

Design-To-Cost from the perspective of project logistics

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Liiketalouden koulutusohjelma

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<p>Tämän opinnäytetyön tarkoituksena on kehittää projektilogistiikkaa Design-To-Cost –mallin avulla.</p> <p>Tutkimus tehtiin syksyn 2013 ja kevään 2014 aikana HAAGA-HELIAN ja kohdeyrityksen yhteistyön pohjalta. Se koostuu erilaisista kirjallisista lähteistä, jotka rakentavat tutkimukselle teoreettisen viitekehyksen, ja projektianalyysistä kohdeyrityksessä, joka luo opinnäytetyölle käytännönläheisen tarkastelutavan.</p> <p>Päämääränä on löytää projektilogistiikan kulutekijöitä ja ratkaisuja logististen prosessien suunnitteluun, sekä tutkia kohdeyrityksen meneillään olevaa projektia ja logistiikan asiantuntijan roolia projektinhallinnan kannalta.</p> <p>Etsittäessä näitä tekijöitä teoreettiselta pohjalta tutkimuksen on mahdollista soveltaa tietämystään kohdeyrityksen projektissa ja löytää täten kehitysratkaisuja projektilogistikassa.</p> <p>Tutkimuksen lopussa opinnäytetyö esittelee oman ainutlaatuisen Design-To-Cost –mallinsa kohdeyritykselle räätälöitynä projektilogistiikan näkökulmasta, joka muodostuu neljästä eri tasosta (yhteistyö, tavaran valvonta, koulutukset ja tapaamiset, tutkimus ja kehitys).</p> <p>Näiden kehitysehdotusten pohjalta yritykset voivat harkita lisätutkimuksen tekemistä logististen kustannusten tarkemmassa budjetoinnissa.</p> <p>Tämän lisäksi opinnäytetyöstä saatavaa tietoa voidaan käyttää muillakin aloilla. Ottamalla käyttöön sovelletun DTC-mallin, kohdeyritys ja muut vastaavanlaiset toimijat voivat vahvistaa asemiaan kilpailukykyisinä projektilogistisina yrityksinä.</p>	
<p>Asiasanat Logistiikka, Projektinhallinta, Suunnittelu, Kustannustehokkuus</p>	

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<p>This thesis focuses on improving project logistics with the design-to-cost – model.</p> <p>The study was carried out during autumn 2013 and spring 2014 in collaboration between HAAGA-HELIA and a target company. It contains a variety of literary sources, which are considered as the thesis' theoretical frame, and a survey of a project in the target company, which provides a practical approach to the thesis' topic.</p> <p>The objectives were to find factors that affect project logistics costs, find solutions for designing logistics processes and examine the target company's ongoing project and logistics specialist's role.</p> <p>By researching these factors first from the theoretical frame, the study was able to apply the knowledge to the target company's ongoing project and find improvement solutions for project logistics.</p> <p>In the end the thesis introduces a unique Design-To-Cost – model from a project logistics perspective applied for the target company, which can be combined into a four-stage model (co-operation, product supervision, training and meetings, research and development).</p> <p>On the basis of these improvement solutions, companies can consider further research on how to calculate logistics budget more specifically.</p> <p>Furthermore, the information of this thesis can be used in other business areas as well. By taking the applied DTC-model into use, the target company as well as other related companies can strengthen their position as a competitive project logistics company.</p>	
<p>Key words Logistics, Project Management, Design, Cost-effectiveness</p>	

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1 Introduction

Most of the companies face severe competition in the market and price being one of the major decision criteria on purchase decision. Therefore price competitiveness is very important. This enables market share and business growth. The company's growth is added to value for investors and also shareholders want return for their investments. As a result one understands that company needs to get more and more profit each year.

Richard Atkin (Fihta 2013) argues in Medtech-event that one needs to get whole company committed to the growth and one needs to justify why growth is necessary. It is important to explain why the future is better than the present when the company is making large process related decisions. Stacking up against the competition has to be thought. Companies tend to think that they're doing something special but so do competitors. Logistic solutions can be one of the key factors when business wants to stand out from competitor businesses.

Companies provide strategic objectives which often include strategic decisions. They determine the direction of the company's operations. Objectives aim to be realistic and accurate and those can be used to assess company's change of success. In order to achieve the objectives the company can give schedules. Objectives are often given at the organization level and after that they will be divided into smaller groups. Logistics objectives can for example ensure and improve cost-effective material flow and information flow execution (Logistiikan maailma 2013a).

Competitive advantage can be taken when the company wants to stand out by improving their logistics solutions. Product itself might not get any cheaper, but designing-to-cost – model can get their product to the top position.

1.1 Background of the topic

This thesis was made in collaboration between school and target company. Author of the thesis is working as a logistics specialist in the target company. The subject was

determined by business need and it shows how it has been applied with ongoing project in Russia. Thesis is in English, as the target company's primary language is English and it is used in international business. The most common abbreviation which shows up in the text is TC (=target company) and it is used because of the privacy policy.

Research has been done by view of project logistics from design to cost. The aim is to find out ways to minimize costs in short- and long term objective. This study deals with questions such as, what factors affect to designing the project logistics cost, what it requires, how and when it can be measured.

Companies can save significant amounts of money if they design their logistics processes well and design their products into the optimal size. This study presents an example case of one shipment. It shows how much one container price changes in different type of container and it shows how oversized goods affect to the shipment price. Assessment gives an opportunity to calculate whether the product makes sense to redesign. This study shows where the project logistics costs come from and it can be used to plan the logistics budgets and as a project logistics' model of design-to-cost.

1.2 Three objectives

This thesis has been done during autumn 2013 and spring 2014 in HAAGA-HELIA thesis course. It contains a variety of literary sources, which are considered as a thesis' theoretical frame, and it includes a survey referring to the TC-project (= target company's project), which can be seen as a thesis' practical function. Literary sources of this thesis are scientific articles, taken from logistics and project sources. Survey of TC-project was made in co-operation of target company's project engineers.

These two slightly different perspectives, theoretical and practical, aim to three objectives. First one is to examine target company's ongoing project, second objective identifies what affects to the project logistics costs and finds solutions for designing logistics processes. Last but not least, the third objective is to examine logistics specialist role in the project logistics.

1.3 The scope of the study

The main scope of this study is to find possible improvement solutions in project logistics by examining and identifying its costs and processes and logistics specialist's role.

Figure 1. Framework and goals of thesis shows that using above-mentioned three objectives and focusing on to the thesis' main scope, this study aims to answer to these three questions:

- 1) What factors affect to project logistics costs?
- 2) What factors affect to design logistics process?
- 2) What is the logistics specialist's role in project logistics?

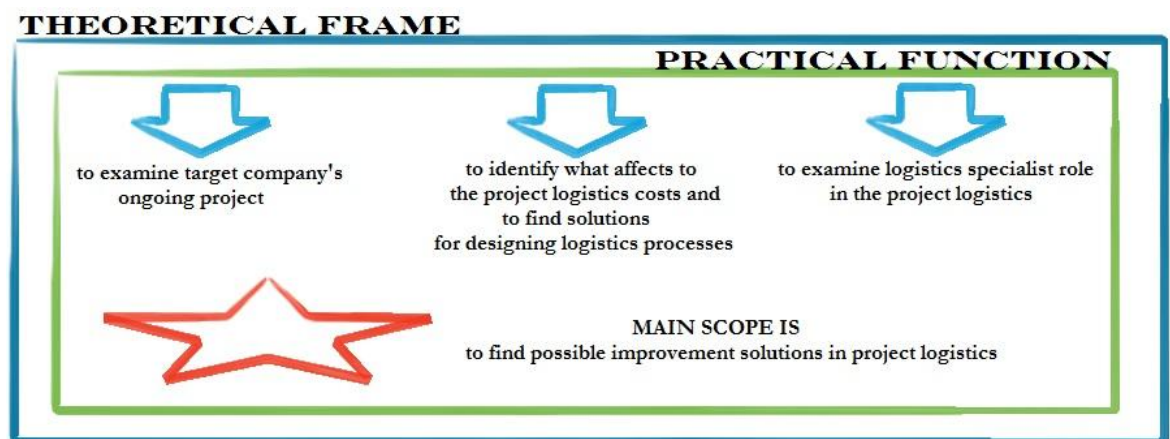


Figure 1. Framework and goals of thesis

These three questions bundle a unique design-to-cost – model from a project logistics perspective, which can also be used as an Avant-guard in the other sectors as well.

2 Profile of the Target Company

This chapter is concealed.

2.1 Target Company in numbers

This chapter is concealed.

2.2 Industry analysis

This chapter is concealed.

2.2.1 Technology industry

This chapter is concealed.

2.2.2 Minerals and metal industry

This chapter is concealed.

3 Key concepts

The key concepts of this thesis are defined below as those endorse the common thread of this thesis. Concepts are related to each other and being used throughout on this study. At the end of this chapter all of these key concepts are combined together and analyzed.

