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Supply chain analysis for drafting a distribution plan for non-profit organizations. Case: TestPlus

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Bachelor's Thesis
Degree Programme in International Business
2014

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University of Applied Sciences

Abstract

26.1.2015

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Degree programme
International Business

Report/thesis title
Supply chain analysis for drafting a distribution plan for non-profit organizations. Case: TestPlus

Number of pages and appendix pages
53+3

TestPlus is a Finland-based start-up developing easy to use, comprehensive home health testing devices and accompanying smartphone apps. This thesis describes the project of drafting a distribution plan to get the products from Finland to Bangladesh with the co-operation of NGOs.

The project begins with creating a theoretical framework for the drafting phase. The theory includes a brief explanation of supply chain management and trends in it. The thesis focuses on the operations in the downstream part of the supply chain, from the focal company towards the customers. The explanation of distribution is given with an elaboration of global distribution and distribution channels. Inside the distribution chain is transportation; transportation modes, services and management are discussed. Warehousing and warehouse operations are described with inventory management. The last topic concerning distribution involves the information requirements in global transportation and trade. This is followed by a discussion of corporate social responsibility and sustainability through distribution, the environmental impact of transportation modes, warehousing, and the role of non-governmental organisations.

The project documentation starts with drafting a simple distribution chain derived from the theoretical background. With the basic chain drafted, the case specific distribution chain is described along with a discussion of the author's recommendations for each step. Research on plausible co-operating NGOs is reported with a brief description of the research methods and discussion of the criteria chosen to evaluate the NGOs. The NGOs chosen are listed at the end of the chapter.

As a conclusion, some remarks are made on how the commissioning company may best benefit from the thesis, after which some additional projects are suggested. The report ends with the author's evaluation of the project.

As an attachment, the report includes a summary of the drafted distribution chain in the form of a flow chart and a table of the links to the organisations suggested.

Keywords
Supply chain management, Distribution chain, Transportation, Warehousing, Corporate social responsibility, Home health testing

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1 Introduction

This report is the author's bachelor's thesis. In it will be explained how a draft for a simple distribution plan is designed for a home health testing device. First the background, the topic and the product are introduced with the chosen target market and the case company. Then a brief glossary of the key concepts is given.

Chapter 2 consists of theoretical framework and practical needs for completing the project. In the beginning of the chapter supply chain management as a whole and three megatrends in it are briefly described. Then the aspects affecting the topic of the thesis; distribution, transportation, warehousing, inventory management and information requirements are explained followed by aspects of corporate social responsibility focusing on examples of how the supply chain may be affected.

In chapter 3 a basic distribution chain is outlined with case specific options and recommendations then discussed. The plan is not final, merely mapping the possibilities and necessities and aims to work as a guideline for the future. Later possible co-operating organisations are suggested and criteria for choosing them are described.

Chapter 4 consists of the conclusions of the project and pointers on how the project can be applied to other markets. It includes the key findings of the project, suggestions for the company for additional projects and the author's evaluation of the project.

1.1 Background

Developing countries are nations where large part of the population lives with far less money than in the developed countries. These are often countries with low GDP and often largely agricultural, infrastructure of roads, safe water and education are in a poor and insufficient state. According to the World Bank, in these countries hunger, lack of education and unsustainable governmental debt are often major issues. (World Bank 2012.)

According to the World Trade Organisation the member countries announce themselves as developed or developing countries, other member countries may challenge this announcement if they see it as incorrect. Announcing themselves as developing countries allows some relaxation of deadlines or other requirements for the countries. (World Trade Organisation 2014.)

CSR – corporate social responsibility is, or at least should be, required for every company from a strategic level. For a company it can be possible to do well by doing good. With the products in question, the aim of helping the less fortunate and preserving resources may be achievable. The case company aims to create substantial non-profit operations in co-operation of other global non-profit organisations in order to help people improve their quality of life.

The millennium development goals stated by the United Nations (UN) form a blueprint for helping the poorest of the world. The cut-off date for these goals is set to be in the year 2015. The eight goals are shown below (Figure 1). For the topic of this thesis the goals 4, 5, 6 and 8 are the most important. (United Nations.)

Figure 1 UN Millennium development Goals

Health care in the developing countries can be a difficult issue, especially in the more rural areas where the nearest hospital might be too far away and resources are limited. Any means for helping people maintain good health and improve knowledge is always a step forward for the quality of life.

Co-operation with non-profit organizations on the grass root level is important for the success of the distribution planned, because they have the knowledge and means to operate in developing parts of the world. The lack of infrastructure is a major obstacle in the distribution and a start-up rarely can go to the developing areas on its own. The easy to use products the company will offer can be used by inexperienced volunteers to help the

work of healthcare professionals, as well as the citizens of the targeted developing countries.

1.2 Topic

The thesis topic contains a preliminary downstream supply chain analysis for drafting a simple distribution plan for the company in co-operation with non-profit organizations in Bangladesh.

PO: The objective of the project is to draft a distribution plan to work as a guideline for designing the plan in the future. Additionally, aim is to find possible co-operators and non-profit organizations that would aid in distributing the products to the target market.

The project tasks were chosen to be as follows, and are fulfilled in the stated chapters.

Table 1 Overlay matrix

PT1:	Create theoretical frame of reference	Chapter 2
PT2:	Outline a basic distribution plan	Chapter 3.1
PT3:	Research for plausible partners	Chapter 3.3
PT4:	Contact organizations	Discarded
PT5:	Draft the distribution plan with non-profit organizations	Chapter 3.2 + attachments

1.3 Product to be distributed

As the company's products are still in the development stage, a really superficial explanation of the product is given here.

The company aims to bring to the market easy-to-use home health testing devices for infectious diseases, STDs and pregnancy and ovulation tests. These products can be used independently, but are designed to be used with the accompanying smartphone app. The app offers comprehensive, easy-to-use entity with necessary tips and contacts. The use of the app is encouraged when possible, but for the sake of this thesis the focus is on the STD testing device. Probably that the devices will be manufactured in China or other low-cost countries at least in the early stages, where they will be directly shipped to the target country or first shipped to Finland for inspection, packaging and bundling.

World Health Organization (2013) mentions in their factsheet, that diagnosing sexually transmitted diseases/infections (STDs) is difficult in developing areas. Therefore there is a real need for the easy to use and affordable product the company is developing. Also a key aspect of reducing STD rates is educating the customers of the dangers of the diseases and ways to prevent the infections. This education should be provided with the tests, but will not be further discussed in this thesis.

For this thesis it is also assumed that the products require dry conditions and approximately room temperature for storing and transportation. This assumption is made in order to consider the in-transit care and the warehousing needs of the product.

.

1.4 Target market

The commissioning company has agreed with a Scandinavian investment organization, Pharmera Group, to distribute the products to Bangladesh. **Bangladesh** is an Asian country with a population of 155 000 000, of which 29 % live in urban areas. The GDP of Bangladesh in 2013 was 129.9 USD. More than half of the GDP is generated by service industry, but more than half of the labour force works in agriculture, specially rice farming. The largest exporting industry of Bangladesh is garment manufacturing. (CIA; World Bank 2014; World Health Organization 2014a; World Health Organization 2014b.)

For this thesis the target market is merely an example, as the aim of this thesis is to draft a distribution plan and highlight key points for future reference and to work as a guideline in designing specified distribution plans for future markets.

1.5 Case company

TestPlus is a start-up company founded by Haaga-Helia International Business graduate Jess Yliniemi, with the head office located in Helsinki, Finland and ambitions to operate globally. The company products are on the development stage, but in the future the company will produce and distribute home health testing kits for several common illnesses, STDs, drug testing, pregnancy test kits and accompanying smart phone apps. The apps are in development and the company is currently researching all the available tests. As the company was founded in the spring of 2014, the search for seed funding and interested investors is a major goal for the entire team.

The company aims to distribute the products and services to basically all markets, in developed countries as well as in the developing countries. The founder and the entire team working for the company aims to go above and beyond the legal obligations. For this purpose the company will have major focus on not-for-profit operations and partnerships.

1.6 Key concepts

Supply chain management (SCM) is the management of the flow of goods and information through the supply chain from raw material to manufacturing, packaging, transportation, warehousing and distribution. Integrated information systems are important for well-functioning supply chains, as the correct information may help reduce inventories, bottlenecks and other risks.

Distribution chain is the chain of tasks and operations needed to get the goods from the focal company to the end customer efficiently.

Transportation refers to the physical movement of raw materials or goods through the supply chain.

Warehousing refers to the operations within the supply chain when the raw material or goods are stored and handled for the next step in the chain. Warehouse operations may be organised in-house or outsourced to a specialised warehouse operator.

Corporate social responsibility (CSR) is the corporate philosophy of considering all the company's stakeholders instead of merely the shareholders on the company's operations and decisions. CSR actions enable sustainable use of resources, to consider the impact to people, planet and profit when designing each action and operation of the company. It means greener transportation modes, environmentally friendly packaging, and liveable wages to the workers and sustainable growth to the company.

2 Distribution chain and corporate social responsibility

In this chapter the theoretical background of the thesis project is explained. First, as an introduction, basic explanation of supply chain management is given and some of its current trends described. Then, brief descriptions of upstream operations in the supply chain are given. As the focus of this thesis is on the downstream part of the supply chain, the upstream operations are only shallowly discussed before explaining the downstream operations in more detail.

In the downstream part of the supply chain, meaning the actions and operations from the focal company towards the customer, first the basic definitions of distribution and demand management are given and global distribution is discussed. Next, a major component of a distribution chain, transportation, is introduced with aspects of transportation modes and transportation service possibilities are discussed, as well as topics of transportation management. Then the topic of warehousing, its tasks and management are discussed and later the inventory management and its importance is described briefly. Also information and documentation requirements of international trade are explained. Finally some topics of corporate social responsibility are discussed with the emphasis on the impact of the distribution chain.

All the previously listed operations and tasks are described and discussed in order to draft the distribution plan, which is detailed in chapter 3. The aim of a distribution plan is to detail the decisions and effects of each step in the chain in order to design a well operating, efficient transport and distribution of goods. A distribution plan is an important roadmap that shows which decisions to make in which stage and how to figure out applicable criteria for the decisions.

2.1 Supply chain management and the upstream

The aim of any company is to satisfy its customers' needs and beat its competitors for it. The company may compete by offering a lower cost product and therefore be considered a commodity, or the company may aim to increase the customers' perceived value of the product. The customers often are willing to pay more of the product with a higher perceived value compared to the total cost of ownership. Higher perceived value is an important competitive advantage to any company. Martin Christopher (2010, 2-3) in his text gives a simple way to define the customer value:

$$\text{Customer value} = \frac{\text{Perceived value}}{\text{Total cost of ownership}}$$

Figure 2 Customer value by Martin Christopher 2010, 3

According to Christopher (2010, 2) the perceived value include the tangible product and intangible services or service-related aspects of the seller-buyer-relationship. With this relationship the company competes with others. Therefore companies must improve their capabilities in every step of the process, and for this improvement logistics management offers a unique opportunity as it may impact both perceived value and total cost of ownership.

