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Improving outbound delivery service at Heineken Hanoi Brewery

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Abstract

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Transportation is one of the most important elements in the supply chain. A good transportation system can significantly contribute to the success and the competitiveness of companies by decreasing cost, reducing lead time and improving service quality.

The thesis aims to enhance the outbound delivery service at Heineken Hanoi Brewery by reviewing the current delivery operation (investigative question 1), figuring out areas that can be improved (investigative question 2) and offering proposals for improvement (investigative question 3).

The thesis is opened with introduction where the background, research question, scope of thesis, benefits, key definitions and the case company are presented. In the theoretical framework, the advanced literature about supply chain management and logistics is reviewed and studied before the author digs deeper into transportation management and its such important aspects as costs and pricing, network design, performance measurement and outsourcing.

The research process involves three major phases. In phase 1, relevant literature about supply chain management, logistics and transportation management is examined. In phase 2, data are collected about the company from a wide range of sources with various methods including interviews, online survey, observation and document analysis. In the last phase, the data are analysed with two methods: qualitative and quantitative in a thorough and precise manner. Based on the literature review and data analysis, the author reaches conclusion about current delivery operation at the case company and provide developing recommendations accordingly.

The research findings indicate that the outbound delivery at Heineken Hanoi is executed at an acceptable and satisfactory level to the company. However, there is room for improvement. The author has provided four proposals that can support the case company to enhance its outbound delivery service. The first recommendation involves cost cutting strategies which consist of freight consolidation and rate negotiation. The second suggestion proposes the establishment of a more comprehensive KPI system. In the third proposal, the author recommends that Heineken Hanoi should build a system of rewarding and penalty to motivate logistics service providers more effectively. Finally, the delivery timeframe is suggested to be changed for distributors located in urban areas to tackle congestion.

Keywords
Transportation management, network design, performance measurement, transportation outsourcing, logistics service providers, key performance indicators.

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1 Introduction

This chapter presents the background of the thesis, the research question, the demarcation, benefits of the research, the case company as well as definitions of key concepts mentioned throughout the paper.

1.1 Background

Transportation is of high importance as it provides linkages and connection between different stages in the supply chain. Any disruption in transportation will put the whole supply chain at risk. On the other hand, a well-established transportation system is beneficial to company's development and success. To be more specific, transportation plays a key role in reducing operational cost, diminishing supply chain cycle time, improving service quality and increasing customer satisfaction. (Tseng, Yue & Taylor 2005, 1661.) As a result, transportation deserves a large amount of attention from researchers and companies' management levels.

The case company, Heineken Hanoi Brewer, is one of the largest beer brewers and sellers in Vietnam with a wide network of 177 distributors (Vu & Blenkinsop 2019). Such a large number of customers located in various different regions results in a complicated outbound delivery operation. The implementation of five logistics service providers adds significantly to that complexity. Besides, with approximately 1500 shipments per month, transportation accounts for the largest proportion of logistics costs. Moreover, it is undeniable that delivery service exerts a substantial influence on customer satisfaction and lead time. Therefore, the company starts to pay more attention to optimizing its outbound delivery operation.

The thesis looks to review and examine Heineken Hanoi Brewery's current outbound delivery service. In addition, its weaknesses and strengths are identified, based on which the recommendations for improvement will be offered. It is expected that the thesis will support the case company to enhance its delivery service and reduce transportation cost.

1.2 Research questions

This thesis aims to optimize outbound delivery service at Heineken Hanoi Brewery.

The main research question (RQ) is: “How can Heineken Hanoi Brewery optimize its outbound delivery service?” In order to find out the answer to the research question, three below investigative questions (IQ) need to be investigated:

IQ1: How is outbound delivery currently executed at Heineken Hanoi Brewery?
IQ2: What are the issues that hinder good delivery performance at the company?
IQ3: What recommendations can be made to enhance the company’s outbound delivery service?

Table 1 below presents the theoretical framework, research methods and results chapter for respective investigative questions

Table 1. Overlay matrix

Investigative Question	Theoretical Framework*	Research Methods	Results (chapter)
IQ1. How is outbound delivery currently executed at Heineken Hanoi Brewery?	- Transportation management - Transportation cost and pricing - Network design - Performance measurement - Transportation outsourcing	- Interviews with logistics manager and transportation staff - Analysis of company's records - Observation of daily operation of logistics department	Chapter 4.1
IQ2. What are the issues that hinder good delivery performance at the company?	- Transportation management - Transportation cost and pricing - Network design - Performance measurement - Transportation outsourcing	- Interviews with logistics manager and transportation staff - Analysis of company's records - Observation of daily operation of logistics department - Online survey for all customers of the company	Chapter 4.1
IQ3. What recommendations can be made to enhance the company's outbound delivery service?	- Transportation management - Transportation cost and pricing - Network design - Performance measurement - Transportation outsourcing	- Author's analysis and recommendation	Chapter 4.2

1.3 Demarcation

In this sub-chapter, the scope of the research is explained.

Logistics which is an immense field includes various significant aspects such as: purchasing, production planning, packaging and so on (Figure 1).

Figure 1. Logistics components (Dorn 2019).

All of the elements of logistics are of importance and interesting. However, the author has chosen transportation to be the topic of the thesis. Transportation consists of inbound transportation, outbound transportation and reverse transportation. Inbound transportation is in charge of moving materials from suppliers to the organization whereas outbound transportation deals with product movement from the organization to the customers. On the other hand, reverse transportation is responsible for returning materials back to the organization because of quality issue or for reusing, recycling or safe disposal. (Waters 2003, 14.)

Considering the need and situation of the case company, the author narrows the topic down and the thesis will concentrate on outbound delivery. Therefore, inbound transportation and reverse transportation will not be studied and researched in this paper.

1.4 Benefits

In this thesis, the delivery service of Heineken Hanoi is reviewed, analysed and evaluated. Therefore, the company can benefit from gaining more insights into its transportation operation and better understanding of the strengths and weaknesses. Besides, developing proposals are offered, which will support the firm to reduce costs, increase service quality and enhance customer satisfaction.

Moreover, the thesis process will exert a positive influence on the author's learning and development. By virtue of studying a large quantity of advanced and up-to-date literature, her understanding of supply chain management, logistics and transportation management

will be significantly intensified. Furthermore, the author will gain valuable skills such as research skill, analysis skill and time management skill. Conducting the thesis is also a good opportunity for the researcher to cultivate qualities like patience and carefulness.

1.5 Key concepts

In this session, the key concepts that are mentioned in the thesis are briefly defined.

Supply Chain Management: is “the design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer” (Institute for Supply Management 2019).

Logistics: is “a process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders” (Christopher 2011, 2).

Transportation management: is “the planning, implementation, and control of transportation services to achieve organizational goals and objectives” (Bloomberg, LeMay & Hanna 2002, 119).

Outsourcing: is “the strategic use of external specialized service providers to execute and manage activities or functions that are normally seen as non-core to the business” (Rushton & Walker 2007, 5).

Logistics service provider (LSP): are “external providers who manage outsourced activities on behalf of the shippers or customers whose business processes they support. They are also commonly referred to as 3PLs” (Rushton & Walker 2007, 4).

Third-party logistics (3PL): is “the management of outsourced logistics, transportation and distribution activities. 3PL is commonly used as the term to describe an external provider who manages outsourced activities on behalf of the shippers or customers whose business processes they support” (Rushton & Walker 2007, 5).

Service level agreement (SLA): “identifies all the key performance measures related to the provision of customer service and will indicate the levels of service that have been agreed” (Rushton & Walker 2007, 295).

Key performance indicators (KPI) are “a set of quantifiable measures that a company uses to gauge its performance over time. These metrics are used to determine a company's progress in achieving its strategic and operational goals, and also to compare a company's finances and performance against other businesses within its industry” (Twin 2019).

1.6 Commissioning party

Heineken, which was set up in 1860s, has developed and become one of the largest global brewers. It operates in almost all parts of the world, producing and selling roughly 250 brands in more than 190 countries. (Reuters 2019.)

Heineken Hanoi, 100% owned by Heineken Group, brews and markets three brands: Heineken, Tiger and Larue. From a small company with around 20 employees, the company has risen to the position of the second largest beer company in the country with approximately 3500 employees. The company possesses a large network of approximately 170 distributors located all over the north and central of the country (Figure 2). (Heineken Vietnam 2019.)

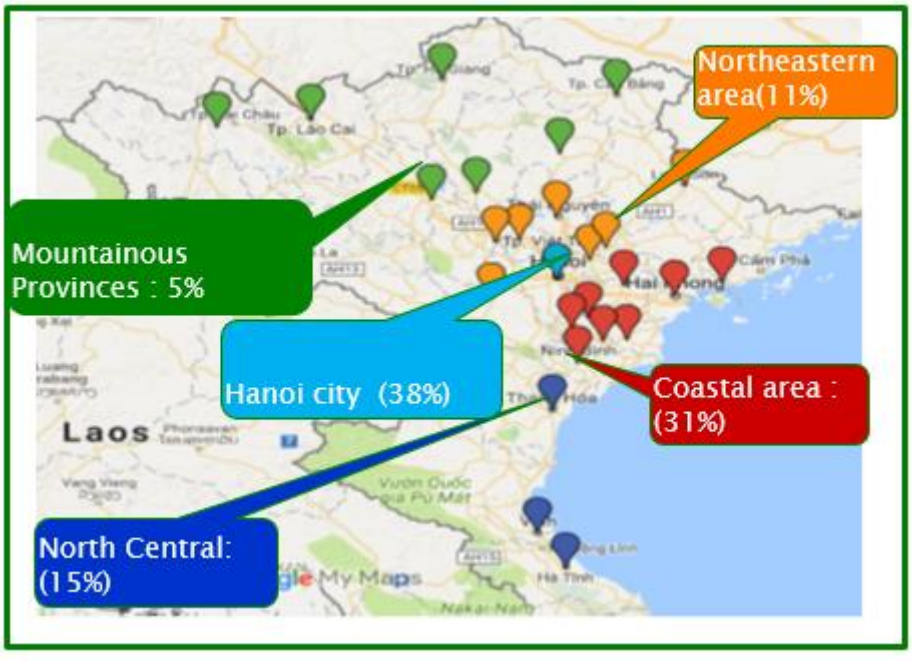

Figure 1. Map of Heineken Hanoi Brewery’s distributors (Heineken Hanoi Brewery’s Logistics Manager 15 June 2019).

As can be seen from above figure, the distributors can be classified into five regions, with Hanoi and coastal area accounting for more than half of the total number of customers.

Due to the significant quantity of customers, the company turns to 5 logistics service providers for transportation service.

Internal research shows that transportation is responsible for the largest percentage of logistics costs. Therefore, transportation management has caught the attention of the company management level. By improving delivery operation, the company can also benefit from increased customer satisfaction in addition to cost reduction. Thus, Heineken Hanoi is striving to optimise its outbound delivery management system.

2 Theoretical framework

In this chapter, the most advanced and up-to-date literature and theories related to supply chain management, logistics and transportation management are reviewed and examined. The theoretical framework structure is illustrated in figure 2.

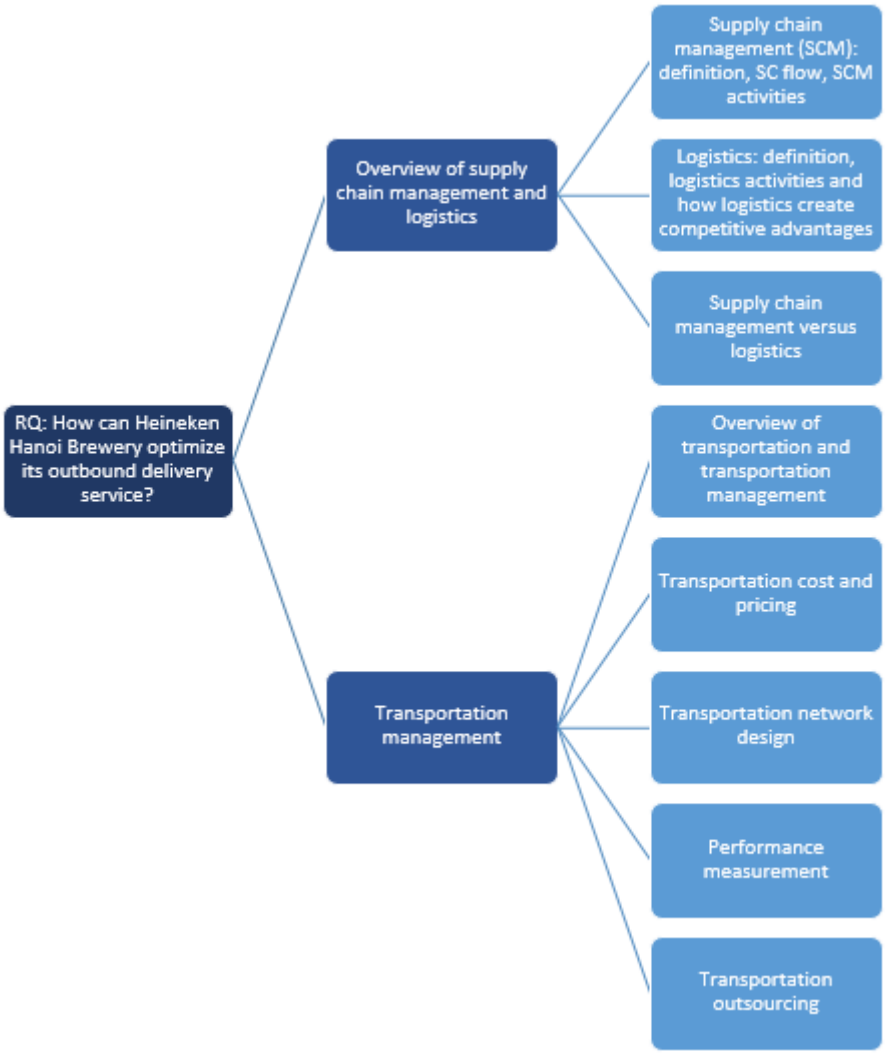

Figure 2. The theoretical framework structure.

The theoretical framework starts with the wider concepts of supply chain management and logistics which entail the definitions, key activities and major differences between the two concepts. Next, the author delves into transportation management including the overview, transportation cost and pricing, network design and performance measurement. Since the case company outsources its delivery operation, literature about transportation outsourcing is also examined.

2.1 Supply Chain Management and Logistics

In this sub-chapter, the overview of supply chain management and logistics as well as the key differences between the two concepts are presented.

2.1.1 Overview of Supply Chain Management

In order to understand the concept of Supply Chain Management, it is important to firstly define a supply chain. According to Christopher (2008, 9), a supply chain is “a network of connected and interdependent organizations mutually and co-operatively working together to control, manage and improve the flow of materials and information from suppliers to end users”, which is realistically illustrated in the below figure.

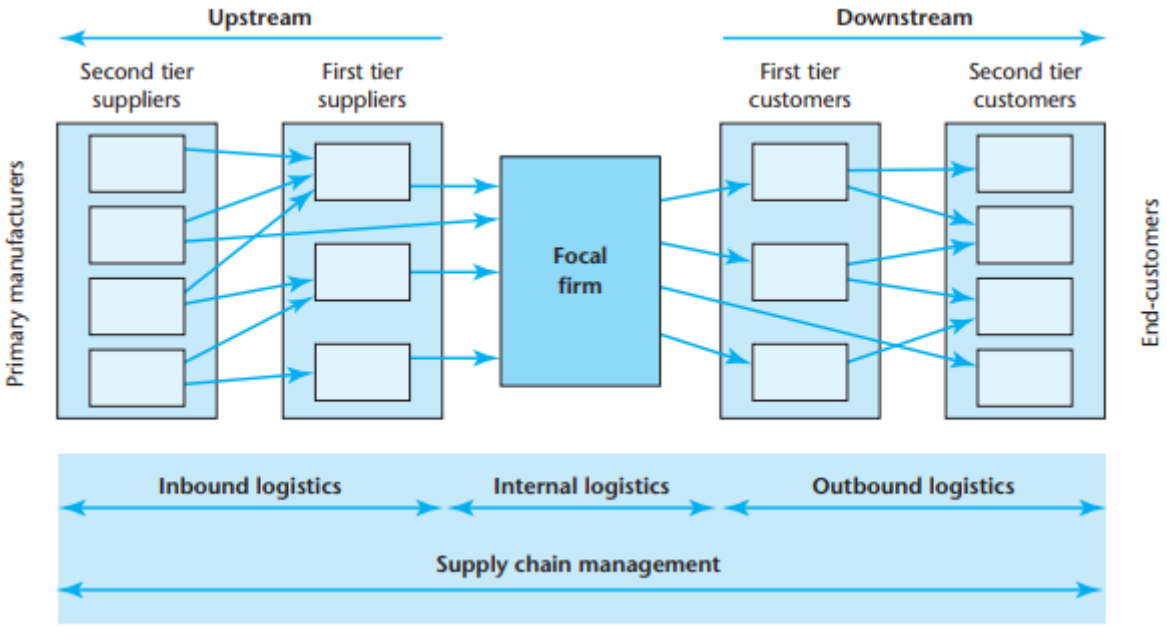

Figure 3. Supply Network (Harrison & Hoek 2008, 9).