3.1 Definition of logistics

Logistics was described in 1950s America as physical distribution and marketing logistics. It was often sorted to category “Materials Management”. After the fifties this term has been expanded to consider logistics processes as well. After re-definition of logistics came along terms such as designing information-, material and cash flow combination (Figure 4). Cash flow proceeds from consumer to supplier where consumer buys a product from producer which turn to buy that from suppliers. Material flow, in turn, goes in another direction when supplier produce parts of products which producer designs it according to customers need. Some flowcharts show that information flow is going only from supplier to consumer while some present that information flow between both directions reduces duplication work. (Sakki, J. 1999, 23-25.)

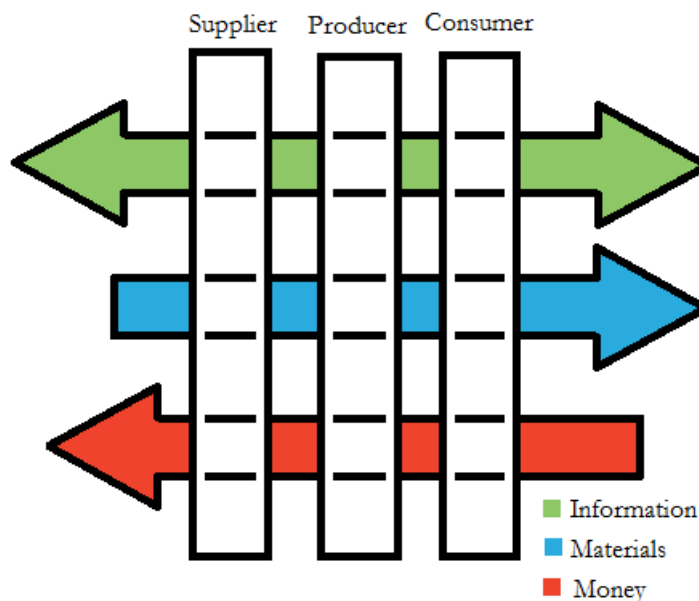


Figure 4. Logistics flows (Sakki, J. 1999, 25.)

Logistics processes are therefore designed for the whole product life cycle. Product developing, manufacturing and delivering are logistics processes. Processes allow cost-effective deliver value for customer. Sometimes customer needs continuing services and this can be also a part in the logistics processes such as spare parts deliveries. (Christopher, M. 2010, 1)

3.2 Competitive product by logistical view

Price of the product, delivery, installation, commissioning and operating costs form the total cost of the goods. The company can influence to these factors by planning and designing processes. The customer is interested in how much the product costs and how it benefits to the customer's company. Quality is directly linked to the price (Figure 5. Quality & Price). Companies tend to tailor its products according to customers' needs. Quality & Price can also be applied to logistical view that the customer pays for good performance and delivery terms. (Sakki, J. 1999, 161-163.)



Figure 5. Quality & Price

Company's management and owners usually set goals for business development. In addition, customer's point of view is especially important to take into consideration. It is often forgotten because the customer may not be interested in company's organiza-

tion or processes. The customer's point can be taken into account by the added value what they can gain (Sakki, J. 1999, 161-163).

Logistics costs can be very high but it's not necessarily a bad thing. If logistical solutions can give something that the other competitors are unable to provide, it must be beneficial for customers so that they're willing to pay for it. For example goods or services can be exported to the customer's place which they have chosen (Sakki, J. 1999, 161-163).

Logistical how-know can be used as a competitive factor. It is often described as "invisible" operations and it doesn't always affect directly to the purchasing decision. However, the logistics can differentiate from the competitors with external factors such as flexible, efficient and environmental how-know. This means that external factors are in balance and the customer's prior expectations can be fulfilled. Fulfilled expectations provide a satisfied customer who will continue their customer relationship. (Sakki, J. 1999, 161-163.)

3.3 Incoterms

International Chamber of Commerce (ICC) has made rules to clarify trade tasks, costs and risks of transportation. ICC defines that: "The Incoterms rules are accepted by governments, legal authorities and practitioners worldwide for the interpretation of most commonly used terms in international trade." (ICC 2010.)

At this moment companies are using the eight versions of Incoterms which were published in 2010. Incoterms have a long history as the first version was published in 1936 and after this versions have been developed according to the needs. (ICC 2010.)

Incoterms 2010 (Figure 6. Incoterms) define 11 rules which can be divided into two categories: conditions that apply to all transportation modes (EXW, FCA, CPT, CIP, DAT, DAP, DDP) and conditions that apply only to sea freight (FAS, FOB, CFR, CIF). Incoterms give opportunity to negotiate the delivery terms what are directly linked to the price. For example TC deliveries large-sized goods and delivering them

may cost up to millions. Terms of Incoterms have been abbreviated into three letters (Figure 6. Incoterms) and the first letter forms groups such as E- group (E stands up for departure), F-group (F stand up for main carriage unpaid), C-group (C stands up for main carriage paid) and D-group (D stands up for arrival). (Cargoways Logistics 2014 ; Finpro 2014 ; ICC 2010 ; STI Global Logistics Limited. 2013.)

Incoterm 2010	Export-Customs Declaration	Carriage to port of export	Unloading of truck in port of export	Loading charges in port of export	Carriage (Sea Freight/Air Freight) to port of import	Unloading charges in port of import	Loading on truck in port of import	Carriage to place of destination	Insurance	Import customs clearance	Import taxes
EXW	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
FCA	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
FAS	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
FOB	Seller	Seller	Seller	Seller	Buyer	Buyer	Buyer	Buyer		Buyer	Buyer
CFR	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer		Buyer	Buyer
CIF	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer	Seller	Buyer	Buyer
CPT	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
CIP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Buyer	Buyer
DAT	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
DAP/DDU	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Buyer	Buyer
DDP	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller		Seller	Seller

Figure 6. Incoterms (Cargoways Logistics 2014.)

3.4 TIR

TIR, Transport International Router, is an agreement between 68 countries such as all European countries, USA and Canada. It extends to the Middle East and North Africa countries. The purpose of TIR agreement is uninterrupted flow of goods between the countries. TIR transports allow bypassing “normal” customs procedures and because of this transportation flow becomes faster. (Suomen Tulli 2011, 13.)

In the news has been on a discussion of TIR-agreement between Finland and Russia. Freight shipments under the TIR ended on March 2014 at the border crossing point in Vaalimaa, Finland. (Yle uutiset 2014a.) Practically it means that the transporters have to give a guarantee to ensure that the cargo goes where it should and the customs duties are handled. It may significantly slow down border crossing and increase bureaucracy. (Kallionpää, Laitinen & Perttu 2014.)

Figure 7. Capacity and traffic volume in 2011 of border crossing points

(Rajavartiolaitos 2013) shows that the crossing point in Vaalimaa had a significant amount of vehicles crossing the border between Finland and Russia during the year

2011. Traffic volume was higher when compared to the other crossing points. It can be estimated that after the removal of TIR-agreement the congestion at the border and nearby it will increase. It will have a negative impact on project logistics as well as on whole logistics sector. The extent of the impact is not yet possible to know precisely as Kimmo Naski, the CEO of port of HaminaKotka, has stated in the local news (Kymen Sanomat 2013).

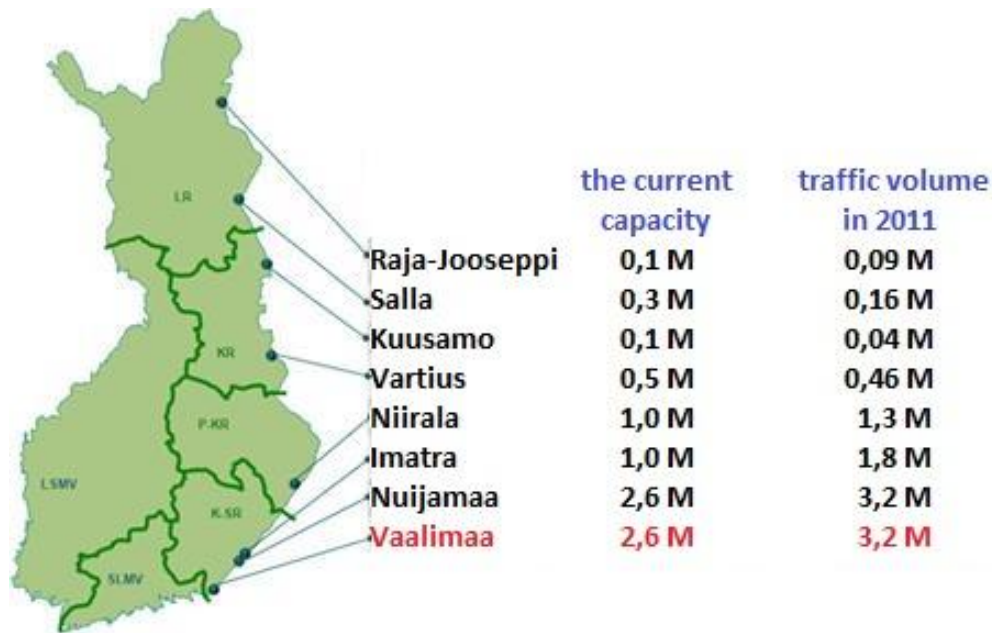


Figure 7. Capacity and traffic volume in 2011 of border crossing points (Rajavartiolaitos 2013).

