

# What is the Real Cost of Purchasing?

- A comparison between purchasing  
offshore and purchasing nearshore

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# Foreword

We would like to thank Rickard Andersson, Vice President Supply Chain at Thule Group. We are grateful to conduct our final project for our Master of Science in Mechanical Engineering for Thule Group. Thank you to you and your colleagues for your support, engagement and valuable inputs throughout the work.

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Lund 2017-05-16

Maria Alström & Johannes Gustafsson



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## Abstract

The product price given when producing offshore is not the entire truth and more companies decide to move their offshore production nearshore (Stentoft et. al, 2016). To measure the actual cost of producing many more parameters than visible costs needs to be taken account for. There are advantages as well as risks with outsourcing and costs can increase with distance such as quality issues, freight prices, increased cost of tied-up capital in transportation and more; the lowest price offer may not be the most cost effective or risk adverse one.

To determine what cost drivers to take into consideration, the data collection will be conducted using a combination between literature studies and data mining at Thule Group through semi-structured interviews. The interviews will target key persons working within Thule Group. Thule Group works mainly with purchasing finished products or parts to assembly in their production sites. To quantify the cost drivers, two purchased finished products that today are outsourced in China, representing offshore production, have been selected for a case study. This will be compared with an in-house production location in European Union, representing nearshore production. The costs identified are set in relation to the product prices for the two products and presented as mark-ups for each element.

The result shows that duty and freight are the supreme cost drivers for the offshore production location when not as remarkable for the nearshore alternative when having a high market share nearshore. Quality related costs such as having purchasing departments to secure and work with suppliers and claims can be treated as mark-ups but the main cost for quality issues will land within the price of producing the product for either the supplier or for Thule Group if producing in-house. Cost drivers related to delivery performance result in a higher mark-up for the offshore production location than the nearshore due to higher minimum order quantity (MOQ) and lead-time, leading to higher inventory levels. Physical cost of storage and the cost of risk are only a fraction of the financial cost when keeping stock, implying that it is not necessary to calculate on more than the financial cost. To take a decision regarding the inventory levels, the economic optimum between cost of losing sales and the cost of keeping a high stock to prevent this need to be calculated. The cost of lost sales can be calculated but not the cost of negative goodwill. Not to forget is that the intangible costs increase with producing offshore are difficult to predict and calculate for such as; risk of getting obsolete products when keeping higher stocks, converging manufacturing wages, insecurity in exchange rates, increased quality issues and other risks

increasing with distance. A separate case study also shows that duty-free warehouses are to prefer, looking to costs, over traditional warehouses when importing products. The difference between aggregated costs related to the two location options can give the possible difference in production price for the alternatives.

**Keywords:** cost management, nearshore, offshore, purchasing management, risk management

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# 1. Introduction

*The introduction chapter describes the background of the thesis followed by a problem discussion that comes down to a research question. The purpose, work procedure, delimitation and finally disposition of the thesis is presented.*

## 1.1. Background

From years of looking for the lowest possible price, leading to moving productions offshore to low cost countries, researchers find a trend in companies backshoring their productions. Backshoring means bringing back the production to the country where the company's headquarter or core plant is located. Several drivers for this trend are found such as; cost, quality, time and flexibility, access to skills and knowledge, risks, market, and other factors. (Stentoft et. al, 2016)

The decision where the production facility should be located is of great strategic importance to any manufacturing company (Andersson et. al, 2013). The consideration for a purchasing manager today, has changed dramatically from before when only having one key priority; cost reduction. Traditional cost reduction meant procurement by letting suppliers compete with each other by offering lowest possible price. With focus changing, many companies wanted to reduce the number of suppliers to earn both the lowest price and the lowest transaction cost. Due to this behaviour, many regional suppliers were replaced with fewer suppliers' origin from low-cost countries. This development resulted in a much higher dependency of the sole suppliers remaining. In the pursuit of global sourcing and achievement of lowest possible price this leads to increased supply risk. This vulnerability considering supply risks should be made visible and transparent in today's world. (van Weele, 2014)

A decision of geographical localisation is very complex containing several stages and with phases including both strategic and tactical level. It is very valuable for any company to account for all parameters when facing such a decision, but at the same time it's a great challenge. "Making estimations is still better than not doing any estimations at all". (Andersson et. al, 2013)

The Thulin family living in Hillerstorp, Sweden founded Thule as a company already in 1942. Thule Group, is a global organisation with presence in 140 markets all over the world. They are global market leader within a number of product categories such as Sport and Cargo Carriers, Other Outdoor &

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Bags and also Bags for Electronic Devices. The company has more than 2,000 employees spread across nine production facilities and more than 35 sales locations worldwide. Each manufacturing site in the Thule Group organization are manufacturing its own unique products. To support the organization Thule Group has two logistic centres; one, located in Huta, Poland and the other, located in Venlo, Netherlands. The one in Venlo is managed by third party logistics provider. (Thule Group, 2017)

In 2016 Thule Group's net sales reached over 5.3 billion SEK with a profit margin above 15 percent (Thule Group, 2016).

Thule Group distributes outsourced finished products and their in-house production concerns mainly assembly and packaging of outsourced parts. The production of outsourced finished products is today located in Asia and the production of outsourced parts is located in Europe where Thule Group has their production sites and distribution centres. (Rickard Andersson, face-to-face interview, 27<sup>th</sup> January 2017)

Thule is a producing company, having all its production sites on- or nearshore which in the thesis refers to as in-house production where they assemble purchased parts. All the production made offshore is referred to as outsourcing of finished products. Thule has no outsourcing of finished products nearshore and does not have any production sites offshore (Rickard Andersson, face-to-face interview, 27<sup>th</sup> January 2017).

## **1.2. Problem Discussion and Research Question**

To estimate the actual cost for producing offshore and producing nearshore, even the hidden costs need to be taken account for. In other words, meaning that the lowest priced offer may not be the most cost effective or risk adverse one in long terms.

The above problem discussion narrows down to the following research question:

*What is the real cost of producing offshore in relation to nearshore?*

## **1.3. Purpose**

The purpose of the thesis is to identify and quantify the cost drivers with considerable impact on producing offshore and nearshore. This will be used to develop a common, transparent and accurate way to take decisions on

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where to manufacture and/or purchase products in order to save time and money in the long-term perspective.

## **1.4. Methodology**

### **1.4.1. Determination of Cost Drivers**

To determine what cost drivers to take into consideration, the data collection will be conducted through a combination of literature studies and data mining at Thule Group through semi-structured interviews to learn more about the process at Thule Group and other similar companies. The interviews will target key persons working within Thule Group.

### **1.4.2. Case Study**

To quantify the found cost drivers, two purchased finished products that are today outsourced in China, representing offshore production, have been selected for a case study and to be compared with an in-house production location in European Union, representing nearshore production. The two products differ in size and are chosen by Thule because they want to investigate further in the two products to decide production location. The costs found are set in relation to the product prices for the two products today produced in China and presented as mark-ups for each element.

In the result, the outcomes from the model are summarized to be followed by a conclusion with suggestions and recommendations for Thule Group.

## **1.5. Delimitation and Simplifications**

The thesis will not look into the price of the products but all the additional costs to purchasing offshore and nearshore. The price of product for purchasing offshore is used as a base for nearshore purchasing as well.

## **1.6. Disposition**

The thesis starts with a literature study to evaluate cost drivers related to producing offshore and nearshore. The literature study is followed by an empirical study where information of how Thule Group works today and data related to the case study are collected. In the model, theory and empirical studies are combined and data applied on the case study. Through findings,

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an additional case is added to the thesis to investigate further into a subject. The result presents the chosen cost drivers quantified. The chapters have the same structure through the work divided into risk and cost management with the determined cost drivers.

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## 2. Theory

*The theory investigates in the cost drivers related to producing offshore and nearshore, to get a deeper understanding of the cost of production location. The theory is divided into cost management and risk management with the following cost drivers; quality, delivery performance, intangible risks, price and logistics, as presented in Figure 2. 1.*



**Figure 2. 1 – Purchase Management**

Purchasing Management entails all activities necessary to manage supplier relationships with the company's overall business strategies and interests. The purchasing decision is not an isolated activity, but should be done in a way which would optimise the value of the amount of money spent, rather than reaching for the lowest product price (van Weele, 2014).

According to Van Weele (2014) the best value for a company is the best value a company can acquire per risk-adjusted money spent, thus both cost and risk should be considered. This is made by working in a cross-functional way within the company, with a purchasing department orchestrating many interests in the company.

By outsourcing, companies will not only face risks but also avoid them. Today's manufacturing companies face competitive and changing environments which require strategic management from the firms. The challenge to design, produce and distribute products for a global market, while managing its resources and operations in the global network as efficiently as possible, increases with globalization (Olhager, Pashaei and Sternberg, 2015).

Through the aggregation of orders from many different customers, the supplier can take advantage of its size, in terms of purchasing and manufacturing capacity. This leads to lower costs both for the customers and

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the suppliers. By outsourcing, the customer is able to transfer demand uncertainty to the sub-contractor. The manufacturer has, through the risk pooling effect, the advantage to aggregate demand from many companies and thus reduce uncertainties (Simchi-Levi, Kaminsky and Simchi-Levi, 2003).

According to Simchi-Levi, Kaminsky and Simchi-Levi (2003), another important reason for outsourcing is the reduction of risk in capital investments.

Through outsourcing, the buyer is able to focus on its core strengths. Products of which they do not possess knowledge are outsourced, rather than focusing on investing in new talents, skills and knowledge. The core strength is where the company has the advantage in the eye of the customers and differentiates itself from its competitors (Simchi-Levi, Kaminsky and Simchi-Levi, 2003).

There are common issues which are reduced by outsourcing, such as the ability to better react to changes in the customer demand. The supplier, which has a much higher production rate than the customers themselves, has a technical knowledge which can accelerate the product development cycle time. Through outsourcing both the customer and the supplier can gain access to new technologies and innovation (Simchi-Levi, Kaminsky and Simchi-Levi, 2003).

## **2.1. Risk Management**

*Risk management encompass cost drivers related to risks to be considered such as quality, delivery performance and intangible risks.*

Risk Management is here about reducing the risks of purchasing. Managing outsourcing relationships goes beyond the traditional buyer-seller relationships. Many aspects need to be taken into consideration when going in into a long-term relationship. Parties that have no previous established relationship need to arrange dealings for risks and uncertainties via detailed contracts. The relationship between the supplier and buyer needs to be a win-win situation (van Weele, 2014).

According to Aron, Clemons, and Reddi (2005), to outsource correctly is not about outsourcing as much as possible or to do the first year for as low a cost as possible; but rather about looking at the long-term perspectives of achieving the very best risk adjusted rate of return. Aron, Clemons, and Reddi (2005) divide risks, associated with outsourcing, into four core groups

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as shown in Figure 2. 2; Strategic risk is a risk of poor quality as a result of deviations from contract. An operational risk can occur due to the distance between the developer and the outsourcing unit due to different transaction systems, as well as communication problems which will most likely increase with the complexity of the product. Another risk that is difficult to measure is the risk of atrophy, meaning the loss of competence. When outsourcing a product, a company might lose its competence, the maintenance and development of the specific technique. The final risk; risks of location concerns the geographical location where the outsourcing is held in terms of geopolitical risks, sovereign risks and exchange rate risks.



***Figure 2. 2 – Risk Management***

When choosing a supplier, the importance of securing timely and undisturbed availability of purchased products and services cannot be stressed enough; both in short and long-term. Purchasing is accountable for securing not only consistent quality and a reasonable total cost, but also supply from reliable suppliers. The company should, as far as possible avoid being dependent on too few suppliers. By investing in reliable suppliers, the company avoids the risk of captive situations. When choosing a supplier, aspects such as high quality products and accurate and timely delivery are more important than the price of the product itself (van Weele, 2014).