As can be seen in the diagram, a focal firm has various linkages and connections with different suppliers and customers which can be tiered in the upstream and downstream of the supply chain.

Supply chain management is “the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole” (Christopher 2011, 3). To be more specific, supply chain management deals with “the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities”

and it requires “coordination and collaboration with channel partners which include suppliers, intermediaries, third party service providers and customers” (Council of Supply Chain Management Professionals 2019).

Supply Chain Management is responsible for managing three key flows: material flow, information flow and money flow (Figure 4) (Chopra & Meindl 2016, 15).

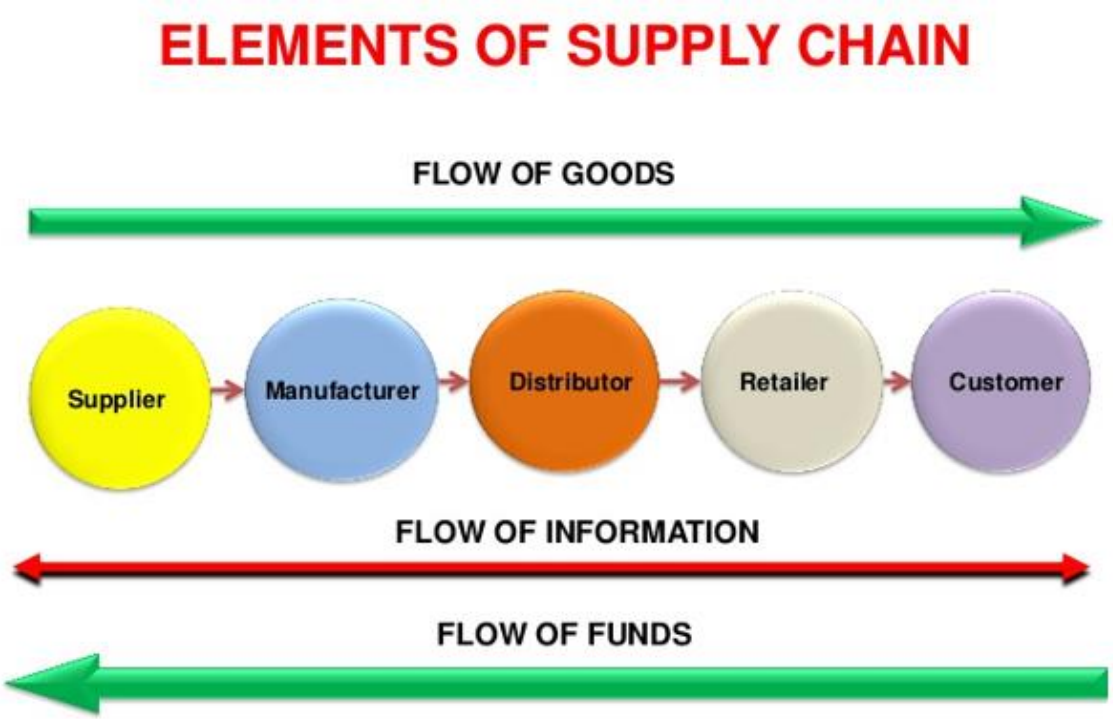

Figure 4. Flows in Supply Chain Management (Adapted from Chopra & Meindl 2016, 15).

Materials flow downstream from suppliers as raw materials to end users as finished products whereas the information flow which is bi-directional is the exchange of information about quotations, purchase orders, delivery status and so on. Last but not least, money flows upstream from the end customers to suppliers when they receive the products and pay for them. (Chopra & Meindl 2016, 15.)

There are three major activities in Supply Chain Management: coordination, sharing information and collaboration. Coordination seeks to create alignment of plans and actions of members in the supply chain, hence enhancing the performance of the whole chain. Anything that happens at one single organization in the supply chain can affect other entities in the chain, therefore, it is of utmost importance that information be shared regularly to ensure smooth and efficient operation of the supply chain. Besides,

collaboration plays an indispensable role as it is the key to unifying all supply chain members to work together towards a common goal. (Sanders 2012, 6.)

2.1.2. Overview of Logistics

Logistics can be defined as the function in charge of the forward and reverse flows and storage of material and information from suppliers through organizations to end customers. Logistics is categorized into inbound logistics, material management and outbound logistics. Inbound logistics is transporting materials from suppliers to organizations whereas delivering materials out to customers is outbound logistics. Furthermore, material management covers the movement of components and materials within the organization. (Waters 2003, 5.)

Logistics deals with the flow of information and materials throughout the supply chain, therefore, it usually includes the following activities.

Procurement. Logistics activities start when Procurement places a purchase order. Procurement is responsible for the acquisition of materials which includes such activities as identifying potential suppliers, negotiating prices and terms and conditions, payment and arranging insurance.

Inward transport. Inward transport is in charge of material delivery from suppliers to the focal firm which involves choosing suitable modes of transport and transporters, route designing with a view to achieving on-time delivery at the minimum cost.

Receiving ensures that the right materials are delivered with no damage, unloads and sorts them.

Warehousing stores and takes care of materials until they are needed or ready to be moved to the next step. Different materials have different requirements, hence, it is vital that warehousing has necessary conditions and treatment to keep materials in good condition.

Stock control manages inventory. The flow of materials is ideally continuous and non-stop through a supply chain. However, in reality, there are delays when materials are not used when they are ready, which results in stocks. Stock control takes into account factors such as which materials to store, inventory cost, stock levels, order timing, order size and so on to ensure smooth supply chain and prevent disruption.

Order picking. Before being loaded onto vehicles for delivery to customers, materials need to be identified, checked, taken out of racks and packed.

Materials handling involves the material movement from operations to operations within an organization, for example between storage areas and delivery areas. Efficient material handling minimizes movement, reduces waste of space, decreases costs and helps avoid mistakes and damages.

Outward transport is similar to inward transport, but deals with delivery of materials from the focal firm to customers.
Physical distribution management refers to all activities associated with the provision of finished goods to customers, including outward transport.
Recycling, returns and waste disposal. After the products reach customers, logistics may not be done yet. If there are problems with the products, they need to be brought back to the focal firm. In other cases, materials are returned to be reused such as pallets and delivery boxes or recycled like glass, metals, paper and plastics. Besides, dangerous and toxic chemicals are returned to be safely disposed. All the activities that bring materials back to a firm are called reverse logistics or reverse distribution.
Location is responsible for finding the optimum geographic locations for different operations in the supply chain by taking into consideration various factors such as operating costs, taxes, number of competitors, population, supply reliability and so on.
Communication. In addition to the flow of materials, the flow of information also plays an important role in the supply chain. Without the exchange of information about product demand, timing, stock level, costs and so on, the supply chain is incomplete and can not function properly.
(Waters 2003, 13-14.)

All above activities are key logistics activities. Nevertheless, other activities like forecasting and scheduling can also be considered logistics activities. It is worth noting that there should not be boundaries and separation between functions. Instead, collaboration and co-operation among functions and logistics activities is important to achieve smooth and efficient supply chain. (Waters 2003, 13.)

Logistics plays an important part in the success of the supply chain thanks to providing needed materials and products in needed form at needed time and place at a competitive cost. In general, there are three areas that logistics can support companies to create competitive advantage: quality, time and cost. (Harrison & Hoek 2008, 16-18.)

Quality in logistics refers to the fact that the right items should arrive at the right place in the right condition in the right quantity. High quality logistics system should not allow delivery of wrong products, incorrect quantities and defects since those problems certainly cause negative experiences for customers, which will reduce customers' loyalty. Besides, it goes without saying that the less time customers have to wait for products to arrive, the more satisfied they are with the experience. In addition to customer satisfaction, shortened lead time can also decrease the quantity of obsolete stock. Last but not least, cost is a major factor that determines the competitiveness of a supply chain. Lower costs

equal lower prices and more profits, which puts the company in a stronger position in the market. (Harrison & Hoek 2008, 16-18.)

2.1.3 Logistics versus Supply Chain Management

Logistics and Supply Chain Management are commonly used interchangeably, which leads to a certain amount of confusion although they refer to different concepts (Prater & Whitehead 2013, 8). Therefore, clear differentiation between the two terms is necessary. Christopher (2011, 2) points out that logistics management creates single plans and conventionally focuses on optimizing the flow of materials and information within organizations whereas Supply Chain Management utilizes this framework to form linkages between processes of other entities in the pipeline. In other words, logistics is a narrower concept than supply chain management. (Christopher 2011, 2.)

Michigan State University conducts further comparison and comes up with key differences between the two concepts (Table 2) (Michigan State University 2019).

Table 2. Differences between logistics and supply chain management (Bagal 2015).

BASIS FOR COMPARISON	LOGISTICS MANAGEMENT	SUPPLY CHAIN MANAGEMENT
Meaning	The process of integrating the movement and maintenance of goods in and out the organization is Logistics.	The coordination and management of the supply chain activities are known as Supply Chain Management.
Objective	Customer Satisfaction	Competitive Advantage
Evolution	The concept of Logistics has been evolved earlier.	Supply Chain Management is a modern concept.
How many organizations are involved?	Single	Multiple
One in another	Logistics Management is a fraction of Supply Chain Management.	Supply Chain Management is the new version of Logistics Management.

One of the first differences lies in the meaning of the two terms. The movement, storage and flow of products and information in and out of the organization is known as Logistics while Supply Chain Management seeks to link and integrate business processes within

and across companies into an efficient business model. Moreover, Logistics concentrates on achieving customer satisfaction whereas Supply Chain Management's main objective is competitive advantage. Another distinction is that Logistics has a longer history than Supply Chain Management with the former originating from the Greek and Roman empires when soldiers called "Logistikas" were responsible for the provision and distribution of resources. On the other hand, coined by Keith Oliver in 1982, Supply Chain Management is a relatively modern term. Furthermore, Logistics Managements involves a single organization while Supply Chain Management is concerned with multiple organizations. Last but not least, Logistics Management is a part of Supply Chain Management. (Michigan State University 2016; Prater & Whitehead 2013, 11; The best logistics guide 2017.)

2.2 Transportation management

Transportation which is one of the most noticeable components of logistics involves the movement of physical goods and materials throughout the supply chain (Waters 2003, 309). There are two main functions that transportation serves: movement and storage of products and materials (Bowersox, Closs & Cooper 2002, 329).

Product movement is the primary function of transportation as it is in charge of the delivery of goods and materials between points in the supply chain. Time, financial and environmental resources are required in order for transportation to operate. Time resource is consumed because when being delivered, it is usually not possible to access and process goods and materials. Thus, it is recommended to minimize transportation time. Besides, transportation uses financial resource including labor cost, energy and administration. In addition, not only does transportation consume natural resources such as oil and fuel but it also influence the environment due to vehicles' noise and exhaust emissions. (Bowersox & al. 2002, 329.)

In spite of being the other transportation's major function, product storage does not receive as much attention as product movement. When delivered, the goods are transported and stored simultaneously. Moreover, in some cases when the goods will be moved to the next destination shortly, the costs of unloading, warehousing and reloading may be so high that storing goods temporarily in vehicles is a more beneficial option. (Bowersox & al. 2002, 329.)

According to Bloomberg & al. (2002, 119), transportation management refers to "the planning, implementation and control of transportation services to achieve organizational goals and objectives". It involves a wide range of activities. One of the fundamental

activities of transportation management is to assign people and resources to tasks, such as assigning drivers and trucks to shipments. Transportation staffs need to take into consideration various factors including the weight of shipment, capacity of trucks, availability of drivers and so on. Another activity that is in the scope of transportation management is negotiation. Transportation can be divided into three categories: private, for-hire and mixed. For the first category, private carriage, the delivery is carried out by the firm which owns the products so no negotiation is involved. However, for for-hire and mixed, another company will be involved in the execution of the delivery, therefore, negotiation is necessary so that both parties reach an alignment about costs and service levels. In addition, transportation management also involves establishing strategy. In general, there are four strategic decisions that transportation managers need to make. (Bloomberg & al. 2002, 119.)

- What modes of transportation will be used?
- What carriers will be used?
- Whether the firm should operate own fleet or outsource the transportation services to outside parties?
- Should the firm manage transportation operation on its own or hire another company?

(Bloomberg & al. 2002, 119.)

The four above categories are interrelated and transportation managers' decisions for each of them have an influence on the others. Moreover, distinct factors need to be taken into account before any decision is made. (Bloomberg & al. 2002, 119.)

Regarding modes of transportation, there are five major modes: rail, truck, water, pipeline and air each of which have different characteristics. The choice of mode is challenging because it is determined by various factors: nature of goods, access to carriers, price, speed or transit time, security of goods, government regulation, safety and integrated strategy. (Bloomberg & al. 2002, 119.)

Nature of goods.
Different modes of transports are appropriate for different types of products. For instance, low valued and bulky goods should not be delivered by air because the transportation cost will be so high that it can not be covered by the revenue in this business deal. Likewise, ocean freight is not supposed to be applied to fragile or high valued goods like gold and jewelry as a result of high possibility of damage and loss. (Bloomberg & al. 2002, 119.)

Access to carriers.

It is ideal that all modes of transportation are available for all shipments, which is not always the case. For example, ocean is an economical choice for transportation of coal. Nevertheless, it is challenging for ocean freight to reach all destinations, hence train is a more common option. Therefore, access to carrier is a factor that can affect the choice of transportation modes. (Bloomberg & al. 2002, 119.)

Price

It is stated by Bloomberg & al. (2002, 120) that air transportation is the most costly, followed by truck, rail and ocean freight whereas pipeline is the cheapest. It is necessary that in addition to nature of goods, access to carriers, prices should also be taken into account to ensure a sound decision of transportation mode.

Transit time

Transit time which is defined as the time from departure of shipment at the origin to the receipt of shipment at the destination plays an important role in cycle time. Shorter transit time means shorter lead time and enhanced customer service, therefore, transportation managers attempt to reduce transit time. Nonetheless, in some cases, longer lead time is preferred when there is no space in warehouse and the firm wants to use moving vehicles for inventory. (Bloomberg & al. 2002, 120.)

Security of goods

Products when transported are exposed to various risks and dangers which are distinct for each type of modes. Air transportation bears more climate risks than others because high and low pressure and humidity are involved, which leads to corrosion and condensation. Furthermore, risk of theft is higher with road, rail and sea transportation than air transportation since shipments are usually inaccessible when flown. In addition, cargo with short lifespan is put at the risk of being spoiled when delivered by rail transportation as it is one of the slowest modes. Therefore, risks and security of goods should be taken into thorough consideration when logistics executives make the decision of transportation mode. (Binova & Heralova 2016, 1-4.)

Safety

Not only goods security but personnel and public safety also need to be considered and can affect transportation mode choice. In some cases, even though it is more cost-effective to transport goods in bulk, packaging is required for the sake of safety, therefore, mode choice is influenced. (Bloomberg & al. 2002, 120.)

Government Regulations

Various aspects of transportation are regulated by the government, such as truck size and weight, land use and transportation safety. For example, for goods with high density, trucks may reach the maximum weight decided by the government before they reach their capacity limits, which makes rail or water a better option. (Bloomberg & al. 2002, 120.)

Integrated Logistics

In addition to aforementioned factors, integrated logistics solution plays a role in transportation mode choice because it needs to be in alignment with other aspects like inventory and customer service targets. A prime instance would be the fact that the locations of warehouses and customers' sites will affect the route and mode of transportation. For example, usually rail is the most popular mode for coal delivery, however, if the warehouse is located close to customer site, truck delivery is a better option. (Bloomberg & al. 2002, 121.)

After the choice of transportation mode comes the decision of carriers which is made based on certain criteria: price, responsiveness, accessibility, claims record and reliability (Bloomberg & al. 2002, 121).

Price

As mentioned earlier in this research, the core functions of transportation are movement and storage of goods which can be fulfilled by most of carriers. Therefore, a major factor that distinguishes between carriers is price. Assuming there is no significant differences in other aspects, the carrier with the most competitive price will win the business. (Bloomberg & al. 2002, 121.)

Accessibility

Another important factor that determines the choice of carrier is accessibility. It is ideal that transportation service is available whenever it is needed since if not, a waste of time and resource is caused. Therefore, some carriers put their vehicles at customer premises in order to improve their competitiveness. (Bloomberg & al. 2002, 124.)