According to Christopher (2010, 2-4) logistics management aims to optimize the flow of materials and goods from raw material to the finalised product for the company by creating an integrated process throughout the company. The aim of the process is to plan, monitor and manage the flow of supplies from the upstream, meaning from the suppliers towards the focal company, to downstream, meaning from the focal company towards the customers, as well as plan, monitor and manage the information flow between operators in order to ensure smooth delivery of expected results. This concept is nowadays widely known as supply chain management (SCM).

The concept of SCM has fundamentally changed the perception of how to manage the partnerships within the supply chain. Instead of only focusing on maximizing profits by minimizing costs, often on the disadvantage of the supplying companies, the aim nowadays is to create mutually beneficial partnerships within the supply chain. In SCM the entire chain is considered in order to enhance competitiveness. The supply chain must be closely coordinated so that the final customer may be served with a sustainably low cost, short time frame and high perceived value. Below is a figure modelled from Martin Christopher (2010, 4) showing simplistically the critical links within the supply chain. In these links material and information flow must be managed in order to ensure customer value. (Christopher 2010, 4.)

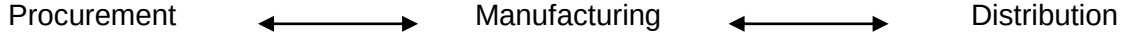

Figure 3 Linkages in supply chain Christopher 2010, 4

As the focus of this thesis is in designing a distribution plan, the upstream part of the supply chain is now very briefly discussed.

Purchasing

The supply chain of a product starts from the raw material. The raw materials are purchased from suppliers. In the past companies rarely paid much attention on purchases, even though they often are the single largest cost in the company. Purchasers have been merely pushed to search for cheaper alternatives, which may result in huge supplier bases that are difficult to manage. Lately companies have started to pay more attention on purchasing as a strategic decision and have created more sustainable and tighter partnerships with their suppliers. (Christopher 2010, 5.)

Manufacturing

After purchasing the raw materials, the products are manufactured, either by the focal company or their first tier suppliers. Some manufacturers have moved to the lean thinking in their processes. Lean philosophy means minimising waste in each step of the way. In lean thinking waste can be time, movement, raw material or discarded products. Just-in-time deliveries often go hand-in-hand with the lean thinking. It enables the manufacturer to minimise inventories of raw material and components, as they are delivered by the supplier just as they are needed. (Christopher 2010, 5-6.)

2.2 Trends in logistics

In a business' strategic level trends are understood as social and economic structures' tendency to change substantially. These trends should not be considered as minor passing things, but major changes in the near future. Straube and his colleagues discuss in their piece the evolution of some trends in logistics. Straube and his colleagues identify three megatrends, economic and social changes that have a greater scope and scale of effect globally. These megatrends are internationalisation, security and ecological sustainability. These megatrends have long-term effects and create challenges for logistics managers. (Straube, Nagel & Rief 2010, 32-48.)

2.2.1 Megatrend internationalisation

Companies are more and more operating globally, either purchasing from foreign suppliers, or selling to foreign markets. This is done in order to expand their sales and improve the customer value of the product. The market penetration must be done in a controlled manner. Straube and his colleagues trace a simplified framework of the planning process. Below is a figure based on the framework. (Straube, Nagel & Rief 2010, 33-37.)

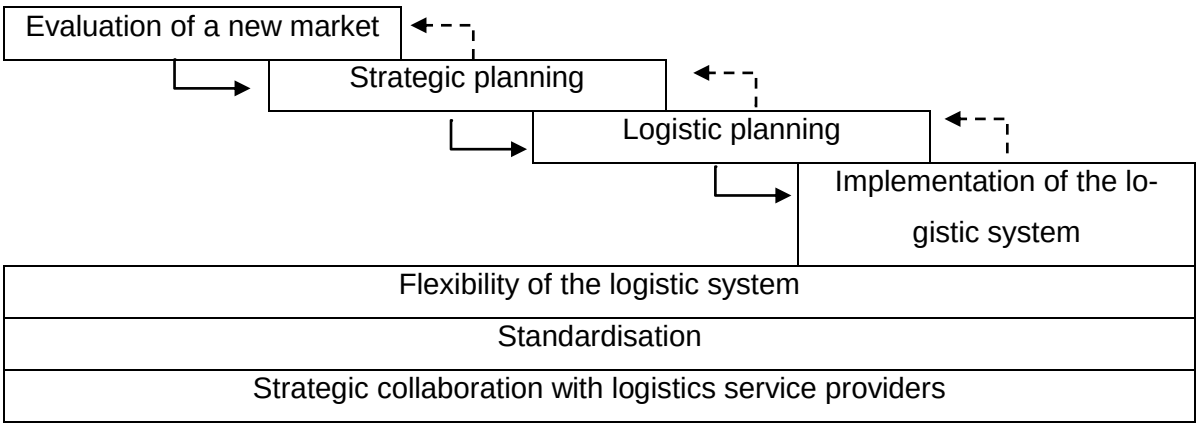

Figure 4 Internationalisation process framework Straube, Nagel & Rief 2010, 34

This simplified framework (Figure 4) shows the cross-functional nature of internationalisation. The process starts with evaluating the target market, by which the feasibility of the market entry is evaluated. The evaluation step also gives preliminary information about the demand on the new market. This stage is executed or at least initiated by the top management. (Straube, Nagel & Rief 2010, 34.)

The second stage, strategic planning, is still done by the top management. In the strategic planning stage the market entry is planned as a project, given timeline, budget, goals and key performance indicators. The result of this phase is to give each function in the company its tasks in the internationalisation process. (Straube, Nagel & Rief 2010, 34-35.)

The third stage is the logistics planning, when the upstream and downstream logistics are planned as well as warehouses, service level requirements and inventory policies. Logistics planning includes usually also IT planning, as smooth information exchange is a key factor in well operating logistics system. Even though the logistics planning is a major task with effects in all phases of the process, the planning managers are often pushed on tight schedules. (Straube, Nagel & Rief 2010, 35.)

In the final stage, the implementation of the logistics system, the planned process is put to action. In this operational stage the management finally sees if the decisions made in the planning stages were correct. The implementation is done by the operational level, and the workers must have proper problem solving skills in order to make the plan work well. If the planning stages have been done well, the implementation can easily be done by the book. (Straube, Nagel & Rief 2010, 35.)

Overall the internationalisation is a difficult and cross-functional process that requires proper planning and communication in order to be successful. Internationalisation also brings more market conditions and regulations that have to be considered in the planning stages. Nevertheless more organisations are internationalising their operations because it offers larger, more versatile markets, cost reductions and competitive advantages. (Straube, Nagel & Rief 2010, 33-37.)

There is some level of global standardisation in logistics, in packaging pallets, strategies and information and documentation. There seems to be willingness and preparedness for more standardisation in the future in the logistics managers around the world, as managers acknowledges the possibilities for cost reduction through standardisation. There is a large degree of worldwide standardisation within large companies, but in the future there probably will be more standardisation between companies as well. (Straube, Nagel & Rief 2010, 36-37.)

2.2.2 Megatrend security

Security in logistics processes means security from outside threats, such as crime and acts of terrorism against transport vessels and networks. Security also means securing against risks within the supply chain, from procurement flaws, bottlenecks in production or changing customer preferences. For the inside threats safety stocks and flexibility in the supply chain can be used. For outside security there are legislative measures and private initiatives. (Straube, Nagel & Rief 2010, 37-41.)

Security and risk management in logistics has improved as the knowledge has increased; still some companies consider supply chain security difficult and time consuming. Supply chain security should be considered as a competitive advantage and working towards better customer relationship, as it does increase the reliability of the company. (Straube, Nagel & Rief 2010, 37-41.)

Risk management

Risk management is often connected to financial institutions, in which it is a commonly used tool. Similar tools may be used in non-financial operations also and it is recommendable to use risk management tools also in supply chain and logistics planning. Understanding the potential benefits of integrating risk management to the company's opera-

tion from an early stage may improve the company's potential for sustainable growth. (Stemmler 2010, 178-179.)

To be able to implement the concept of risk management in supply chain all partners in the chain should be involved. Risks that are considered in the management system are measurable possibilities, chances of danger, loss or injury. In a business sense also loss of potential customers can be considered a risk. Well operating risk management system offers the company's top management continual identification assessment and analysis of potential risks in the operations and in the market. Through this information the management may adjust the company's operations. (Stemmler 2010, 180-181.)

Possible risks must be reliably identified, the probability of the occurrence assessed and the financial and operational scope of the occurrence identified for the company to better prepare for future actions. Managers must be open to the potential risks in their field of responsibility, since hiding the potential risks may only make the situation worse in the face of the occurrence. By mapping the potential risks and their probabilities the company may better prepare and so mitigate the effect of said occurrence. In order to enable proper risk management within the supply chain close cooperation between partners is important, as well as communicating risks openly and controlling them clearly. (Stemmler 2010, 181-184.)

2.2.3 Megatrend ecological sustainability

Customers and other stakeholders are pressing companies to consider ecological values in their processes as the climate change and diminishing resources are consider more and more important. Also global regulations on emissions and rising fuel prices drive companies to consider more sustainable options. Companies are pressured to consider the entire life cycle of the product and several companies use their acknowledgement and action in sustainable production as a competitive advantage and a marketing opportunity. (Straube, Nagel & Rief 2010, 41-46.)

Logistics often contribute large portion of a company's greenhouse gas emissions, therefore it is an important aspect to consider when thriving for a greener supply chain. Other aspects of the company's operations must also be scrutinised for creating non-wasteful use of resources. Many companies acknowledge the role of logistics in creating more sustainable processes for their future operations, but often the set goals are vague and ge-

neric. In many cases projects for green logistics were seen as an additional cost the customers aren't willing to pay. Companies need to create holistic, tangible and measurable guidelines and goals for more sustainable future. (Straube, Nagel & Rief 2010, 41-46.)

Companies acknowledge the possibilities of improving operations and reducing emissions and costs in logistics by better planning of different stages. Packaging design may reduce raw material needed and improve warehousing and transport capacity utilisation. Using recycled or recyclable materials in packaging is often strategy also. However the recycling capabilities in the target market must be considered as well as package integrity in long haul transportation. In transport ensuring better capacity utilisation and avoiding empty runs by route planning and bundling when possible quickly generate cost reduction as well as less emissions. These are attractive options for companies as the results are visible already in the short run. In longer time perspective companies may invest in increasing the usage of renewable energy sources in their vehicles. (Straube, Nagel & Rief 2010, 43.)