Russia has stated that all the other freight shipments under TIR-agreement at the other crossing points are also going to end until 1.7.2014. Iiro Lehtonen, the CEO of SKAL (= Suomen Kuljetus ja Logistiikka Ry, transl. Finnish Transport and Logistics), has said that TIR-shipments may not come to an end and it depends on Russian customs and Russian transport association ASMAP. (Yle Uutiset 2014c.)

3.5 International trade payment methods

Competition in the international market is tough. Sellers have to be able to provide good payment methods and at the same time to avoid risks. The seller must ensure that the payment is going to be on time and the buyer must ensure that the goods are deliv-

ered on time. As shown in Figure 8. There are five types of payment methods. The seller and the buyer need to find a payment method what fits in both parties interest. (International Trade Administration 2008, 1-2 ; International Trade Administration 2012.)

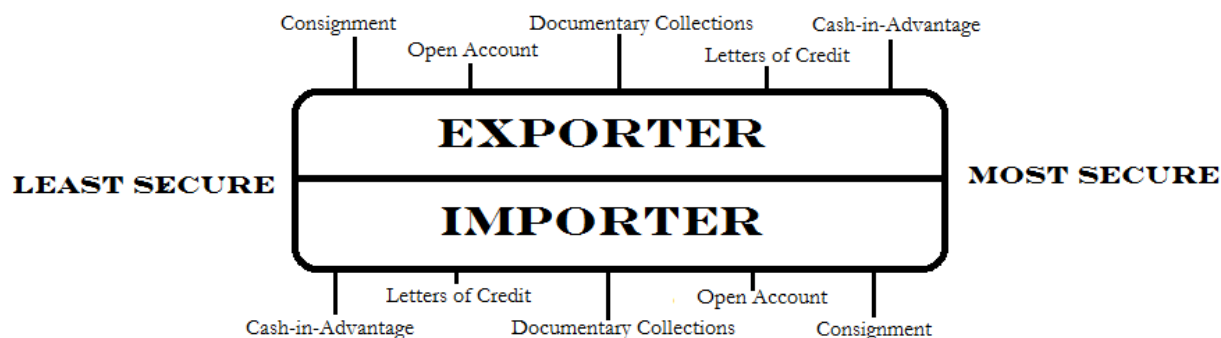


Figure 8. Payment risk diagram (International Trade Administration 2008, 1-2).

Cash in advantage is the most secure payment method for the seller (exporter). The buyer pays to the seller full or part of the sales price and then binds to the delivery. This can be used if the buyer is located in a country where unstable political situation is. Also in some cases the seller might have a custom-made product for the buyer that can't be found anywhere else or the product's re-sale is difficult. (Virtanen 2012, 18 ; International Trade Administration 2008, 1-2.)

Both parties (the seller and the buyer) give rights for banks to handle financial transactions when using letter of credit (L/C). It is a secure payment method to the seller because the buyer's bank guarantees the payment. For example if the buyer bank goes bankrupt, then the seller will receive still the money from the buyer's bank. The seller is responsible for proving all the shipping documents which have agreed in L/C. It usually includes a certificate that all the products has been delivered. After showing documents the seller will receive money from the bank. (Logistiikan maailma 2013b ; International Trade Administration 2008, 1-2.)

Documentary collection (D/C) differs from L/C that the bank operates as a middle man. The buyer can't receive the goods before the payment has been done. At the same time the seller must hand over the bill of lading in order to get the money. Banks transfer the payments and the bill of lading when the risk is equal for both sides. (Sherman, F. 2014. ; International Trade Administration 2008, 1-2.)

An open account is a good advantage for the sales especially if the buyer is known and trusted. The seller delivers the goods or the services to the customer and requests the payment with invoice. The seller can give payment time for the buyer and the ownership of the goods passes to the buyer when invoice is paid. (Export Finance Navigator 2014 ; International Trade Administration 2008, 1-2.)

Consignment differs from the open account system as the stock is owned by the seller but the customer has free access to the goods. The seller receives payments only when the customer uses items from stock. It is the least secure payment method for exporter because the payment isn't guaranteed and the goods are in the different country. (International Trade Administration 2008, 1-2 ; International Trade Administration 2012.)

3.6 Mode of transportation

Nowadays logistics magazines are talking about how transportation goods should be in the right place at the right time, and this should also be cost-effective. Companies can gain a competitive advantage by effective logistics solutions. Choosing the right form of transportation affects the choice of among, what products, how much and where it should be transported. The right mode of transportation is good to find out in the beginning of the transportation. The most common modes of transportation are road, sea, air and rail transportation. Each mode of transportation has its own advantages and disadvantages. Comparison of the modes of transportation needs to be done with a view of business requirements. (Universal Customs Broker 2013.)

When selecting the right mode of transportation, asking a client's opinion is quite advisable because it will increase customer satisfaction. In some cases, the customer may have better transport agreements and they can arrange transport with lower prices. For

example delivering goods in the customer's home country. It's important to know what kind of product is in question, especially its weight and dimensions. Although dimensions can't be measured exactly but those can be deduced from estimates. Product knowledge is also important for leading time and logistics budget. For example, if heavy goods should be transported and not in urgent time, focusing on sea or land transportation is more suitable than air freight. (My Business 2012 ; Roberts, K. 2012 ; Universal Customs Broker 2013 ; World Industrial Reporter 2012, 1-3.)

3.7 Containers

Container shipping is important in global logistics because containers cover more than 34 million TEU's of the global container fleets. TEU, twenty-foot equivalent unit, is determination of one 20'ft (feet) container dimensions. There are different types of containers which 20'ft and 40'ft are most common. Containers are located all over the world and it allows storage opportunities without unloading steps. Containers can be transported by all transport modes if there's possibilities to load and unload it. Containers indoor dimensions can vary a little from container series. (Logistiikan Maailma 2013c ; Maersk Line 2014 ; World Shipping Council 2014 ; O.V. Lahtinen Oy 2014.)

Containers can be divided into dry freight containers (DC), open tops (OT) and flat racks (FT). In addition there are special kind of containers such as tunnel containers which have doors in both sides, open side storage containers which provide big door in the slide, double door containers providing double doors for a wider room, refrigerated ISO containers with a low temperature, insulated and thermal containers with higher temperature, tanks which are typically used for liquids, cargo storage roll containers which are foldable, half height containers which heights are lower, car carriers for vehicles transportation, intermediate bulk shift containers, drums which are small circular containers, special purpose containers which are custom made and swap bodies with a flexible bottom top and strong bottom. (Maersk Line 2014 ; MarineInsight 2014 ; World Shipping Council 2014.)

Table 1. Dry freight containers (Maersk Line 2014).

Size feet/inches	Door openings		Internal dimensions			Weight			Volume M ³ cubic feet
	mm		mm			kg			
	feet/inches		feet/inches			lb			
	Width	Height	Length	Width	Height	Max gross	Tare	Max. pay- load	
20 standard 20' x 8' 8,6"	2,339 7'8 1/16"	2,274 7'5 1/2"	5,896 19'4 1/8"	2,350 7'8 1/2"	2,393 7' 10 3/16"	30,480 67,200	2,280 5,030	28,200 62,170	53 1,165
40 standard 40' x 8' x 8'6"	2,340 7' 8 1/8"	2,274 7'5 1/2"	12,032 39'5 11/66"	2,350 7'8 1/2"	2,393 7' 10 3/16"	32,500 71,650	3,700 8,157	28,800 63,493	67 2,356
40 high 40' x 8' x 9'6"	2,340 7'8 1/8"	2,577 8'5 7/16"	12,032 39'5 11/16"	2,350 7'8 1/2"	2,697 8' 10 1/8"	32,500 71,650	3,880 8,554	28,620 63,100	76 2,684
45 high 45' x 8' x 9,6"	2,340 7'8 1"	2,585 8'5 12"	13,556 44'5 11"	2,352 7'8 9"	2,698 8'10 3"	32,500 71,650	4,900 10,803	27,600 60,848	85 3,036

Dry freight containers are most common used shipping containers. International Organization for Standardization, ISO, has defined the dimensions of dry freight containers. Dry freight containers are generally least expensive due to the large production. Dry freight containers are in 10', 20' and 40' sizes of which 20' and 40' are the most common. Maersk defines container's dimensions and weight according to the dry freight container table (Table 1. Dry freight containers). Standard dry containers are lower than high containers and therefore also cheaper. Dry container is most suitable option in the majority of cases because most of the transport vehicles can carry them and they can be stacked. (Maersk Line 2014 ; MarineInsight 2014 ; World Shipping Council 2014.)

Table 2. Open top containers (Maersk Line 2014).