Responsiveness

Responsiveness refers to carriers' ability to meet changing customers' needs. It is highly likely that customers' needs and requirements will not stay the same. As a result, carriers that can swiftly adapt to and meet customers' new demand possess competitive advantage over others since customer attrition is reduced. (Bloomberg & al. 2002, 125.)

Claims record

In order for logistics managers to judge carriers' ability to maintain product condition and quality during transportation, their claims record should be checked thoroughly. When goods are damaged, it negatively affects the shipper's customer satisfaction. As a consequence, the more damage caused to goods, the less likely the carrier is chosen. (Bloomberg & al. 2002, 125.)

Reliability

Reliable delivery contributes to ensuring timeline and prevents interruption in the supply chain. If there is a delay in material transportation, the production line may need to stop, which causes not only waste of time but also increased cost. Thus, on time and reliable delivery is one of top priorities of transportation management. (Bloomberg & al. 2002, 125.)

The third decision that logistics managers need to make is whether to apply private fleet or hire third party or combine both options. Operating own fleet gives the company total control and management of the supply chain and delivery operation. However, a large amount of investment is required and some resources need to be allocated to managing the fleet which hinders the firm from fully focusing on developing and managing its core competency. On the other hand, for-hire carriage limits the shippers' control over the vehicle utilization but lifts the burden of managing the fleet off their shoulders. Some shippers choose the combination of the two options, which offers them the advantages but also brings the disadvantages of both. To put it in a nutshell, each option has pros and cons and it is vital that logistics managers take them into account so as to select the one that suits the business nature and needs the best. (Bloomberg & al. 2002, 125.)

As a next step, logistics managers will define whether to insource or outsource transportation management (Bloomberg & al. 2002, 125). If transportation is handled by internal staff of shippers, they are fully responsible for operational and managerial activities such as negotiating prices and planning distribution. Therefore, complete control over costs and the flow of materials and goods is guaranteed. However, it is important that appropriate labor resource and transportation system capabilities should be available. On the contrary, by outsourcing transportation management, shippers can take advantage of existing resources, technology and capabilities of logistics service providers. Nevertheless, the visibility of transportation and cost control are limited. It is likely to be more challenging for shippers to find and implement cost optimization opportunities due to the dependence on carriers. Both approaches have advantages and disadvantages which are suitable for different business models. (Feuchtwanger 2017.)

Transportation plays an indispensable role in logistics. Effective transportation management can significantly contribute to the competitiveness of logistics system by diminishing operation cost, reducing lead time and enhancing service quality.

According to Chang (1998), transportation accounts for the largest portion of logistics costs. To be more specific, transportation occupies around one third of logistics costs, followed by inventory and warehousing while packaging, movement and ordering in total constitute approximately 25% (Figure 5). Therefore, cost reduction in transportation will lead to better result than other components and it should be the first area to be addressed if logistics managers plan to cut down on logistics costs. Lower transportation cost means larger contribution margin and more profitability, which has a positive impact on the company's competitiveness. (Tseng, Yue & Taylor 2005, 1661.)

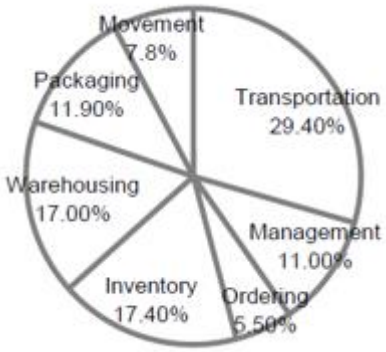

Figure 5. Cost ratio of logistics item (Tseng, Yue & Taylor 2005, 1661.)

Transportation is considered a bridge among suppliers, producers and customers as it connects several stages in the supply chain. It supports companies to create quality and time advantage by ensuring that the right goods arrive at the right place at the right time in right quantity and condition. If there is any disruption or problems during transportation, the competitive advantage of time and quality may not be secured. For example, if the goods arrive damaged or in wrong quantity, on time delivery is pointless. On the other hand, assuming that the goods arrive in desirable condition and right quantity but a week late, customers are not satisfied either. Therefore, it is essential that all those criteria of right item, right place, right time, right quantity and right condition should be met for the sake of time and quality advantage. (Tseng, Yue & Taylor 2005, 1662.)

2.3 Transportation cost and pricing

This session looks into major aspects of transportation cost and pricing such as economic drivers, cost structure, pricing strategies and transportation cost principles.

2.3.1 Economic drivers

Understanding economic variables which drive price of transportation is beneficial to reducing transportation costs. There are seven factors that affect transportation costs: distance, volume, density, stowability, handling, liability and market (Bowersox & al. 2002, 356).

One of the most important factors is distance as it is a major contributor to variable cost (Bowersox & al. 2002, 356). The relationship between distance and transportation cost is demonstrated in figure 6.

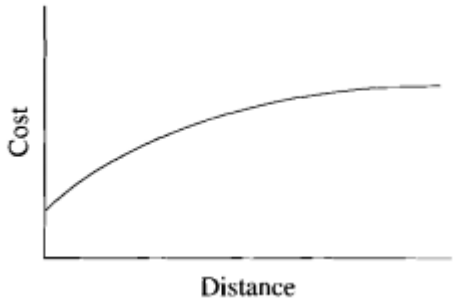

Figure 6. Generalized relationship between transportation cost and distance (Bowersox & al. 2002, 356).

As can be seen from the figure, the cost curve does not start at the origin due to the fixed costs such as shipment pickup cost and administration cost. Besides, when distance increases, the cost of transportation also rises but at a decreasing rate. (Bowersox & al. 2002, 356.)

Another factor closely related to price of transportation is volume. The basic principle is that the larger the volume, the lower the unit cost. The reason is although the variable costs increase, the fixed costs remain the same and can be spread out on more units. Therefore, it is recommended that small loads be consolidated into larger ones to optimize economies of scale. (Bowersox & al. 2002, 357.)

Freight density is the reflection of the weight – volume ratio. There is a difference between the densities of different products. For example, a truckload of cotton should be lighter than a truckload of steel. Thus, the rate per pound of cotton will be higher than that of

steel. The logic behind this is that weight does not have a major influence on labor and fuel expenses, therefore, products with higher density have fixed costs spread over more weight. To summarize, the higher the density, the lower the transportation costs (Figure 7). (Bowersox & al. 2002, 357.)

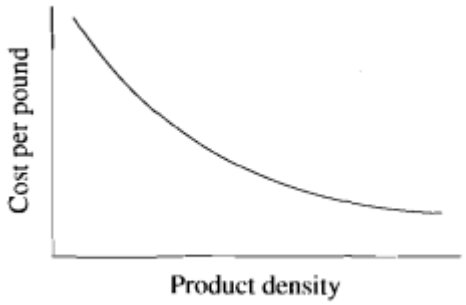

Figure 7. Generalized relationship between density and transportation cost/pound (Bowersox & al. 2002, 357).

Stowability is another crucial factor. It refers to the influence that the sizes and dimensions of the products shipped have on the space utilization of the vehicles. Some products with odd sizes and shapes, for example lawn mower, may not fit well in the vehicles, which leads to waste of space. Therefore, odd-shaped products usually cost more per unit to be transported. Furthermore, in order to optimize space utilization, it is necessary to standardize the vehicle designs and product packaging to create better fit between vehicles and products. (Bowersox & al. 2002, 357.)

Certain products require special handling such as repacking and repalletizing. To carry out special handling, specially trained labor and special handling equipment are necessary. As a result, if specially handled, products are charged an additional fee. In addition, handling cost also depends on the quantity of goods handled. More goods handled means higher cost. (Bloomberg & al. 2002, 123.)

Liability can also affect transportation costs. It involves the vulnerability of products to loss and damage. The carrier will be held liable for any damages caused to the products during transportation. Besides, higher-valued and fragile products usually lead to increased transporters' liability cost. Thus, carriers either protect themselves with insurance or take financial risk which can be reduced by enhanced packaging and better security to diminish potential for damage and loss. (Bowersox & al. 2002, 358.)

Last but not least, transportation costs are also driven by such market factors as lane balance. As vehicles and drivers need to return to the origin point after delivering products to the destination, if there is no back-haul load, the vehicle is returned empty. In this case, fuel, labor and maintenance costs will be charged to the front-haul transportation. As a result, obtaining two-way delivery is optimal, especially where the volume is equal in both front-haul and back-haul delivery. Nonetheless, the demands in distinct areas are different, for example, in Vietnam, a large quantity of products are manufactured in industrial zones in the suburb or the countryside and then transported to markets in big cities, therefore, it is challenging to achieve balance in movement volumes. (Bowersox & al. 2002, 358.)

2.3.2 Cost structure

In addition to economic drivers, it is of importance that we understand transportation cost structure which is comprised of four main categories: variable costs, fixed costs, joint costs and common costs.

According to Kenton (2019), variable costs are corporate expenses that are proportional to the output. That means if volume increases, variable costs will rise and if volume falls, variable costs will be reduced. In case of transportation, higher quantity of goods delivered will result in higher variable costs and vice versa. It should be noted that although the total variable costs vary based on the level of activity, the variable costs per unit remain unchanged, except when there is no activity, the variable costs can be avoided. Furthermore, variable costs are generally measured over a unit of distance or weight. Besides, labor and fuel costs are considered typical variable costs. Moreover, in order to maintain the business, the firm needs to charge at least the amount equal to the variable costs. (Bowersox & al. 2002, 358.)

By contrast, fix costs are defined as expenses that remain unchanged when the volume increases or decreases (Kenton 2019). Even when not operating, companies still need to pay fixed costs including vehicles, depreciation, insurance, utilities and so on. In addition to variable costs, each shipment should cover a fraction of fixed costs. Fixed costs and variable costs are two important components in a firm's cost structure that contributes to defining its profitability. (Bowersox & al. 2002, 359.)

Another type of costs is joint costs which are inevitably and automatically generated by providing a specific service. For a prime instance, when a shipment is executed from point A to point B, a joint cost for the return trip is created. Even if the back-haul delivery is

empty and does not help carriers gain any profit, the joint cost should be considered and included in the quotation. (Bowersox & al. 2002, 359.)

Common costs
Common costs are classified as costs shared between two or more parties when producing a product, a service or operating a facility. It is noteworthy that common costs can not be attributed to a single party and each party's share of costs will be lower than the total expense if they had to pay for it single-handedly, which is beneficial for each party involved. (Accounting Dictionary 2019.)

2.3.3 Pricing strategies

Pricing activity has a direct influence on transportation costs, therefore, it is highly necessary to understand distinct strategies carriers apply when setting rates.

One of the first pricing strategies is cost-of-service strategy which involves actual cost of delivering the service and a profit margin. For instance, if the cost is 300 euros and the profit markup is 7%, then the price will be 321 euros. When implementing cost-of-service strategy, it is vital that accurate evaluation of cost should be available as it is the base of the prices. Imprecise measurement of cost can lead to the fact that the price is not high enough to break even or too high to be competitive in the market. Besides, this approach is often used for low-valued products or in competitive situation where the profit margin is insignificant and high transportation rates are not affordable. Cross-subsidization is sometimes utilized. To be more specific, rates for some shipments can be higher to lower rates for other shipments so that the total costs can still be covered. It is worth noting that in the long term, the implementation of only cost-of-service is detrimental to the business since only marginal costs are covered, not the full costs. (Bloomberg & al. 2002, 122; Bowersox & al. 2002, 359; Coyle, Novack, Gibson & Bardi 2011, 105.)

Another strategy is value-of-service which refers to "charging what the traffic will bear" (Coyle & al. 2011, 106). The prices are defined by the values of the products. A prime example could be the difference between the rates of a shipment of 100 kilograms of gold and a shipment of 100 kilograms of sand. Since gold is more valuable than sand, it is likely that the customers are willing to pay higher prices for the delivery. A real case of value-of-service strategy is FedEx and overnight delivery service. When overnight delivery was first launched, FedEx dominated the market and hardly could any companies provide the similar service, which makes it valuable and worth around 20 dollars a package. However, when more competitors entered the market, the value of overnight transportation decreased and so did the prices. As opposed to cost-of-service, value-of-

service strategy is often applied for products of high value or in situation where there is inconsiderable competition. (Bowersox & al. 2002, 359-360.)

The third strategy is the combination pricing which is defined as establish the rate at the middle level between the cost-of-service minimum and the value-of-service maximum. This is the most popular strategy and it is necessary that the range of prices should be understood clearly to set the optimum rate. (Bowersox & al. 2002, 360.)

It should be pointed out that good command of pricing strategies is vital not only for carriers to establish optimum rate but also for customers to negotiate and achieve the most competitive prices.

2.3.4 Transportation cost principles

Economies of scale refers to the cost advantage that is achieved through the increase in the scale of operation or output. The reason for the cost reduction is the fact that the bigger the volume is, the smaller the average fixed cost per unit gets as the total fixed cost is divided to a larger quantity. (Corporate Finance Institute 2019.)

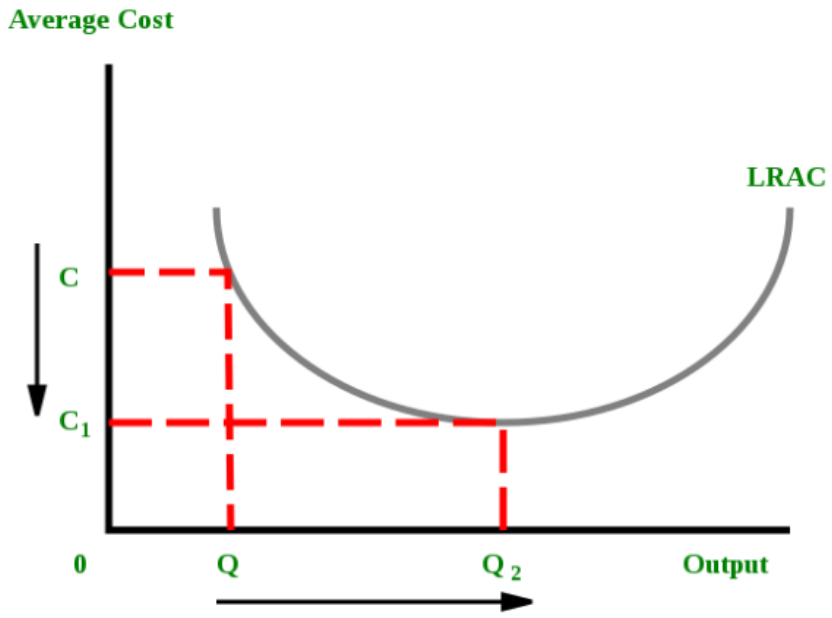

Figure 8. Economies of Scale (Corporate Finance Institute 2019).

As can be seen from figure 8, when the output rises from Q to Q2, the average cost declines from C to C1, which results in cost saving. Likewise, in transportation, compared to a full truckload shipments, shipments that do not utilize full capacity of the vehicles will have higher cost per kilogram since fixed costs such as scheduling and invoicing can be

spread over more weight in full truckload shipments. It is noteworthy that rail and sea freights are more competitive in terms of costs than air and road freights since the formers possess more considerable capacity. (Bowersox & al. 2002, 353.)

Similarly, economy of distance, also known as tapering principle, involves a reduction in transportation cost per kilometer as a result of an increase in distance. For instance, a shipment of 600 kilometers is less costly than three shipments (of the same combined weight) of 200 kilometers. The logics behind this is similar to economies of scale. Longer distance enables the fixed cost to be spread over more kilometers, which leads to lower fixed cost per kilometer. (Bowersox & al. 2002, 353.)

2.4 Transportation network design

Transportation network has a significant influence on transportation operational activities such as scheduling and routing. Besides, it also plays an important part in increasing the supply chain's responsiveness and reducing cost. As a result, designing transportation is of utmost importance. Logistics executives when designing network need to take into account three main questions:

1. Direct transportation or using an intermediate site?
2. In case of using intermediate site, should it store goods or act as a cross-docking site?
3. How many destinations should be included in a route?
   (Chopra & Meindl 2016, 421.)

The answers to those above questions will lead to different choices of networks. There are six typical types of networks that logistics managers can consider (Chopra & Meindl 2016, 421).

Direct shipment network to a single destination

In direct shipment network to a single destination, products are transported directly from supplier to customers (Figure 9). In this model, no intermediate warehouses and distribution centers are involved, therefore, the supply chain can benefit from shorter lead time and operational simplicity. Nevertheless, when it comes to cost dimension, this type of network is disadvantageous because a large quantity of shipments are required and it is challenging to organize full truckload shipments. Hence, transportation cost is not optimized with this model. (Chopra & Meindl 2016, 421.)