Important factor in the environmental impact of a company are also its suppliers. As international companies improving their sustainability tend to create stronger relationships with their suppliers, they also require certifications or conduct audits on them. Companies are willing to terminate supplier relationships if the supplier is not able or willing to reach the desired level of operational sustainability. However, if the supplier is willing to improve its operations in order to reach the desired level, several companies are willing to support their suppliers. (Straube, Nagel & Rief 2010, 43-44.)

Many companies outsource logistics and warehousing operation, these service providers play an important role in the equation. Companies require logistics service providers to offer greener services and certificates of their actions but are rarely willing to accept lower service levels or additional costs. Companies may contact third parties to audit the footprint of potential logistics service providers, but are expecting the service providers to do it more themselves in the future. Logistics service providers wanting to operate in the future will consult their clients when designing more sustainable future operations. (Straube, Nagel & Rief 2010, 44-45.)

As in any other aspect of a company's operations, in order to improve, the current situation must be measured and evaluated. The problem for sustainable logistics is the lack of tools and research on the subject. Companies lack the tools necessary for evaluating the

impact, both the environmental damage and the monetary loss. In order to properly understand the current situation and how to plan an improved future, the companies require comprehensive measurement and evaluation tools. The companies also lack the strategic concepts and cost-benefit calculations needed for proper understanding and planning. (Straube, Nagel & Rief 2010, 45.)

2.3 Distribution

The conventional view of distribution was focused merely on transport and warehousing, this has expanded with the overall adoption of SCM. Now the main task of distribution is considered to be demand management. Demand management starts with information and defining customer service goals, these goals should preferably be based on real information of actual usage and consumption of the products. Also in defining the customer service goals, the manufacturing schedules and lead times must be considered. For fluent demand management, cross-functional co-operation is also important within the company, as e.g. promotions or other marketing activities will affect the demand of the product. (Christopher 2010, 6-7.)

Forecasting accuracy may be difficult to achieve, therefore flexibility in the supply chain and quick response to the changing market situations are crucial for successfully filling the demand. Martin Christopher (2010, 6-7) speaks about quick response logistics as an aim for many companies. Quick response logistics requires seamless information exchange between each member of the supply chain as it is basically a replenishment-driven model. This model enables operators to minimise inventories, as the products are only delivered when they are consumed, and each step in the chain triggers the prior step to replenish the next one. This leads to smaller, more rapid deliveries instead of larger ones. This often leads to higher delivery costs, but they are more than paid off in reduced inventory in the pipeline.

In some cases postponement is a valid strategy. It more often is for manufacturing, as the manufacturer may need fewer inventories of finished goods and rather do the final configuration as the product is ordered. This model enables flexibility in the process especially if several of the manufacturers' products require standardised parts. (Christopher 2010, 7.)

2.3.1 Global distribution

Supply chains in general have become international. It is easy nowadays to find lower manufacturing costs from the other side of the world even when the transportation costs are added. Also, as companies may sell their products globally, they reach the economies of scale. The internet enables quick and accurate communication between operators globally and transactions over time zones. (Arnold, Chapman & Clive 2008, 366.)

Designing a global distribution chain some additional aspects should be considered, e.g. language, culture and currency. The longer distances the goods will travel will affect the lead time and needed transportation inventory. The target country might have a different measurement system, so clear documentation and using internationally accepted standards may help. Cultural differences may affect the ways of conducting business and local national holidays should be considered. Currency fluctuations may affect costs, but as doing business becomes more common and connections are better, foreign currency transfers become easier. (Arnold, Chapman & Clive 2008, 366-367.)

Customs and tariffs

Customs is the official department that administers and collects duties from imported goods. Customs offices are located in ports and airports or other frontiers to check and control the transport of goods and control for illegal substances. (Oxford dictionaries 2014.)

Tariffs are trade barriers imposed by governments to restrict the importing of specific goods or raw materials. Tariffs are often laid to reduce dumping of certain products with below market price in order to balance the home market.

2.3.2 Channels of distribution

Channel of distribution consists of individuals or organisations who participate in the flow of goods or services from the producer to the consumer. A company may organise and manage its distribution itself, or they may employ outside operators in different stages of the channel. The individuals or organisations between the producer and the consumer, called intermediaries, may be wholesalers, retailers, transport operators or agents. Two separate but interconnected channels operate at the same time supporting each other; **the transaction channel** is concerned or the negotiations, contracts and transferring the

ownership of the goods, whereas **the distribution channel** is concerned of the transfer of the physical goods from one operator to the other. (Arnold, Chapman & Clive 2008, 361.)

Intermediaries in the distribution channel include distributors, trading houses, government departments, industrial buyers, wholesalers, retailers, chain stores and export agents. Each of these intermediaries may have their own tasks in the distribution chain, contributing to the sales of the products but diminishing the profit of the focal company. A distributor is the exporter's customer who buys the products and sells them to its own customers, usually wholesalers or retailers. Trading houses act as agents to both importers and exporters. Government departments usually prefer long term contracts for desired goods. Industrial buyers usually are interested of raw materials or components and usually buy directly from the manufacturer. Wholesalers may buy directly from the exporter or from a distributor, they usually aren't exclusive with the buying and selling rights but command a great market position. Large retail chains may buy directly from the exporter, but usually the retailer buys the goods from a distributor or wholesaler. Export agents are individuals or legal entities operating as the principal of the exporter in a specific geographical area or field of business. The export agent doesn't assume risk of the goods, but operate on a commission. (Pienaar, Vogt, 384-386.)

Distribution is critical for company's expansion, as the customers may be geographically dispersed and rarely companies are willing to serve only the local market. By reaching for wider markets the companies may be able to bring down unit costs and therefore either reduce prices or increase profit. A well designed distribution also adds value to the product and to the company. (Arnold, Chapman & Clive 2008, 361.)

According to Arnold, Chapman & Clive (2008, 364-365) the key points to consider in designing a distribution are:

- **Transportation**, this involves carrying the products from the company, throughout the entire distribution chain to the customer. Transportation modes are discussed later.
- **Distribution inventory**, this, as explained in a later chapter, means the finished goods that are in transit from the company towards the next stages of the distribution chain, but aren't yet in the reach of the customer.
- **Warehouses (distribution centres)**, as discussed later, are used to store the products and are used by the company, the wholesaler, the retailer.
- **Material handling** is the movement of goods inside the distribution centres.

- **Protective packaging**, to ensure that the customer will receive undamaged products.
- **Order processing and communication** must operate effectively to ensure the right amount to be delivered to the right place. Many intermediaries may be involved in this, so the communication may affect the lead time.

These decisions also generate costs that ultimately will be carried to the customer. The aim in designing the distribution chain is to minimise the total cost of the operations.

2.4 Transportation of goods

Transportation as a business activity adds value to the process by moving the goods from a supplier to the next level in the supply chain. The transported goods may be raw materials, semi-finished goods or finished goods. Raw material is transported from where it is unusable and plentiful to the location where it can be processed and is needed. Semi-finished goods may be transported from the primary processing location to the final processing location or to postponement storage. (Pienaar 2009a, 323-324.)

Several factors, characters of the goods, affect the decisions for the proper transportation system such as in-transit care, density of the goods, size and divisibility, stowage ability and potential liability of the goods. Below brief explanations of these factors are given. (Pienaar 2009a, 331.)

In-transit care refers to the requirements of the goods. Such elements are the form, animation, destructibility, fragility, wetness, potential danger and perishability. Form means whether the goods are liquid or solid, it significantly influences the way the goods are packed and handled. Animation refers to whether the goods are animate or inanimate, e.g. live animals require special handling. Destructibility refers to how well the goods handle elements, vibrations or jolting during transportation. Fragility of goods may vary greatly, but may be compensated with protective packaging. Wetness of the goods affects the packaging, handling and consolidation possibilities of the goods. Potentially dangerous goods include combustibles, contaminators, corrosives, explosives, inflammables, malodorous materials, oxidisers, poisons, radioactive material, water reactors as well as some compressed gasses and other inherently dangerous products. Perishability may be natural, as in fruits or cut flowers, or it may be obsolesce, such as newspapers that become out dated the next day or fashion or medicine needed in emergency cases. (Pienaar 2009a, 331-332.)

Density of the goods refers to the mass-to-volume ratio and is expressed as kilograms per cubic meter. Different transport modes have different carrying capacities and to optimise the transportation operation, the density of the goods should be as close to the carrying capacity of the vehicle as possible. In some cases the goods carried are in such shape or form or they otherwise require additional space around them, these must be taken into consideration. (Pienaar 2009a, 332.)

Size and divisibility alongside the density effect on the vehicle decision and utilisation. The dimensions of the goods effect on how well they may be packed into the vehicle and to which vehicle they best fit. (Pienaar 2009a, 333.)

Stowage ability refers to the ease of handling of the goods. Loose or bulk commodities require specialised handling techniques and equipment, but they don't suffer damage so easily during handling or transport. Packaged goods usually are packed on pallets or similar easy to handle loads. Packaging protects both the product and the handler from damage. (Pienaar 2009a, 333.)

Liability is the final factor to consider. For this consideration there are four important factors; the value of the goods should be compared to the cost of transport, packaging fragile goods to withstand potential impacts or vibrations and jerking during transport. If needed to protect against loss or theft, non-transparent packaging may be used, finally the potential liability stemming from the product itself. (Pienaar 2009a, 333.)

2.4.1 Transportation modes

Transportation is an essential economic as well as an essential part of the distribution chain. The transportation modes have their characteristics, impacts and costs that have to be considered when choosing the proper modes for the company's needs. The chosen transportation mode effects on the terminals and ways that will be used. (Arnold, Chapman & Clive 2008, 368-371.)

The transportation modes go to three basic forms: air, land and water ways. From these land and water ways may further be divided to pipeline, rail and road freight on land and sea freight and inland waterways. (Pienaar 2009a, 324.)

Rail freight provides their own infrastructure of ways, terminals and vehicles. In many countries railways are the dominant transport mode. Railways work well for large, bulky products and long distances, often used for raw materials and semi-finished goods. Rail freight also is comparatively less polluting per tonne of carried goods. On the other hand packaging costs may be higher as products must be packed more in order to minimise damage during transport and consolidating. (Arnold, Chapman & Clive 2008, 369-370; Pienaar 2009a, 326-328.)

Road freight is more flexible than rail freight as it doesn't require own tracks, but can go anywhere that has roads. Truck capacity is small compared to the other modes. Truck operations often require licencing, taxes and tolls from the operator. Trucks are able to carry out door-to-door deliveries and are often used in mixed mode transportation for the final mile. The carrying capacity of road freight is small and the environmental impact is high. (Arnold, Chapman & Clive 2008, 370; Pienaar 2009a, 3225-326.)