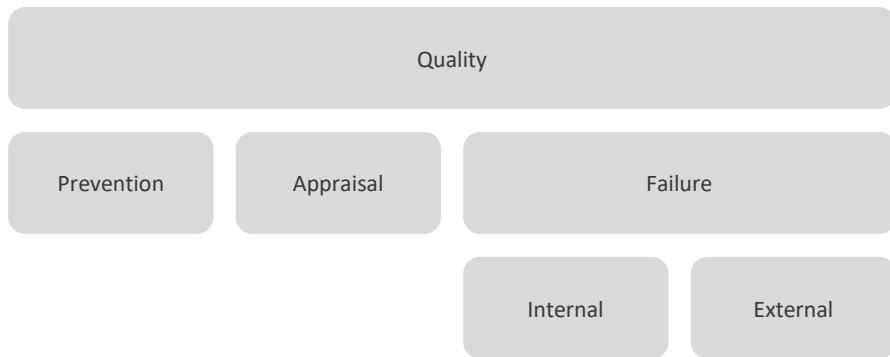
### **2.1.1. Quality**

In highly competitive environment organisations strive to increase their bottom line performance. A by-product of quality improvements is the increased productivity that follows due to reduction of errors, elimination of non-value-added activities and waste and resource capacity is therefore released. Not to forget is that this capacity needs to be used in order to

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increase the bottom line performance. The improvement of quality does also result in increased sales result due to better time on delivery and the opportunity to reduce selling price (Beecroft, 2000).

Cost of quality (COQ) is the sum total of the costs predicted for a company when preventing quality, the costs incurred to ensure that quality requirements are being met, and the costs incurred from quality problems. Quality costs are expenses which add no value. COQ can be broken down into three different categories, shown in Figure 2. 3, as; prevention, appraisal and failure costs (Beecroft, 2000).



***Figure 2. 3 – Quality***

The prevention costs are planned costs incurred by a company to ensure no errors are made during any of the stages in the production. Prevention costs entail education, training, continuous improvements efforts, quality administration staff, process control, market research, field testing and preventive maintenance, amongst others (Beecroft, 2000).

Appraisal costs include the costs of verifying, checking and/or evaluating products during the cost of quality process. Examples of appraisal costs are inspection, internal product audit, inventory counts, quality administration salaries, supplier evaluation and audit reports (Beecroft, 2000).

Failure costs occur because a product does not meet the set requirements, and must therefore be fixed or replaced. Failure costs are divided into two groups; external and internal failure. This means that the error is observed when the customer obtains the product, or before delivery to the market. Examples of internal failure include scrap, rework, extra inventory, repair-stations, re-design salvage, corrective action reports and overtime. Examples of external failure costs are costs such as warranty, customer complaint administration, replacement product, recall, shipping costs, amongst others.

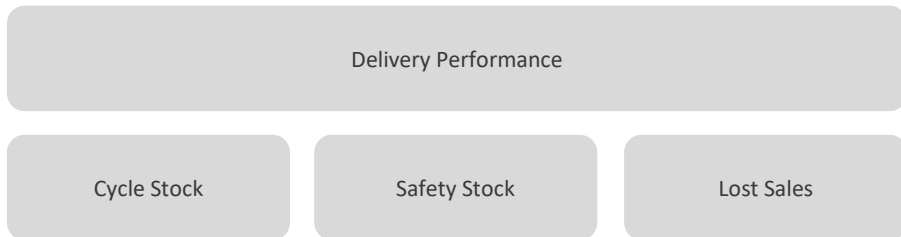


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Many of the COQ costs are hidden and can be very difficult to identify by formal a COQ measurements system. Many of the costs would be classified as the overhead costs. Hidden costs are costs such as lost reputation costs, customer dissatisfaction and customer incurrent costs (Beecroft, 2000).

### 2.1.2. Delivery Performance

Delivery performance is divided into cycle stock, safety stock and lost sales as Figure 2. 4 shows. These are explained in further subsections.



**Figure 2. 4 – Delivery Performance**

Jonsson and Mattsson (2011) state that there are three costs related to keeping products in storage. This is divided into a; financial part, physical part and a part associated with risks as shown in Figure 2. 5.



**Figure 2. 5 – Cycle and Safety Stock**

The capital that is tied up in the warehouse has a return requirement set by the company's equity interest. The physical part is the storage costs, this being the operating costs for the warehouse. The third cost is the cost of covering the risks of keeping products in storage (Jonsson and Mattsson, 2011).

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### 2.1.2.1. Cycle Stock

MOQ is the smallest orders a company can make. The Economic order quantity (EOQ) is related to the buyers own attributes such as equity rate etc. Chinese suppliers most often require a relatively high MOQ due to a number of reasons. Low margins which Chinese suppliers often have requires large volume for them to do better than break even with the deal, they produce to orders meaning keeping minimum in stock and their suppliers operate in similar manner. (Chinainportal, 2016)

### 2.1.2.2. Safety Stock

Safety stock is an inventory that is carried to prevent stockouts. The inventory is dimensioned for variability in supply and demand (King, 2011).

### 2.1.2.3. Lost Sales

Deficiency costs occur when a delivery cannot be delivered on time. In the worst case this results in a product that cannot be sold to the customer, and this could lead to the producer losing a future customer. The cost of products that cannot be sold, due to absence, are difficult to estimate (Jonsson and Mattsson, 2011).

According to Peter Berling, Ph.D. in Production Management at Lund University (telephone, February 28<sup>th</sup>, 2017), it is possible to calculate the cost of sales lost, even though this might be difficult. The cost of the lost sales is dependent on three things, shown in Figure 2. 6; the contribution margin of the products, the cost of negative goodwill and loss of sales of complementary products, e.g. when products are sold in modules.



**Figure 2. 6 – Lost Sales**

The cost of negative goodwill is difficult to quantify and it needs to be evaluated at each product category as it differs between them. A product category that is unique to the market has a lower cost of negative goodwill

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through loss of sales, because the customers will wait for the products. Products that are easy to replace with competitors' alternatives will also be replaced (Peter Berling, telephone interview, February 28<sup>th</sup>, 2017).

The measure cross elasticity of demand is the responsiveness of demand for one product, to a change in the price of another product. Many products are related, and the measurement indicates just how they are related. Perfect substitutes mean that the product can easily be replaced by another product and perfect complement, meaning that other products will not be sold if one product will not. In other words, two products are substitutes if the change in price for one product changes the demand of another in the same direction, meaning an increase in price for product Y makes an increase in demand for product Z. If the change of price affects another product's demand in the opposite way, they are rather complements meaning one product will not be sold in the same extend without the other product being sold (Nicholson, 2002).

### **2.1.3. Intangible Risks**

Fröberg (2012) reports that the raise in wages, exchange rates and cost of transports effects the entire game of outsourcing in the world. Emerging countries' wage increase, among other factors such as uncertainty in lead times and variations in exchange rates, have resulted in more companies back sourcing productions Stentoft et. al (2016) report. PricewaterhouseCoopers (2013) shows that wage gaps between emerging countries and advanced economies will shrink significantly within the next 15 years. As its relative wage levels rise, China will become less important as a low-cost production country and increase its share as a consumer market. This will also apply to other middle income emerging economies such as Poland, Turkey, Mexico and South Africa.

Countries with continued relatively low wage levels, such as India and the Philippines, could become more attractive to be used as manufacturing locations. However, they need to meet certain standards with regards to infrastructure and energy. Some US companies have lately started using eastern Europe as a manufacturing location where wages are not as low, but they are more closely located. PricewaterhouseCoopers (2013) also states that wages are important when deciding on locations, but companies should also consider the ease of doing business and wider measures of a country's competitiveness and therefore consider to bring productions closer to the product development site.

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The BCG (2011) reports that China's manufacturing cost advantages over the U.S. is quickly decreasing and that the cost gap for goods will virtually be eliminated due to rising Chinese wages, higher U.S. productivity, a weaker U.S. dollar, among other factors. Companies are recommended to undertake a rigorous, product by product analysis of their supply network that considers total costs, rather than just factory wages. Even if China may be the best choice because of technology or economies of scale it should not be treated as the default option any longer.

## **2.2. Cost Management**

*Cost management investigates in direct costs such as the price of the product and cost of logistics.*

According to Eriksson and Sterner (2016), there are a lot of theories regarding cost analysis and purchasing cost models. Eriksson and Sterner have been evaluating four different cost models; total cost of ownership (TCO), activity-based costing (ABC), landed cost and life cycle costing (LCC). Based on this research, they have been able to identify the amount of the existing theories, cost elements and cost drivers, applications and success factors of the models. Through the studies of the four cost models, they found TCO to be the model including the greatest amount of information, in terms of theory. Landed Cost only includes the cost drivers from the supplier to the customer, considering price of the product, transport, customs, inventory, overhead and risk while TCO also entails customer-related costs, such as costs for maintenance and life cycle, which includes recycling.

Purchasing needs to make sure that the highest value is achieved from the choice of supplier, which can be the lowest total cost of ownership. TCO is divided into two major parts; direct material costs, and indirect costs such as transportation, handling of material, incoming inspection, inventory, administration, scrap, etc. (van Weele, 2014). TCO suggests that managers adopt a long-term perspective, and not an initial-price perspective of the buying perspective. Ferrin and Plank (2002) suggest that a generic model for total cost of ownership is not appropriate, but some cost drivers are more universal than others and will therefore appear in many different cost models.

### **2.2.1. Price of Product**

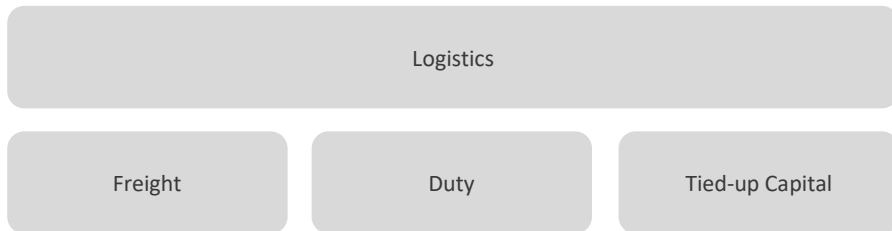
According to Ståhl (2011), the cost of producing a product is more than just the material cost and cost for wages. To obtain a complete breakdown of the

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costs of manufacturing products or parts is of high importance. Knowing whether it is the costs for rejects, downtimes, slowdowns, waste of material, adjustment times, or costs connected with some other parameter or variable, that are costliest is important for improvement and targeting the resources right. Andersson and Ståhl (2014) show how the price of the part decrease with increased overall equipment efficiency, with other words decreased internal failure or increased production effectiveness.

### 2.2.2. Logistics

The cost of logistics chapter is divided into following three parts, illustrated in Figure 2. 7; freight, duty and tied-up capital during transportation.