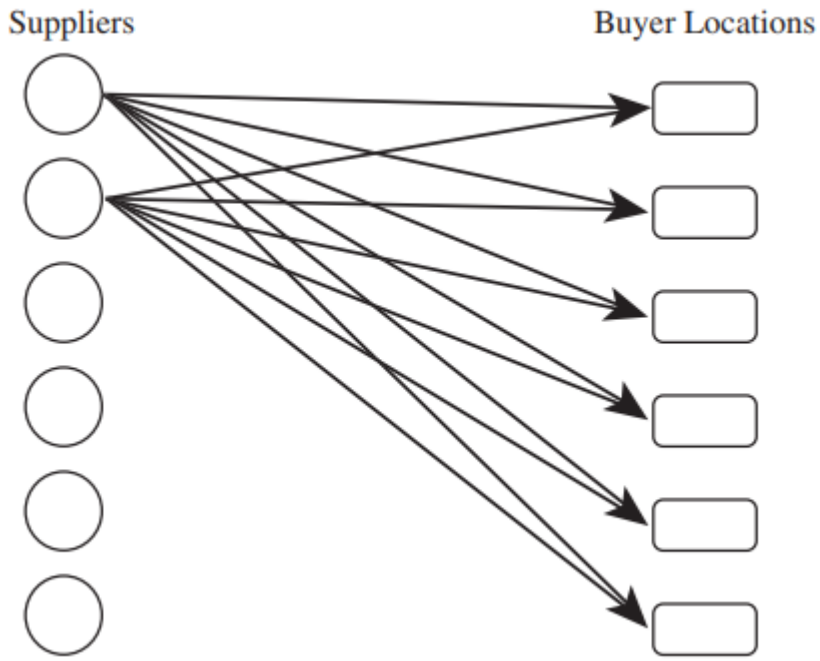

Figure 9. Direct shipment network (Chopra & Meindl 2016, 421).

Direct shipping with Milk Runs

In this scenario, products are either shipped from a single supplier to various buyers or from multiple suppliers to a single buyer (Figure 10). Not only can this type of network take advantage of elimination of intermediate parties thanks to direct shipment but it can also benefit from larger volumes because of milk runs. Direct shipping with milk runs should be implemented when the numbers of goods to be delivered to each location are too insignificant and locations are in proximity. (Chopra & Meindl 2016, 422.)

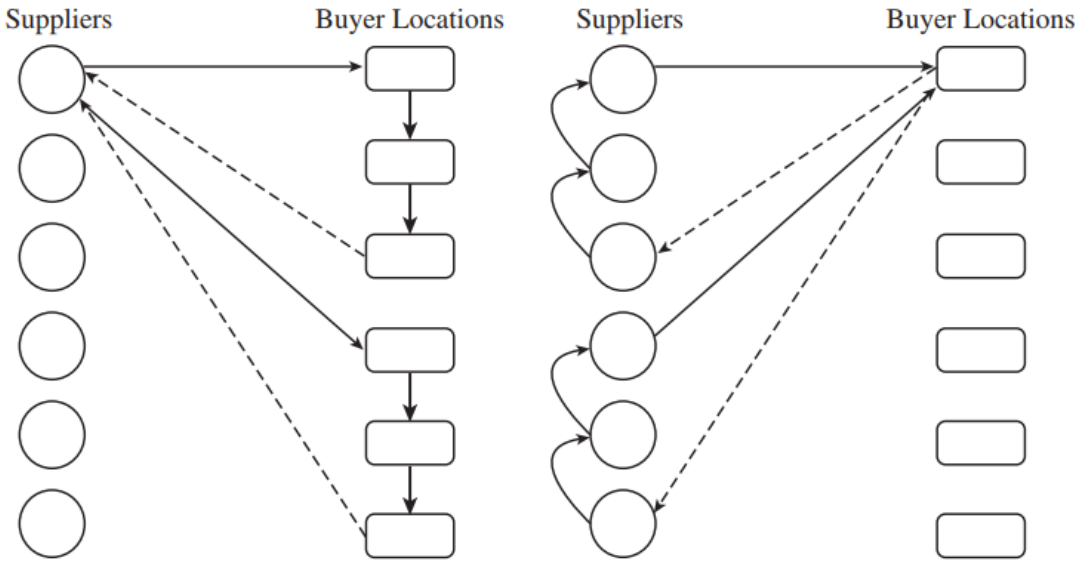

Figure 10. Milk Runs from Multiple Suppliers or to Multiple Buyers Locations (Chopra & Meindl 2016, 422).

All Shipments via Intermediate Distribution Center with Storage

Another type of transportation network is delivery using intermediate distribution center with storage which means all products are delivered from suppliers and stored at an intermediate center before being shipped to customers when there is demand as illustrated in figure 11. Implementation of a distribution center is appropriate when large inbound volume is necessary and there is difficulty in coordinating outbound transportation. In this case, products are delivered in huge volumes to a distribution center where they are stored before being divided into smaller shipments and shipped to different customers. It should be kept in mind that distribution centers should be located close to customers' sites so that the economies of scale can be maximized for inbound transportation and cost can be minimized for outbound transportation. (Chopra & Meindl 2016, 423.)

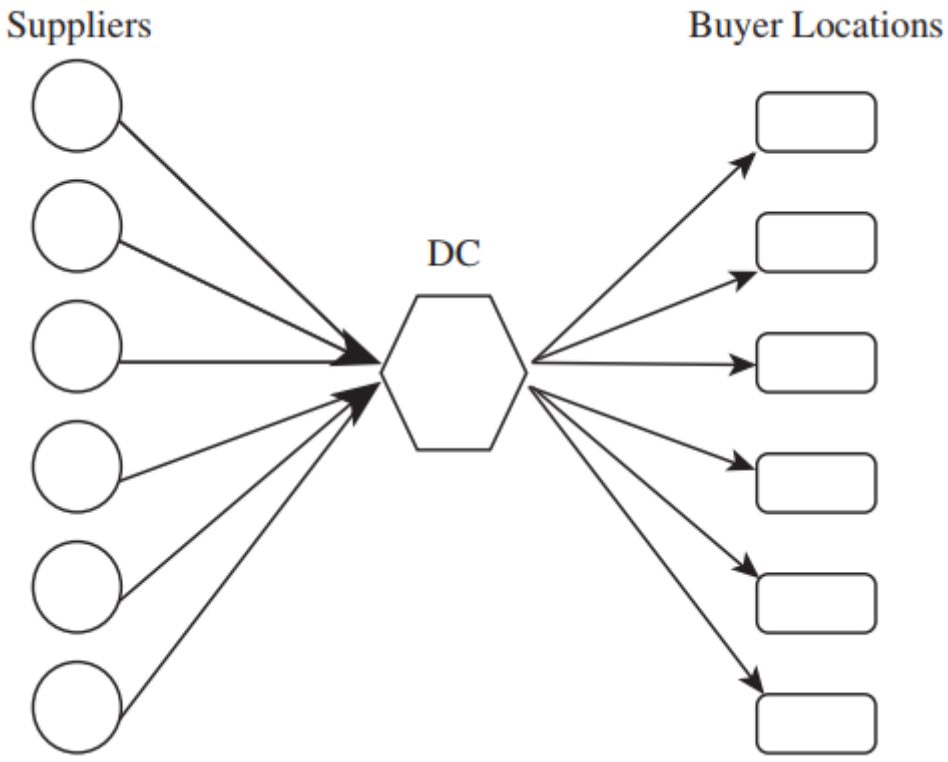

Figure 11. All Shipments via Distribution Center (Chopra & Meindl 2016, 423).

All Shipments via Intermediate Transit Point with Cross-Docking

A network model which is similar to all shipments via intermediate distribution center with storage is all shipments via intermediate transit point with cross-docking. This model also applies an intermediate point, however, no storage is involved. To be more specific, products will be unloaded from inbound trucks and loaded directly to outbound trucks.

Therefore, cross-docking enables faster good flows, shorter lead time, low inventory and handling cost. A prime example would be Walmart which possesses a large number of stores in an area. Moreover, the company builds a distribution center in each area to support logistics activities of those stores, which promotes economies of scale of both inbound and outbound transportation. Specifically, the volumes from one supplier to all stores of Walmart can be consolidated into a shipment and delivered to the transit point at which the volumes from all suppliers will be bundled and shipped to a store. (Chopra & Meindl 2016, 423.)

Shipping via Distribution Center Using Milk Runs

The model of shipping via distribution center using milk runs is demonstrated in figure 12. As can be seen in figure 12, milk run can be applied for outbound delivery when the volumes designated to each customer are small. By virtue of volume consolidation, this type of network contributes to transportation cost reduction, especially for small lots and when customers are not able to hold much inventory. However, in this case, more complicated coordination is required. (Chopra & Meindl 2016, 423.)

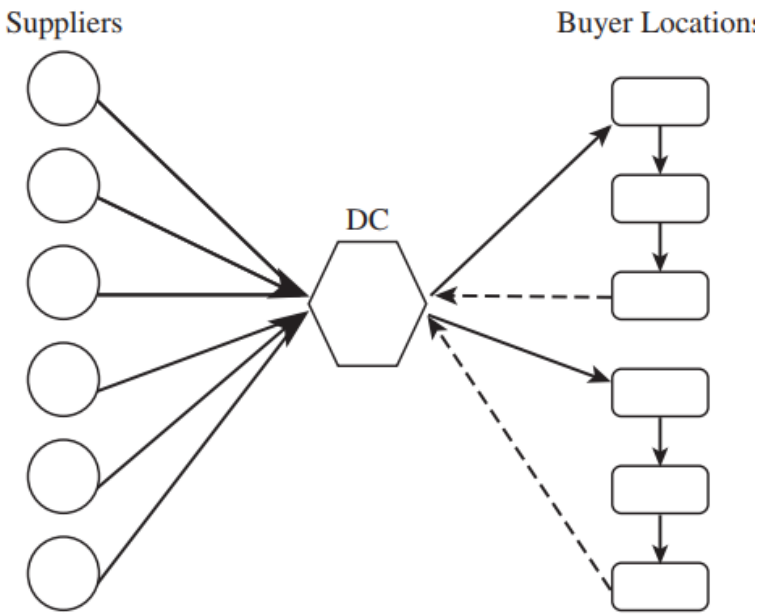

Figure 12. Milk Runs from Distribution Center (Chopra & Meindl 2016, 423).

Tailored Network

Last but not least, tailored network is the most advanced kind of network, hence requiring the most complex coordination. Tailored network is customized according to the nature and needs of each company with the objective of simultaneously decreasing the cost and enhancing the supply chain's quality. For instance, if the volume is high, products can be

shipped directly to customers. On the other hand, if the volume is low, consolidation is necessary. Since distinct processes are implemented for different products, transportation management is highly complicated. (Chopra & Meindl 2016, 425.)

To summarize, there are six main types of networks all of which have pros and cons (Table 3). For example, direct shipping is simple and faster but firms need to bear high inventory cost. When milk runs are integrated into direct shipping, the coordination is more complex but companies can benefit from lower costs and lower inventory levels. Besides, the use of distribution centers allows firms to consolidate shipments, hence reducing costs. However, if distribution centers also act as storage points, inventory and handling costs will increase. When distribution centers are only used for cross-docking or milk runs are implemented, the complexity of transportation management climbs. When it comes to tailored network, the needs of companies will be fulfilled the most effectively, however, firms also need to deal with the highest level of complication. (Chopra & Meindl 2016, 425.)

Table 3. Advantages and Disadvantages of Transportation Networks (Chopra & Meindl 2016, 425).

Network Structure	Pros	Cons
Direct shipping	No intermediate warehouse Simple to coordinate	High inventories (due to large lot size)
Direct shipping with milk runs	Lower transportation costs for small lots Lower inventories	Increased coordination complexity
All shipments via central DC with inventory storage	Lower inbound transportation cost through consolidation	Increased inventory cost Increased handling at DC
All shipments via central DC with cross-dock	Low inventory requirement Lower transportation cost through consolidation	Increased coordination complexity
Shipping via DC using milk runs	Lower outbound transportation cost for small lots	Further increase in coordination complexity
Tailored network	Transportation choice best matches needs of individual product and store	Highest coordination complexity

2.5 Logistics performance measurement

As the saying goes, “what you can’t measure, you can’t manage”. Without measurement, it is impossible for companies to know their current level of performance, whether they are improving or deteriorating, what areas they can improve on. Therefore, in the interest of

efficient logistics and transportation management, systematic measurement should be set up. (Waters 2003, 197.)

The following sub-chapters will discuss the main objectives of a logistical performance measurement system and its crucial aspects.

2.5.1 Objectives of logistical performance measurement

There are three objectives that an effective measurement system should achieve: monitoring, controlling and directing logistical operations. To achieve monitoring purpose, proper metrics need to be identified and established to support performance tracking. After the establishment of appropriate metrics, setting the desirable standards of performance is required to enable controlling because it helps pinpoint when there is a problem with the logistics system. For instance, if on time delivery standard is not met, logistics managers need to determine the reasons and come up with solutions to increase on time delivery rate. Last but not least, so as to effectively direct logistical operations, it is necessary that logistics managers ensure employee motivation because there is no doubt that lowly motivated employees equal low productivity and poor performance. (Bowersox & al. 2002, 555-556.)

The ultimate goal of logistics system is to enhance shareholder value. As a result, in addition to monitoring, controlling and directing, a measurement system should be designed to reflect influence on shareholder value. (Bowersox & al. 2002, 556.)

Figure 13. Shareholder value model (Bowersox & al. 2002, 556).

As can be seen from figure 13, shareholder value is divided into two major dimensions: operational excellence and asset utilization. Operational excellence is indicated by improved customer success and decreased total cost to serve whereas asset utilization refers to fixed capital and working capital. Fixed capital is the investment in long term assets such as facilities and manufacturing equipment. On the other hand, working capital is defined as the money available to fund a company's daily business. If logistical asset utilization is optimized, some capital can be liberated and reinvested in other functions of the company. (Bowersox & al. 2002, 556; Surbhi 2017.)

In order to effectively serve all aforementioned purposes, a system of logistical performance measurement needs to be comprehensive. Not only does it measure basic function performance but it also should assess customer accommodation and integrated supply chain performance. Another key aspect in performance measurement is performance comparison. The next sub-chapters look to present all above essential aspects of a system of logistical performance measurement. (Bowersox & al. 2002, 556.)

2.5.2 Measurement of functional performance

There are five major areas that logistics functional performance can be divided into: cost, customer service, quality, productivity and asset management (Table 4) (Bowersox & al. 2002, 556).

Table 4. Typical Performance Metrics (Bowersox & al. 2002, 557).

Cost Management	Customer Service	Quality	Productivity	Asset Management
Total cost	Fill rate	Damage frequency	Units shipped per employee	Inventory turns
Cost per unit	Stockouts	Order entry accuracy	Units per labor dollar	Inventory levels, number of days supply
Cost as a percentage of sales	Shipping errors	Picking/shipping accuracy	Orders per sales representative	Obsolete inventory
Inbound freight	On-time delivery	Document/invoicing accuracy	Comparison to historical standard	Return on net assets
Outbound freight	Back orders	Information availability	Goal programs	Return on investment
Administrative	Cycle time	Information accuracy	Productivity index	Inventory classification (ABC)
Warehouse order processing	Delivery consistency	Number of credit claims	Equipment downtime	Economic value-added (EVA)
Direct labor	Response time to inquiries	Number of customer returns	Order entry productivity	
Comparison of actual versus budget	Response accuracy		Warehouse labor productivity	
Cost trend analysis	Complete orders		Transportation labor productivity	
Direct product profitability	Customer complaints			
Customer segment profitability	Sales force complaints			
Inventory carrying	Overall reliability			
Cost of returned goods	Overall satisfaction			
Cost of damage				
Cost of service failures				
Cost of back order				

Cost

Cost is one of areas receiving the most attention from logistics managers. Thus, it is vital to keep track of cost data for each of logistics functions such as transportation, inventory and material management. As indicated in table 4, cost performance can be measured as total cost, cost per unit or percentage of sales. For instance, transportation cost is typically measured as percentage of sale or the amount of money spent on each unit delivered. Besides, distinct metrics for cost measurement include product profitability, customer profitability, cost of service failures and cost of back order all of which are of importance. However, it is challenging to accurately calculate those costs because most of the necessary data are sophisticated and unavailable. Furthermore, it should be noted that there are different ways to measure cost performance of different logistics activities, which leads to a large quantity of potential metrics. Logistics managers are responsible for identifying which metrics are the most suitable for their organizations' nature and needs. (Bowersox & al. 2002, 558.)