Water ways freight is optimal for large quantities of non-perishable products as they have the largest capacity to carry, but are slow moving. Water ways consist of oceans and inland lakes, rivers and canals. In some places inland water ways are a viable way to transport commodity goods. Globally ocean freight carries most of goods transported as it is a cost effective although slow mode of transport. The carrier vessels may be specialised to carry liquids such as oil, solids such as ores or containers. The container ships may carry any commodity or product and are therefore very versatile for the producer of the goods. (Arnold, Chapman & Clive 2008, 370-371; Pienaar 2009a, 329-330.)

Air freight has large variable costs, but is fast even in long distances. Therefore air freight is best suitable for high value perishable goods. Air freight often is the fastest mode of transport especially on long hauls, but the deliveries usually require feeder and distribution services as the terminals usually are located far from businesses or customers. Air freight also has the largest environmental impact. (Arnold, Chapman & Clive 2008, 370; Pienaar 2009a, 324-325.)

Pipeline is only used in transportation of liquids and gasses e.g. oil and its refined products. The initial investment on pipelines is very large, they are geographically inflexible and only accommodate large continuous delivery of gas or liquid from and to fixed places. (Arnold, Chapman & Clive 2008, 371; Pienaar 2009a, 328-329.)

2.4.2 Freight transport service operators

Companies may deliver their own goods through the supply chain, but more often than not companies make use of specialised freight transport service operators. These operators each have their specialised tasks they perform. Two groups of service providers may be distinguished; transport operators and non-operating transport service providers. From these groups the first one may be divided private carriers and professional carriers, the second group may be divided to freight forwarders and freight brokers. (Pienaar 2009a, 333-335.)

Private carriers operate their own or leased fleets to support the company's core operations. Private carriers may provide in-bound and out-bound movements as well as movement between company locations or operations. (Pienaar 2009a, 334.)

Professional carriers offer their own or leased fleet to companies on contractual basis. The contracts may be long term or single haul contracts. Professional carriers are also known as third-party carriers or commercial carriers. Professional carriers may also provide more comprehensive logistical services according to their mutual agreements. (Pienaar 2009a, 334-335.)

Freight forwarder is a fourth-party operator; an outside operator who takes responsibility of the shipments contracted to them, consolidates them to larger, more economical shipments with the same destination, organises the shipment and the break-bulk operations in the receiving end. Freight forwarders don't own or lease their fleet, but contract professional carriers often for long time contracts. (Pienaar 2009a, 335.)

Freight broker acts also as a fourth-party operator, but unlike freight forwarders don't take the shipments in but recruit carriers for their customers. Professional carriers may also use freight brokers to better utilise their carrying capacity by finding additional loads to fill the cargo, especially for return hauls that would otherwise be under-utilised. (Pienaar 2009a, 335.)

2.4.3 Transport management

Proper management of the transportation system is important for the entire supply chain to operate properly. Transport management must be considered on the strategic, tactical

and operational levels. Badly managed transport system will halt the entire company's operation and render customers unsatisfied. (Pienaar 2009b, 362-382.)

The main **strategic** decision is whether to use private or professional carrier. An important consideration in this decision is the efficiency of the carrier service. Wessel Pienaar (2009b, 365) gives five points to think of in this consideration:

- Volume of traffic; does the company have the volume to get real benefit from private carrier.
- Back hauls may be difficult to gain for a private carrier therefore reducing the vehicle utilisation.
- Professional carrier has better opportunities for labour specialisation and therefore greater customer service.
- Managerial issues rising from auxiliary operations of the private vessels and labour force.
- Investment in to own vehicles, drivers, licences and other costs.

The potential carriers must be evaluated first for their **technical capacity** to perform the required service, second for **the acceptable price** and thirdly for their **willingness** to offer the desired service. The deciding factors are suitability, accessibility, goods security, journey speed, reliability and flexibility. (Pienaar 2009b, 368.)

On **the tactical** level the main problem in transport management is consolidation of goods to maximise vehicle utilisation. There are several methods and options for consolidation, but the result in all the cases is to reduce trips, maximise utility and best serve the customers. In load consolidation the carrier receive several consignments sometimes from separate companies directed to same destination or same direction. Consolidation may be done also between two hubs when in the first one several shipments from different sources are consolidated into single truck, container, train or ship and broken into individual lots in the break-bulk-side hub. (Pienaar 2009b, 368-371.)

Consolidating smaller shipments into containers have several advantages on top of vehicle utilisation. These advantages, according to Wessel Pienaar (2009b, 371-373) are:

- Efficiency of storing handling and carrying reduces the unit cost.
- Identifying, tracing and tracking individual items during transport.

- Good security improves as the containers are handled mechanically and are less likely to be damaged or stolen.
- Space may be better utilised during transit with consolidated container loads rather than individual loads.
- Transit time is reduced as loads may be handled more efficiently when moved from transport mode to another.

On the other hand containers have their disadvantages; these include restrictions of ports that can handle containers as they require special equipment and finding freight for the return trip to maximise utilisation therefore leading to the transportation of empty containers. (Pienaar 2009b, 371-372.)

Other tactical transport management issue is to consider intermodal transport, sometimes called multimodal transport. This refers to using more than one mode of transport to fulfil the distance between the origin and the destination. Road transport is the most flexible and able to reach most places of business, it is therefore most used for pick-ups and deliveries. Between these points consolidation and mode switches may occur for more efficient transportation. The haul may be from the point of origin to a break bulk terminal or distribution centre, from a consolidation centre to the destination or from a consolidation centre to a break bulk terminal. The consolidation and break bulk services may be operated by fourth-party operators such as freight forwarders or multimodal shippers, who operate more than one mode of transport in their operations. (Pienaar 2009b, 372-373.)

The operational transport management tasks consist of routing, clustering and coordinating incoming traffic. In routing the first decision is choosing the proper vehicle, for this the carrier must optimally aim for continuous flow of goods, maximum unit size, maximum vehicle size, maximum mass-carrying capacity related to the vehicle mass, adaptation of vehicle unit to volume and nature of traffic, standardisation, compatible unit load equipment, long-haul freight consolidation and maximum utilisation of inputs. (Pienaar 2009b, 373-375.)

The next consideration is the clustering and routing of collection and delivery points. The principles for routing are clustering the service points as densely as possible, clustering the service points according to the daily trips, determining the routes starting from the furthest point, the sections of the routes must not cross, two routes must not overlap, using the largest available vehicles, collecting and delivering in the same trip, minimising dis-

tances the heaviest loads will travel, avoiding single service points located far from the cluster and avoiding narrow time windows at service points. (Pienaar 2009b, 375-376.)

Coordinating the incoming traffic enable the company to operate smoothly. A smooth flow of supplies enable the company to hold fewer inventories as the supplies may be soon consumed or sold and reduce possible bottlenecks in the supply chain. Professional carriers may offer additional services to improve flexibility and service level such as tracking and tracing the products, expediting delayed products or arrange earlier deliveries, diversion or reconsignment of loads to a different destination and demurrage or detention on overtime loading or unloading of the vessel. (Pienaar 2009b, 377-379.)

2.5 Warehousing

Supplies or goods are stored in warehouses. In some cases the goods are stored for an extended time, in some cases the turnover is very quick and in some cases the warehouse operates as a distribution centre. The main objective of proper warehouse management is to minimise costs and maximise customer service. (Arnold, Chapman & Clive 2008, 335-336.)

In the physical warehouse the quantity of goods stored must be considered, how they may be packaged and stored in an optimum cube utilisation; meaning what kind of shelving, how high spaces and what kind of layout works best offering optimal usage and accessibility. For warehouse space more than just the shelves are needed, also aisles, receiving and shipping docks, order handling, offices and possibly assembly areas are needed. (Arnold, Chapman & Clive 2008, 336-342.)

There are two types of warehouses commonly used in the supply chain, both types have variations according to the specific needs of the goods stored, but the basic distinction is to general warehouses and distribution warehouses. In **general warehouses** goods are stored until needed with minimal handling. In **distribution warehouses** the larger volume lots are broken down to accommodate each individual order. The goods are stored only briefly in a distribution warehouse. (Arnold, Chapman & Clive 2008, 377.)

These warehouses play important roles in the supply chain by filling certain important functions: (Arnold, Chapman & Clive 2008, 377-379; Bozarth & Handfield 2013, 243-246.)

- **Transportation consolidation**, to reduce transportation costs by combining smaller shipments from several suppliers in to larger shipments going to the same direction. These warehouses may be operated by the manufacturer of the product or by contract carrier who consolidates smaller units into larger shipments to better utilise the vehicle capacity.
- **Break-bulk warehousing** means the opposite, when larger quantities are divided into smaller shipments to deliver to factories or retailers. This is often the case in distribution centres.
- **Cross-docking** is similar to break-bulk warehousing. In this operation large shipments are taken in, broken in to smaller individual orders and shipped out. In some cases this operation includes incorporating goods from several suppliers into other deliveries to same destination. In a cross-docking operation the goods aren't stored, but sorted and shipped forward.
- **Product mixing** means the combining of goods from several origins in to single customer order, this way the customer doesn't need to order each product separately and receive them in separate shipments.
- **Hub-and-spoke** system operates somewhat similarly to cross-docking, the hubs benefit from transportation economies of scale, they take in large shipments from several sources, sort the shipments and combine to desired mixes and transfer them to the spokes, the retailers.

Considering the topic of this thesis, focus is on the distribution warehouses; manufacturer's warehouses play their own important roles in the supply chain, but are not considered here. In a distribution warehouse, or distribution centre, the aim is to get the correct products delivered to the customer in correct time. To enable accurate and timely operations the products must be documented and continuously tracked. The documentation and tracking enables the entire operation to work well. (Vogt 2009, 305.)

There is no one mode of operations that would work in every kind of warehouse, but there are some basic principles from which the operations may be developed from. Below is a brief explanation of these principles by John Vogt. (2009, 309-316.)

Stock purchasing enables the operator to serve its customers by replenishing the inventory and aim to match the outgoing orders. In many distribution centre the purchasers aim to keep the purchase levels as predictable as possible, but they must also consider the fluctuations in the customer demand. (Vogt 2009, 309.)

Inbound transport arrivals and identification of loads starts with well scheduled transportation. The deliveries must be scheduled well in advance to enable smooth operations for each party. As the delivery arrives on its allotted time period, the delivery documentation is checked against the order. When the documents are checked the delivery may be taken in at the proper door where proper personnel and equipment are located. (Vogt 2009, 309-310.)

In the **receiving bay** the products are unloaded into the warehouse premises, inspected for flaws and loaded to the storage location. The receiving bay should be located to minimise the additional moving of the products. The rate of receiving deliveries should be compatible to the rate of outgoing sales to maximise the efficiency of the entire operation. (Vogt 2009, 310-311.)