**Figure 2. 7 – Logistics**

#### 2.2.2.1. Freight

Freight is the transportation between different geographical locations. There are many ways to transport products, and this has both pros and cons. Transport by sea is convenient for big batches to be sent because of its low cost. However, this ties up capital due to long transportation time in relation to other alternatives of transportation. Transport by railway has an advantage. in comparison to the road alternative because it can move high volumes across greater distances. Transport by road is the most common way to transport both long and short distance products, and it is the only transportation medium that can offer transportation directly between the supplier and the customer. Transportation by air is the fastest long distance alternative, but is also more costly. Additional transportation is needed from the terminal to the customer, and from the supplier to the terminal, as is the same for shipping and railway. The combination of transport methods is called intermodal transportations. (Jonsson and Mattsson, 2011)

The Incoterms rules are constituted by the International Chamber of Commerce (ICC) and are used today as a common language within

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worldwide trade. The rules are incorporated in contracts for the sale of products and provides rules and guidance to importers, exporters, lawyers, transporters, insurers and more. (International Chamber of Commerce, 2017)

Ex Works (EXW) means that the seller supplies the buyer with the products by leaving it at the seller's premises or another predetermined place. The seller has no responsibility to load nor to clear, if applicable, the products for export. (International Chamber of Commerce, 2017)

Free on Board (FOB) means that the buyer bears all risks and costs from when the seller delivers the products on board the transport vessel in the port, and this is decided by the buyer. (International Chamber of Commerce, 2017)

#### *2.2.2.2. Customs Duty*

When products, finished products and parts, are imported from a country outside European Union (EU), the term import is used. Products imported need to be cleared through customs, which means that an import declaration needs to be submitted, and fees such as Custom duties, VAT, etc. need to be paid. If the company is registered for VAT in Sweden, it does not need to be paid to Swedish Customs, instead it is reported to the Swedish Tax Agency. Before making an import declaration, the products need to be classified through determining the commodity code and investigating if there is any need for a license or special permit to import the products. (Tullverket, 2017a)

The World Custom Organization (WCO) has developed the Harmonized Commodity Description and Coding System, referred to as the Harmonized System (HS) and is a multipurpose product. The product comprises of approximately 5 000 commodity groups that each are referred to by a six digits code. The series of digits is determined with the help of rules and helps the product to achieve a uniform classification. More than 200 countries and economies use the HS to set up their Customs tariffs, and more than 98 percent of all products in international trade are classified with HS. The Harmonized System is an important tool for international trade. (World Customs Organization, 2017)

The item's customs value is the basis for the decision of the customs duty to be paid. The customs value is based on the price paid to the supplier, the cost of the transport and any insurance costs. (Tullverket, 2017a)

A customs warehouse is a setup that enables the suspension of Import Duty. A procedure that is to the advantage of products that are to be sent to another

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final market. If the products are imported and then exported, duty will first be paid to import the products based on the freight and value of the products. When exported, the importer of the products will pay for duty based on the country of origin, the new price from the exporter and freight from latest destination. With a customs warehouse, no duty is required if the products are to be further shipped. (Tullverket, 2017b)

#### *2.2.2.3. Tied-up Capital*

According to Jonsson and Mattsson (2011), a company's assets can be divided into fixed assets and liquid assets. When investing in an asset, the capital is tied up, this effects the company's liquidation. The material flow in a logistical system constitutes parts of the liquid assets and therefore affects the company's total tied-up capital. The tied-up capital influences the profitability directly, but also indirectly because it effects on the service of delivery. To be able to measure and analyse the logistical performance, it is necessary to calculate the amount of tied-up capital. The average tied-up capital expresses how much capital is tied-up, and divided in storage, products in work, finished inventory, transports, etc. It can be expressed in absolute numbers, turnover ratio, and average time in respect of place of storage.

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## 3. Empirical Studies

*The gathering of empirical data was made through semi-structured interviews, a qualitative method of inquiry that combines a pre-determined set of open questions and discussions. Key persons at Thule Group related to the cost drivers found in the theory are interviewed and the interviews are part of an iterative process to gather data. The purpose of the interviews is to understand how the risks and costs are taken into consideration today at Thule Group. The following people, presented in Table 3. 1, at Thule Group was interviewed.*

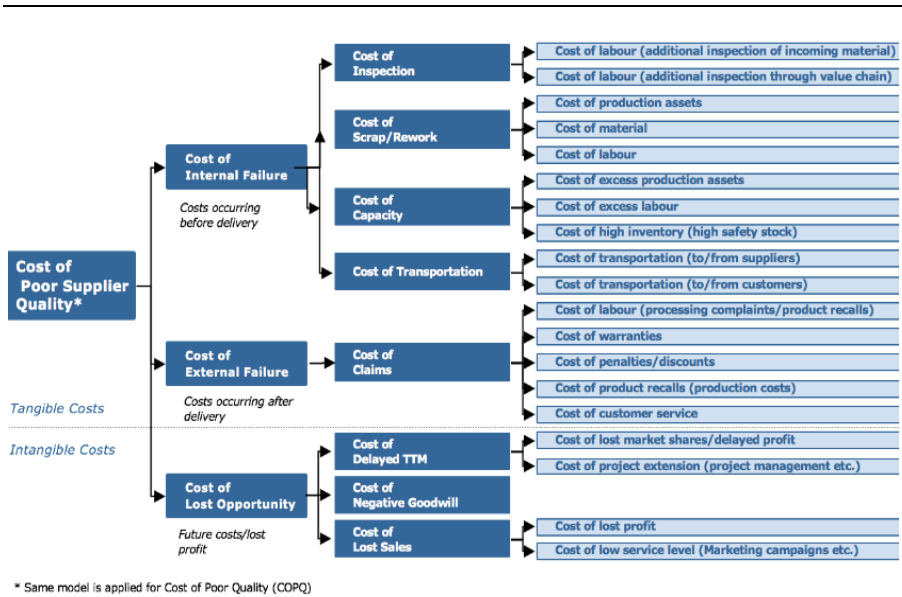
**Table 3. 1 – Interviewees**

Interviewee	Position
Rickard Andersson	Vice President Supply Chain at Thule Group
Lars Andreasson	Marketing Director at DSV Solutions AB
Mattias Dahl	Category Manager Transports and Site Purchase at Thule Group
Magnus Friman	Purchase and Planning Analyst at Thule Group
Klas Hagelin	Quality Director at Thule Group
Hanna Notmeijer	Purchasing Director at Thule Group
Henrik Wanfors	Quality & Environmental Manager at Thule Group
Michael Wolfsteiner	Demand Planner at Thule Group

### 3.1. Risk Management

#### 3.1.1. Quality

Klas Hagelin (telephone interview, March 1<sup>st</sup>, 2017) highlights the cost drivers shown in Figure 3. 1; cost of inspection, cost of scrap and rework, cost of capacity, cost of transportation, and cost of claims.



**Figure 3. 1 – Cost of Poor Supplier Quality, provided by Thule Group**

**3.1.1.1. Prevention and Appraisal Cost**

**Overhead costs for purchasing department**

Thule Group has three regional purchasing departments; one located in Asia, one located in Europe and one located in North America. The purchasing department located in Asia handles most of the purchasing of finished products, and the ones located in Europe and North America handle most of the purchasing of components and raw-material. Other prevention and appraisal work are integrated within the production (Rickard Andersson, face-to-face interview, March 27<sup>th</sup>, 2017). In Table 3. 2, are the costs for purchasing departments presented.

**Table 3. 2 - Overhead costs for purchasing department, provided by Thule Group**

Cost Driver	Simplification	Cost [MSEK]
<b>Overhead costs for purchasing</b>		
Cost for Asia purchasing department	Finished products	X1
Cost for Europe purchasing department	Parts	X2
<b>Direct costs for purchasing</b>		
Cost for purchased finished products	Finished products	Y1
Cost for purchased parts	Parts	Y2

When selecting a new supplier, costs are calculated following a procedure. Audits, inclusive corporate social responsibility (CSR) audits, conducted through supplier quality engineers (SQE) are to be done. This needs to be made in a manner which involves the departments supply chain, finance and sourcing health and safety.

To initiate a relation with a new supplier, research work has to be done, a legal agreement established and the site must be inspected to ensure that the supplier comply with Thule Group’s standards. Therefore, initiating an agreement entails travel and administrative costs according to Rickard Andersson (email correspondence, March 29<sup>th</sup>, 2017). Below, in Table 3. 3 are costs related to initiating an agreement with a new supplier.

**Table 3. 3 – Cost for evaluating a supplier, provided by Thule Group**

Cost Driver	Simplification	Cost [SEK]
<b>Overhead costs for evaluating supplier</b>		
Audits (Inclusive CSR)	SQE	24,000
Administrative work	Supply chain, finance and sourcing	14,000
Travels	Overall	10,000

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## **Inspection**

Cost of inspection is an appraisal cost, meaning that it occurs before delivery and can be divided into two different cost drivers; cost of labour due to additional inspection of incoming material, as well as additional inspection throughout the value chain (Klas Hagelin, telephone interview, March 1<sup>st</sup>, 2017). An agreement between Thule Group and the supplier is made to secure the quality of finished products and parts delivered, meaning no further inspections are conducted; except for the three first deliveries for parts, and the first delivery for finished products, a cost negligible according to Henrik Wanfors (face-to-face interview, March 27<sup>th</sup>, 2017).

### *3.1.1.2. Internal Failure*

#### **Scrap and rework, capacity and transportation**

Cost of scrap and rework is a cost of internal failure and entails three cost drivers; cost of production assets, cost of material and cost of labour. (Klas Hagelin, telephone interview, March 1<sup>st</sup>, 2017)

Cost of capacity is a cost of internal failure and entails three cost drivers; cost of excess production assets, cost of high inventory and cost of excess labour. (Klas Hagelin, telephone interview, March 1<sup>st</sup>, 2017)

Cost of transportation is a cost of internal failure and entails all additional transportation due to insufficient parts and finished products. (Klas Hagelin, telephone interview, March 1<sup>st</sup>, 2017)

Finished products which are delivered directly to distribution centres without any further inspections, do not incur costs such as cost of scrap and rework, capacity and transportation. (Henrik Wanfors, face-to-face interview, March 27<sup>th</sup>, 2017)

### *3.1.1.3. External Failure*

#### **Claims**

The cost of claims is a cost of external failure, meaning it occurs after delivery to the customer. It is divided into five different cost drivers; cost of labour for processing complaints, cost of warranties, cost of penalties, cost of product recalls, and cost of customer service. (Klas Hagelin, telephone interview, March 1<sup>st</sup>, 2017)

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In order to handle claims there is an overhead cost related to every claim. If the product needs to be replaced, there are logistical costs as a result of the storage and transportation of the product (Rickard Andersson, telephone interview, April 12<sup>th</sup>, 2017). The estimated direct costs for claims for an average product is presented in Table 3. 4.

***Table 3. 4 – Direct cost of claims, provided by Thule Group***

Cost Driver	Cost [SEK]
Average product cost	370
Overhead cost	25
Logistic cost	75

### **3.1.2. Delivery Performance**

#### *3.1.2.1. Cycle Stock*

By decreasing the order quantity to its optimum there are some advantages such as; decreased cost, decreased risk for obsolete inventory and quality issues detected earlier, Thule Group can become more flexible related to variations in seasons. (Rickard Andersson, telephone interview, April 12<sup>th</sup>, 2017)

The physical and risk costs for keeping products in storage are presented in Table 3. 5 as cost per pallet per month. In Table 3. 6 are pieces per pallet presented.

***Table 3. 5 – Cost per pallet, provided by Thule Group***

Product	Cost per pallet per month [SEK]
Product A	73.5
Product B	43.8

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**Table 3. 6 – Pieces per pallet, provided by Thule Group**

Product	Pcs per pallet
Product A	30
Product B	90

The cycle stock-levels, shown in Table 3. 7 and Table 3. 8, represent the average number of products in cycle stock and are provided by Michael Wolfsteiner. (email correspondence, March 23<sup>rd</sup>, 2017)

**Table 3. 7 – Average cycle stock levels Chinese supplier 2017, provided by Thule Group**

Product	Average cycle stock levels [pcs]
Product A	200
Product B	500

**Table 3. 8 – Average cycle stock levels EU supplier 2017, provided by Thule Group**

Product	Average cycle stock levels [pcs]
Product A	30
Product B	90

### 3.1.2.2. Safety Stock

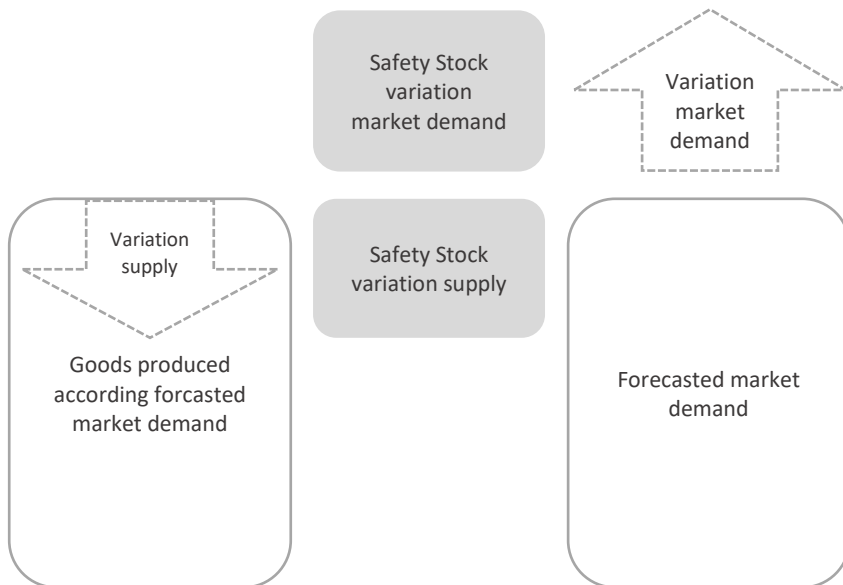
According to Michael Wolfsteiner (telephone interview, February 15<sup>th</sup>, 2017), the extent to which a company is able to serve their customers is measured by delivery performance. Delivery performance is the calculation of the percentage of placed orders which are delivered according to the customers' request. The size of the safety stock increases exponentially as the delivery performance rises.