Customer service

Three main components of basic customer service include availability, operational performance and service reliability. Availability which refers to the capacity to have

products available when there is customer demand is typically measured with fill rate metrics. (Bowersox & al. 2002, 74.) Fill rate is the ratio of customer demand which can be satisfied through available stock without backorders or lost sales (Vermorel 2015). To be more specific, if customers order 10 pieces of a products, but only 9 pieces are available, then the fill rate is 90%. Fill rate can be calculated based on number of items, number of line, value and number of order (Figure 14). (Bowersox & al. 2002, 558.)

$$\text{Item fill rate} = \frac{\text{Number of items ordered by customers}}{\text{Number of items delivered to customers}}$$

$$\text{Line fill rate} = \frac{\text{Number of purchase order lines ordered by customers}}{\text{Number of purchase order lines delivered complete to customers}}$$

$$\text{Value fill rate} = \frac{\text{Total dollar value of customer orders}}{\text{Total dollar value delivered to customers}}$$

$$\text{Order fill rate} = \frac{\text{Number of customer orders}}{\text{Number of orders delivered complete}}$$

Figure 14. Ways of calculating fill rate (Bowersox & al. 2002, 558).

Out of all above fill rate metrics, order fill rate is considered the most difficult to achieve since even only one item missing will cause an incomplete order. Moreover, other popular indicators of availability include stockout frequency and number of backorders. (Bowersox & al. 2002, 558.)

Operational performance is relevant to the amount of time needed for an order to be transported. The most common metrics to monitor operational performance are average order cycle time, order cycle time consistency and on time delivery. Average order cycle time refers to the average quantity of time gap between order receipt and order delivery to customers. Consistency of order cycle time tracks the frequency of actual order cycle time meeting planned order cycle time. Much attention is paid to order cycle consistency since it can significantly influence customers' inventory management. For instance, inconsistent order cycle leads to customers' additional safety stock to protect themselves in case of delayed delivery. (Bowersox & al. 2002, 558.)

Quality

In spite of being one of customer service components, service reliability is measured by quality related metrics. Service reliability involves the ability to protect delivered shipments from damage, ensure the accuracy of performance, transport products to the right destination and so on. One of the most important quality metrics is damage frequency

which is calculated by dividing the number of damaged units to the total number of units. In addition, customer returns of damaged products is also tracked to measure damage frequency as in some cases only after customers receive the shipments can the damage be detected. Moreover, accuracy of performance is reflected by the ratio of the total quantity of times the activity is carried out accurately to the total quantity of times the activity is performed. For instance, if 95 times out of 100 times the orders are entered correctly in the system, the accuracy is 95%. Besides, research shows that reliable services should be capable to provide transparency regarding order status and timely notification about problems such as delayed delivery and incomplete orders, which can be tracked with information availability metrics. Not only should information be available but it also needs to be accurate. Therefore, information accuracy is of high importance. (Bowersox & al. 2002, 559.)

Productivity

Productivity is the connection between input and output of products or services. With the same amount of input, if company A can produce more products that company B, then company A possesses higher productivity. According to table 4, labor productivity is one of the aspects that logistics managers focus on. It can be measured by labor cost or labor hours. To be more specific, in transportation, labor productivity can be quantified by numbers of products shipped per staff while in warehouse, labor productivity is measured by numbers of items picked or stored per staff. (Bowersox & al. 2002, 559.)

Asset management

Asset management which refers to how effectively capital invested in facilities and equipment is utilized is usually measured by the percentage of total capacity deployed. An instance would be if 1000 shipments can be delivered, but only 900 are shipped, then the capacity utilization is 90%. Moreover, facility and equipment utilization can also be measured in terms of time. Generally, the number of hours that equipment and facilities are not used which is known as downtime should be as low as possible because higher down time equals less utilization. Not only capital utilization but inventory is also measured to monitor asset management. One of the most typical metrics is inventory turnover rate which can be calculated in three distinct ways (Figure 15). (Bowersox & al. 2002, 560.)

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold during a time period}}{\text{Average inventory valued at cost during the time period}} \quad (1)$$

$$\text{Inventory turnover} = \frac{\text{Sales revenue during a time period}}{\text{Average inventory valued at selling price during time period}} \quad (2)$$

$$\text{Inventory turnover} = \frac{\text{Units sold during a time period}}{\text{Average unit inventory during the time period}} \quad (3)$$

Figure 15. Ways of inventory turnover rate calculations (Bowersox & al. 2002, 560).

The first method is the most popular one while the second way is usually applied by retail companies. For the products whose costs and selling prices undergo considerable change during short period of time such as gas and fuel, calculation based on units instead of costs and prices is implemented. Another metrics that can be applied to measure inventory investment is days of supply which reflect the available quantity of goods to meet forecasted sales. To be more specific, if there are 1000 units available in inventory and forecasted sales are 500 units, then the inventory can meet 2 days of supply. (Bowersox & al. 2002, 561.)

To sum up, the measurement of functional performance has been enhanced during the last few years with an increase in the number of metrics, which results in the improvement in availability and comprehension of information (Bowersox & al. 2002, 561).

2.5.3 Measurement of customer accommodation

In addition to excellent functional performance, it is vital that companies should be capable to accommodate customer requirements so as to succeed. Thus, enhanced metrics which focus on customers' needs are required. Customer accommodation metrics can be divided into three categories: perfect orders, absolute performance and customer satisfaction. (Bowersox & al. 2002, 561.)

Perfect Orders

Perfect orders which mean every single aspect of orders is accomplished without any flaws reflect the performance of the integrated logistics system instead of separate functions. It is calculated by dividing the number of perfect orders by the total number of orders. Logistics executives need to take into consideration various dimensions to effectively monitor perfect orders (Table 5). (Bowersox & al. 2002, 562.)

Table 5. Dimensions of Perfect Order (Bowersox & al. 2002, 562).

Correct order entry	Timely arrival
Correctly formatted EDI and transaction codes	Shipment not damaged
Items are available	Correct invoice
Ship date allows delivery	Accurate overcharges
Order picked correctly	No customer deductions
Paperwork complete and accurate	No errors in payment processing

As indicated in table 5, there are a large number of factors that can affect Perfect Order such as order entry, availability and correct picking, which makes Perfect Order challenging to achieve. According to research, most of companies can obtain only approximately 60% perfect orders. (Bowersox & al. 2002, 562.)

Absolute Performance

According to Bowersox & al. (2002, 562), it is common that metrics are monitored over a large number of order and a period of time, which can be misleading. For instance, if a firm has 100 000 shipments to deliver a day and the on time delivery rate is 99%, 1000 orders are delivered late. The rate of 99% apparently can be satisfying but 1000 late orders certainly have a significant influence on customer base, which proves the importance of tracking absolute performance in the interest of better understanding of the logistics performance. (Bowersox & al. 2002, 562.)

Customer satisfaction

It should be highlighted that the major purpose of customer accommodation is customer satisfaction therefore customer satisfaction measurement is essential. In order to quantify customer satisfaction, thorough analysis of customer expectation and perception of companies' performance needs to be available. Furthermore, popular methods that can be used for customer satisfaction measurement are interviews and surveys. Typical surveys and interviews cover customers' expectation and opinions about different dimensions of logistics quality such as order accuracy, on time delivery and so on. Not only customers' opinions about distinct aspects of logistics operation but also their levels of contentment about the whole integrated logistics system should be taken into account. (Bowersox & al. 2002, 562-563.)

2.5.4 Measurement of supply chain comprehensive performance

So as to truly thrive in the increasingly competitive business world, firms should deliver excellence in the whole supply chain in addition to functional performance and customer accommodation. However, the supply chain involves various functions whose executives may have different views regarding the definition and what make an effective logistics system. Therefore, supply chain comprehensive metrics which support executives in distinct functions in the supply chain reach an alignment are in demand. Major supply chain comprehensive metrics include cash-to-cash conversion time, supply chain inventory days of supply, dwell time, on-shelf in-stock ratio, total supply chain cost and supply chain response time. (Bowersox & al. 2002, 563.)

Cash-to-Cash Conversion

Cash-to-Cash conversion is defined as the amount of time needed to turn investment into raw material and inventory into revenues. In general, the quicker the cash-to-cash conversion, the more beneficial it is for companies as they can take advantage of the free inventory and invest cash for interest. The formula for quantifying cash-to-cash conversion is below:

Cash-to-Cash Conversion = Inventory Days of Supply + Days of Account Receivable Outstanding – Days of Trade Account Payable Outstanding

Assuming a firm has 6 days of supply, 33 days of account receivable and 55 days of account payable, then that firm has -16 days of cash-to-cash conversion. Moreover, cash-to-cash measurement is crucial as it supports firms to more effectively evaluate the integrated process from inbound materials through manufacturing to outbound delivery to customers. (Bowersox & al. 2002, 563; Farris & Hutchison 2002, 290-291.)

Supply Chain Inventory Days of Supply

Inventory days of supply assess individual firm's performance. However, supply chain inventory days of supply focus on the inventory performance of the whole supply chain by considering the total inventory at all firms and locations in the chain. Therefore, supply chain inventory days of supply is conducive to a more comprehensive perspective of the integrated supply chain performance. (Bowersox & al. 2002, 563.)

Dwell Time

Dwell time is one of the main metrics that reflect the productivity of the supply chain. It refers to the ratio between the amount of time an item is idle to the amount of time necessary for that item to contribute to its designated purpose. Ideally, dwell time should be as low as possible as higher dwell time equals higher investment in inventory and

asset. Moreover, the key to minimizing dwell time is to remove non-value-adding process and activities, which requires close collaboration of all entities in the supply chain. Furthermore, continuous material flow and timely delivery also contribute to reducing dwell time. (Bowersox & al. 2002, 563.)

On-Shelf In-Stock Ratio

Product availability wherever and whenever there is demand from end customers is one of the major goals of the supply chain and this can not be appropriately monitored with individual companies' fill rates since they only reflect the ability to meet demand of individual firms' customers, not the end customers. As a result, on-shelf in-stock percentage is implemented. On-shelf in-stock ratio exerts a direct impact on retailers, nonetheless, an improvement in the on-shelf in-stock ratio will be favorable to all entities in the supply chain. (Bowersox & al. 2002, 564.)

Total Supply Chain Cost

Total supply chain cost is the total of costs of all members in the supply chain (Figure 16). It is vital to focus on the total supply chain cost instead of individual company's cost so as to obtain effective supply chain management. The reason is that it is likely that some firms will try to shift costs to others, which does not support cost reduction in the whole supply chain. It is common that when a firm reduces its costs, others may undergo cost increase. However, if the total cost reduction is more substantial than the cost increase, the whole supply chain is enhanced. (Bowersox & al. 2002, 565.)

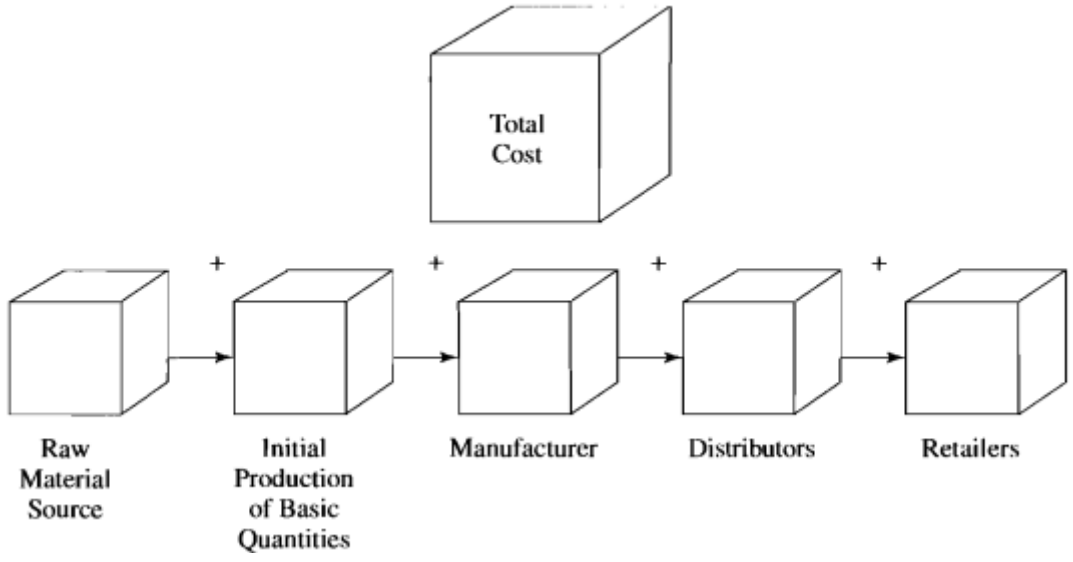

Figure 16. Total supply chain cost (Bowersox & al. 2002, 565).

Supply Chain Response Time

Last but not least, supply chain response time is the time required for companies to identify a significant change in market trend and make adjustments to satisfy the new demand. A prime example would be when automakers recognized that the demand for e-mobility is increasing rapidly, it takes them years to build new supplier base, develop manufacturing facility and capability to adapt to the change in market demand. Therefore, it will be beneficial for executives to estimate supply chain response time for the sake of timely action and adaptation. (Bowersox & al. 2002, 566.)

2.5.5 Performance comparison

The ultimate purpose of performance indicators is to support managers in decision making by helping them have a better understanding of how good the firm's performance is compared to competitors' and how far the firm is from the objectives. Moreover, measures of performance also play an important role in indicating if the firm's performance improves or deteriorates over the time, how much it has improved or deteriorated and the areas that can be improved on. (Waters 2003, 207.)

After measuring performance comes evaluating performance which can be conducted in four ways. The first way is to compare performance indicators with absolute standards which refer to the ideal results such as zero customer claims. Another way is comparison between indicators with target performance which is more realistic goal aligned by managers such as five customer claims per week. Thirdly, since improvement is always desirable, measures of performance can be compared to historical standards which can be considered the worst accepted performance. Last but not least, performance can be judged based on competitors' standards which firms need to achieve and even surpass to maintain the competitiveness. (Waters 2003, 207.)

Benchmarking is a vital tool that a large quantity of companies utilize to evaluate their performance by means of comparison between their performance with leaders' in the industry. Thanks to benchmarking, companies can discover effective ideas and learn from others. Interestingly, studies indicate that organizations with higher capabilities are more interested and involved in benchmarking than the ones with average performance. (Waters 2003, 207.)

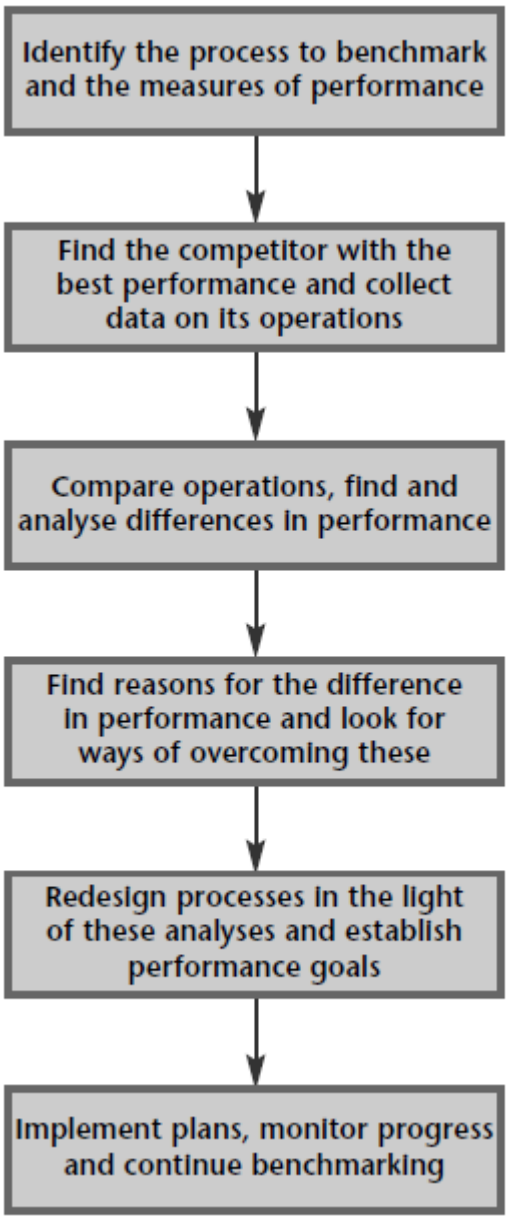

Figure 17. Benchmarking process (Waters 2003, 208).

As illustrated in figure 17, benchmarking process consists of various steps. The first step is to realize the need for improvement and benchmarking activity even though it is not mentioned in the figure. Next, identification of the suitable measures of performance and the firm with the most efficient performance is required. After that comes the analysis of the gap in the performances and identification of the reasons for that gap. Then, firms need to make adjustments, create an improvement plan based on the finding and set up new goals. The last step would be implementation and supervision of the plan. (Waters 2003, 208.)

However, it should be pointed out that benchmarking may be hindered by the unavailability of data because most organizations keep the information about their operational process confidential. Besides, for corporations which have multiple business units, internal benchmarking can be carried out to promote knowledge sharing and improve efficiency. (Bowersox & al. 2002, 566.)