Transfer of stock into storage means moving the products from the receiving area into the permanent storage slots. From here the products may be picked to the individual orders going out. This is a crucial step and it must be checked that the status of the product in the warehouse management system also corresponds with the physical location of the products, as misplaced products create delays and additional work. (Vogt 2009, 311-312.)

Replenishment and let-down of stock to pick face means the location in the warehouse where the products are picked from the pallets, or other units they are delivered in, into the outgoing orders. In order to operate properly, the pick face must be replenished as they are picked. The warehouse management system usually automatically replenish the pick face before the previous pallet is completely picked, therefore there must be some additional space to accommodate enough products. (Vogt 2009, 312-313.)

As a customer places an order the **order processing** system checks the availability if said product in the stock, if the product is in stock and there are no restrictions to deliver the order to the customer, the ordered product is reserved to the customer. If the product isn't in stock at the ordering moment, the system may check future deliveries or place an order to get the product from a supplier. (Vogt 2009, 313-314.)

Stock picking is the stage where the products are picked form the pick face for smaller than full pallet orders. The products are picked according to the picking note created by

the warehouse management system corresponding with a customer order. (Vogt 2009, 314.)

Dispatching to assembly of the goods to create a transport load means assembling the picked products to the transportation units. The products are then loaded to the delivery vehicles in an order that enables the most efficient delivery. (Vogt 2009, 315.)

Delivery of goods means the physical delivery of the products from the warehouse to the customer. The delivery must also consist of acquiring the proof of delivery stating that the agreed products have been delivered in the ordered quantity and the ownership of the goods is transferred accordingly. (Vogt 2009, 315.)

Proof of delivery and billing; as the products are delivered and registered as so, it offers the operator the authority to bill the products. Sometimes the customer may query the delivery later, so a formal authentication and proof of delivery should be available. (Vogt 2009, 315.)

Return of unwanted goods is sometimes needed for several reasons, e.g. errors in delivery or order information may lead to delivering incorrect products, there might be over-ordering of the products or they might be damaged. The operator might credit the customer of the returned products and inspect them. If the products are intact, they may be re-stocked and re-sold, if they are damaged, they must be stocked separately. (Vogt 2009, 315-316.)

Stock write-off means the operation needed when damage is incurred, whether it happens during the operations or delivery. Damaged products may sometimes be sold on reduced price, sometimes they must be scrapped. In any case the damages should be documented in the warehouse management system in order to keep the record of the value of the inventory. (Vogt 2009, 316.)

Stock count is imperative in order to ensure correct stock levels against the records in the warehouse management system and therefore fluent operations. There are two major ways to do a stock count; first is a full stock count, in which all the stock in the warehouse are manually counted by at least two separate individuals or teams. A full stock count is labour intensive and time consuming, often carried out only before major audits. The other option is to do a cycle count in which a specified section is counted. Cycle counts are of-

ten carried out regularly in order to stop errors from accumulating. Cycle counts are less time consuming and often less interrupting to regular operations. (Vogt 2009, 316.)

2.6 Inventory management

Inventory means the raw materials, supplies or products a company holds for manufacturing or for selling. Inventories often represent 20-60% of the company's total assets. Managing inventories is an important task that goes hand in hand with production planning and distribution planning. The aim of almost any company is to minimise inventory, optimally match the supply of goods with the demand, but this is rarely possible, as demand usually isn't quite so steady and predictable. (Arnold, Chapman & Clive 2008, 254-257.)

J. R. Tony Arnold, Stephen N. Chapman and Lloyd M. Clive describe six different functions in their book; Anticipation inventory, fluctuation inventory, lot-size inventory, transportation inventory, hedge inventory and maintenance, repair and operating supplies. Below is a brief explanation of each function. (Arnold, Chapman & Clive 2008, 258-259.)

- **Anticipation inventory** is build up in anticipation of a peak in demand, e.g. promotion program or vacation.
- **Fluctuation inventory** is also known as safety stock, it is held in order to cover fluctuations in demand or unpredictable events in the supply.
- **Lot-size inventory** is created to reduce set-up costs or to take advantage of quantity discounts, or if it is impossible to purchase by the flow of manufacturing or sales.
- **Transportation inventory** means the goods in transit and is dependent on the transit time.
- **Hedge inventory** is created in some mineral or other commodity exchanges by operators who expect the prices to rise, they buy large hedge inventories when prices are low and sell them with a profit when the prices are higher.
- **Maintenance, repair and operating supplies** are parts, products and consumables needed to support the core operations but do not directly become part of the product.

2.7 Information required in international trade

As international trade becomes common and complex, correct information that is understandable to all parties becomes increasingly important. For this reason there are standardised documents and codes for goods agreed by the World Trade Organization (WTO) and World Customs Organization (WCO). (Pienaar & Vogt 2009, 397.)

The goods are coded by the Harmonised Schedule or Tariff Code number, this code categorises the goods from the broadest to the most detailed ones. According to these code categories the customs authorities are able to allocate duties without inspecting each shipment entirely. (Pienaar & Vogt 2009, 397-398.)

Another possible coding for the goods is the Export Control Classification Number, which identifies the technology level and capabilities of the goods combined with the information about the country of destination, customer and intended application. This information is used to determine whether an export licence is required. Some goods require a license to be allowed to be imported or exported to or from a specific country. If a licence is required, it must be acquired before the goods may be exported or imported. The licence may be required of specific products manufactured in a specific country or e.g. harmful goods. (Pienaar & Vogt 2009, 398.)

The country of origin of the goods transported must be clearly stated as large numbers of customs duties depend on it and the harmonised schedule –code. Duties and tariffs are often imposed to prevent dumping of goods below realistic market value. Some countries may require the country of origin documentation to be certified by appointed officials or organisations. (Pienaar & Vogt 2009, 398.)

2.7.1 The documentation

The distribution chain consists of several operators and service providers, instructions for each must be well documented. Comprehensive documentation is needed for bookkeeping, invoicing, cost accounting, taxation, export and import formalities and payments. The main categories of the documents are; import and export documents that enable legal movements of goods in and out of countries; transport documents that assign task to each operator in the distribution chain; financial documents that describe and assign the payments of each transaction. (Pienaar & Vogt 2009, 398-399.)

Some common documents needed in international trade specified by Pienaar and Vogt (2009, 400-403.) are listed below. Pienaar and Vogt mention that some of the information of required documents may be difficult to find and have therefore tried to list them comprehensively.

Customs declaration or **commercial invoice** includes information to reflect the sales of the goods and necessary information for the customs authorities such as: (Pienaar & Vogt 2009, 400, 403.)

- Name and address of the seller and the buyer
- Date of issue

Each product specified with

- The harmonised schedule number
- Material number
- Category description
- Quantity
- Value of the goods
- Weight
- The export control classification number
- Licence details.

The next document required is the **packaging list**. A copy of this document is often sent to the buyer to help inspection of the shipment. The packaging list includes: (Pienaar & Vogt 2009, 400-401.)

- Name and address of the seller and the buyer
- Date of issue
- Invoice number
- Order or contract number
- Quantity and description of the goods
- Shipping details
- Quantity and description of each package, carton, crate or container
- Any other information required in the sales contract or documentary credit

The shipper's letter of instruction is a document issued by the seller detailing the transportation of the goods and authorising the specified operators. This document must be clear and precise to reduce ambiguity and confusion within the chain. The document

must not have gaps, but each step has to be specified with the information of who, when, what and how. The shipper's list of instructions, according to Pienaar and Vogt (2009, 401.), details:

- Arranging transportation
- Booking ships
- Filing export declarations
- Delivering the goods to the customs broker in the receiving country
- Crating the goods
- Adding marks to the crates

The **bill of lading** is a document issued by the carrier that is simultaneously a receipt of freight and details the contractual conditions and the engagement to deliver the consigned goods to the prescribed destination. The bill of lading should include name of the carrier and signature of the operator, indication of the status of the shipment with a date, place of departure, and place of delivery, terms and conditions of the carriage. There are several types of bill of lading according to Pienaar and Vogt, (2009, 401-403.)

- Non-negotiable bill of lading
- Negotiable bill of lading
- Air waybill
- Ocean bill of lading
- Clean bill of lading
- Claused bill of lading

If needed, the **dangerous goods certificate** must also be issued by the seller. This document specifies the nature of the hazard presented by the goods and instructions on how to handle them in transit and if the goods are spilled. If the goods require a dangerous goods certificate, the packaging and the shipping crates must also have appropriate international markings. (Pienaar & Vogt 2009, 402-403.)

Dock and master receipts are issued throughout the distribution chain as the goods move from warehouses to transport vessel. An operator receiving the goods issues a dock receipt acknowledging that the company has received the goods and as they are on board a ship a master receipt is issued. These receipts specify the condition of the goods at the moment of the docking or boarding to enable to identify the moment of damage if the goods are damaged in transport. (Pienaar & Vogt 2009, 403.)

2.7.2 Incoterms

The international chamber of commerce has developed and maintains the rules of international trade, Incoterms. These rules specify the rights and responsibilities of the seller and the buyer. The rules clearly state when the products are considered delivered, who is responsible of organizing and paying delivery, insurance and modes of transport. There are 11 rules, each specifying rights and responsibilities of each party. Below is a brief description of each of the rules: (International Chamber of Commerce.)

Rules for all transportation modes according to the International Chamber of Commerce

- **EXW Ex Works** means that the goods are considered delivered when the seller places them at the buyer's disposal at the seller's premises. The buyer is responsible of organizing and paying everything from there forwards.
- **FCA Free Carrier** means that the seller will deliver the goods to a specified carrier at the seller's premises. The buyer is responsible of organizing and paying everything from the point when the goods are delivered to the carrier.
- **CPT Carriage Paid To** means that the seller will organize and pay a carrier for the goods to the named destination that is agreed between the seller and the buyer. The Buyer is responsible of the goods from that point forwards.
- **CIP Carriage And Insurance Paid To** is similar to the previous one (CPT), but the seller will also contract an insurance against loss or damage during the delivery.
- **DAT Delivered At Terminal** means that the seller has delivered the goods when they are unloaded to a named terminal; be it port, warehouse, rail or truck terminal or container yard. The buyer is responsible of the goods from that moment forward.
- **DAP Delivered At Place** is similar to the previous one (DAT), but the seller will deliver and unload the goods in to a named place.
- **DDP Delivered Duty Paid** means that the seller will organize and pay the transport, customs clearance and other export/import practicalities and often also insure the goods during transport to a named location.

Rules for sea and inland waterway transport

- **FAS Free Alongside Ship** means that the seller will deliver the goods alongside the vessel in a named port. The buyer is responsible of loading and transporting the goods from that point forwards as well as the risk of loss or damage.