Variation in supply is due to delays and deficiency of transported finished products, parts or products produced in-house. The delays need to be taken into consideration when dimensioning safety stock. Consistency in lead-time

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is a higher priority for Thule Group, compared to having a short lead-time. (Michael Wolfsteiner, telephone interview, February 15<sup>th</sup>, 2017)

The market demand is difficult to predict and is forecasted by Thule Group. When forecasting, deviations will appear and one must keep in mind that variations in demand may occur when dimensioning the safety stock. If a company wants to have a 100 percent delivery performance, the safety stock on the demand-side needs to be equal to, or greater than the highest variation in demand. At the same time the safety stock on the supply-side needs to be equal to or greater than the variation in supply, this is illustrated in Figure 3. 2. The safety stock should offset deviations of supply and demand to make sure customers do not need to wait or to prevent lost sales. (Michael Wolfsteiner, telephone interview, February 15<sup>th</sup>, 2017)



***Figure 3. 2 – Explanation of safety stock***

To achieve the desired delivery performance, Thule Group is using a tool that simulates inventory as a function of the delivery performance. The delivery performance is set specifically for each product. Thule Group's model used to calculate the safety stock for the demand variation is dependent on previous sales statistics, new launches and other changes in assortments and campaigns. The output of the model is the forecast of the future sales and the variation in demand. The safety stock will cover the difference between the maximum demand and the forecasted sales. Thule

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Group does not yet have the coherent input data to calculate their safety stock for the supply side. The safety stock is measured in terms of tied-up capital; neither the cost for risk of storing the products, or the physical cost is taken into consideration in the model. (Michael Wolfsteiner, telephone interview, February 15<sup>th</sup>, 2017)

Due to the lack of coherent input data for delays on the supply side, Thule Group calculates an average delay of 10 percent of the lead-time for all of their suppliers. This covers the uncertainty in supply from the supplier. There is no detailed calculation behind the 10 percent lead-time delay. Shown below in Table 3. 9 and Table 3. 10 are the actual average safety stock-levels during 2017 for two of Thule Group’s products; Product A and Product B. The safety stock-levels represent the average number of products in safety stock for supply-side and is provided by Michael Wolfsteiner (email correspondence, March 23<sup>rd</sup>, 2017).

***Table 3. 9 – Average safety stock levels for Chinese supplier 2017, provided by Thule Group***

Product	Average safety stock levels [pcs]
Product A	325
Product B	538

***Table 3. 10 – Average safety stock levels for EU supplier 2017, provided by Thule Group***

Product	Average safety stock levels [pcs]
Product A	214
Product B	364

### *3.1.2.3. Lost Sales*

According to Rickard Andersson (face-to-face interview, March 27<sup>th</sup>, 2017) Thule Group’s actual delivery performance for outsourced products is a few percentage below the actual delivery performance of its products produced in-house. The reason for this is, according to Michael Wolfsteiner (telephone interview, March 2<sup>nd</sup>, 2017) that the applied variance by Thule Group,



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represented by a 10 percent addition to the lead-time on supply side, does not correspond to the actual delivery performance by the suppliers.

The data presented in Table 3. 11 show total order lines placed at Thule Group by their customers and the delivery performance by Thule Group.

***Table 3. 11 – Delivery performance, provided by Thule Group***

	Total order lines	Delivery performance [%]
In-house	470,827	91.1
Outsourced	173,177	89.8

Due to confidentiality of the actual contribution rate, the rate for each product in the thesis is calculated through the proportion between the net sales and operating profit collected from official figures.

Table 3. 12 shows collected data from Thule Group’s Annual Report 2016.

***Table 3. 12 – Net sales and operating profit, provided by Thule Group***

Consolidated income statement	
Net sales [MSEK]	5,320
Operating profit [MSEK]	825

### **3.1.3. Intangible Risks**

Rickard Andersson (telephone interview, January 24<sup>th</sup>, 2017) highlights that risk factors such as change in labour prices and currency volatility are taken into consideration in future location decisions.

## **3.2. Cost Management**

### **3.2.1. Price of Product**

The price of the product, shown in Table 3. 13, is offered by a supplier. Thule Group prefers to receive the price specified in material and manufacturing. In the offer, there is also a specified Incoterms for the deal, deciding where

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risk, cost and responsibility is taken over for the products (Rickard Andersson, face-to-face interview, March 27<sup>th</sup>, 2017).

**Table 3. 13 – Price of product, provided by Thule Group**

Product	Price [SEK]
Product A	332
Product B	87.2

### **3.2.2. Logistics**

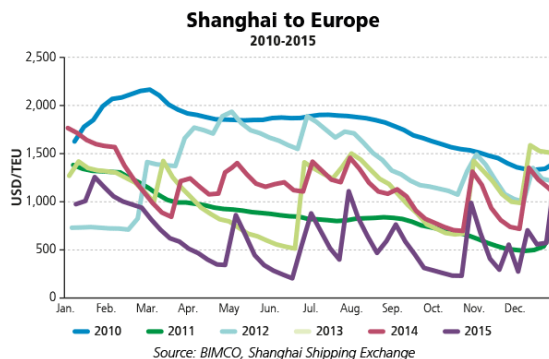
Mattias Dahl (face-to-face interview, February 22<sup>nd</sup>, 2017) highlights the following cost drivers; freight with entry and harbour maintenance fees, handling costs, duties and import fees.

According to Mattias Dahl (face-to-face interview, February 14<sup>th</sup>, 2017) smaller companies using sea freights may be down prioritized to companies with greater shipping orders, due to lack of space on the ship. This factor causes uncertainty and inconsistency in lead-times coming from overseas. Air freight is only used in certain cases and is not default way of transportation within Thule Group.

According to Mattias Dahl (face-to-face interview, February 14<sup>th</sup>, 2017) the most common Incoterms rules used within Thule Group when transporting overseas are ex works (EXW) and free on board (FOB).

#### *3.2.2.1. Freight*

According to Mattias Dahl (face-to-face interview, February 14<sup>th</sup>, 2017) it is not common to insure each specific freight, instead there is one insurance policy which covers all freights. The insurance often has a high deductible rate, and is therefore most often used in bigger accident claims only. The cost of damaged or stolen products in connection with freights is negligible in the total cost of freights, both when it comes to freight by sea and by road, the freight prices fluctuate considerably, as seen in Figure 3. 3, and are dependent on the demand and the oil price.



**Figure 3.3 – Freight prices Shanghai to Europe, provided by Thule Group**

The cost of handling products is a large cost of the overall freight, and it is where the biggest risks for the products occurs, says Mattias Dahl (face-to-face interview, February 14<sup>th</sup>, 2017). The cost of handling products is managed as a cost within freight at Thule Group.

Just as with the loading and unloading of products, the entry and harbour maintenance fees are handled within freight at Thule Group (Mattias Dahl, face-to-face interview, February 14<sup>th</sup>, 2017).

In Table 3. 14 and Table 3. 15 are the freight prices for a 40-foot size high cube container (40 HC) from China respectively EU to final market. In

Table 3. 16 shows the volume that fits in a 40 HC for Product A and Product B.

**Table 3. 14 - Cost of freight from China, provided by Thule Group**

From China, to	Price for a 40 HC [SEK]
EU	15,000
U.S.	30,900
Japan	3,900
Australia	11,000

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**Table 3. 15 - Cost of freight from EU, provided by Thule Group**

From EU, to	Price for a 40 HC [SEK]
EU	0
U.S.	21,500
Japan	28,900
Australia	32,500

**Table 3. 16 - Pcs per container, provided by Thule Group**

Product	Pcs per container
Product A	850
Product B	3600

#### 3.2.2.2. Customs Duty

The duty costs, as well as the import fees, are handled externally by a logistic company (Mattias Dahl, face-to-face interview, February 14<sup>th</sup>, 2017).

Some products are being imported to the distribution centre in EU, and then later exported to other markets, such as Japan and Australia. The site buying the products needs to pay for duty expenses of the country of origin, based on the price they pay for the product and the freight from EU. In addition, duty has been paid for the same products when arriving to the distribution centre in EU. An option would be to store the products in a duty-free warehousing, and then it would not be necessary to pay the duty into EU. The difference in cost between storing the products in a duty-free warehousing or in a distribution centre is negligible (Magnus Friman, face-to-face interview, April 3<sup>rd</sup>, 2017).

According to Lars Andreasson (telephone interview, May 9<sup>th</sup>, 2017) the cost of storing in duty-free warehouses is the same as traditional warehousing. Both duty and VAT is paid first when the products are distributed from the duty-free warehouse.

The following two tables, Table 3. 17 and Table 3. 18 show the forecasted markets for Product A and Product B.

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**Table 3. 17 – Markets Product A, provided by Thule Group**

Market	Markets for Product A [%]
EU	87.2
Japan	5.57
U.S.	0.982
Australia	1.34
Total	95.1

**Table 3. 18 – Markets Product B, provided by Thule Group**

Market	Markets for Product B [%]
EU	88.4
Japan	4.69
U.S.	2.56
Australia	1.13
Total	96.8

### 3.2.2.3. Tied-up Capital

The lead-time is, according to Michael Wolfsteiner (telephone interview, February 15<sup>th</sup>, 2017) considered within safety stocks. Tied-up capital related to lead-time is not taken into consideration today at Thule Group.

According to Mattias Dahl (face-to-face interview, April 4<sup>th</sup>, 2017) the payment conditions are between 30 and 60 days, depending on the agreement with the supplier for both EU and Chinese suppliers and the transportation time is approximately 5 weeks from the harbour in China to the harbour in EU. The transportation from a production site in EU to the distribution centre is approximately one week and the transportation time from the harbour in EU to the distribution centre a little less than a week.

Hanna Notmeijer (telephone interview, February 14<sup>th</sup>, 2017) explains that suppliers for Thule Group are being classified into five different categories; priority suppliers, potential priority suppliers, critical suppliers, unique and

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other suppliers. Priority suppliers are the suppliers with which Thule Group has started an agreement, and both companies are in a win-win situation in terms of the contract. Thule Group considers such suppliers as sustainable suppliers in the long-term. Potential priority suppliers have done well and therefore Thule Group is further investigating whether or not they are sustainable enough to become priority suppliers. Critical suppliers are suppliers that Thule Group has chosen as a result of lack of alternatives, and do not value the cooperation as sustainable. Unique suppliers are suppliers that contribute with a function that can differentiate the product from competitors, and Thule Group therefore has a specific interest in cooperating with such suppliers. Other suppliers are new suppliers, or smaller suppliers that have not yet been classified.