Size feet/inches	Internal dimensions			Door openings		Top opening		Weight		
	mm			mm		mm		kg		
	feet/inches			feet / inches		feet / inches		lb		
	Length	Width	Height	Width	Height	Length	Width	Max. gross	Tare	Max. payload
20 open top 20' x 8' x 8'6"	5,919 19'5"	2,346 7' 8 5/16"	2,286 7' 6"	2,286 7'6"	2,253 7'4 11/16"	5,490 18'1/16 "	2,223 7'3 1/2"	30,480 67,196	2,280 5,027	28,000 61,728
40' open top 40' x 8' x 8'6"	12,192 40'	2,338 7' 8"	2,289 7'6 1/16"	2,289 7'6 1/16"	2,253 7'4 11/16"	11,810 38'8 25/26"	2,223 7'3 1/2"	32,700 72,090	4,000 8,818	28,700 63,272

40' open top	12,192	2,338	2,653	2,388	2,580	11,810	2,223	30,480	4,000	26,480
40' x 8' x 9,6"	40'	7' 8 4/8"	8' 8 4/9"	7' 8"	8' 5 9/12"	38' 8"	7' 3"	67,196	8,818	58,377
						25/26"	1/2"			

Open top containers are optimal especially for higher goods. The roof of the container is usually covered by tarpaulin. Open top facilitates loading when some products don't fit from the door openings. Maersk defines its open top containers sizes to 20' and two of 40' containers which differ from each other by having bigger door openings but smaller maximum payload (Table 2. Open top containers). The downside is that one can't load anything above the containers since there isn't a resistant roof. (Maersk Line 2014.)

Table 3. Flat rack containers (Maersk Line 2014).

Size feet/inches	Door openings			Length between		Max width	Weight		
	mm			mm		mm	kg		
	feet/inches			feet/inches		feet /inches	lb		
	Length	Width	Height	Head ers	Corner points angle		Max cross	Tare	Max. pay- load
40 fixed corner FR 40' x 8' 8,6"	12,192 40'	2,346 8'	1,940 6' 4 3/8"	12,080 39' 7 9/16"	11,796 38' 8 3/8"	2,114 6' 11 3/16"	40,000 88,183	5,500 12,125	34,500 76,058
40 flush fold FR 40' x 8' x 8'6"	12,192 40'	2,346 8'	1,940 6' 4 3/8"	12,058 39'6 11/15"	11,662 38' 3 1/8"	2,224 7'3 1/2"	40,000 88,183	5,500 12,125	34,500 76,085
40 high 40' x 8' x 9'6"	12,192 40'	2,346 8'	2,260 7' 4 29/30"	12,058 39' 6 11/16"	11,662 38' 3 1/8"	2,224 7'3 1/2"	52,500 111,741	5,300 11,684	47,200 104,056

Flat racks are containers which have open top and slides. They're used usually for heavy cargo and goods which don't fit into the basic containers. Flat racks have been designed for 20' and 40' platforms. Maersk defines its flat racks to 40' sizes which are divided to fixed corner, flush fold and high flat racks (Table 3. Flat rack containers). Flush fold flat racks are kind of intermediate solution compared to other flat racks. High flat racks as the name tells they are higher than the others and they have bigger maximum payload. Fixed corner flat racks have bigger corner points and smaller maximum width. (Maersk Line 2014.)

3.8 Shipment and shipping documents

This chapter is partly concealed.

Shipping documents are drawn up for every shipment. Required shipping documents depend on sender and receiver countries. For example one doesn't need commercial invoice if one is delivering goods inside EU-area. (Department of Forest Economics, University of Helsinki 2002, 1-12.)

Cargo which is transported under the terms of bill of lading or air waybill determines the shipment (Business Dictionary 2014). Also consignment is a term that is used to infer shipment. Shipment can include a plurality of containers, packages and/or pieces. One project can include as many shipments as the case can include. (Lane, S. 2014, 1-3.)

Shipment costs depend on what, where, when and how one is shipping. In chapter 4, costs are explained with more detail of what influences to the shipping costs. It is important to know the price estimates of the shipment.

3.9 Design to cost

Design to cost abbreviated to DTC is a concept of defining the optimum cost-effective ratio. It can be considered as a tool to follow in what stage a product is going in a designing process. The product needs to be calculated by the total costs, in order to enable the possibility to improve the product. DTC is particularly suitable for large products but it can be also being applied to smaller goods. (Anders, D. 2014.)

W. Edward Deming developed problem solving model in the 1950's (Figure 9. The Deming Cycle). The Deming cycle helps the company to achieve improvements in four steps (plan, do, check and act). It can be applied to DTC concept by 1) continuous product planning and designing, 2) implementation of the product design, 3) assisting the measurements and reporting the results, and finally 4) decision of improving the changes. (Arveson, P. 1998.)

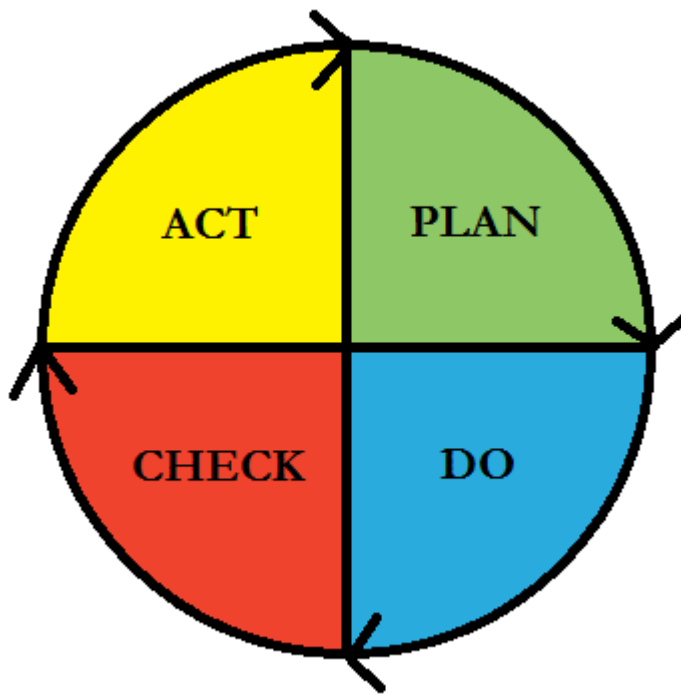


Figure 9. The Deming cycle (Arveson, P. 1998).

DTC is also suitable for the project and service delivery cycle which has five stages (Figure 10. Project Delivery Cycle). The Project Delivery Cycle – model is used to visualize different stages of the project. Each step can be used to design a good performance and it will help to reduce costs. Initiating is the starting point when the objectives and the scope are performed. Planning is the second step when the expected resources of the project have been calculated. Tracking is the third step when the budget, the schedule and the status are reviewed. Charging is the fourth step when the charge-back or the invoices are made. Last but not least is the analyzing step when all the information is collected. Detailed report analysis can be used for decision making and improving processes. (Melik 2007, 19.)

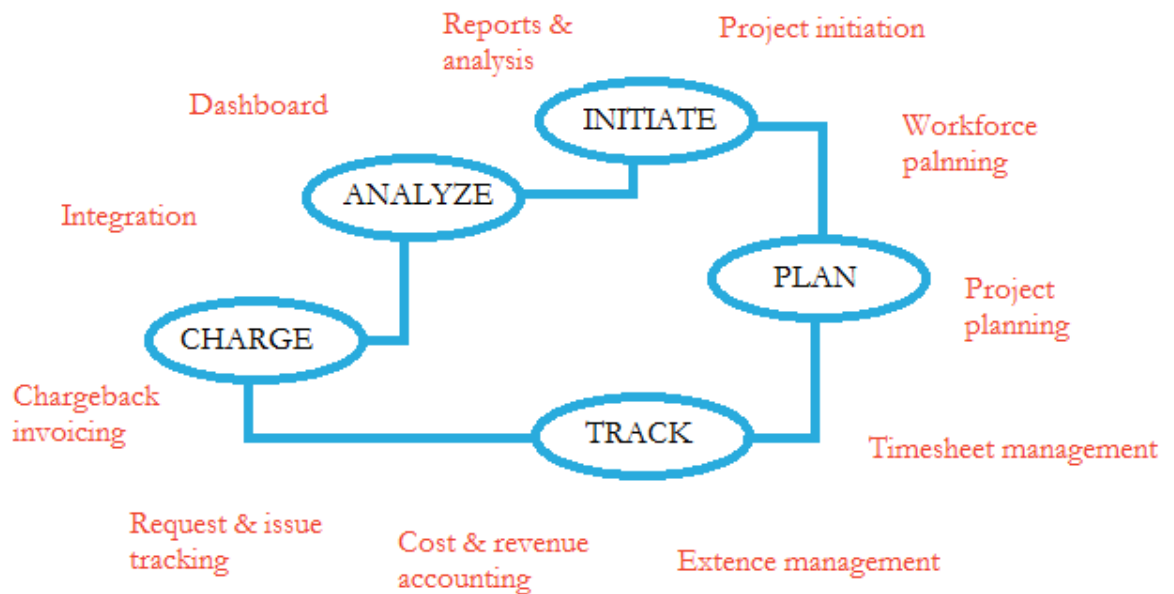


Figure 10. Project Delivery Cycle (Melik 2007, 19).

By using these two DTC-models, The Deming Cycle and The Project Delivery Cycle, an applied DTC-case can be demonstrated from the project logistics view under the following.

Company X is launching a new project to China from Finland. The purpose of the project is to produce a factory which produces mining equipment. The shipments consist of many goods which are familiar to the company from previous projects. Most of the goods are really big and need special arrangements. Project’s largest goods are 50 pieces of motors which are planned to load into 40’HC containers.