- **FOB Free On Board** is similar to the previous one (FAS) but the seller is also responsible of loading the goods on to the ship.
- **CFR Cost and Freight** means that the seller organizes and pays the cost and freight of the goods and also bears the risk of loss or damage to the named port.
- **CIF Cost, Insurance and Freight** is similar to the previous one (CFR), but the seller also must insure the goods against loss or damage during carriage to the named port.

In the contract, the agreed rule is clearly stated by first stating that Incoterms 2010 are used. Second, the abbreviation of the desired Incoterm written followed by the destination city where the good is considered delivered. As the Incoterms are globally well acknowledged and are developed to reduce disputes over the ownership of goods in transit. Therefore the Incoterms are recommended to use when exporting or importing goods. (International Chamber of Commerce.)

2.8 Corporate social responsibility

CSR is an abbreviation from the words Corporate Social Responsibility. The European commission defines CSR as the companies taking responsibility of the impact on stakeholders and the environment. (European commission 2014.)

Aside of CSR, other important concept to consider is sustainable development, the aim to continuously improve one's effect as a company. According to this concept the aim is to consider the restricted amount of resources and the effect on the surrounding environment and people while in the same time keeping the company profitable. Niko Roorda in his book "Fundamentals of sustainable development" explain with large amount of examples and analysis how a company may do well by doing good. The core concept of the book is the triple P's; People, Planet and Profit. (Roorda 2012, 30.)

Niko Roorda (2012, 307-327) discusses how some companies aim to improve their actions and the effect they have in the environment from the strategic level. Some companies state the sustainable intentions in their mission and hold it as a guide throughout their operations. Companies may aim to use environmentally friendly suppliers, design their logistics considering the more ecological alternatives when possible or invest and take part into initiatives to improve the environment. The most important factor in developing sustainable business practices is transparency, clearly reporting their actions, effects and

improvements. The Global Reporting Initiative is a well-known standard for reporting the company's CSR actions.

2.8.1 Environmental impact of transportation modes

Sustainability is a rising megatrend on many fields as consumers become more and more conscious of the climate change and demand sustainable operations from companies. Transportation is often the largest single contributor of greenhouse gasses in the company's operations and therefore prime target to focus on when considering the company's environmental impact. Transportation modes may affect the results as well as the size of the trucks used. Delivering larger quantities at a time and in off-peak hours reduce congestion and reduce emissions. If possible, in land transport trains should be chosen instead of trucks. If the company isn't able to fill entire truck loads or rail containers, consolidators, operators who use several suppliers to fill containers with the same destination, should be considered. (McIntyre 2010, 251-252.)

Below is a graph modified from McKinnon's (2007) report of UK emissions on different transportation modes showing the comparative emissions of the different transportation modes. The graph is not precise but used here only to show the scale of differences between the emissions of the different transportation modes. To enable comparison the emissions are shown by tonne-km. There are governmental regulations for allowed emissions, but companies may aim to go above and beyond what is expected from them. (Woodburn & Whiteing 2010, 129-130.)

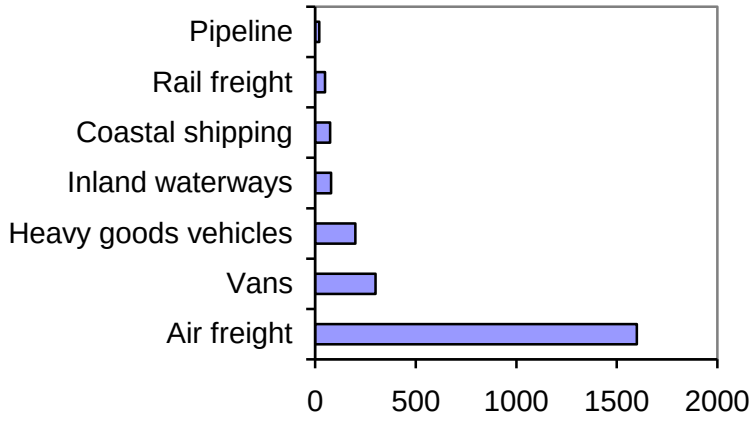

Figure 5 CO^2 emissions of transportation modes modified from McKinnon 2007

According to Woodburn and Whiteing (2010, 136-137) companies designing or improving their distribution chain to be more sustainable, may expect several positive results such as cost savings from e.g. more economical oil usage, enhanced performance, greater reliability, PR possibilities of the 'greener' image and CSR actions. Also considering different modes of transport may increase flexibility in the supply chain and better risk handling.

2.8.2 Impact of warehousing

Warehouses, as all other buildings and operations, require resources and emit greenhouse gasses both in construction and in operation. Clive Marchant (2010, 167-192) explains how warehouses and warehousing is resource intensive and how its effects could be reduced. The resources in question and focused in the piece are land, raw materials and energy. Warehouses are increasingly large, and operate around the clock in order to reduce the unit fixed costs.

Marchant gives a brief framework for assessing the environmental impact of the warehouse before explaining ways to reducing it. He divides the framework into micro-level and macro-level perspectives. In the micro-level perspective the focus is on the business and the economy. It includes assessment of water, energy and buildings. In the macro-level perspective the focus is on the environment and the society. It includes assessment of the land use, such as recreational use, water management and recycling, the assessment of the environmental impact in the form of visual intrusion, travel plans and green energy and the ecological impact in landscaping and bio diversity. (Marchant 2010, 174.)

After the initial assessment Marchant introduces ways to reduce the environmental impact of the warehouse and warehousing operations. The three focus areas in improving the impact Marchant offers are improving energy efficiency, using green energy and designing the buildings in a more sustainable way. The first two may be utilised to improve existing operations, the third one is focused on the designing and building new warehouses. (Marchant 2010, 173-190.)

Improving energy efficiency

In improving energy efficiency of the warehouse the first area to focus is the warehouse **temperature**. The products stored and handled in the warehouse may require a specific temperature and humidity. The warehouse may also have separate areas requiring different temperatures according to the functions, e.g. areas requiring much physical activity

such as loading bays may be adequate with lower temperatures than inspection areas. Over all reducing the target temperature by 1°C may produce savings of 10% in the energy requirements. The ventilation and possible draft also affect the energy consumption to hold the desired temperature. Therefore insulation and segregating different temperature zones within the warehouse help reduce the energy need. (Marchant 2010, 175-176.)

Next focus area Marchant describes is the **lighting** of the warehouse, both inside and outside. First considering the lighting needs of any given area within the warehouse, keeping them relatively free of dust as accumulated dust reduces the efficiency of the lighting therefore leading to increased energy consumption and designing replacement strategy according to the average usage instead of failure help improve the efficiency. The choice of lamp type and controlling gear also affect the energy consumption. (Marchant 2010, 177-178.)

The third area to consider as Marchant describes in order to reduce the energy consumption within the warehouse is the use of **mechanical handling equipment**. The equipment includes forklift trucks, conveyors, ride-on trucks and other systems of cranes and pickers. Some warehouses are even entirely automatized. In the case of the forklift trucks the choice of type of power unit is crucial, whether the trucks are powered by internal combustion engines or electrical engines with high capacity batteries. The trucks powered by internal combustion engines produce exhaust gasses that must be considered and may not be used in closed spaces. Also it is important to consider the entire life cycle of the truck, also in the case of the electrical versions the life expectancy and discarding of the batteries. (Marchant 2010, 179-182.)

Harnessing green energy

Next stage in reducing the environmental impact is to switch to green energy sources. As electricity is necessary, the source of the electricity should be considered. The main goal in choosing greener energy sources, the resources of the power supply still need to be compatible with the needs of the company. The company should aim to choose renewable energy sources such as wind, solar, water or biomass instead of fossil fuels when possible. (Marchant 2010, 182-185.)

Sustainable design

The third stage, according to Marchant, is to consider the sustainable aspects in the design stage of the warehouse buildings. This means designing the buildings to be more

energy efficient and considering wider socioeconomic life cycle perspective of the building and operations. For this goal there are several schemes to use for benchmarking and guidelines for the design and the construction. The aim in sustainable building design is to consider resources used such as direct energy, water and land and also the indirect use such as the energy embedded into the construction materials. (Marchant 2010, 185-189.)

2.8.3 NGOs

Non-governmental organisations (NGOs) are aid organisations operating mostly by volunteer work and donations. These non-profit organisations may operate on local, national or international level. They operate towards a common goal within the organisation to improve education, humanitarian functions, advocate and monitor policymakers and provide information. They provide analysis, expertise, help monitoring and implementing international agreements and serve as an early warning system in critical situations. (NGO.org)

To follow the NGO scene of Bangladesh there is a convenient news site NGO News. From this site it is easy to follow news according to specific fields (NGO News).

3 The project

In this chapter the project of drafting the distribution plan is documented. First, the basic steps of the distribution chain are listed to highlight the main decisions. Then the author's recommendations and suggestions for each step given and the rationalisations of each decision are elaborated. In this drafting stage needs of the product and the company are considered and thus discussed with each decision. As explained in the introduction, the product doesn't exist yet, therefore some assumptions are laid in order to deliver a reasonable draft for a plan.

After the draft for a distribution plan is discussed some plausible co-operators are listed with discussion of criteria suited for choosing the organisations for further search and discussion.

3.1 Basic distribution chain

For the topic of this thesis the distribution chain now discussed begins with the focal company. A very simple option of a distribution chain is given with some brief explanations of the steps. As each stage is discussed in detail in the theoretical part, this chapter focuses on summarising and drafting the simple model for a distribution chain. The distribution chain drafted is also shown in a form of a flowchart in attachment 1. These basic distribution chains drafted here aim to work as a guideline for future operations design.

3.1.1 Methods

From the literary background described in the chapter 2 the key steps of the distribution chain are identified. As the aim is to draft a general guideline from where the company may work forwards, very detailed information is not necessary, only a simple example is built in order to highlight the main steps needed to build a functioning distribution chain.

3.1.2 Simple distribution chain

In the company the goods need to be stored and handled in a warehouse, this warehouse may be the company's property or the service may be outsourced.	Warehouse
From the warehouse the products are picked according to the customer order or the expected demand and transported forwards.	Transportation
Smaller deliveries, often from several sources are consolidated to larger, more economical loads. This step may be done by the company with several of its products, the logistics provider or a freight forwarder.	Consolidation
The consolidated loads are then loaded on to the best suited transportation vessel and transported to the destination.	Transportation
The consolidated and transported goods are separated into smaller individual orders; they may be cross-docked with other shipments going to the same destination.	Break-bulk
The goods are transported to the distributor, this operator may be a wholesaler who sells the goods even further to the retailers. Or the distributor may be the retailer who receives the goods from the break-bulk operator. Or the distributor may be a NGO aiming to improve the lives of people in the developing countries.	Distributor
A plausible step in the distribution chain. The retailer sells the goods to its own customers.	Retailer
The final user of the goods.	End customer

Figure 6 A simple distribution chain

The attachment 1 summarises the distribution chain in a more visual way and highlights some of the key decisions throughout the chain and documents required in each step.