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## 4. Model

*Based on literature research and semi structured interviews; cost drivers are identified as possible cost components to the cost model. The cost drivers are investigated one by one and further discussed and evaluated through a quantitative analyse applied on the case study. The case study is made separate in grey boxes. The thesis chooses to combine both the landed cost model and the total cost of ownership as Eriksson and Sterner (2016) present, this to cover all cost drivers from the supplier to the customer.*

### 4.1. Risk Management

#### 4.1.1. Quality

Beecroft (2000) divides cost of quality into the following stages; prevention, appraisal, internal and external failure. The model Thule currently are using covers; appraisal costs, internal and external failure but not costs of prevention according to Klas Hagelin (telephone interview, March 1<sup>st</sup>, 2017). Prevention costs is an important cost driver regarding in-house production but not relevant in terms of outsourcing. Appraisal costs are represented as overhead costs for purchasing departments and cost of inspection. Cost of failure is divided into external and internal failure as Beecroft (2000) suggests and treated thereafter.

##### 4.1.1.1. Appraisal Costs

Appraisal cost is an important part both according to Beecroft (2000) and Hanna Notmeijer (telephone interview, February 14<sup>th</sup>, 2017). Thule Group is today working with the choice of suppliers in both a quality and value-aspect.

The cost drivers of starting up a new supplier are presented in Table 4. 1, based on information from Table 3. 3, and contains the evaluation of the supplier through audits, administrative work and travels related to inspections by the departments supply chain, sourcing and finance.

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*Table 4. 1 – Summarized costs for evaluating a supplier*

Activity	Cost Driver	Cost [SEK]
Audits (included CSR-audits)	SQE	24,000
Administrative work	Supply chain, sourcing and finance	14,000
Travels	Overall	10,000
<b>TOTAL</b>		<b>48,000</b>

The total average cost of initiating a new supplier relationship for Thule Group, is estimated to 48,000 SEK. Dependent on how big the order is, the cost of setting up a new supplier has different impact on cost for the product. A supplier that is being evaluated may not meet the requirements and a supplier that has been evaluated for a product does not need to be evaluated for a second product if an agreement is already initiated. The cost of setting up a new supplier is a one-time cost and will therefore not be calculated as a cost per product. It is not possible to treat the cost as a separate mark-up of the product if not knowing how many products that Thule Group will purchase from the supplier in a life time. Asia and Europe have local purchasing departments why the cost can be kept low even when looking at suppliers in Asia.

### **Overhead cost for purchasing departments**

The cost of handling suppliers by Thule Group is treated as an overhead cost. Assumptions that all products bought from Asia are finished products and all products bought from Europe are parts - are made for the following analysis. Purchased parts represents material for in-house production and costs for finished products represents outsourced production.



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### **Calculations describing mark-up for purchase department**

By dividing the overhead costs for the purchase department of parts with the total cost for purchased parts - a mark-up for overhead costs for China is achieved. By dividing the overhead costs for the purchase department of finished products with the total cost for purchased finished products - a mark-up for overhead costs for purchased finished products is approximated. The size of the mark-ups can be determined and compared between nearshore production and outsourcing. Cost of product inspection is a small cost that is covered within the overhead costs for purchase departments. Data used in following equations are collected from Table 3. 2.

$$\text{Mark - up for China} = \frac{\text{Overhead cost for Asia purchase department MSEK}}{\text{Cost for purchased finished products MSEK}}$$

$$\text{Mark - up for China} = \frac{X1}{Y1} = 0.847\%$$

$$\text{Mark - up for EU} = \frac{\text{Overhead cost for Europe purchase department MSEK}}{\text{Cost for purchased parts MSEK}}$$

$$\text{Mark - up for EU} = \frac{X2}{Y2} = 0.820\%$$

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#### **Product A**

Overhead costs CN = 0.847% \* 331 SEK = **2. 80 SEK**

Overhead costs EU = 0.820% \* 331 SEK = **2. 71 SEK**

#### **Product B**

Overhead costs CN = 0.847% \* 87.2 SEK = **0. 739 SEK**

Overhead costs EU = 0.820% \* 87.2 SEK = **0. 715 SEK**

The mark-up for the purchasing department for nearshore production is 0.82 percent and the mark-up for purchasing department for offshore production is 0.85 percent meaning the same mark-up can be used for both parts and finished products.

#### **4.1.1.2. Internal Failure**

Internal failure can be considered in two ways; either the internal failure occurs at the supplier's site which is a cost covered within the product price given by the supplier, suggested by Ståhl (2011). The other way to consider internal failure regarding outsourcing, is when purchased parts in in-house production is insufficient. To estimate the cost of internal failure for outsourced parts used in in-house production, data is required to relate the purchased parts to cost of scrap and rework, capacity and transportation. Internal failure is not an additional cost to purchased finished products.

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#### 4.1.1.3. External Failure

External failure is described as cost of claims. There is an average direct cost that is estimated for each product claim within the company. In Table 4. 2 the costs related to a claim of Product A is estimated. Due to confidentiality with Thule Group's claims-ratio, the cost of claims will not be shown as a mark-up, worth mentioning is that the claim ratio is that low it will not have a remarkable impact.

**Table 4. 2 - Total direct costs of claims**

Cost Driver	Cost [SEK]
Product cost	370
Overhead cost	25
Logistic cost	75
<b>TOTAL</b>	<b>470</b>

#### **Calculations describing mark-up for claims**

The mark-up is calculated through multiplying cost of a claim ( $C_c$ ) with the total number of claims for in-house produced products ( $n_{c,in-house}$ ) respectively outsourced finished products ( $n_{c,outsourced}$ ) and divide with the cost of all sold in-house produced products ( $C_{p,in-house}$ ) respectively the cost of all sold outsourced finished products ( $C_{p,outsourced}$ ).

$$\text{Mark - up for cost of claims in - house produced products} = \frac{C_{c,in-house} * n_c}{C_p}$$

$$\text{Mark - up for cost of claims of outsourced finished products} = \frac{C_{c,outsourced} * n_c}{C_p}$$

Numbers are not shown due to confidentiality of the total number of claims.

### 4.1.2. Delivery Performance

#### 4.1.2.1. Cycle Stock

The cost of cycle stock is the dependent on the mean volume of products kept in cycle stock. The volume of products kept in cycle stock is determined partly on the MOQ and order frequency. In Table 4. 3 data for the calculations of cycle stock is presented.

**Table 4. 3 – Parameters used to determine cost of cycle stock**

Product	MOQ Chinese supplier [pcs] ( $V_{CN}$ )	MOQ EU supplier [pcs] ( $MOQ_{EU}$ )	Annual volume of products sold [pcs] (V)	Cost of capital [%] ( $i_{CC}$ )	Price of product [SEK] (P)
Product A	200	30	12,900	10	331
Product B	500	90	27,200	10	87.2

**Calculations describing cost of cycle stock**

To get the financial part of the cost, the product price is multiplied with the MOQ divided by two and the cost of capital. To receive the physical and risk cost the price per pallet is divided with the quantity per pallet and multiplied with the MOQ divided by two. The costs are divided by the annual volume of products sold to split the cost on each product.

$$\text{Cost of cycle stock per unit} = \frac{P * \frac{MOQ_{CN,EU}}{2} * i_{CC} + \frac{P_{pallet}}{n_{per\ pallet}} * \frac{MOQ_{CN,EU}}{2}}{V}$$

**Product A**

$$\text{Cost of cycle stock per unit CN} = \frac{331 \text{ SEK} * \frac{200 \text{ pcs}}{2} * 10\% + \frac{73.5 \text{ SEK/pallet}}{30 \text{ pcs/pallet}} * \frac{200 \text{ pcs}}{2}}{12,900}$$

**= 0.276 SEK**

$$\text{Cost of cycle stock per unit EU} = \frac{331 \text{ SEK} * \frac{30 \text{ pcs}}{2} * 10\% + \frac{73.5 \text{ SEK/pallet}}{30 \text{ pcs/pallet}} * \frac{30 \text{ pcs}}{2}}{12,900}$$

**= 0.0413 SEK**

**Product B**

$$\text{Cost of cycle stock per unit CN} = \frac{87.2 \text{ SEK} * \frac{500 \text{ pcs}}{2} * 10\% + \frac{43.8 \text{ SEK/pallet}}{90 \text{ pcs/pallet}} * \frac{500 \text{ pcs}}{2}}{27,200}$$

**= 0.0846 SEK**

$$\text{Cost of cycle stock per unit EU} = \frac{87.2 \text{ SEK} * \frac{90 \text{ pcs}}{2} * 10\% + \frac{43.8 \text{ SEK/pallet}}{90 \text{ pcs/pallet}} * \frac{90 \text{ pcs}}{2}}{27,200}$$

**= 0.0152 SEK**

The cost of cycle stock increases proportional to the MOQ, e.g. if the product would be ordered with half the frequency and the double volume, the cost for the cycle stock per unit would double.

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#### 4.1.2.2. *Safety Stock*

The financial cost of safety stock is measured in terms of cost of tied-up capital. Neither the cost of risk or the cost for physical storage is taken into consideration in Thule Group today which Jonsson and Mattsson (2011) suggest it should.

The lead-time is the time from when the order is placed until the products are at the distribution centre. The lead-time does therefore include two parts; the variance in production time, which includes the time from when the order is placed until the products are finished, and the variance of the time of freight.

It is not the lead-time itself that is the problem but the variance in lead-time as Michael Wolfsteiner (telephone interview, February 15<sup>th</sup>, 2017) means. Variance in time can occur both in the production as well as during freight and safety stock therefore needs to take variance in supply in consideration to offset delays in supply of products. Products that do not meet the quality requirements can be treated as a kind of delay.

The safety stock for the supply side is a 10 percent addition to the lead-time and Thule Group makes no difference between suppliers. The ideal calculations of the safety stock should consider the supplier's production capacity and variations in transportation time, in other words, the lead-time.

The difference between the safety stock with the added 10 percent lead-time and without show the extended cost for keeping safety stocks for outsourced products. Thule Group's method of calculating safety stock on supply side may result in a negative deviation in delivery performance when the supplier exceeds the 10 percent addition in lead-time. The result of keeping too high safety stock when suppliers deliver below the 10 percent added lead-time may incur increased cost of safety stock. Deviation in delivery performance is considered under cost of lost sales. In

Table 4. 4, parameters to determine cost of capital are shown.

The cost of capital is due to confidentiality, set by the authors to 10 percent.

**Table 4. 4 - Parameters used to determine cost of safety stock**

Product	Average volume of safety stock Chinese supplier [pcs] ( $V_{CN}$ )	Average volume of safety stock EU supplier [pcs] ( $V_{EU}$ )	Annual volume of products sold [pcs] ( $V$ )	Cost of capital [%] ( $i_{cc}$ )	Price of product [SEK] ( $P$ )
Product A	325	214	12,900	10	331
Product B	538	364	27,200	10	87.2

**Calculations describing cost of safety stock**

To calculate the financial part of the cost, the product price is multiplied with the average volume of safety stock and the cost of capital. To receive the physical and risk cost the price per pallet is divided with the quantity per pallet and multiplied with the average volume of safety stock. The costs are divided by the annual volume of products sold to split the cost on each product.

$$\text{Cost of safety stock per unit} = \frac{P * V_{CN,EU} * i_{cc} + \frac{P_{pallet}}{n_{per\ pallet}} * V_{CN,EU}}{V}$$

**Product A**

$$\text{Cost of safety stock per unit CN} = \frac{331 \text{ SEK} * 325 \text{ pcs} * 10\% + \frac{73.5 \text{ SEK/pallet}}{30 \text{ pcs/pallet}} * 325 \text{ pcs}}{12,900}$$

$$= \mathbf{0.896 \text{ SEK}}$$

$$\text{Cost of safety stock per unit EU} = \frac{331 \text{ SEK} * 214 \text{ pcs} * 10\% + \frac{73.5 \text{ SEK/pallet}}{30 \text{ pcs/pallet}} * 214 \text{ pcs}}{12,900}$$

$$= \mathbf{0.588 \text{ SEK}}$$

**Product B**

$$\text{Cost of safety stock per unit CN} = \frac{87.2 \text{ SEK} * 538 \text{ pcs} * 10\% + \frac{43.8 \text{ SEK/pallet}}{90 \text{ pcs/pallet}} * 538 \text{ pcs}}{27,200}$$

$$= \mathbf{0.182 \text{ SEK}}$$

$$\text{Cost of safety stock per unit EU} = \frac{87.2 \text{ SEK} * 364 \text{ pcs} * 10\% + \frac{43.8 \text{ SEK/pallet}}{90 \text{ pcs/pallet}} * 364 \text{ pcs}}{27,200}$$

$$= \mathbf{0.123 \text{ SEK}}$$

---

#### 4.1.2.3. *Lost Sales*

A problem detected within Thule Group, is that the actual delivery performance is not aligned with the desired delivery performance, which can lead to lost sales. The deviation may be a result of incorrect approximated delay of products from suppliers as discussed under safety stock.