2.6 Transportation outsourcing

This section aims to present the overview of logistics outsourcing, its drivers and drawbacks as well as the overall outsourcing process.

2.6.1 Overview of logistics outsourcing

Outsourcing refers to the act of hiring a third party provider to perform services that were previously performed in-house for a company. It is sometimes confused with contracting out. However, they are two different concepts. The difference lies in the fact that contracting out means customers specify exactly what contractors need to do and how to do that whereas outsourcing means customers only specify the outcomes and contractors use their expertise and knowledge to decide how to accomplish the required result. (The U.S. Agency for International Development 2010, 7.)

As a result of increasing globalization, the product movement all over the world has been escalating. Besides, globalization also raises the complexity of supply chain management with longer lead time, local added value, unreliable transit time and so on. In addition, emerging markets are promising markets with increasing demand, however, setting up in-house logistics system is risky and costly. Due to all aforementioned factors, logistics outsourcing has experienced an exponential growth, especially transportation and warehousing (Figure 18). (Rushton & Walker 2007, 8.)

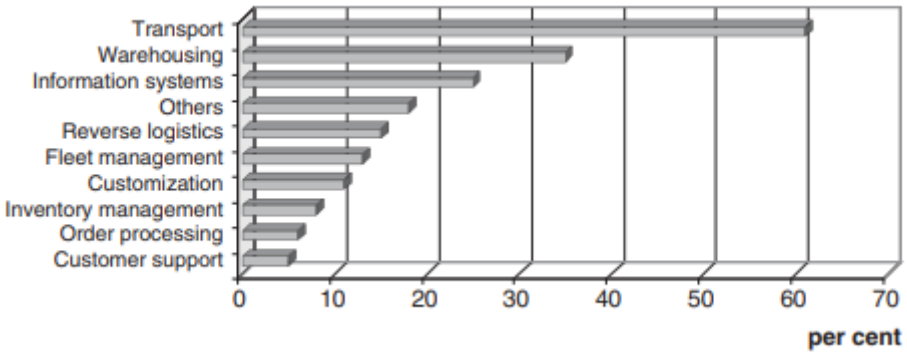

Figure 18. Logistics functions outsourced in Europe 2006 (Rushton & Walker 2007, 8).

There are three main types of logistics service providers. Firstly, third party logistics providers, also called 3PLs, are specialized in providing such logistics functions as transportation and warehousing. So as to provide better solution than organization's in-house logistics, they pour a large amount of capital into facility and information service investment. On the other hand, non-asset-based 3PLs also provide logistics services, nonetheless, they do not own physical resources. Instead, they are responsible for negotiating and renting warehouses and trucks in addition to providing information services. A more advanced type of logistics service providers is fourth party logistics providers (4PLs) who offer a comprehensive solution by coordinating, monitoring and managing different aspects of the supply chain for their clients. Basically, 4PLs serve as the interface between the customers and 3PLs. (The U.S. Agency for International Development 2010, 9.)

There is outsourcing potential in various logistical activities and operations. Figure 19 depicts a typical physical flow from suppliers to customers, from raw materials to finished goods. Almost all of the functions in the figure can be outsourced, even including production and assembly of products which may require more thorough consideration. (Rushton & Walker 2007, 106.)

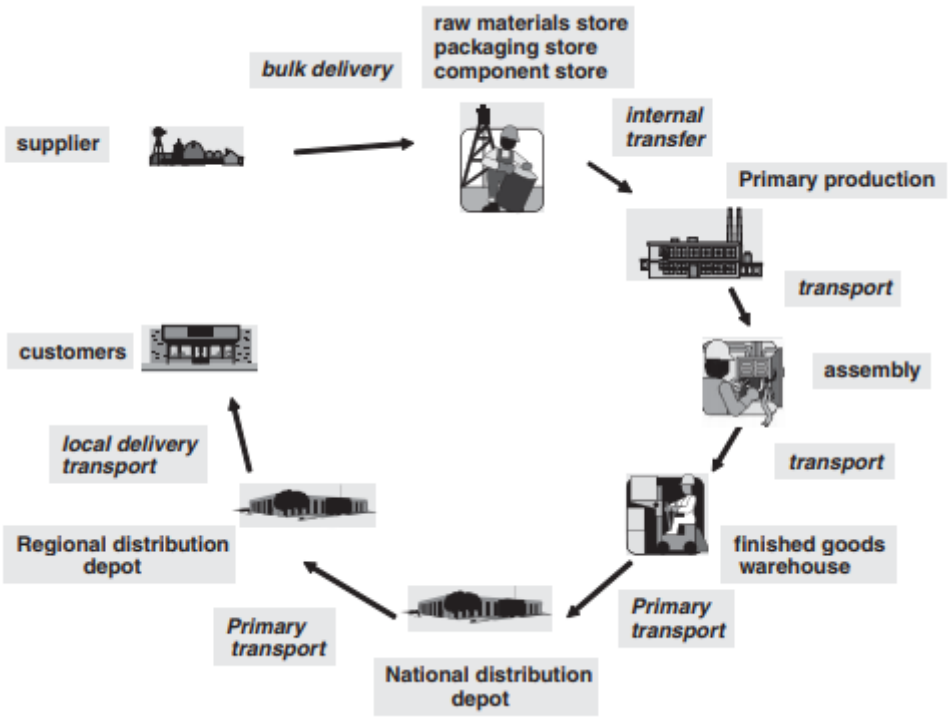

Figure 19. A typical physical logistics structure (Rushton & Walker 2007, 106).

In addition to functions illustrated in figure 19, there are reverse logistics flow and other supporting activities which can have outsourcing potential (Rushton & Walker 2007, 106).

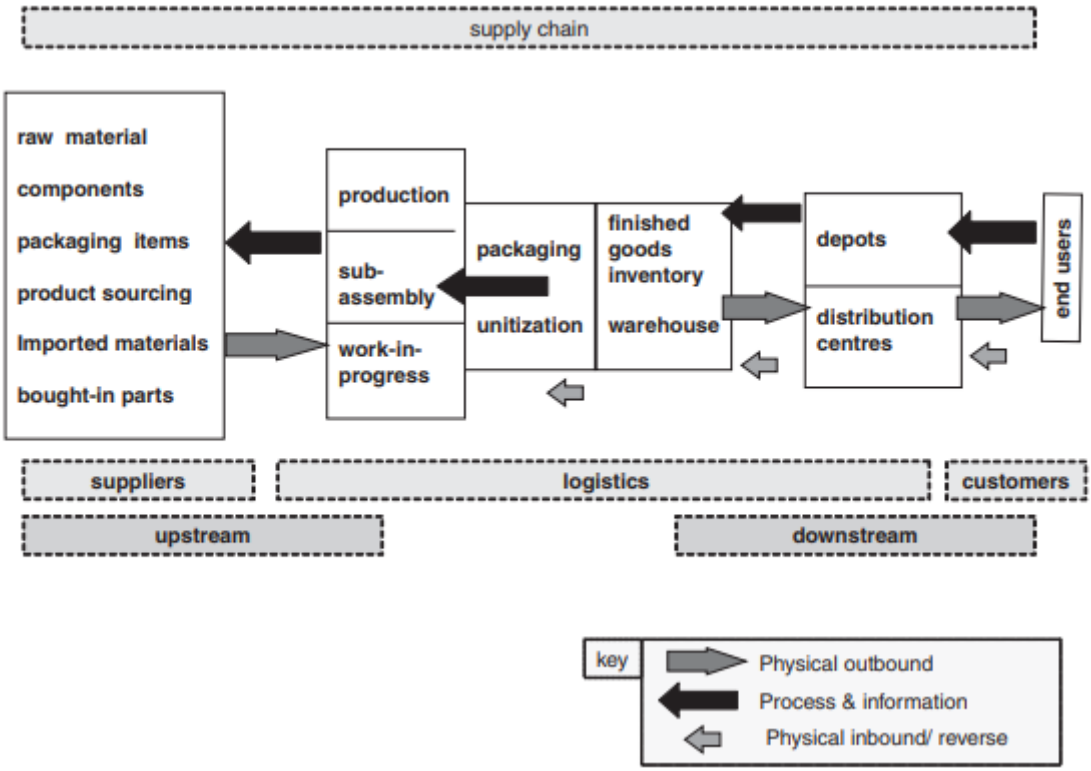

Figure 20. Flows and processes in the supply chain (Rushton & Walker 2007, 107).

As can be seen from figure 20, logistics executives should take into account three aspects when looking for areas with outsourcing opportunities: outward physical flow, reverse physical flow and supporting processes. In each aspect, there are activities and elements, one or some of which can be picked for outsourcing. For instance, the ordering process includes order receipt, credit control, stock checking and stock allocation. Companies can choose one or some or all of those elements to outsource to logistics service providers. It should also be pointed out that there are various extents to which companies can outsource logistics service. Figure 21 demonstrates the continuum of outsourcing which contains distinct alternatives of outsourcing. The first option is total internal asset management equaling not outsourcing anything. In this case, companies fully own their infrastructure, facilities and management system. On the contrary, total external asset management refers to companies fully outsourcing their logistics operation and having no investment in logistics system and no management of asset and labor. Between the two above extreme alternatives are different options. For instance, firms can choose to keep storage in-house and outsource delivery service or to contract transportation and storage but maintain own management. Each choice will fit a particular firm's needs and requirements. Moreover, the continuum of outsourcing can support the decision whether

to outsource or not and what should or should not be outsourced. (Rushton & Walker 2007, 109.)

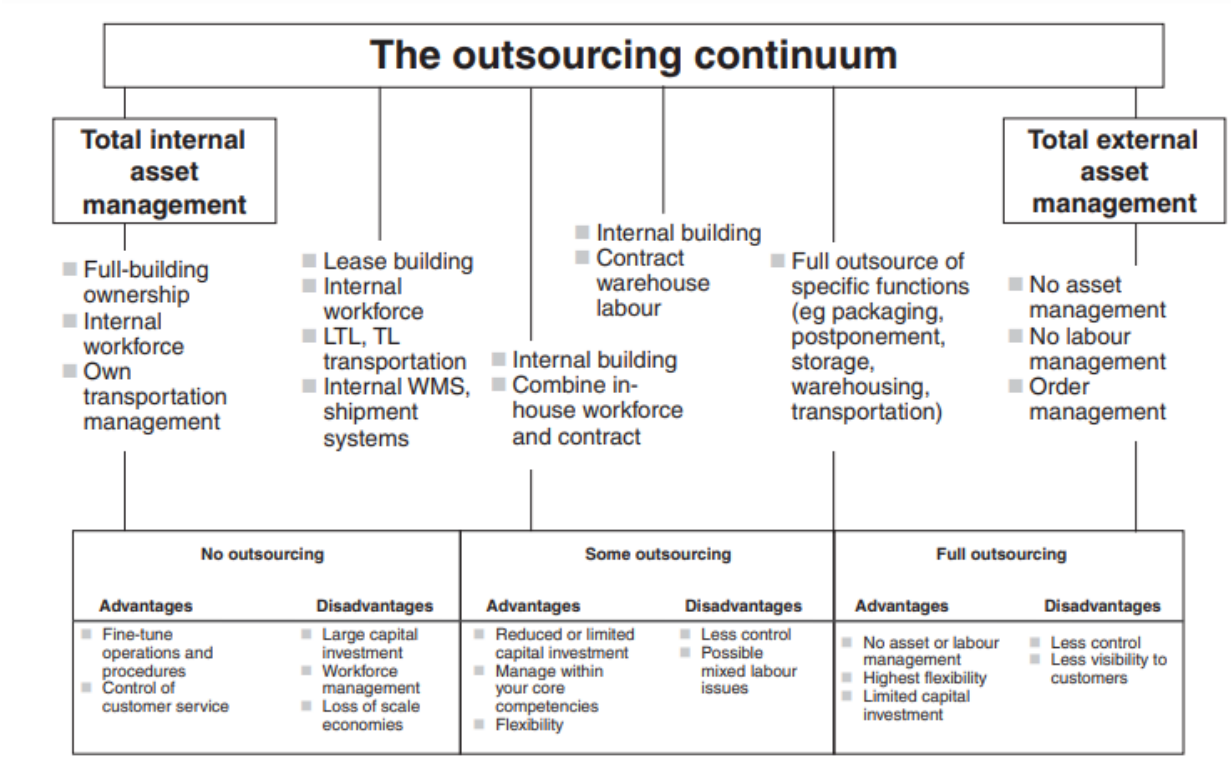

Figure 21. Continuum of logistics outsourcing (Rushton & Walker 2007, 109).

2.6.2 Drivers and drawbacks of outsourcing

There are multiple factors that motivate and demotivate companies from outsourcing their logistics operation and Rushton and Walker (2007, 222) classify those drivers and concerns into 4 major categories: organizational, financial, service and physical.

Organizational Dimension

One of the most popular rationales why companies choose outsourcing is that it will allow them to concentrate on their core competence. For instance, by virtue of outsourcing logistics, retailers can focus on their core businesses which are brand management or store management. In addition, it is vital that companies should be aware of what their core competencies are in this case. Another organizational driver is that logistics outsourcing enables firms to take advantage of expertise and knowledge of logistics service providers. Besides, state-of-the-art technology such as radio frequency identification and geographic information system can be more accessible and employed for the sake of enhanced operation without considerable investment required from client firms. (Rushton & Walker 2007, 222-223.)

Nevertheless, there are some drawbacks that need to be considered. Firstly, it is likely that 3PLs do not have the necessary knowledge and understanding of customer firms' products and markets to effectively deliver the service. Secondly, the partnership and cooperation may be put in jeopardy because of the difference and clash of cultures of the two parties. Thirdly, companies may suffer from the loss of control over logistical variables, which prevents them from deciding the shipment sizes, shipment frequency, vehicle sizes and so on. However, the lack of control can be mitigated by partnering with the 3PL structure that is the most appropriate to companies' needs. Fourthly, in the future, if client firms want to move back to in-house logistics operations, they will encounter some difficulties due to the loss of logistics expertise during outsourcing phase. A solution to this could be keeping logistics management and expertise in-house which not only facilitates supervision and evaluation of 3PLs' performance but also aids companies to return to in-house logistics operation if they want to. Fifthly, brand integrity can be a concern as client companies will not have their brands on vehicles, hence reducing the opportunity for advertising on vehicles. Last but not least, it is common that client companies' products may be consolidated with competitors' products. As a consequence, it is challenging to ensure confidentiality. (Rushton & Walker 2007, 223-224.)

Financial Dimension

When it comes to financial aspect, there are a large quantity of benefits that firms can enjoy when outsourcing. One of the first advantages is that investment in facilities and resources is not required. Therefore, the capital can be poured into other areas yielding more profit such as advanced manufacturing technology. In some cases, logistics service providers can pay clients for the ownership of clients' existing assets, which improves the cash flow. Another advantage is that since firms get rid of the ownership of facilities and equipment, these property will not be in the balance sheet and fixed costs will be reduced. Furthermore, logistics outsourcing can contribute to cost saving thanks to economies of scale. Logistics service providers can consolidate the volumes of various customer companies, which means the fixed cost is spread over more units of items. Therefore, the fixed cost is reduced. Moreover, outsourcing requires payments to be made regularly, hence providing more cost visibility and transparency. In addition, sometimes customer companies can benefit from cost lag or cushion effect when there is a delay in passing the influence of increased costs such as fuel cost from logistics service providers to clients. The advantage is even more significant when the inflation rate is high. (Rushton & Walker 2007, 224-225.)

On the other hand, it is probable that the changeover cost from in-house to outsourcing is so high that there is no point in doing so. For example, clients need to pay the sunk cost

of own sites and equipment or long-term rent which are likely to be costly. In other cases, clients may have just invested a great amount of capital in advanced new equipment and facility which can not be passed to service providers. In such instances, outsourcing does not bring financial benefits to firms. (Rushton & Walker 2007, 224-225.)

Service dimension

Some critics find it arguable whether outsourcing can enhance service levels. For instance, for single-user operations, 3PLs carry out almost exact activities as in-house operations, which leads to no considerable distinction. Furthermore, companies' control over logistics service is reduced due to outsourcing. (Rushton & Walker 2007, 225-226.)