3.2 The distribution of the home health testing kits

As the basic layout of a distribution chain is previously explained, this sub-chapter discusses the distribution planning of the TestPlus products. As mentioned in the introduction, the product doesn't exist yet, so for the sake of this thesis some assumptions are made, they are clearly stated and reasoned as they are reached. The textboxes on the right side summarise the documents and information required on the adjacent step.

One important assumption of the product that affects the transportation, warehousing and distribution is the storage environment needs and in-transit care. As a pharmaceutical product the test device may require some special care, but to ensure easy handling within the distribution chain and for the customer, the aim is to develop the product to be stored in dry, approximately room temperature conditions. Large variations in the temperatures and the humidity within the storage and transit may damage the products and therefore reduce the reliability.

3.2.1 Warehousing in Finland

For the sake of this thesis it is assumed that the products are stored in a warehouse in Finland as the company aims to at some point manufacture its products in Finland as the country is known for high-quality products and innovative IT-solutions. Before starting its own manufacturing in Finland the company will source its products from a large manufacturer and transport them to Finland for packaging and distribution.

Packaging for transportation

For this thesis the author assumes that the products are stored in Finland as packaged products ready to be shipped. The products will be packed in to individual boxes with all the necessary information included. These individual boxes are packaged into bigger boxes, shipping cartons, to protect the products during transport and to help the handling of the products. These boxes usually consist of e.g. 10, 12 or 20 individual product boxes. The shipping cartons are then loaded onto pallets, shipping platforms with specific measurements that enable the shipments to be handled with forklifts and other equipment and efficiently loaded into the chosen vessel.

There are several different pallets with different specifications. It is said on the European Pallet Associations web page, there is no global standard on the pallet size, but it is mentioned that both in Europe and in Asia 800x1200mm and 1000x1200mm pallets are widely

used. Therefore it is recommendable for the company to use either **800x1200mm** or **1000x1200mm pallets** and configure the dimensions of the product packaging and the shipping cartons to best utilise the pallet dimensions.

As the shipping cartons are packed onto the pallets and secured on to it, the load is given an identification that may be used to track the load throughout the distribution. A packaging list must be attached to each pallet with the information listed in the box on the right. These pallet loads may easily be stored and handled in the warehouse with mechanical handling equipment. As mentioned before, for the sake of this thesis it is assumed that the products will be stored in Finland in the same warehouse as the rest of the company's products; therefore the warehouse operations are not further designed here.

Packaging list (Pienaar & Vogt 2009, 400-401.)

- Name and address of the seller and the buyer
- Date of issue
- Invoice number
- Order or contract number
- Quantity and description of the goods
- Shipping details
- Quantity and description of each package, carton, crate or container
- Any other information required in the sales contract or documentary credit

Transportation from the warehouse

From the warehouse the desired shipments are loaded onto a truck, as trucks are the most flexible vehicles for pick-up of the shipments. It is recommendable for the company to **contract a professional carrier** to handle the transportation as logistics is not the company's core business and therefore the resources to own and manage own fleet is not feasible. The shipments are then carried to the consolidation centres of the chosen freight forwarder or logistics provider.

3.2.2 Consolidation

If the company doesn't ship a full container load of products at a time, the smaller shipments are consolidated into larger, more economical shipments going to the same destination. This is done in order to reduce needed trips, to reduce the unit cost and to better utilise the vessel capacity. The consolidation may be organised by a fourth party operator such as a freight broker or freight forwarder.

It is recommendable for the company to **use a freight forwarder,** who would handle the shipment from Finland to Bangladesh, take responsibility of the shipment and has the expertise to ensure all the required documentation and other technicalities are in order.

Before exporting the products from Finland certain information must be disclosed. Information needed to the customs declaration is listed in a box on the right. Customs declarations may often be filled electronically though a web portal at the customs authority's web page. In other cases the company may either print the needed documents from the portal or in some cases meet the officials in person to fill in the documentation manually. As mentioned before, using a freight forwarder is recommendable as the specialised operator reduces the risk of missing or misfiling necessary documentation.

Customs declaration (Pienaar & Vogt 2009, 400, 403.)

- Name and address of the seller and the buyer
- Date of issue

Each product specified with

- The harmonised schedule number
- Material number
- Category description
- Quantity
- Value of the goods
- Weight
- The export control classification number
- Licence details.

Shipper's letter of instructions discloses who is responsible for: (Pienaar & Vogt 2009, 401.)

- Arranging transportation
- Booking ships
- Filing export declarations
- Delivering the goods to the customs broker in the receiving country
- Crating the goods
- Adding marks to the crates

3.2.3 Transportation to Bangladesh

For the products in question the recommendable mode of transport from Finland to Bangladesh is **sea freight**, as the product most likely isn't easily perishable nor is it other ways time sensitive. Sea freight offers reliable, cost effective and environmentally friendly option to transport the products from Finland to Bangladesh. However, as the product in question is pharmaceutical, in-transit care must be considered in warehousing and transportation.

From Finland the products, packaged onto pallets and consolidated into full containers are transported first to one of the two major cargo port cities in Europe, Hamburg in Germany

or Rotterdam in the Netherlands. In the European port the containers are loaded onto a freight vessel headed to Bangladesh.

Bill of lading
Packing list
Deed of donation
Certificate of origin

Dock receipts

Master receipts
(Pienaar & Vogt 2009, 401-403.)

3.2.4 Customs and tariffs considering NGOs

When arriving to the port in Bangladesh, the goods must be customs cleared. According to Global Hand (2014) Bangladesh gives tax exemption to humanitarian cargo. The customs authorities require certain documentation to be submitted, such as **bill of lading**, **packing list**, **deed of donation** and **certificate of origin**. As mentioned before the freight forwarder ensures that the required documentation arrives with the shipment. It is still recommendable to contact the nearest embassy, which in the case of Finland is located in Stockholm, before exporting the goods in order to gain up-to-date information.

3.2.5 Break-bulk and distribution

The container loads are broken into smaller loads again according to the destination. Distribution centres often are located on the outskirts of large cities, close to major transportation ways.

3.2.6 Warehousing in Bangladesh

After the break-bulk operation the goods are transported to warehouses. These warehouses may be operated by the NGOs the products are delivered to or by other operators. The pallets are stored in a warehouse ready to be picked according to the individual order. As mentioned before, the products should be stored in dry and in room temperature.

The warehousing and inventory management, as discussed in the chapters 2.5 and 2.6, play an important role in the distribution chain. The inventory at hand and the operations in the warehouse enable the end customer to receive the correct products in a timely fashion. Example warehouse operations considering the TestPlus products are drafted below.

Stock purchasing is the beginning of the warehouse operations. The test devices are purchased in advance by the distributor or a consignment of products is allocated to an NGO.

As the products arrive to the warehouse **receiving bay the loads are identified**. It is important to have comprehensive and correct information on the packaging lists and other required documents. After the products are registered in to the warehouse system, they are **transferred into storage** areas consigned to the specific load.

The products in stock are then available for order. **Order processing** in the warehouse management system first checks the inventory status of the products when an order is received, then issues a picking list to the warehouse to be filled.

Replenishment and let-down of stock to pick face; the pick face, as previously discussed, is the location in the warehouse where the individual products are collected for each order. Replenishment actions ensure the product's availability in the pick face without unnecessary interruptions. **Stock picking** is the action of collecting the ordered quantity of the products from the warehouse shelves and adding them to other products ordered by the same customer.

The picked products specified to the order are **dispatched to assembly of the goods to create a transport load** where they are accompanied with a packing list identifying all the products in the transportation load.

Delivery of goods is then organised from the warehouse to the point of use, to the NGOs or to the end customer. **Proof of delivery** is done by signing a receipt as the products are unloaded from the delivery vehicle. **Billing** may then be done if necessary, meaning if the products are transported to be sold, not as a humanitarian cargo.

If for some reason the customer inspects faults in the products, they may **return of unwanted goods** to the warehouse, from where they are either disposed or sent back to TestPlus. Returned items must then be registered as **stock write-off** in the warehouse management system.

Stock count is regularly done in order to ensure that the warehouse management system is up to date with the quantity of products in stock.

3.2.7 The end customer or user

The users of the products in this project's case most likely would be volunteer workers of the NGOs administering the test to the locals. As mentioned in the introduction, important aspect to be delivered with the test devices is education of their use, of the diseases, how to prevent and avoid them and how to care for the existing infections. The test devices may be distributed to the locals to be used in the privacy of their own home, or they may be administered in the local clinic.

3.3 Search for plausible co-operators

The NGOs may already have the networks and connections needed to get the products to the rural areas of Bangladesh. The organisations benefit from the possibilities TestPlus products offer by enabling fast, accurate and inexpensive diagnosing tools for STDs and education offered with the products.

Considering that the plan drafted in this thesis is not time bound or specific, but aims to work as a guideline offering information, contacting the organisations for interest was not considered necessary after all. Therefore this chapter focuses on preliminary search for NGOs and drafting criteria for choosing the appropriate ones.

3.3.1 Methods

The search for possible co-operators was done purely on desk top basis. With criteria later described the NGOs internet pages were searched for necessary information. The chosen NGOs are later briefly introduced. The search was limited to organisations that have at least some sort of web presence, internet pages stating in English their programs and goals.

From January 2015 NGOs may use the ".ngo" domain name extension. The Public Interest Registry that currently manages the ".org" domain will also manage the new ".ngo" extension and will offer validation to the organisations wanting to use it. (Alawadhi 2014.)

3.3.2 Criteria

In order to choose the most useful co-operators, criteria for the selection must be established. Similar criteria may be used in other similar projects by switching to the specific

target country. Best case scenario would be to find global organisations willing to distribute the products to several regions.

- As the aim of this thesis is to draft a distribution plan from **Finland** to **Bangladesh**, the NGOs suggested should also operate in either of these locations. → for future application **global** NGOs are first considered as the same organisations may be useful in distributing the products to other developing countries as well as to Bangladesh. But in this case operations in Bangladesh are the primary target in this project.
- As the product is an improvement in healthcare, the organisations operating to improve the **healthcare** in the target country should be the first ones.
- Also if the organisations have **established logistics operations** they may be applied in the distribution.

3.3.3 List of possible co-operators

The search for the NGOs was started from the large international organisations. The United Nations (**UN)** collaborates with many NGOs around the world. They also report their actions and open programs that individuals or companies may contribute. Other well-known organisations, such as **Plan International**, were researched. After the large, well-known, global organisations are discussed some less known local organisations are introduced.