In the theory chapter, cross elasticity demand describes as how likely a product is to be substituted by another. Thule Group has many different product categories; some products are more unique than others and therefore also less replaceable, meaning a customer is willing to wait for it in another extent than less unique products. Cross elasticity demand measures the change in price, but in this analyse the authors compare it with a change in availability instead, which can be compared to a price change because the product is more difficult to get. Thule Group also sell some products in modules meaning if one product cannot be sold due to missing stock, a number of other products will not be sold, something that theory refers to as complementary products.

A missing product will result in negative goodwill, possible loss of sales of other products and also loss of sales for the actual product. It is according to theory difficult to measure negative goodwill and will therefore not be quantified in the thesis.

When calculating the cost of lost sales, assumption that there are perfect substitutes for the products to be sold is made and that Thule Group therefore misses the sale when the product is missing in the store.

To track the lost sales of complementary products, a lot of data is required about how the products are related to the specific product sales and it is therefore chosen to look beyond this fact. An assumption that will affect the result in lower cost of lost sales. The data used in the following calculations are collected from Table 3. 11 and Table 3. 12.

---

### **Calculations describing cost of lost sales**

The target for outsourced products is to have the same delivery performance as for in-house produced products. To calculate the amount of lost sales per product in relation to the target - in-house production ( $t$ ); the actual delivery performance is set in relation to the ideal delivery performance.

$$t = \frac{\text{Delivery performance for outsourced products}}{\text{Delivery performance for in-house products}}$$
$$t = \frac{89.8\%}{91.1\%} = 98.6\%$$

The amount of lost sales in relation to the target ( $r$ ).

$$r = 1 - t$$
$$r = 1 - 98.6\% = 1.48\%$$

The contribution rate ( $cr$ ), in general for all Thule products, is set by the fraction between operation profit and net sales.

$$cr = \frac{\text{Operation profit}}{\text{Net sales}}$$
$$cr = \frac{825 \text{ MSEK}}{5,320 \text{ MSEK}} = 15.5\%$$

To calculate the cost of lost sales per product, the amount of lost sales in percentage ( $r$ ), is multiplied with the contribution rate ( $cr$ ) and the product price ( $P$ ).

$$\text{Cost of lost sales per unit} = r * cr * P$$

---

#### **Product A**

$$cm = 15.5\% * 331 \text{ SEK} = 51.4 \text{ SEK}$$

$$\text{Cost of lost sales per unit CN} = 1.48\% * 51.4 \text{ SEK} = \mathbf{0.760 \text{ SEK}}$$

For all the Product A, the total cost of lost sales reaches 9,840 SEK, this is just one of the colours available for the Product A.

#### **Product B**

$$cm = 15.5\% * 87.2 \text{ SEK} = 13.5 \text{ SEK}$$

$$\text{Cost of lost sales per unit CN} = 1.48\% * 13.5 \text{ SEK} = \mathbf{0.200 \text{ SEK}}$$

For all the Product B, the total cost of lost sales reaches 5,450 SEK.

---

### **4.1.3. Intangible Risks**

Important from the theory is the advantages to be gained from outsourcing that can be value creating for a company. Simchi-Levi, Kaminsky and Simchi-Levi (2003) highlight the fact that suppliers can produce to lower prices due to the aggregated demand from many customers when the suppliers at the same time are spreading the risk between many customers, and Thule Group can focus on its core strength and increases the production flexibility and thereby reduces the risk of changes in need for capacity.

Aron, Clemons, and Reddi (2005) describe the risks with outsourcing where strategic risk, operational risk, risk of atrophy and risk of location is the four main groups. When choosing a supplier, aspects such as high quality products and accurate and timely delivery are more important than the price of the product itself which decreases with distance to the supplier regarding the operational risk.

Both BCG (2011) and PricewaterhouseCoopers (2013) are pointing at converging wages with other shrinking cost advantages and suggests that companies should consider to take the production home just as Stentoft et. al (2016) report that many companies do today.

## **4.2. Cost Management**

### **4.2.1. Price of Product**

The price of the product will be treated as an input parameter, for the calculations, as seen in Table 3. 13.

### **4.2.2. Logistics**

Even if the customer of the final destination pays for freight and duty of the products, it is good to know what impact the freight and duty have on the price of the products. A lower price with the same contribution margin may lead to increased sales because of a lower price on the market.

The four greatest markets are linear transformed from actual market share to approximated market share, to represent the entire market in the analysis, which are the following; EU, U.S., Japan and Australia. The reason why not all markets are represented is due to the little impact in relation to the amount of work to search for all duty rates and freight prices for the remaining smaller markets.



---

**Table 4. 5 – Market shares Product A**

Market Product A	Actual market share [%]	Approximated market share [%]
EU	87.2	91.7
Japan	5.57	5.85
U.S.	0.982	1.03
Australia	1.34	1.41
Total	95.1	100

**Table 4. 6 – Market shares Product B**

Market Product B	Actual market share [%]	Approximated market share [%]
EU	88.4	91.3
Japan	4.69	4.84
U.S.	2.56	2.69
Australia	1.13	1.17
Total	96.8	100

#### *4.2.2.1. Freight*

Freight prices are significantly fluctuating and therefore the authors suggest that the price for freight is negotiated and collected before every decision. More costs such as fuel surcharge, terminal handling charge, and delivery are included in the door-to-door price and are treated within the freight price. The price per product is achieved by dividing the price per container with pcs per container and is presented in Table 4. 7 and Table 4. 8.

**Table 4. 7 – Cost of freight from China per pcs**

From China, to	Freight per pcs Product A [SEK]	Freight per pcs Product B [SEK]
EU	17.7	4.17
Japan	4.58	1.08
U.S.	36.4	8.58
Australia	13.0	3.06

**Table 4. 8 – Cost of freight from EU per pcs**

From EU, to	Freight per pcs Product A [SEK]	Freight per pcs Product B [SEK]
EU	0	0
Japan	34.0	8.04
U.S.	25.2	5.96
Australia	38.2	9.02

**Calculations of cost of freight**

To get the weighted freight, the freight to market  $n$  ( $F_n$ ) is weighted for the market  $n$  ( $W_n$ ).

$$\text{Cost of freight} = \sum_1^n (F_n * w_n)$$

**Product A**

Cost of freight per unit CN = 17.7 SEK \* 91.7% + 4.58 SEK \* 5.58% + 36.40 SEK \* 1.03% + 13.0 SEK \* 1.41% = **17.1 SEK**

Cost of freight per unit EU = 0 SEK \* 91.7% + 34.0 SEK \* 5.85% + 25.2 SEK \* 1.03% + 38.2 SEK \* 1.41% = **2.79 SEK**

**Product B**

Cost of freight per unit CN = 4.17 SEK \* 91.3% + 1.08 SEK \* 4.84% + 8.58 SEK \* 2.69% + 3.06 SEK \* 1.16% = **4.13 SEK**

Cost of freight per unit EU = 0 SEK \* 91.3% + 8.04 SEK \* 4.84% + 5.96 SEK \* 2.69% + 9.02 SEK \* 1.17% = **0.655 SEK**

---

#### 4.2.2.2. Customs Duty

Finished products will hold a duty rate depending on the origin of country and the final destination of the products, the duty rates are presented in Table 4. 9 and Table 4. 10. When calculating the cost of duty, the authors make the assumption that the finished products go straight to the final markets. Even if duty is paid by the customer, the cost will have impact on Thule Group's contribution margin or competitiveness.

**Table 4. 9 – Duty rates from China**

From China, to	Duty rate Product A [%]	Duty rate Product B [%]
EU	4.7	6.5
Japan	0	5.8
U.S.	10	5.3
Australia	0	5

**Table 4. 10 – Duty rates from EU**

From EU, to	Duty rate Product A [%]	Duty rate Product B [%]
EU	0	0
Japan	0	3.9
U.S.	10	5.3
Australia	0	5

---

### **Calculations of cost of duty**

To get the summarized weighted cost of duty, the duty rate for the market  $n$  ( $d_n$ ) is weighted by its market share ( $W_n$ ). The weighted cost of duty is multiplied with the freight for market  $n$  ( $F_n$ ) and price of the product.

$$\text{Cost of duty per unit} = \sum_1^n (d_n * w_n * (F_n + P))$$

---

#### **Product A**

Cost of duty per unit CN =  $(4.7\% * 91.7\% * (17.7 \text{ SEK} + 331 \text{ SEK}) + 0\% * 5.85\% * (4.58 \text{ SEK} + 331 \text{ SEK}) + 10\% * 1.03\% * (36.4 \text{ SEK} + 331 \text{ SEK}) + 0\% * 1.41\% * (13.0 \text{ SEK} + 331 \text{ SEK})) = \mathbf{15.4 \text{ SEK}}$

Cost of duty per unit EU =  $(0\% * 91.7\% * (0 \text{ SEK} + 331 \text{ SEK}) + 0\% * 5.85\% * (34.0 \text{ SEK} + 331 \text{ SEK}) + 10\% * 1.03\% * (25.2 \text{ SEK} + 331 \text{ SEK}) + 0\% * 1.41\% * (38.2 \text{ SEK} + 331 \text{ SEK})) = \mathbf{0.367 \text{ SEK}}$

#### **Product B**

Cost of duty per unit CN =  $(6.5\% * 91.3\% * (4.17 \text{ SEK} + 87.2 \text{ SEK}) + 5.8\% * 4.84\% * (1.08 \text{ SEK} + 87.2 \text{ SEK}) + 5.3\% * 2.69\% * (8.58 \text{ SEK} + 87.2 \text{ SEK}) + 5\% * 1.17\% * (3.06 \text{ SEK} + 87.2 \text{ SEK})) = \mathbf{5.86 \text{ SEK}}$

Cost of duty per unit EU =  $(0\% * 91.3\% * (0 \text{ SEK} + 87.2 \text{ SEK}) + 3.9\% * 4.84\% * (8.04 \text{ SEK} + 87.2 \text{ SEK}) + 5.3\% * 2.69\% * (5.96 \text{ SEK} + 87.2 \text{ SEK}) + 5\% * 1.17\% * (9.02 \text{ SEK} + 87.2 \text{ SEK})) = \mathbf{0.369 \text{ SEK}}$

### **4.2.2.3. Tied-up Capital**

Cost of tied-up capital related to lead-times is not taken into consideration today within Thule Group (Michael Wolfsteiner, telephone interview, February 15<sup>th</sup>, 2017). The average delay in transportation is only a small fraction of the total lead-time according to Mattias Dahl (telephone interview, March 20<sup>th</sup>, 2017) the average delay is not relevant to take into consideration when measuring the tied-up capital during transportation.

The transportation of products is tying up capital during longer sessions. The cost of capital rate set by the company is used to calculate this. The cost of capital is assumed to be 10 percent.

The payment terms are most often between 30 to 60 days with an estimated average of 45 days for both Chinese and EU suppliers.

The transportation time from China to the harbour in EU is approximately 5 weeks. An assumption is that the transportation time from the harbour to the distribution centre is corresponding to the time from a production site in EU to the distribution centre and approximated to a week.