The company noticed that there are big pipes in the engines which they could weld in the site. The site doesn’t have welding equipment and external welder with equipments would cost USD 300 per hour. The company calculated that each motor needs one hour for welding, total USD 15 000. Re-designing would also cost USD 5000 but because the motors were identical they would need to re-design it only once.

The company’s logistics department informed that sending 40’HC all in price would be USD 5400 and 40’HC would be USD 1700. The company stated that the quality of the product doesn’t deteriorate and time would be possible for re-design. The company developed following calculations:

- Shipping the product without any changes would cost :
USD 5400 x 50 = USD 270 000
- Shipping the re-designed product would cost:
USD 1700 x 50 + 15 000 + 5000 = 105 000
- Re-design performance: USD 270 000 – USD 105 000 = USD **165 000**.

The company saved USD 165 000 by the good observation.

4 Project logistics cost factors

The importance of logistics has increased considerably. It is considered to be a competitive and successful factor. Logistics is needed because nowadays factories, manufacturing plants and sites are often located in different places than the raw materials. Components can be distributed all over the world. Products may have been made in countries where the production is cheaper. People are living in larger cities, where consumption is high. Distances can be very long between rural areas. Market areas have been expanded. Delivery density has grown as the same time delivery times have shortened. Warehouses are reduced and transferred into moving inventories like “on truck wheels”. Quality of the delivery such as the availability, accuracy and speed has become more important. (Oksanen 2004, 18.)

It is important to know that especially in project logistics designing logistics costs depend on numerous of factors. Not only the delivery time and the size of the product reflect to the cost in itself. However, you have to remember that all of the points are almost impossible to estimate in advance.

4.1 Logistics costs in general

Logistics costs can be divided into four freight categories; sea-, road-, rail- and air freight. Each class has its own benefits and drawbacks. Categories can be also combined according to the situation. (IRISH exporters association 2014.)

Air freight allows fast delivery with low stocks, good security and insurance opinions. However airfreight is by far the most expensive transportation form. Air freight is mostly used for urgent and high-value goods. For example if an important component breaks down, it will raise downtime. As a fast transportation, air freight can reduce costly downtimes. (BOR GER 2014 ; IRISH exporters association 2014 ; Skyways Group 2012 ; Suddath Van Lines 2014.)

Sea freight is cheap way to deliver especially heavy and bulky goods. However sea freight is slow and it requires long lead/delivery time. Routes can be inflexible but

there is no traffic congestion. Almost all types of cargo can be delivered by sea freight. Sea freight is suitable for projects because often a majority of goods are transported at the same time. (rajatvibhute 2011 ; Staydan Freight Services Ltd 2014.)

Rail freight offers a fairly affordable and fast transportation because trains run on time generally. It is also a green and safety option in long distances. Rail freight offers only inflexible routes so door-to-door service is not available. Rail freight is often used for long distance heavy cargo goods. (International Union of Railways 2014 ; Mehta, V. 2012 ; Ministry of Transport and Communications 2014 ; Mode Shift Centre 2012 ; UIC Rail Freight Portal 2014.)

Road freight is the most common transportation method because it provides door-to-door service. Fewer people want to go to the terminal to pick-up the goods. It is a fast and economical delivery mode for short distances. Road freight is also the most flexible way to deliver the goods. Road freight disadvantages are based on delivering large sized goods because roads may not take too much weight and a large transport may need escort cars. (Lopez, K. 2014 ; Jaruzel, M. 2012.)

Most of the logistics costs arise from the transportation and storage costs, which enable to level out the production availability. When choosing the most cost-efficient transportation, consideration should focus on distance, volume, product size, loading space handling, susceptibility and as well on market and service level. In practice, the price of logistics is what the company wants from the logistics and are they willing to pay for it. Part of the logistics processes is often outsourced, such as warehousing and transportation, because it requires capital costs, insurances, storage space, vehicles and time. (Jalanka J., Salmenkari, R. & Winqvist, B. 2003, 9-10 ; Koskelainen, S. 2006 ; Logistiikan Maaailma 2013d ; Yrityssuomi 2014.)

4.2 Cost factors from target company's view

This chapter is concealed.

4.3 Pricing calculations

As in the previous sections can be seen, there are a lot of factors which are affecting to the price. However, the price can be assessed still. Price calculations refer to methods of calculations with the aim of performance unit price determination. Logistics companies are giving a price which seeks to achieve financial profit and company's other goals.

Costs can be divided into direct and indirect costs. Direct costs are all variable and fixed costs which have a causal link to the target function or object. While indirect costs can't be allocated directly in front of the function. (Oksanen 2004, 137-139.)

4.3.1 Distribution calculation

Figure 11. Distribution calculation is used when company provides only one route with few cars and they want to determine cost per unit. In practice it means that incurred costs will be allocated with corresponding period of the mileage. Usually there are more routes and vehicles used, so this formula is applied very rarely, but it is used as a simplified example. (Oksanen 2004, 137-139.)

$$\text{Unit cost } \text{€}/\text{t} = \frac{\text{Total cost of the accounting period (€)}}{\text{Calculation period of goods carried out (t)}}$$

Figure 11. Distribution calculation (Oksanen 2004, 137-139).

4.3.2 Increment calculation

Companies can produce different ranges of services which production processes may be different. In this kind of situation increment calculations can be used. It requires cost division to indirect and direct costs. Figure 12. Absolute real-valued- and relative percentage overhead cost increment calculations system shows how overhead costs can

be calculated as absolutely (real-valued) and relatively (percent) methods. (Oksanen 2004, 137-139.)

Absolute real-valued overhead cost

$$\text{Overhead costs } \text{€}/\text{unit} = \frac{\text{Indirect costs from the calculation period (€)}}{\text{Total transport from the calculation period (unit)}}$$

Relative percentage overhead cost

$$\text{Overhead cost \%} = \frac{\text{Indirect costs from the calculation period (€)}}{\text{Direct costs from the calculation period (€)}} \times 100$$

Figure 12. Absolute real-valued- and relative percentage overhead cost increment calculations (Oksanen 2004, 137-139).

5 Conclusion and valuation of literary sources

The theoretical part of this thesis is based on key concepts related to DTC. Also the key concepts are related to each other. They form a logical base for the practical function.

Figure 13. Theory base is a summary from theory base of this study. Logistics costs can be divided into contracts, transportation modes, know-how and payments methods. They are in turn divided into subcategories such as Incoterms, insurance, TIR, containers, how the payment is done, freight modes (road, air, rail and sea) and bases such as container categories.

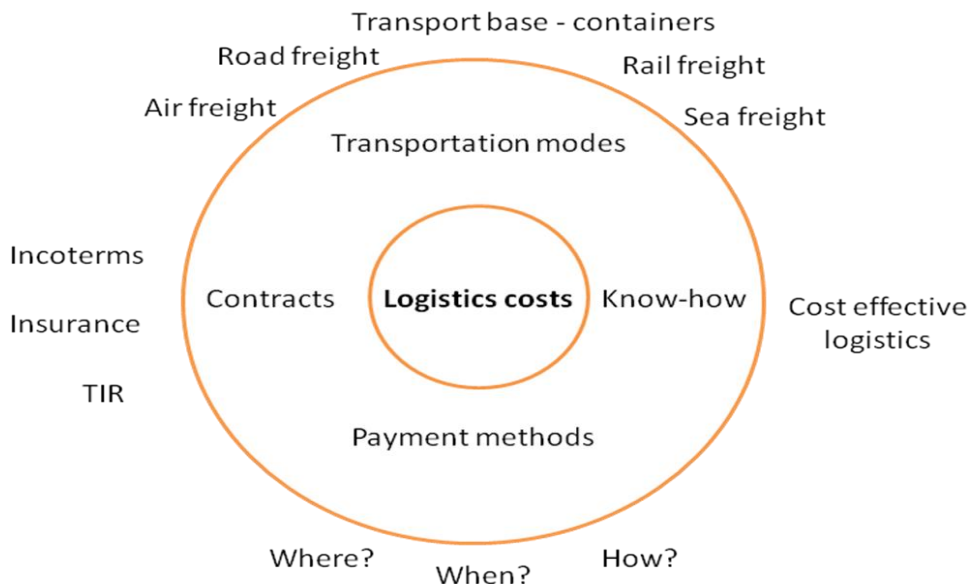


Figure 13. Theory base

Contracts, transportation modes, payment methods and logistical know-how need to be evaluated with the seller and the customer. For example, the seller can have a great experience in logistics and therefore the customer would be willing to pay for it. In turn, the customer might need more time to make the payment. Evaluation helps to achieve win-win situation where both parties are satisfied.

In the previous chapters (3. Key concepts and 4. Project logistics cost factors) all of the terms above have been explained and analyzed with more detail. Information is depending on the sources strongly.

This thesis has used three types of literary sources which occurred while writing process. First two categories differ from each other whether the source is available in internet or is the source an actual book or magazine. Third category can be considered as a source of anonymous writers. Generally speaking this category can be considered as an insecure source yet in this thesis the occurring part from this category has been verified from other reliable sources. The main reason why this study relies on the anonymous writers is that their articles can be considered proficient and ahead of their time.

All of the information in this thesis has been analyzed in preparation for the actual topic. There have been sources counted on the fingers which deal with Design-To-Cost – model. Writing process, including source criticism, aims on reliable and empiric information which can be applied on unique DTC – model.