The United Nations

As a member state of the UN, Bangladesh has a great opportunity to benefit from the global network. Bangladesh has established a permanent mission in New York and is present at all the discussions ensuring the view of the country to be heard. The UN has many divisions focusing on specific demographics and topics. The main divisions to be considered with this project are:

- **Business Partnership** enables companies to engage with the UN and commit products or services for UN-affiliated projects (UN Business Partners).
- **The Office of Partnership** is a gateway or portal helping the private to organise their partnership with the UN (UN Office of Partnership).
- **UNICEF** the UN division focusing on the health, wellbeing and education of children (UNICEF).

- **The United Nations Population Fund** UNFPA focuses on reproductive health, family planning and empowerment of young people (UN Population Fund).
- Through the **UN Global Marketplace** the company may answer tenders to offer its products to the different divisions of the UN (UN Global Marketplace).

NGOs co-operating with the UN in Bangladesh

Some of the NGOs co-operating with the UN and the UNICEF were listed on their site. From these listed sites the ones fitting to the criteria previously described were chosen to the list:

- **Dhaka community hospital trust** is a non-profit organisation offering health care services to underprivileged people (Dhaka community hospital trust).
- **Dwip Unnayan Songstha** operates among others static and satellite clinics offering health care services (Dwip Unnayan Songstha).

Other NGOs

As mentioned in the introduction, it is important to offer education as well as concrete products to reap the most sustainable results, therefore many of the NGOs researched aim to empower children and women through education and improve their quality of life.

- **Plan international** operates to improve children's life in developing countries. They offer the possibility for corporations to join their effort in short term or long term partnerships (Plan international).
- **HEED Bangladesh** offers health care, education and economic development aid in the country. Their hospitals operating in co-operation with UNICEF would be in a good position to receive the company's products. (HEED Bangladesh.)
- **Friendship** offers among other services floating hospitals and clinics. As Bangladesh is located in a large river delta with a large portion of its citizens living on islands without proper infrastructure, floating hospitals and clinics are a convenient way to get to the patients. (Friendship.)
- **BRAC** is a global organisation aiming to empower people through health care and education (BRAC).
- **Women and children first** is a UK based organisation operating globally (Women and children first).

4 Conclusion

In this chapter the process and the results are reflected. The key outcomes of the project are summarised, then the author's suggestions for the commissioning company for additional projects are listed and in the end a self-evaluation of the process is shown.

In this thesis Bangladesh has been used as a target market to aid focusing the research. Similar methods may be used in other developing countries by switching the target market in the criteria for searching the co-operators and customs information. The large international organisations are the recommendable starting place for co-operators as they may offer possibilities to supply several locations, have the infrastructure laid in and are always looking for new corporate partnerships.

If the company is interested in trade Bangladesh, the first recommendable step is to contact the Embassy of Bangladesh for trade promotion and information and the International Trade Centre, operating under UN promoting sustainable trade and public-private partnerships.

4.1 Key outcomes

The key outcomes of this thesis project:

- Theoretical understanding of the distribution planning
- Summarising a simple distribution plan
- Finding interesting NGOs
- Considering applicable criteria for the selection of said NGOs

4.2 Suggestions for additional projects

As this thesis has focused on the non-profit and NGO side of the distribution, these suggestions are also given considering the same aspects. Designing trade partnerships would be entirely different aspect and therefore not listed here.

The author recommends for the commissioning company to consider a project to design the specific distribution of the products to Bangladesh. Based on the information given in this report and its attachments the next project would consist of contacting and contracting the companies and NGOs starting with the Embassy and the large international organisa-

tions. From the information and contacts gained from that project, the next country could be chosen and the distribution to said country could be designed.

Contacting the embassies of desired countries should be a primary task as well as offering the products to the large global organisations to be distributed to developing countries.

4.3 Evaluation of the project

TestPlus has an agreement with Pharmera Group to distribute the products to Bangladesh. The details of this agreement were not disclosed to the author, but are only known to the two agreeing parties. Therefore this co-operation was not considered during the thesis project, but is the responsibility of the commissioning company to see if the plan is applicable in the co-operation.

From the beginning the author was given merely a loose topic to work with and freedom to work on it as she saw best, with a note that the company owner doesn't even want to know what is going on with the project. Later contradictory tasks were expected to be included, tasks completely outside the scope of the topic, such as making the project to be a feasibility study instead of a guideline for a distribution plan. Considering the contradictory, changing topics, the company situation and the author's own expectations of the project, the first topic and the freedom to operate as the author saw best fit were held as guidelines to get the projects as such finished. From the decision to work independently and not to care about the contradictory requests from the company owner, the project got moving. The author chose the tasks she deemed useful for the topic and worked from them. As the initial idea of the project was to develop a guideline for designing a distribution plan, the descriptions were kept broad enough to enable the detailed plans to be designed based on this report in later projects.

The resulting theory and the drafting of a distribution chain have enabled the author to develop the professional understanding of the field, to evaluate the information and develop critical thinking in order to find the key tasks and to execute the project independently. The author has reached the goals set in the beginning of the project and will continue to be curious about the field.

The company benefits from everything someone is willing to do for them and hopefully are able to use the thesis as a background for the distribution planning and creating lasting co-operation partnerships to get the products to the customers in developing countries.

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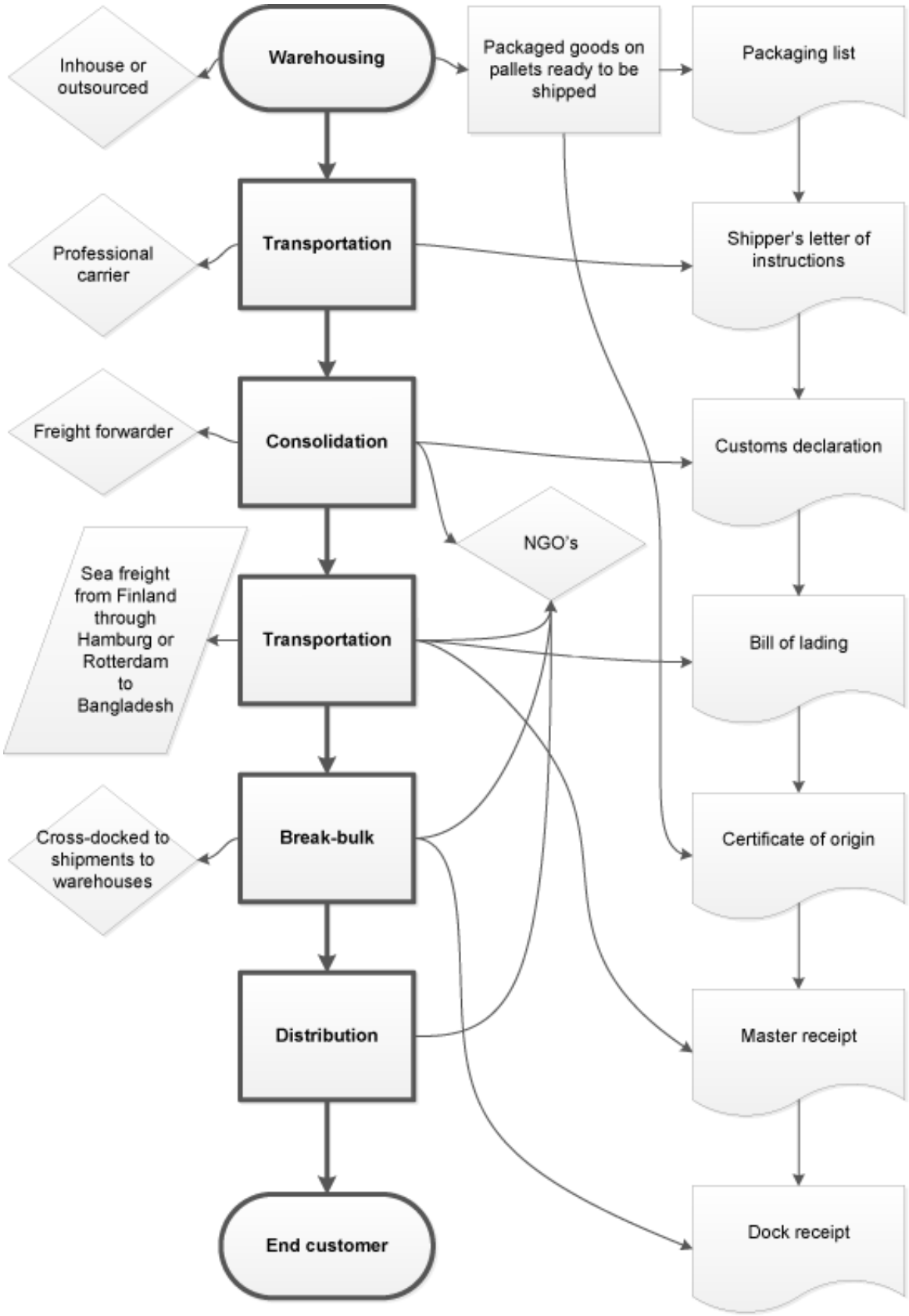
Attachment 1 Distribution plan flowchart



Attachment 2 Information sources and NGOs

Name	Description	Link
Embassy of Bangladesh, Stockholm	First step in creating trade or humanitarian operations in the country	http://bangladoot.se/
The United Nations	The international organisation main page	www.un.org
UN Global Marketplace	Place to sell products to be used in the UN operations	https://www.ungm.org
UN Business Partnership	Creating long term partnerships and commitments to help	http://business.un.org/en
The UN Office of Partnership	The office responsible of organising and maintaining strategic partnerships	http://www.un.org/partnerships/
UNICEF	The UN children's fund	http://www.unicef.org/
The United Nations Population Fund UNFPA	The UN division aiming to improve the reproductive health and empower women and young people	http://www.unfpa.org/public/
Dhaka community hospital trust	A non-profit hospital in Dhaka, Bangladesh	http://www.dchtrust.org/index75b8.html?/home/
Dwip Unnayan Songstha	A Bangladeshi non-profit organisation operating e.g. hospitals and clinics	http://www.dusbangladesh.org/?page_id=101
Plan International	An international organisation aiming to improve children's life	http://plan-international.org/what-you-can-do/corporate-partnerships
HEED Bangladesh	Health, education and economic development focused	http://www.heed-bangldesh.com/index.php?o

	organisation empowering people	ption=com_content&view=catego-ry&layout=blog&id=29&Itemid=14
Friendship	Organisation operating floating hospitals and satellite clinics able to reach remote locations	http://www.friendship-bd.org/page/healthcare
BRAC	Global development organisation originating from Bangladesh, helping and empowering people	http://www.brac.net/content/partners#.VG0R88kxiP0
Women and children first	A UK based organisation aiming to improve maternal and new born health	http://www.womenandchildrenfirst.org.uk/where-we-work/bangladesh?gclid=Cj0KEQiAypGjBRCPme6jmqu3gZsBEiQA8NAiIEcHoy_2MNuHPaWFWUz1_LZU-xuU8UiQdtzM46e_bn8aAih88P8HAQ