---

### ***Calculations of cost of tied-up capital***

*To get the cost of tied-up capital, the cost of capital ( $i_{cc}$ ) is multiplied with the transportation time ( $d$ ) and the price of the product ( $P$ ) payed to the supplier.*

$$\text{Cost of bound capital} = i_{cc} * \frac{d}{360} * P$$

---

#### ***Product A***

$$\text{Cost of bound capital per unit CN} = 10 \% * \frac{42}{360} * 331 \text{ SEK} = \mathbf{3.86 \text{ SEK}}$$

$$\text{Cost of bound capital per unit EU} = 10 \% * \frac{7}{360} * 331 \text{ SEK} = \mathbf{0.644 \text{ SEK}}$$

#### ***Product B***

$$\text{Cost of bound capital per unit CN} = 10 \% * \frac{42}{360} * 87.2 = \mathbf{1.02 \text{ SEK}}$$

$$\text{Cost of bound capital per unit EU} = 10 \% * \frac{7}{360} * 87.2 = \mathbf{0.170 \text{ SEK}}$$

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## 5. Separate Case; Duty-Free Warehousing

When investigating cost of duty for Product A and Product B, the authors find that some of the products are being paid duty for twice, when first imported to EU and later exported again - further called double duty products (DDP). An advantage with a duty-free warehouse is that the duty is not to be paid until the product are sold which opens up for savings in tied-up capital paid for duty. This investigation is made to see how big savings Thule Group can make using a duty-free warehouse.

### 5.1. Double Duty Products

To calculate the total cost of duty paid when importing the DDP to EU and compare it with the cost for having a duty-free warehouse, one can see the total savings. The duty paid into EU is seen as an unnecessary cost, because the cost would not occur if the products to be exported is stored in a duty-free warehouse. Thule Group can use the surplus to increase their contribution margin or decrease the product price.

A list of all (n) DDPs with quantity, price and HS-code is provided by Thule Group and with the information in Table 5. 1 the total duty paid into EU for DDPs is calculated. The duty rate is collected from Tullverket (2017c). Due to confidentiality, the data is not provided in the public thesis.

*Table 5. 1 – Double duty products*

DDP	Quantity [pcs]	Price [SEK]	HS-code	Duty rate [%]
Pr <sub>1</sub>	Q <sub>1</sub>	P <sub>1</sub>	Hs <sub>1</sub>	Dr <sub>1</sub>
Pr <sub>2</sub>	Q <sub>2</sub>	P <sub>2</sub>	Hs <sub>2</sub>	Dr <sub>2</sub>
.	.	.	.	.
Pr <sub>n</sub>	Q <sub>n</sub>	P <sub>n</sub>	Hs <sub>n</sub>	Dr <sub>n</sub>

*Total savings of not having DDPs*

$$DDP \text{ savings} = \sum_1^n Q_n * P_n * Dr_n = \text{--- SEK}$$

## 5.2. Tied-up Capital in Duty

The difference between a duty-free warehouse is that the duty is paid when the product is distributed from the warehouse and in a traditional warehouse the duty is paid as the product is imported. This means that Thule Group saves the cost of tied-up capital for duties before they get sold if using a duty-free warehouse. The data needed to calculate the cost of capital due to tied-up capital in paid duty is shown in Table 5. 2.

*Table 5. 2 – Tied-up capital in duty*

Imported products	Quantity	Price [SEK]	HS-code	Duty rate [%]	Mean time in storage [days]	Cost of capital [%]
Pr <sub>1</sub>	Q <sub>1</sub>	P <sub>1</sub>	Hs <sub>1</sub>	Dr <sub>1</sub>	t	i <sub>cc</sub>
Pr <sub>2</sub>	Q <sub>2</sub>	P <sub>2</sub>	Hs <sub>2</sub>	Dr <sub>2</sub>		
.	.	.	.	.		
Pr <sub>n</sub>	Q <sub>n</sub>	P <sub>n</sub>	Hs <sub>n</sub>	Dr <sub>n</sub>		

*Total savings in cost of tied-up capital for paid duty*

$$\text{Cost of bound capital} = \sum_1^n (Q_n * P_n * Dr_n) * \frac{t}{360} * i_{cc} = \text{--- SEK}$$



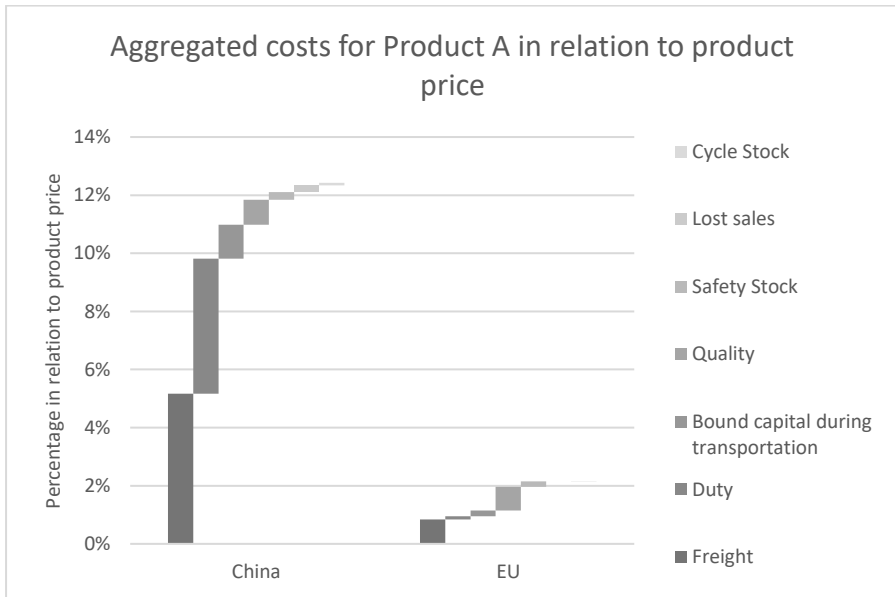
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## 6. Result

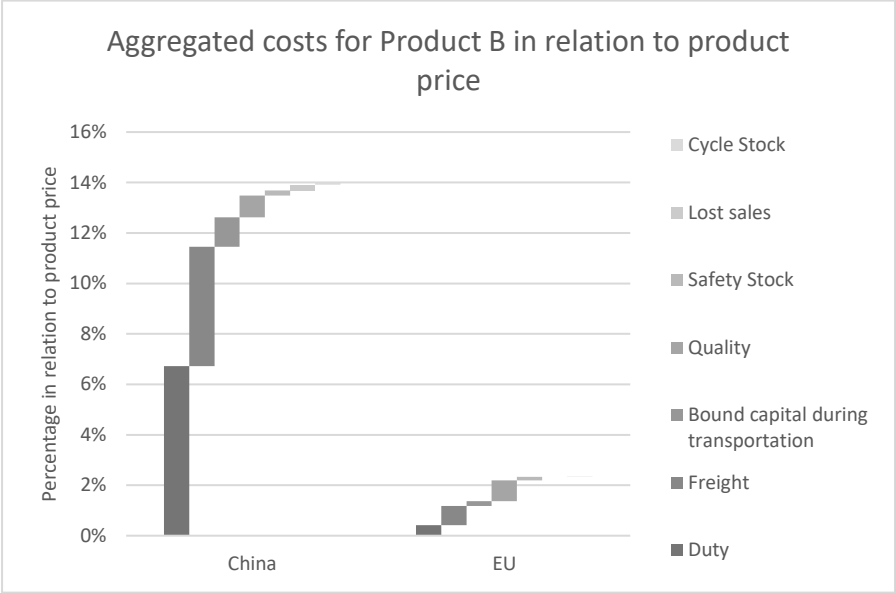
*The result of the cost drivers found in the work is represented as mark-ups on Product A and Product B prices for respectively the two production locations; China and EU. By looking at the mark-ups for both the production locations; it is easier to make decisions of production location.*

The aggregated cost pictures in Diagram 6. 1 and Diagram 6. 2 show that the supreme cost carriers for the production location China are freight, duty and cost of tied-up capital during transportation, which entail the major part of the total cost when not as remarkable for the production location in EU.

The cost difference between the offshore and the nearshore production location represented by China respectively EU gives an estimation of how much more expensive it can be to produce offshore compared to nearshore which should be taken into account when looking at the price of the products.



**Diagram 6. 1 – Aggregated costs for Product A**



***Diagram 6. 2 – Aggregated costs for Product B***

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## 7. Discussion

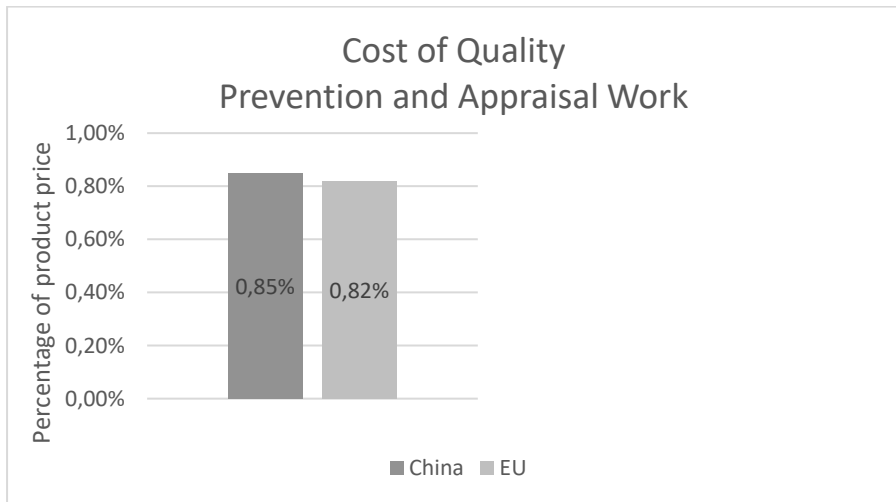
### 7.1. Risk Management

#### 7.1.1. Quality

Quality costs are evaluated to cover prevention, appraisal, external failure and internal failure.

Some prevention work is covered by a mark-up made for the purchasing departments under appraisal work. The prevention work not made by the purchasing department is covered in the product price given by the supplier and for in-house production it is covered in the cost of producing a product, if calculating manufacturing cost considering production deficiencies according to Andersson and Ståhl (2014).

The cost for the purchasing departments which is working with both prevention and appraisal work is represented by a mark-up and leads to the costs shown in Diagram 6. 3.



*Diagram 6. 3 – Cost of Quality*

Internal failure can be considered in two ways; either the internal failure occurs at the supplier's site. This is a cost covered within the product price given by the supplier. The other way to consider internal failure regarding outsourcing, is when purchased parts in in-house production is insufficient.

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To estimate the cost of internal failure for outsourced parts used in-house, data is required to relate the purchased parts to cost of scrap and rework, capacity and transportation. Internal failure will be covered in the production cost if calculating manufacturing cost considering production deficiencies. Internal failure is therefore included in the product prices.

External failure is described as cost of claim. There is an average direct cost that is estimated for each product claim within the company. One claim has a direct cost of approximate 470 SEK for an average product but the mark-ups for in-house produced products respectively outsourced finished products is calculated through amount of claims which due to confidentiality cannot be shown.

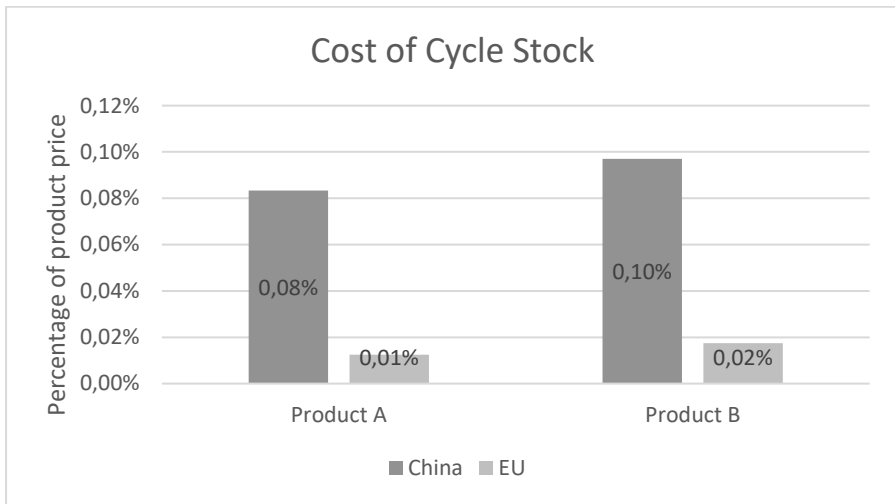
### **7.1.2. Delivery Performance**

Physical cost of storage and the cost of risk are only a fraction of the financial cost when keeping stock, meaning it is not necessary to calculate on more than the financial cost in decision making processes. The cost of increasing stock with the physical cost and risk included, should be set in relation to the cost of lost sales and a new delivery performance should be determined for every unique product.

