The offers are based on specific volumes and big deviations will result in higher costs.

The 3PL case study is a first step in the evaluation and it needs to be backed up with analyzes of the transportation solutions to and from the warehouse. As mentioned earlier does also the number of work hours within administration and IT at both Nordic Lights facilities in Finland and China be verified to get the most realistic profile of the project as possible. Both companies offering 3PL services were also able to offer 4PL services and even 5PL services. It would be interesting to investigate what a complete outsourcing of the supply chain would look like and check against the current setup at Nordic Lights. It's obvious that these well renowned companies with a lot of experience in both technical and infrastructural matters would be able to offer interesting solutions that might be difficult and too cost-intensive to achieve with inhouse knowledge and with an organic growth. The leverage with effective and world class logistic services might be a game changer.

There is always room for improvement and this thesis is no exception. The historical data and assumptions that is presented in appendix 1 was too little for the third-party logistics service providers even though a lot has been added to it from the start. This would have saved a lot of time for both Nordic Lights and the third-party logistics service providers. Less meetings and questions that needs to be resolved. It's important to remember that the experience was new for both the company Nordic Lights and the author. It's difficult to imagine or see things from the counterpart's perspective when knowledge about processes is unknown. That doesn't just apply to 3PL but almost to everything else in life. My background in the field of logistics has helped me to understand what challenges needs to be addressed to reach my purpose. The research within the field of interest has helped me to build on my knowledge about outsourced logistics and more specific outsourced warehousing with the involvement of a third-party logistics service provider. I will have use of much of the new knowledge that I learnt from this project in my daily work as Forwarding Manager at Nordic Lights. The new contacts with the third-party logistics service providers will be valuable for upcoming projects linked to logistics and supply chain.

Other than that, I'm happy how the project and thesis worked out. It was possible to reach the purpose and it feels like the thesis will give good guidance for the evaluation of which offer to choose and the next steps in the project.

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7 Appendix 1

In the appendix will the historic data and assumptions be presented that were given to all third-party logistics service providers that were selected. Additional data and assumption are presented in the result for specific third-party logistics service provider.

General assumptions:

- Warehouse is non-bonded.
 - o No customs activities are performed by third-party logistics service provider / all customs activities are performed by 3rd-party/ broker under supervision of Nordic Light
- WMS is provided by Nordic Light.
 - o Location Management is not available
 - o Unique order ID (in- and outbound) is available
- Nordic Light will set-up a NL-entity to act as IoR (Importer of Record / Exporter of Record).
- No seasonality
- Offer is preliminary and subject to board approval.
 - o Offer is valid for two months
 - o Rates will be reviewed 2 months after start and rebalanced based on actual spend hours/ actual characteristics
- Working days are Monday – Friday
 - o Opening hours are 08:30 – 17:00
 - o Weekend work is possible on request, not included in the current proposal
- No investment in IT-hardware or development by third-party logistics service provider

Assumptions on inbound:

Characteristics:

- Inbound 260 pallets per year, about 30 pallets per inbound
 - Inbound will be close to 100% airfreight from CHN
 - Inbound will be 75% mixed pallets and 25% 1SKU pallet
 - Mixed pallets will contain max. 5SKU, average 3 SKUs per pallet
 - All inbound will be received via truck-on-dock delivery
 - All inbound will be 100% on euro pallet (no exchange)
 - Administration per inbound order is calculated based upon the following:
 - o Documents received complete and correct at least two working days prior to delivery. Delivery is approved in alignment with our CS Department.
 - o Documents will be checked based on Inbound order in WMS, based on unique order ID
 - o Location Management will be performed in separate environment, managed by third-party logistics service provider
 - o Booking in Nordic Light WMS, closure of the inbound shipment

Receiving and put-away, per pallet calculated on 850 put-away per year and 3.000 boxes to be re-palletized.

Assumptions on storage:

80 pallets (euro pallet) on average in storage
 40 SKUs on average in storage

Characteristics:

- Dedicated racking will be made available for this process (per column in aisle)
 - o Resulting in 1 floor location per 7 pallet locations
 - o Resulting in picking from bulk locations on slow-movers
- Cycle counting done according to ABC basis or every 2 week depending on the setup

Assumptions on outbound:

2880 orders per year (based on 600 shipped boxes per month with 2 – 3 boxes (2,5) per order)
 Each order contains on average 1,6 orderlines
 125 active customers
 83000 pcs annually, about 7000 pcs monthly.

Characteristics:

- Orders complete received on a working day before 11:00 CEST will be ready for pick-up by parcel carrier end-of-day
- Shipment on box-level per parcel courier
- Administration per outbound order is calculated based upon the following:
 - o Documents received complete and correct at least 11:00 on the shipment day.
 - o Documents will be checked based on outbound order in WMS, based on unique order ID
 - o If Express or Airfreight to ≠EU customs documentation will be part of the purchased service with the parcel/ airfreight supplier. Documents to be delivered by Nordic Light.
 - o Location Management and picking list will be performed in separate environment, managed by third-party logistics service provider
 - o Booking in Nordic Light WMS, closure of the outbound shipment incl. Tracking

Pick and loading, per order calculated on 240 orders per month with on average 2,5 boxes per order.