In the upcoming section this thesis focuses on the target company's ongoing project and logistics specialist's role in this process, so that the theoretical base of this study gets its practical function. Within its practical function it is far more easier to develop the DTC-model which takes into consideration both of the frames, theoretical and practical.

6 Target Project

This chapter is partly concealed.

When selecting a practical function for this thesis, TC had two optimal projects to research during autumn 2013 and spring 2014. These projects were optimal for further research because they were large enough to get proper information.

Both of the projects were located in Russia, Finland's most important trading partner. Current changes in TIR-agreements and the political circumstances (Yle uutiset, 2014b) didn't influence on this project, but it did rise up questions such as what kind of problems these changes are going to cause for project logistics in the long-term.

Target project research focused on the new project. The results and the budget information in the older case are dealt in the Chapter 8. Conclusion and recommendation, where the final analysis has been done.

6.1 Target Project's survey meeting

A survey meeting with the project engineers was conducted for the target project because the purpose of the meeting was to find out the background of the target project. Attachment 1. "Welcome letter to the project meeting" is an invitation for the target project meeting. Invitation explains its purpose, which was finding out information of minimizing the project's various logistics costs.

Attachment 2. "Questions to the project" contained ten questions about how people can impact on project matters. The survey's response rate was 100% so there wasn't any margin error. Own views were distinguished from answers' because the research was made to a different department.

Survey was made for all project engineers who are responsible for the product categories. Products were divided into seventeen different categories. The project's mission is to send a machine and it includes different part of product groups: feeders, ball mill,

pump sumps, slurry pumps, cyclones, water pumps, chemical pumps, flotation machines, thickeners, filters, chemical tanks, auxiliaries, field instruments, analyzers, automation systems, electrical equipment and conditioners.

The project contains around 175 containers which most of them are 40' feet containers. Project includes also around 252 break bulks which are not placed into containers.

6.2 Target Project synopsis

This chapter is partly concealed.

Individual project engineer's role in designing the package was quite small in the target project because most of the products were standard. However, the target company sends always the instructions of packing to the all the suppliers of the project. Products which are repacked into containers and larger boxes require continuous supplier supervision.

In the beginning of the project equipment was not purchased so the estimated dimensions were hard to give. Automation-, electrification- and field instruments were designed to fit into containers. Pump sumps, slurry pumps, cyclones and filters require containers and wooden boxes. More perceive estimates were not known for other products.

None of the products consisted hazardous materials but the products had be handled with care. The products couldn't withstand the fall without damage.

The products were mainly coming from EU countries. And those were collected to the XXX warehouse where the goods were packed into the appropriate containers.

All products required at least dry storage. Automation- and field instruments, cyclones, water- and chemical pumps required also indoor warm storage.

Products were delivered two months before the actual shipment to the *XXX* warehouse for intermediate storage. With exception some of the goods were delivered directly to Russia. Other intermediate storage wasn't necessary.

7 Logistics specialist's role in project logistics

The purpose of logistics specialist in project logistics is to ensure that delivery flow is cost-effective and efficient. This basically means that logistics specialist plans the transportation and takes care of all the necessary export and/or import documents. Logistics specialist reviews the agreement of project and/or possible L/C documents and checks that there are no problems or impossibilities such as poor delivery term or impossible dates. For example a product manufacturing can take six months and it should be shipped in five months. In this particular case and others, logistics specialist's work is to avoid unnecessary penalties and disagreements. (Great Sample Resume 2014.)

Logistics specialist should be involved in designing the project contract because effective logistical planning can save considerable amounts of money. Logistics specialist will estimate with supply and project engineers the estimated volumes of the transport and possible routes for the project. For example on worst scenarios project is carried out in difficult conditions where the road is not wide enough. (Great Sample Resume 2014.)

Tendering the logistics agreements with transportation companies should be done transparent because then all the project involved people can have an access to check why the logistics contract has been awarded. Logistics agreement may affect the price but also the reliability of the company and the former experience. (Great Sample Resume 2014.)

Logistics specialist manages shipping and keeps schedule of the shipment by best possible ways. Responsibly takes cover also to ensure safety, security, regulations and company polices. Logistics specialist co-operates with suppliers, clients and project employees such as project manager, engineers and purchasing personnel. Suppliers may be in different countries so projects would need pre-carry that goods are collected in one place where they are re-packed to the new containers. (Great Sample Resume 2014.)

Logistics specialist has a big responsibility to develop relationship between customers. Logistics specialist can help client in importing or exporting as necessary and (s)he should inform customers about the shipment. If customers are satisfied, they are easier to be convinced to buy a new product. Logistics specialist assists accounting department by checking the invoices and if necessary, by doing them. Logistics specialist is responsible to present project documents to those who need the information according to the company's police. (Great Sample Resume 2014.)

7.1 Deliver solutions in the Target Company

This chapter is concealed.

7.2 Forwarding plan

Logistics specialist makes a forwarding plan for each project. It is an important tool for project logistics because it helps to provide a more accurate picture of forwarding responsibilities and project scheduling. It is a part of project supply plan which will be made during sell process and plan implementation. (Target company intra.)

Attachment 3. Forwarding plan is an example of forwarding plan. It is filled with the information of the target project. It contains basic information of the project such as name and destination, terms of delivery, responsibilities of for export and import clearance, forwarder- and transport company planning, transport scheduling and estimated quantities, preliminary shipment information and shipment documents, transport plan, contact informations, company's internal codes and consignee and shipping mark.

8 Conclusion and recommendation

This chapter is partly concealed.

Thesis was made between HAAGA-HELIA's and target company's point of view. Researcher's own work as a logistics specialist in the company made possible to obtain even more accurate picture of project logistics.

Figure 1. Framework and goals of thesis was presented in the beginning of the thesis. The objectives were to find factors that affect project logistics costs, find solutions for designing logistics processes and examine target company's ongoing project and logistics specialist role. By researching these factors first from the theoretical frame, the survey was able to apply the knowledge on target company's ongoing project and find improving solutions for project logistics.

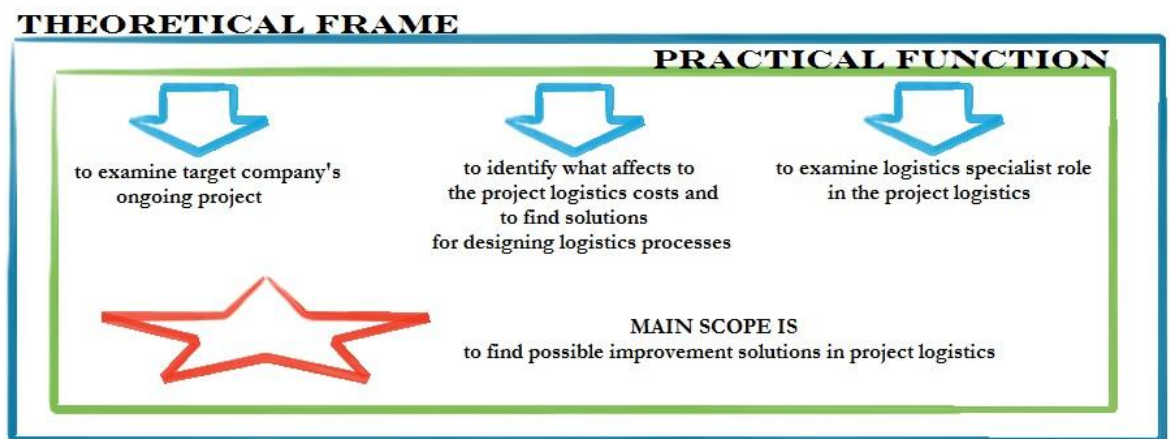


Figure 1. Framework and goals of thesis

During the autumn 2013 and spring 2014 two projects were examined which both were aimed to Russia and goods were similar in each one. The old project which was already implemented had a very big difference between the logistics budget and the actual expenses. The target company's sales department assessed the budget with reference to the logistics budget. The total project value of the implemented project was XXX EUR of which logistics costs were XXX EUR. This project was evaluated logistics budget to XXX EUR. Implemented project logistics costs value difference was XXX EUR (~XXX%) which was advantage for the target company. There wasn't any

exact cause of this difference because the delivery terms didn't change and all the goods were dispatched.

Co-operation between sales- and logistics department is only limited in the target company. Some of the sellers keep in contact with the logistics department but not all of them. Poor logistics budget assessment can lead to the loss of trade because competing company can offer same product with almost same price. If logistics budget is estimated too low the company will lose extra money. When it is too high, then company risks the whole deal and may even lose it.

Amount of final packages of delivery can be hard to estimate in the beginning of the project. However, the logistic department is regularly in contact with shipping companies and their prices. Co-operation between sales- and logistics department needs project supply and category specialists to work with them already in the early stages. This helps to assess logistical budget and as a result the right budgets can be obtained.

The target project of this thesis was in the early stages. Purchases were not made and products were mostly standard items. Most of the item dimensions were small and project engineers hadn't enough opportunities to influence on the item sizes. The target company had given instructions of packing which was sent to all suppliers. This ensures the right kind of packing. The products need more supervision at the later stage when some of the goods will be re-packed into containers and larger boxes.