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### 7.1.2.1. Cycle Stock

The cost of cycle stock is dependent on the MOQ and the order frequency. Due to low margins and culture, Chinese suppliers has a higher MOQ than EU suppliers, which will lead to a higher cost of cycle stock for products made in China. Companies desire a low MOQ, not only to get a low cost of cycle stock but also to be more flexible in variations in demand. In Diagram 6. 4, the mark-up covering physical, financial and risk costs are illustrated.

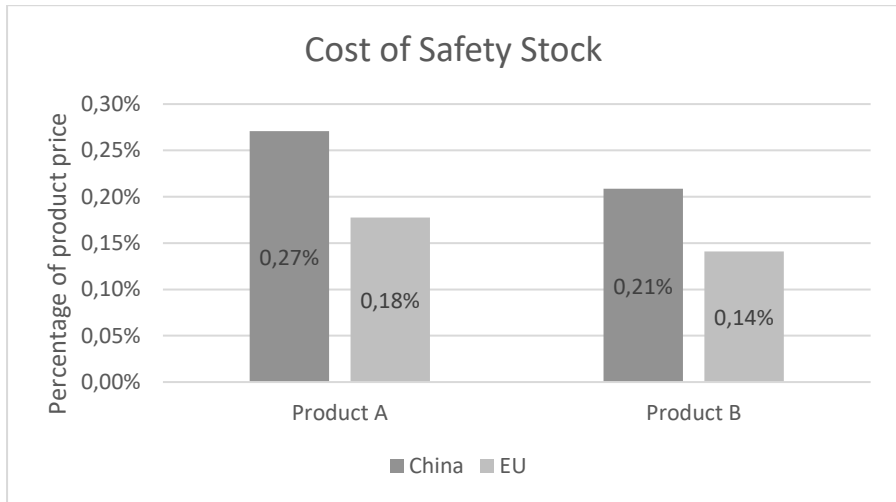


*Diagram 6. 4 – Cost of Cycle Stock*

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### 7.1.2.2. Safety Stock

Today is the variations in supply, offset by Thule Group through adding 10 percent to the lead time in their calculations of safety stock. By following up different suppliers' delivery variations, the resources can be targeted to the right places. Thule Group would save money with suppliers having a lower average lead-time delay than 10 percent by keeping a lower safety stock and not having loss of sales for suppliers that have an average lead-time delay of more than 10 percent. The cost of safety stock is shown as mark-ups in Diagram 6. 5.

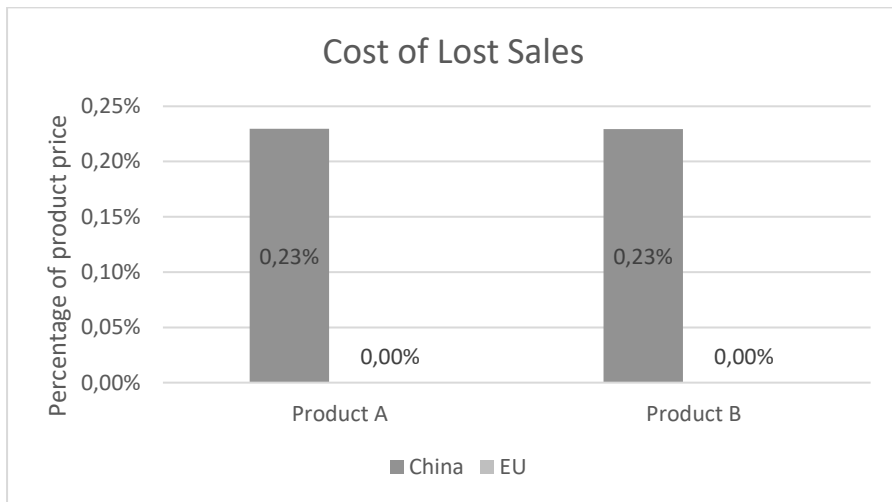


**Diagram 6. 5 – Cost of Safety Stock**

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### 7.1.2.3. Lost Sales

Cost of lost sales lead to both negative goodwill and loss of contribution margin for both the product and sometimes complementary products. When missing stock, the product cannot be sold and dependent on how unique the product is, customers will wait or will not wait for the product. Because of the complexity of calculating cost of negative goodwill or loss of complementary products only the loss of contribution margin is representing cost of lost sales. What the thesis consider as lost sales is when Thule Group is having negative deviations in delivery performance. The ideal delivery performance is set to the delivery performance for in-house produced products why the mark-up for these products, as shown in Diagram 6. 6, is zero.



**Diagram 6. 6 – Cost of Lost Sales**

### 7.1.3. Intangible Risks

According to Stentoft et. al, more and more companies backshore their production and among the reasons are, converging factory wages. The cost savings due to low labour cost have earlier counteracted the risks with having production far away. PricewaterhouseCoopers (2013) means that companies should take back their productions nearshore and BCG (2011) recommends to consider the total cost rather than the lowest factory wages.

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## **7.2. Cost Management**

### **7.2.1. Price of Product**

When being able to quantify all the additional costs associated with a supplier from China and compare them with a potential supplier in EU, it is easier to determine how much the products can cost in EU to break even in the supplier options and a more accurate decision can be made. When calculating the production price in-house it is important to consider all costs such as internal failure and prevention work to get the actual cost.

### **7.2.2. Logistics**

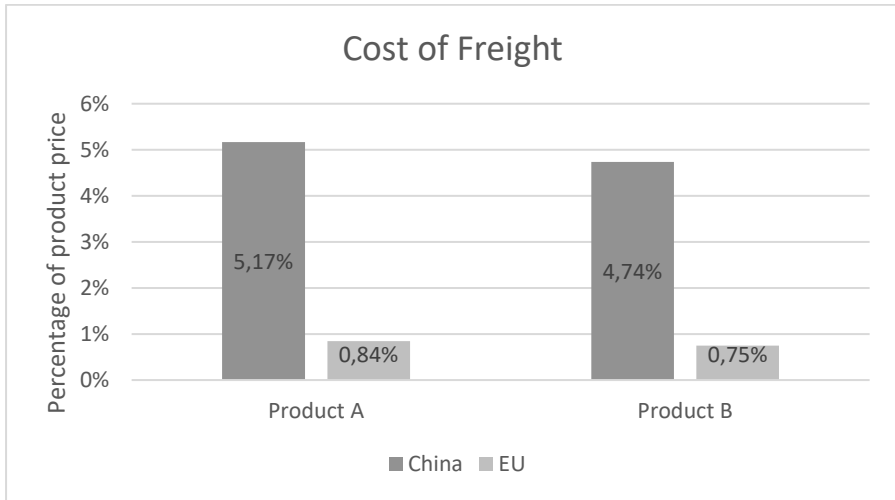
Because of the big market share of approximately 90 percent of that EU stands for today for the two products, the difference in cost of logistics between the two production locations; EU and China will be significant. Cost of freight, duty and tied-up capital when produced in EU is a fraction of the corresponding cost when produced in China. Something to consider when taking decisions is not only what the market looks like today, but it should look like in the more long-term perspective – what is the strategic plan.



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### 7.2.2.1. Freight

The freight per unit is weighted due to the distance and the mark-up is presented in Diagram 6. 7.

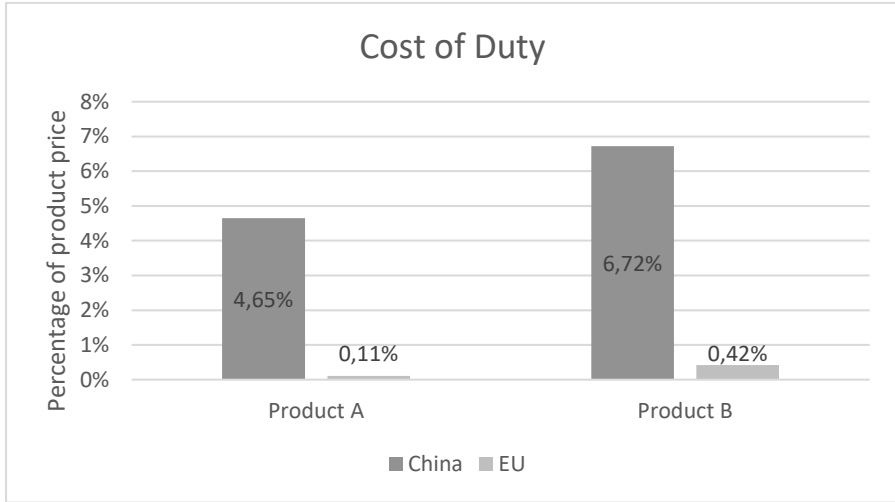


**Diagram 6. 7 – Cost of Freight**

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### 7.2.2.2. Duty

The duty per unit is weighted due to difference in duty rate for the final markets and the mark-up is presented in Diagram 6. 8.

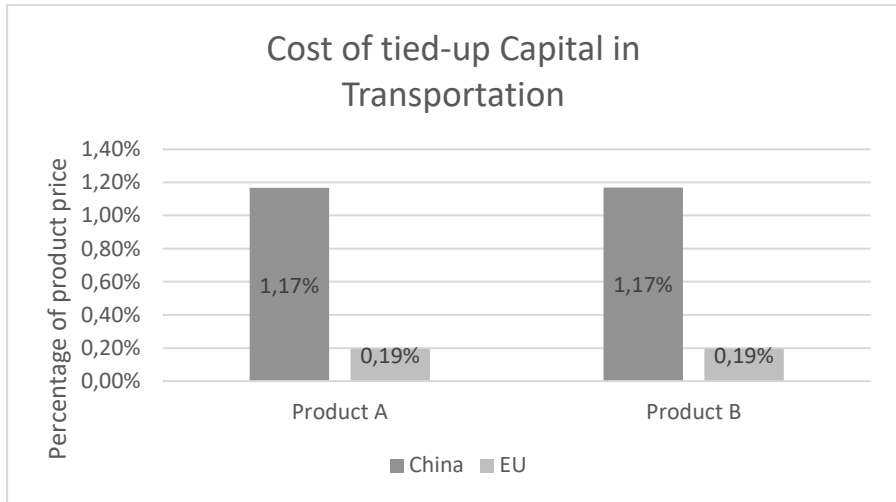


***Diagram 6. 8 – Cost of Duty***

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### 7.2.2.3. Tied-up Capital

The mark-up for tied-up capital based on time for shipping is presented in Diagram 6. 9.



**Diagram 6. 9 – Cost of Tied-up Capital**

## 7.3. Separate Case; Duty-Free Warehousing

Through the data given by Thule Group regarding DDPs calculations show how much money that can be saved by using a duty-free warehouse. With this concept, products can avoid being charged for duty twice and Thule Group will also save money in decreased tied-up capital for duty paid before the products are sold.

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## **8. Conclusion**

When Thule Group are to investigate in the real cost of purchasing, the cost of logistics should be in focus because results in the thesis show that the other cost drivers have less impact. In the decision should intangible risks affecting the product price be taken into consideration and the company are recommended by the authors to look into a long-term perspective.

To be aware of is that some calculations are based on the product price given today in China, meaning a higher product price in EU will result in higher mark-ups. The findings are applied on two products and the results should be observed thereafter.

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