Nonetheless, service level improvement opportunity plays an important role in encouraging a large number of companies to outsource logistics service. It is often the case that logistics is not companies' core competency, thus, they pay little attention to the area. Therefore, the chance for logistics service improvement is limited. By contrast, logistics is core business of logistics service providers, hence they will focus on continuously enhancing the service level to increase their competitiveness. Besides, incentives for service improvement can be clearly indicated in contracts, which promotes motivation to enhance service levels. Improved flexibility is another advantage, especially when a company wants to enter new markets. Upon entry into new geographic regions, it is likely that sales and revenues are low and unstable. As a result, outsourcing logistics is more cost effective than building a whole new distribution system. Moreover, when companies launch new products or services which might be difficult to be delivered by current distribution system, they can turn to 3PLs for suitable delivery methods. Furthermore, outsourcing can add value to logistics services. A prime example would be the implementation of delivery tracking technology which is favorable to increasing customer satisfaction. Logistics service providers can exert a positive effect on service level by dint of enhanced delivery frequency. To be more specific, small companies with low delivery volumes may consolidate shipments in the interest of cost saving, which decreases the delivery frequency. However, 3PLs can bundle those small shipments with shipments of other client companies to the same destination to achieve cost saving and frequent delivery simultaneously. (Rushton & Walker 2007, 226.)

Physical Dimension

As a result of globalization, the number of international companies has undergone substantial growth. More firms expand their business across the borders and open branches all over the world, which adds more complication to the supply chain and logistics. Due to this complexity, it is a better option to employ 3PLs who have more

international experience and knowledge to handle companies' logistics. Moreover, firms may need to relocate their logistics facilities due to such reasons as changes in suppliers' sites and customers' sites. The relocation is likely to be costly and disrupt the logistics operation. In this case, it is more beneficial for firms to choose outsourcing. (Rushton & Walker 2007, 227.)

On the other hand, there can be some incompatibility between client companies' needs and logistics service providers' capability. For example, some special products require special vehicle characteristics or special loading and unloading equipment which might not be available in 3PLs. Another instance of incompatibility is the fact that some products are more suitable for van sales operation where products are ordered and assembled on the vehicles instead of before being loaded onto the vehicles. It is undoubtedly highly challenging to outsource logistics service of those products to 3PLs. Besides, there is a risk of product contamination when incompatible products are transported together, which is less likely to happen if the logistics is conducted in-house. For instance, if ice cream and fish are delivered next to each other, ice cream can absorb fish smell and can not be sold later. (Rushton & Walker 2007, 228.)

2.6.3 Outsourcing process

There have been a certain amount of research into outsourcing process and different researchers identify different stages. To be more specific, Corbett (2004, 24) indicates that outsourcing framework includes idea, assessment, implementation, transition and management whereas according to Click and Duening (2005, 83), outsourcing steps are opportunity analysis, vendor selection, contract development, transition and operation. However, in general, distinct steps in all outsourcing frameworks can be classified into five major stages: preparation, vendor selection, transition, relationship management and reconsideration (Figure 22). (Perunovic & Pedersen 2007, 3.)

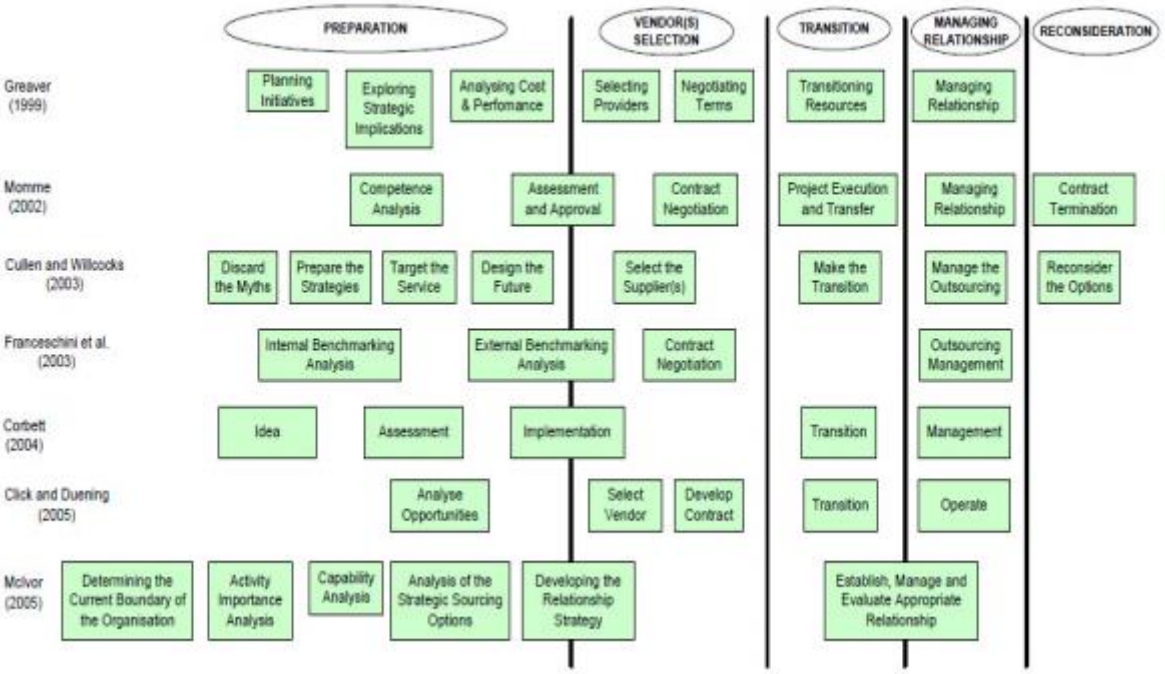

Figure 22. An overview of outsourcing frameworks (Perunovic & Pedersen 2007, 3).

The first step is preparation when companies identify the need for outsourcing and areas with outsourcing opportunities. Next, the most suitable vendor is selected out of all qualified services suppliers. After that come the transition phase from in-house to outsourcing and relationship management with the chosen vendor. In the last stage, the result of the whole process is evaluated and adjustment is made if necessary. (Perunovic & Pedersen 2007, 3.)

In the next discussion, a more detailed framework developed by Rushton and Walker (2007, 269) is presented (Figure 23).

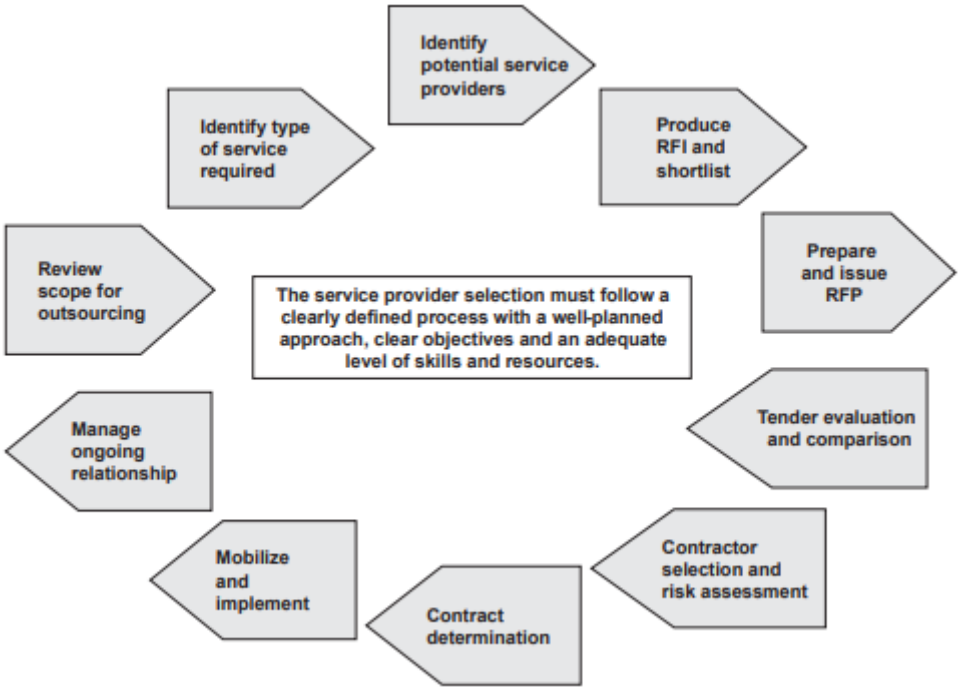

Figure 23. Key steps in the outsourcing process (Rushton & Walker 2007, 269).

As can be seen in figure 23, the first two stages which are similar to other frameworks involve an internal evaluation to determine whether there is a need for outsourcing and if yes, what the services to be outsourced are. To be more specific, there are five questions that should be answered:

1. What are the potential benefits of outsourcing to the company?
2. Should we outsource?
3. What are the key requirements that service providers need to satisfy?
4. What should be outsourced?
5. What approach to adopt?

(Rushton & Walker 2007, 269).

Next, potential vendors are identified and requested for information (RFI) to shortlist the more qualified and interested ones. It is probable that the outsourcing scope is so insignificant that some service providers are not interested or so big that they do not have the necessary capacity to manage the business. A set of key requirements can also facilitate sorting out inappropriate vendors. Then, companies will issue request for proposal (RFP) to invite vendors to tender. It is recommended that preferred formats of response should be included in the RFP so that the comparison is easier and smoother. After that, service providers' proposals of solutions and pricing are evaluated and compared, which should be carried out using both qualitative and quantitative methods. The reason for this is because in addition to cost which is evaluated using quantitative method, there are other non-quantifiable factors that require qualitative assessment such

as vendor's strategy and quality of information system. After the most suitable contractor is identified, companies can conduct further negotiation to optimize the deal. Besides, risks should be assessed to identify and prevent potential problems in the future, which is vital but usually skipped due to the lack of time. Risks can be measured and evaluated based on the probability of an issue taking place and its potential influence. Then, contracts can be made. It is suggested that contracts should be as detailed as possible and include such topics as cost and tariff structure, service-related factors and administration. It is essential to also include service level agreements in contracts as they specify the level of service concurred by both parties and define all key performance metrics that measure the service delivered by vendors. Next is the implementation phase which requires a well-structured plan with a clear timeline (The U.S. Agency for International Development 2010, 27). The final stage, relationship management, is vital to the success of the whole outsourcing process. In order for clients and vendors to attain and maintain a successful relationship, collaboration, engagement and continuous improvement and regular communication are highly crucial. (Rushton & Walker 2007, 269-296.)

3 Research methodology

In this chapter, the author presents the research methods, the research design, various data sources and data collection methods implemented throughout the thesis. Besides, the reliability and validity of the thesis is also discussed.

3.1 Research methods

There are two major approaches to research: qualitative and quantitative. According to Patton (2001, 39), qualitative research aims to gain understanding of phenomena using a naturalistic approach. In addition, Strauss and Corbin (1990, 17) defined qualitative research as “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification”. The expected outcome of qualitative research is complete, detailed insights into the research problem or developing hypotheses of the phenomena (Golafshani 2003, 600).

Quantitative research, on the other hand, means the systematic study of phenomena with the support of quantifiable data and statistical analysis (Surendran 2019). This method stresses quantifying and analyzing the causal relationship between objects. Data can be collected with different tools such as surveys, polls and the final result can be presented in statistical terms. (Golafshani 2003, 600).

The two methods differ from each other in some key categories. When conducting quantitative research, researchers are inclined to remain objective whereas qualitative researchers are immersed in the matter. Besides, quantitative research requires tools to collect data while qualitative research does not as the researcher is the instrument of gathering data. Moreover, closed-ended questions are used in quantitative research as opposed to qualitative research’s questions which are open-ended. Besides, quantitative data are numerical. On the contrary, qualitative data are textual. (Baral 2019, 95; Golafshani 2003, 600.)

It is suggested that qualitative and quantitative methods can be combined and result in higher quality and increased comprehensiveness of research (Creswell 2009, 1). Kuhn (1977, 180) stated that a large quantity of qualitative work has been the premise of productive quantification. Implementing qualitative method, researchers can gain understanding of the phenomena and form hypotheses which can be verified thanks to quantitative method. Besides, distinct parts of the thesis require different techniques and methods. To be more specific, quantitative method is applied in studying logistics service providers’ performance and qualitative technique is used in interviews with the logistics

manager and the transportation staff. Due to all above rationales and justification, the author adopts both qualitative and quantitative methods in her thesis.

3.2 Research design

A research design is a plan and strategy of study to gain reliable and valid answers to the research problem. It defines important aspects such as what sources of data will be used and what methods of data collection will be applied. (Kumar 2011, 94)

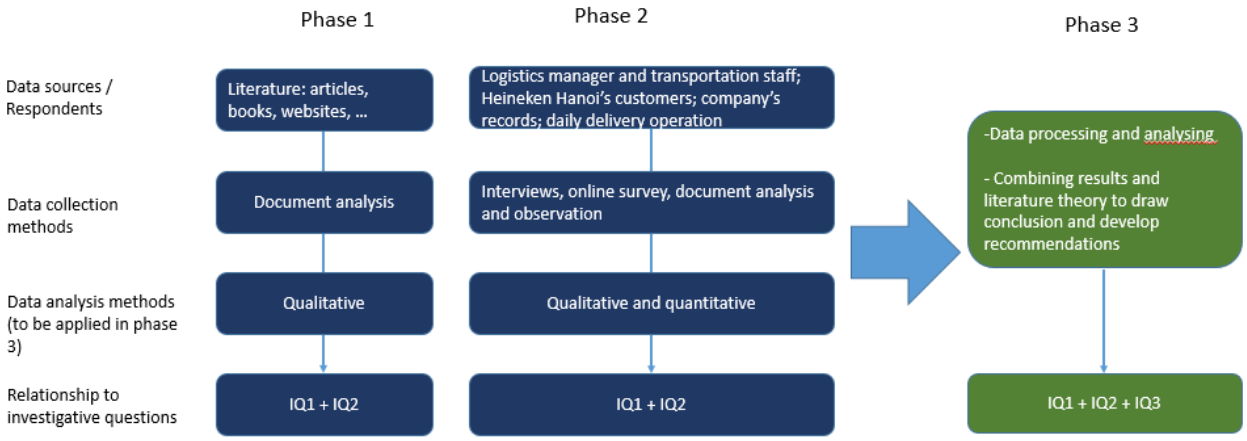

Figure 24. Research methods

The thesis design which is demonstrated in figure 24 entails three major phases. In phase 1, the most advanced and up-to-date theories are studied. The literature review is opened with the broad concepts and theories of supply chain management and logistics before moving on to transportation management and its detailed aspects. In phase 2, specific data are collected about the case company from a wide range of sources with various methods. To be more specific, interviews are carried out with the logistics manager and the transportation staff. In addition, online survey is implemented to gather customer's opinions whereas company's records of all shipments are also a vital source. Moreover, the author also observes the daily operation of logistics department to attain more understanding and insights into the delivery process. In the last phase, the data are analyzed with two methods in a precise manner. Based on the results and literature review, conclusions are made and recommendations are offered.

3.3 Data collection methods

There are various methods of data gathering such as interviews and immersing in the situation. After thorough consideration, the author has decided to collect data via four following channels.

Firstly, a survey which is appropriate for the gathering of both qualitative and quantitative data is applied to gain more insights into customers' experience of Heineken's delivery service. The advantages of this method lie in its convenience and the capability to cover a great quantity of respondents. Besides, its structured format facilitates data interpretation and analysis. Nonetheless, it should be noted that well-designed surveys are challenging and require expertise and skills to create. Surveys are recommended not to be lengthy and complicated so that they can reach a higher respondent rate. Following this advice, the survey is comprised of only 11 questions all of which are simple and short. Two types of questions are included: closed format questions and open format questions to obtain both qualitative and quantitative data. Closed format questions which require the respondents to choose from given answers are quicker and easier to answer while with open format questions, answerers are given more freedom to express their ideas as the number of answers is not limited. In addition, how the survey is delivered should be taken into account. Questionnaires can be delivered personally, by post or via the Internet. Usually, personal delivery allows higher respondent rate because respondents can be persuaded or supported when encountering confusion or difficulty when answering. However, it is time consuming and tricky when the number of target respondents is high. Postal delivery can cover a larger number of respondents but the addresses need to be accurate and postal cost is also a factor that should be considered. The internet has been chosen as the distribution method of the survey for the thesis as it requires the least time, effort and resource, especially when the quantity of target recipients is high (more than 170 recipients). (Walliman 2011, 97-98.)

Interviews are implemented to gather information about daily delivery operation and strategic transportation management at Heineken Hanoi. There are three main types of interviews: structured, unstructured and semi-structured. In structured interviews, formats are standardized and questions are determined prior to the interviews as opposed to unstructured interviews when questions are not set in advance (Surbhi 2017). On the other hand, semi-structured interviews are the combination of structured and unstructured interviews. To be specific, some questions are preset and others are spontaneous. (Walliman 2011, 99-100.) The author has chosen to carry out semi-structured interviews as they offer the advantages of both structured and unstructured ones. The interviewer can benefit from a structured approach by preparing the key questions beforehand and investigate some issues further if necessary with spontaneous questions. Besides, the author has endeavored to optimize the interviews by creating a comfortable and friendly atmosphere.