The goods of the target project were planned to collect to warehouse in XXX two months before the actual shipment. There were only few exceptions when goods were delivered directly to Russia. Logistics specialist is responsible that all of the goods are delivered and re-packed on time. The target company provides opportunity to go check packing and shipping in harbor or warehouse. However, the checking hasn't been done so often. Usually it is because of the urgency in the other projects. An inspection visit could reduce unnecessary mistakes.

All goods of the target project required at least dry storage and some goods needed indoor warm storage. In the of project planning stage, item conditions should be con-

sidered more specifically. For example goods don't usually require intermediate- or indoor storage, which is very expensive and therefore it should be avoided as much as possible.

Logistics specialist role from project logistics' view is large-scaled because (s)he is responsible for the movement of goods. Logistics specialist affects to the prices by competitive bidding between freight companies and therefore specialist is responsible of the cost effective transportation and that all the shipping documents are done correctly and properly. Logistics specialist can also influence on how transportation should be done ethically.

Logistics specialist collaborates with suppliers, project personnel and customer. Employees need to be trained on regularly basis and take monthly meetings where everyone can share their ideas. Sometimes projects are made through another country and the logistics are managed in different countries. Then the importance between co-operation between logistics and other project personnel will come even more important.

As a conclusion, the target company's DTC improvements can be combined into a four- stage model (Figure 13. Design-to-cost from a project logistics perspective applied for the target company):

- 1) Logistics ***co-operation*** between Sales, Project Supply and Category Specialists
- 2) ***Product supervision*** includes site inspection visits and reviews of item conditions
- 3) ***Training and meetings***, such as going to external logistics events to learn more, monthly meetings where everyone can give their own suggestions for development
- 4) ***Research and development*** even in short-term will affect to the long-term results

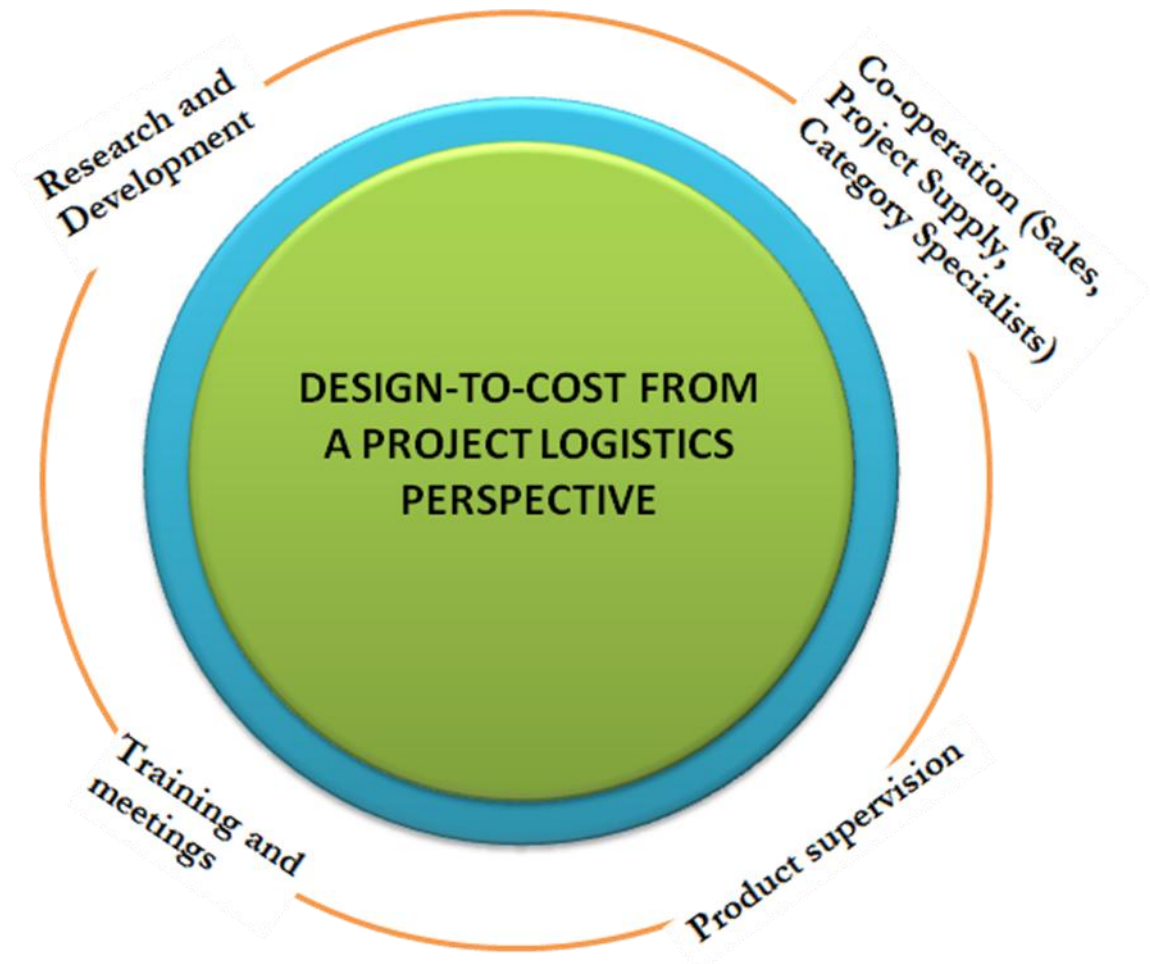


Figure 13. Design-to-cost from a project logistics perspective applied for the target company

On the basis of these improvement solutions, the target company may consider in addition a suggestion for further research of how to calculate logistics budget even more specifically.

Furthermore, the information of this thesis can be used in other business areas as well. By taking this applied DTC-model into use, the target company will strengthen its position as a competitive project logistics company.

Bibliography

Anders, D. 2014. Designing Low Cost Products. URL:

http://www.design4manufacturability.com/designing_low_cost_products.htm Quoted: 22.03.2014

Arveson, P. 1998. The Deming Cycle. URL:

<http://balancedscorecard.org/thedemingcycle/tabid/112/default.aspx> Quoted: 22.03.2014

BOR GER. 2014. Advantages and disadvantages of air cargo. URL: <http://borger.ru/en/articles/preimushhestva-i-nedostatki-aviaperevozki-gruzov> Quoted:

17.5.2014

Business Dictionary. 2014. Shipment. URL:

<http://www.businessdictionary.com/definition/shipment.html> Quoted: 11.02.2014

Cargoways Logistics. 2014. Incoterms. URL:

<http://www.cargowayslogistics.net/tools/incoterms/#!prettyPhoto> Quoted: 12.02.2014

Christopher, M. 2010. New directions in logistics. In Waters, D. (eds.). Global logistics.

New directions in supply chain management. pp.1-13. Kogan Page Limited. London, Philadelphia, New Delhi. Quoted: 10.11.2013

Dawn Shipping Group. 2014. Charts of Responsibility. URL:

<http://dawnsng.com/tools/full/1> Quoted: 02.04.2014

Department of Forest Economics, University of Helsinki. 2002. Shipping and Export Documents. URL:

<http://www.helsinki.fi/metsatieteet/opiskelu/fpm/toolbox/transport/shipdocs.pdf> Quoted: 17.04.2014

Export Finance Navigator. 2014. Open account. URL:
<http://www.exportfinance.gov.au/Pages/Openaccount.aspx#content> Quoted:
04.05.2014

FIHTA c/o The Federation of Finnish Technology Industries. 2013. Kasvu lisää yrityksen arvoa. Newsletter. 28.09.2013. URL:
<http://www.fihtanews.net/component/flexicontent/50-newsletter-articles/294-kasvu-lisaae-yrityksen-arvoa>. Quoted: 01.10.2013.

Finpro. 2014. Incoterms 2010. URL:
https://www.finpro.fi/c/document_library/get_file?uuid=d1a7498d-f87d-4bda-982e-d4869c56e19d&groupId=10304 Quoted: 12.02.2014

Great Sample Resume. International Logistics Specialist Responsibilities and Duties. 2014. URL: <http://www.greatsampleresume.com/Job-Responsibilities/International-Logistics-Specialist-Responsibilities.html> Quoted: 16.01.2014

ICC. 2010. Incoterms 2010: ICC official rules for the interpretation of trade terms. URL: <http://www.searates.com/reference/incoterms/> Quoted: 12.02.2014

International Trade Administration. 2008. Methods of Payment in International Trade. URL: <http://trade.gov/media/publications/pdf/tfg2008ch1.pdf> Quoted: 04.05.2014

International Trade Administration. 2012. Methods of Payment in International Trade. URL: http://export.gov/tradefinanceguide/eg_main_043221.asp Quoted: 04.05.2014

IRISH exporters association. 2014. Transport Selection. URL:
<http://www.irishexporters.ie/section/TransportSelection> Quoted: 17.5.2014

International Union of Railways. 2014. Environment & Sustainability. Article. 15.4.2014. URL: <http://www.uic.org/spip.php?rubrique1045> Quoted: 17.5.2014

Jalanka, J., Salmenkari, R. & Winqvist, B. 2003. Logistiikan ulkoistaminen, käsikirja ulkoistamisprosessista. URL:

<http://www.logy.fi/liitetiedostot/Logistiikanulkoistaminen.pdf> Quoted: 17.5.2014

Jaruzel, M. 2012. Road freight – advantages and disadvantages. Blog article. 13.9.2012.

URL: <http://www.chicsha.com/road-freight-advantages-and-disadvantages/> Quoted: 17.5.2014

Kallionpää, Laitinen & Perttu. 2014. TIR-kuljetukset menivät yhä läpi Vaalimaalla.

News. Helsingin Sanomat. 22.04.2014. URL:

<http://www.hs.fi/talous/a1398050423375> Quoted: 24.04.2014

Koskelainen, S. 2006. Kuljetuskustannusten vertailu vientikustannuksissa. Thesis.

URL: <https://publications.theseus.fi/bitstream/handle/10024/11207/2007-04-27-20.pdf?sequence=1> Quoted: 17.5.2014

Kymen Sanomat. 2013. Venäjän TIR-päätös tukkisi rajan. News. 21.8.2013. URL:

<http://www.kymensanomat.fi/Online/2013/08/21/Ven%C3%A4j%C3%A4n+TIR-p%C3%A4%C3%A4t%C3%B6s+tukkisi+rajan/2013316163697/4> Quoted: 22.04.2014

Lane, S. 2014. Shipment Consignment : Is it risky business?. URL:

<http://www.tradetechnologies.com/Consignment.pdf> Quoted: 18.04.2014

Logistiikan maailma. 2013a. Hankinta ja osto – tavoitteet ja vastuut. URL:

http://www.logistiikanmaailma.fi/wiki/Hankinta_ja_osto_%E2%80%93_tavoitteet_ja_vastuut Quoted: 01.10.2013

Logistiikan maailma. 2013b. Remburssikauppa. URL:

<http://www.logistiikanmaailma.fi/wiki/Remburssikauppa> Quoted: 04.05.2014

Logistiikan Maailma. 2013c. TEU. URL: <http://www.logistiikanmaailma.fi/wiki/TEU>

Quoted: 08.05.2014

Logistiikan Maaailma. 2013d. Varastointikustannukset. URL:
<http://www.logistiikanmaailma.fi/wiki/Varastointikustannukset> Quoted: 17.5.2014

Lopez, K. 2014. What are the Benefits of using Road Freight?. Blog article. 28.4.2014.
URL: <http://www.kg-logistics.co.uk/blog/what-are-the-benefits-of-using-road-freight-2014-04-28> Quoted: 17.5.2014

Maersk Line. 2014. Maersk Line Equipment guide. URL:
<http://my.maerskline.com/globalfile/?path=/pdf/containerDimensions> Quoted:
08.05.2014

MarineInsight. 2014. 16 Types of Container Units and Designs for Shipping Cargo.
URL: <http://www.marineinsight.com/sports-luxury/equipment/16-types-of-container-units-and-designs-for-shipping-cargo/> Quoted: 08.05.2014

Mehta, V. 2012. What are the advantages & disadvantages of railway transport?. URL:
<http://www.publishyourarticles.net/knowledge-hub/business-studies/what-are-the-advantages-a-disadvantages-of-railway-transport.html> Quoted: 17.5.2014

Melik, R. 2007. The Rise of the Project Workforce. Managing People and Projects in Flat World. John Wiley & Sons, Inc. Hoboken, New Jersey. Quoted: 27.10.2013

Ministry of Transport and Communications. 2014. Railway transport. URL:
http://www.lvm.fi/en/railway_transport Quoted: 17.5.2014

Mode Shift Centre. 2012. Why rail freight and how it could benefit your company.
URL: http://www.modeshiftcentre.org.uk/railfreight/why_rail_freightx/ Quoted:
17.5.2014

My Business. 2012. Choose the right mode of transport for your goods. URL:
<http://mybusiness.co.uk/choose-the-right-mode-of-transport-for-your-goods/> Quoted:
06.05.2014

Oksanen, R. 2004. Kuljetustuotannon toimintolaskenta. Ekondata Oy. Hyvinkää.
Quoted : 20.12.2013

O.V. Lahtinen Oy. 2014. Konttien historia URL: <http://www.ovlahtinen.fi/konttien-historia/> Quoted: 08.05.2014

rajatvibhute. 2011. Advantages and Disadvantages : Modes of Transport. Essay. May 2011. <http://www.studymode.com/essays/Advantages-And-Disadvantages-Modes-Of-Transport-706209.html>

Rajavartiolaitos. 2013. Rajaturvallisuuden ja sujuvan rajaliikenteen tulevaisuus puhuttaa. Press release. 11.01.2013 URL:
http://www.raja.fi/tietoa/tiedotteet/tiedotteet_rvle/1/0/rajaturvallisuuden_ja_sujuvan_rajaliikenteen_tulevaisuus_puhuttaa_39391 Quoted: 22.04.2014

Roberts, K. Key Factors and Trends in Transportation Mode and Carrier Selection. The Journal of Undergraduate Research at the University of Tennessee. 2012. URL: <http://trace.tennessee.edu/cgi/viewcontent.cgi?article=1133&context=pursuit> Quoted: 07.05.2014

Sakki, J. 1999. Logistinen prosessi. Tilaus-toimitusketjun hallinta. 4. painos. Jouni Sakki Oy. Espoo. Quoted: 13.11.2013

Sherman, F. 2014. Difference Between a Documentary Collection & a Letter of Credit. URL: http://www.ehow.com/about_6636951_difference-documentary-collection-letter-credit.html Quoted: 04.05.2014

Skyways Group. 2012. Benefits of air freight services. Report. 18.9.2012. URL: <http://www.slideshare.net/skywaysgroup/benefits-of-air-freight-services-14329681> Quoted: 17.5.2014

Staydan Freight Services Ltd. 2014. Sea Freight in Ashford, Middlesex. URL:
<http://www.staydanfreightservices.com/sea-freight-ashford-middlesex.html> Quoted:
17.5.2014

STI Global Logistics Limited. 2013. Incoterms 2010. URL:
http://www.stigl.co.uk/advice_freight_incoterms.php Quoted: 12.02.2014

Suddath Van Lines. 2014. Air freight advantages, disadvantages and when to use it.
URL: <http://www.suddath.com/company/blog/2013/01/air-freight-advantages-disadvantages-and-when-to-use-it.aspx> Quoted: 17.5.2014

Suomen Tulli. 2011. TIR-käsikirja. URL:
http://www.tulli.fi/fi/suomen_tulli/julkaisut_ja_esitteet/kasikirjat/tir/tir_2011.pdf
Quoted: 22.04.2014

Target company intra.

UIC Rail Freight Portal. 2014. Environment. URL:
<http://www.railfreightportal.com/Environment> Quoted: 17.5.2014

Universal Customs Broker. 2013. Tips for Choosing the Right Mode of Transportation for International Trade. URL:
<http://ucbrokersperth.wordpress.com/2013/01/07/tips-for-choosing-the-right-mode-of-transportation-for-international-trade/> Quoted: 06.05.2014

Virtanen, S. 2012. Kansainvälisen kaupan maksutavat. Thesis. URL:
http://www.theseus.fi/bitstream/handle/10024/43051/Virtanen_Suvi.pdf?sequence=1 Quoted: 04.05.2014

World Industrial Reporter. 2013. Global Shipping: Choosing the Best Method of Transport. URL: <http://www.worldindustrialreporter.com/wp-content/uploads/2012/09/Global-Shipping-Methods1.pdf> Quoted: 06.05.2014

World Shipping Council. 2014. Containers. URL:

<http://www.worldshipping.org/about-the-industry/containers> Quoted: 08.05.2014

Yle uutiset. 2014a. Russia to stop expedited freight shipments at Vaalimaa. News.

18.03.2014. URL:

http://yle.fi/uutiset/russia_to_stop_expedited_freight_shipments_at_vaalimaa/7142542 Quoted: 22.04.2014

Yle uutiset. 2014b. Tulli: Venäjä antoi pari viikkoa jatkoaikaa TIR-kuljetusten vastaanottamiseen. News. 19.03.2014. URL:

http://yle.fi/uutiset/tulli_venaja_antoi_pari_viikkoa_jatkoaikaa_tir-kuljetusten_vastaanottamiseen/7144957 Quoted: 22.04.2014

Yle Uutiset. 2014c. SKAL: "Venäjän kanssa ei voi olla koskaan varma". News.

22.4.2014. URL:

http://yle.fi/uutiset/skal_venajan_kanssa_ei_voi_olla_koskaan_varma/7200415?ref=1eiki-uu Quoted: 22.04.2014

Yrityssuomi. 2014. Tuotanto ja varastointi. URL: <http://www.yrityssuomi.fi/tuotanto-ja-varastointi> Quoted: 17.5.2014

Attachments

Attachment 1. Welcome letter to the project meeting.

This attachment is concealed.

Attachment 2. Questions to the project.

This attachment is concealed.

Attachment 3. Deliver solutions.

This attachment is concealed.

Attachment 4. Old deliver solutions.

This attachment is concealed.

Attachment 5. Forwarding plan.

This attachment is concealed.