Observation is another data collection method that is used in the thesis. Observation is defined as “systematic viewing, coupled with consideration of the seen phenomenon” (Young 1992, 64). The expected result of observation is a detached perspective of the phenomenon. This method is appropriate to gather data about processes, events and the nature of objects. By virtue of observation, the researcher can have firsthand experience and better understanding of the context. Besides, the observer is able to directly evaluate the phenomena without the data being distorted and interpreted by other people. Moreover, researchers do not have to be dependent on respondents’ willingness and ability to provide data with observation. Therefore, uncomfortable topics that may be avoided in interviews and surveys can be studied via observation. Observation is especially efficient in obtaining preliminary information, for instance, after a natural disaster, the damage can be observed and evaluated rapidly. However, it can be time and resource consuming if the process is not constant and involves a great deal of inactivity. Furthermore, the objectivity of the research is a concern as observers’ interpretation may be influenced by their bias and personal opinion. Therefore, it is important that the researchers should keep themselves unbiased and their judgments impartial. (Walliman 2011, 100-102.)

Last but not least, document analysis is also a part of the data collection process. Bowen (2009, 27) defined document analysis as a “systematic procedure for reviewing or evaluating documents”. Documents refer to paper-based or computer-based materials which can be in various forms such as letters, maps and newspaper. Document analysis process requires researchers to properly find, choose and interpret data. If carried out appropriately, document analysis can provide deep insights into the researched topics. (Bowen 2009, 28-29.) The method is mostly applied when the author reviews prior literature about the topic and analyses the information from the case company’s records and files.

3.4 Reliability and validity of the research

Patton (2001, 247) suggested that when carrying out research or evaluating the quality of the research, it is crucial that validity and reliability should be taken into careful account. First, understanding the concepts of the two factors is of high importance. Reliability refers to the level of consistency of results over time and a study can be regarded as reliable if the same results can be produced with a similar methodology. Validity can be defined as how truly and accurately the research measures its intended object. (Joppe 2000, 1)

There are three major types of reliability that can be assessed. The first kind is test-retest which means the consistency across time. For instance, a questionnaire is done by the

same group of people twice with one year apart and the same results are achieved, then the results are reliable. Interrater is another kind of reliability. It is explained as the consistency across raters or observers. If distinct people carry out the same study and reach the same results, a high interrater reliability is indicated. Moreover, internal consistency is the consistency of the measurement that exists when there is a significant correlation of results of different parts in the same research. (Middleton 2019.)

Likewise, there are three kinds of validity. Firstly, content validity indicates the degree to which the research covers all aspects of the research problem. For instance, if a test designed to assess students' English skills only includes speaking, listening and reading, the test is considered to have low content validity due to the lack of the measurement of writing skill. Secondly, construct validity illustrates the adherence of a measure to literature and theory. Thirdly, criterion validity is the degree to which results of different measures of the same objects correspond to each other with at least one of the measures validated. (Middleton 2019.)

The research is conducted with the implementation of both qualitative and quantitative methods. Primary and secondary data are collected using four different methods, ensuring a comprehensive data gathering process. The interrater reliability is notable in the thesis as distinct people achieve the same results when carrying out the same measurement. For instance, there is high similarity in the assessment of logistics service providers' capability between the logistics manager, the transportation staff and the author. Besides, the thesis has criterion validity as there is high correlation of one measure to another valid measures. For example, the survey result shows that HT has the highest dissatisfaction rate as a consequence of late delivery, which corresponds with facts and figures.

To sum up, the thesis is trustworthy as it attains both reliability and validity.

4 Findings and discussion

This chapter aims to present the key findings of current outbound delivery management system which is examined carefully based on the theoretical framework and the data collected from various sources. Besides, in this section, four recommendations for improvement are also offered.

4.1 Current outbound delivery management at Heineken

In this sub-chapter, the overall process of outbound delivery operation as well as its crucial aspects are discussed.

4.1.1 Overall process

Transportation contributes significantly to the success of companies by means of enabling effective distribution of goods and services at a reasonable cost. Besides, it offers the connection between different stages in the supply chain (Figure 25). As can be seen from figure 25, delivery is needed after every step to move goods to the next steps. Therefore, any disruption in transportation can adversely affect the whole supply chain. (Bloomberg & al. 2002, 94.)

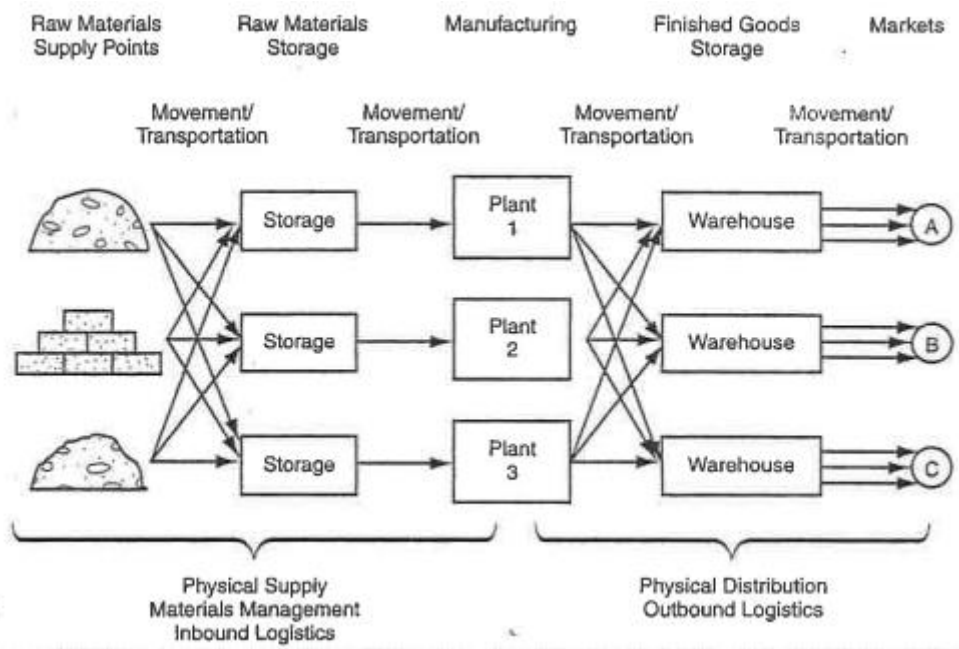

Figure 25. Transportation interface in logistics (Bloomberg & al. 2002, 95).

The outbound delivery plays a vital role in customer satisfaction and cost reduction. Thus, the outbound delivery process should receive a large amount of attention. Through

interviews with the company's representatives and the researcher's observation, the researcher was able to collect relevant data and demonstrate the operational delivery process in the company.

First, it should be noted that Heineken Hanoi choose five logistics service providers to carry out the delivery of shipments: TD, XT, HT, VN and BV. However, the carrier rate negotiation, scheduling and routing remain internal. With this mixed approach, the company can be proactive in optimizing the material flow and achieve better rates when negotiating. (Heineken Hanoi Brewery's Logistics Manager 15 June 2019.)

The operational process starts with distributors placing orders. After order confirmation, sales department transfers the information to logistics department, usually at around 16.00 so that transportation staff can book trucks for the next day because a working day in Vietnam ends at 17.00. The procedure resumes the next day when transportation employee allocates shipments to trucks and to distributors and issue delivery notes. Then warehouse employees pick up the products and load into trucks. The final steps are delivery to distributors and follow-up. The whole outbound delivery procedure is demonstrated in the following figure. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

Figure 26. Outbound delivery process at Heineken

It is noteworthy that the number of orders notified to logistics department the previous day will not stay the same because other orders will be placed by distributors the next day. Therefore, it is usually the case that there will be a lack of trucks the next day or some shipments will be delayed. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

4.1.2 Shipment allocation and network design

In addition to the overall process, it is important to dig deeper into some critical aspects which can affect the quality and cost of delivery. One of the essential aspects is shipment allocation. The company has a wide network of more than 170 distributors spreading all over the North and the Central regions of Vietnam. If there are two or more than two shipments supposed to be delivered to one distributor, those shipments will be bundled

together to save costs. On the other hand, if the order is too inconsiderable and not enough for one truck load, there are two scenarios: either it is delayed to the next day to be consolidated with another shipment to the same distributor if it is less than half truck load or it is shipped that day if it is more than half truck load despite the waste in truck space. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

Besides, to facilitate the shipment allocation, transportation staff calculates and bears in mind the load capacity of different types of trucks with distinct types of containers which include glass bottles, kegs and cans. To be more specific, there are 4 types of trucks based on gross vehicle weight that are most commonly booked: 1.25 tons, 2.5 tons, 3.5 tons and 5 tons. For instance, for 1.25-ton trucks, maximum 200 crates of beer cans or 80 crates of bottles or 45 kegs can fit in. Logistics service providers also offer larger trucks such as 12-ton and 15-ton trucks, or even 25-ton trucks, however, rarely does the company book these trucks due to volume issue. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

Transportation network is another vital aspect. The company has adopted direct shipment network which means all shipments are delivered directly from the plant to different distributors without any intermediary as shown in figure 27. According to Ms. Nguyen, Logistics Manager (15 June 2019), the reason why the company implements this network is because the company can be exempted from setting up intermediate facilities and faster delivery time. However, the firm has to suffer from higher cost when the shipment size is less than the truck load capacity. (Heineken Hanoi Brewery's Logistics Manager 15 June 2019.)

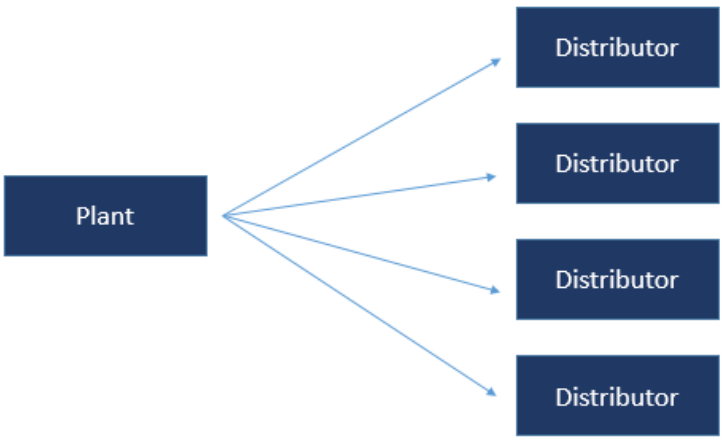

Figure 27. Transportation network at Heineken

4.1.3 Performance measurement

In addition to the effort to deliver excellent performance, measurement is the key to efficient management of performance. The important question is what metrics are appropriate to evaluate delivery operation. It is noteworthy that the ultimate goal of services is to achieve customer satisfaction. Therefore, it is recommended that metrics influencing customers' service experience should be monitored. (Christopher 2011, 238.)

According to the Logistics Manager (15 June 2019), on-time delivery is the most important factor that determines customers' assessment of the company delivery performance. Moreover, the information system is not developed and the data gathering and recording is done manually, which requires a substantial amount of time and labor. Hence, on-time delivery is the only metrics that is tracked and monitored. (Heineken Hanoi Brewery's Logistics Manager 15 June 2019.)

The data regarding delivery time is manually recorded in an excel file as shown in figure 28. The file is simple and lean, containing only necessary information. Average delivery time for each distributor is calculated and stored in another excel sheet which is linked to the on-time delivery assessment sheet. Then based on average delivery time and the time trucks leave the plant, expected delivery time is estimated. The drivers are supposed to input the actual delivery time in the delivery notes and obtain the signatures from distributors' representatives for validation before returning them to Heineken Hanoi transportation staff. The on-time delivery is evaluated based on the gap between expected and actual delivery time. If the actual delivery time is earlier or less than 15 minutes later than the expected delivery time, the shipment is considered to be on-time. To assist the tracking process, there are formulas applied in the excel sheet. For instance, in the "Average delivery time'' column, VLOOKUP function is implemented to connect this sheet to the base file which contains the calculated delivery time needed for all distributors. Therefore, when the distributor code is entered in the first column, the corresponding delivery time will immediately appear in "Average delivery time" column. Besides, SUM function is applied in the "Expected delivery time" which is equal to the time trucks leave the plant plus the average delivery time whereas IF formula is used in "On-time delivery assessment" column. The on-time delivery is calculated as the percentage of the number of on-time shipments by the total number of shipments in a month. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

ASIA PACIFIC BREWERY (HN) LTD.
Brewery Store.

Date : *Wednesday, September 18, 2019*

Cust	LSP	Truck No.	SO / ST No.	Doc.No	Time trucks enter plant	Time trucks leave plant	Average delivery time	Expected delivery time	Actual delivery time	On-time delivery assessment
HN30	HT	18C06767	3286	013782	9H00	9H20	1H	10H20	11h15	No
HL21	HT	18C07449	3547	013783	9H00	9H35	5H	14H35	14H30	Yes
HN30	HT	18C04415	3286	013784	9H00	9H30	1H45	11H15	11H10	Yes
HN30	HT	18C06509	3286	013785	9H30	9H45	1H	10H45	10H55	Yes
HT19	BV	43C09704	3409	013786	10H00	10H30	2H	12H30	12H30	Yes
QN17	HT	18C04147	3557	013787	11H30	11H50	2H	13H50	13H45	Yes
HN26	BV	43C09782	3270	013789	8H40	9H15	2H15	11H30	11H30	Yes

Figure 28. Sample of on-time delivery tracking file at Heineken Hanoi Brewery (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.)

4.1.4 On-time delivery

The author has selected data of the first six months of 2019 for further analysis as it is the latest information at the time of the research carried out.

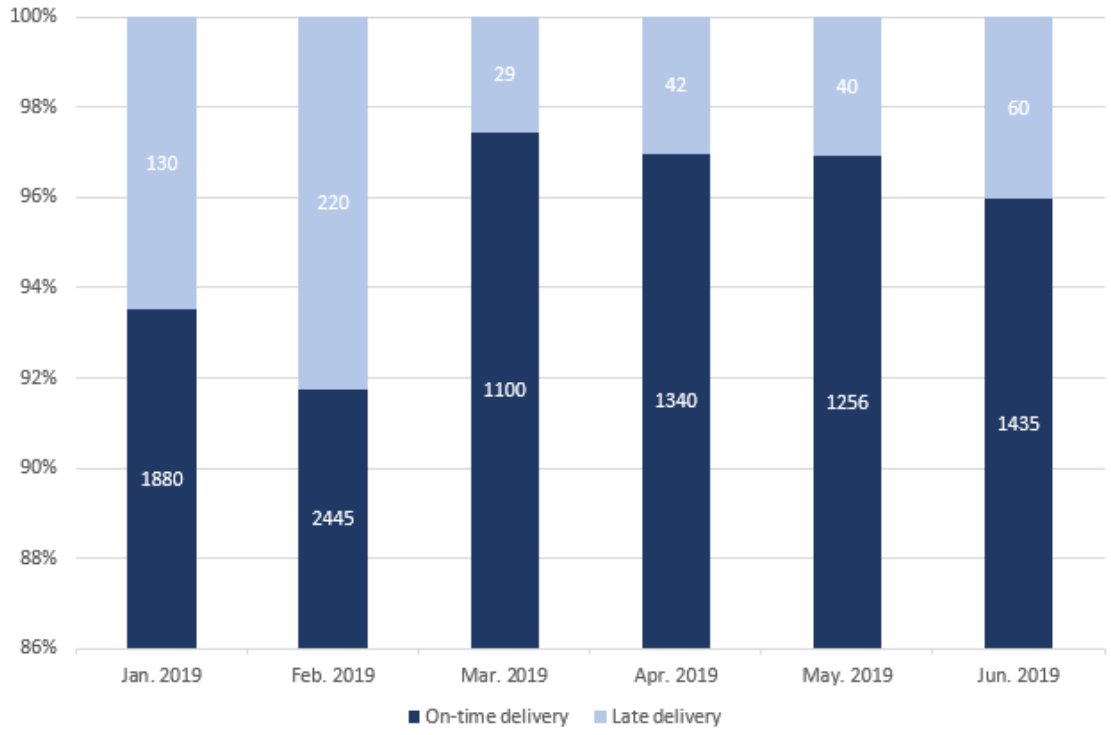

Figure 29. Delivery status at Heineken for the first half of 2019

As indicated in above figure, the on-time delivery ratio stabilized at approximately 96% which is satisfying in the company's perception. However, the quantity of late delivery experienced an increase in the first two months of the year. This can be explained by New

Year and Lunar New Year which are the two biggest holidays in Vietnam. As a result of demand for beer soaring, the number of shipments increased significantly. Nonetheless, labor and vehicle resources stayed the same. Therefore, the company could not deliver service at the same level as usual.

In addition, the researcher investigates more deeply into the issue by calculating the on-time delivery ratio of all logistics service providers.

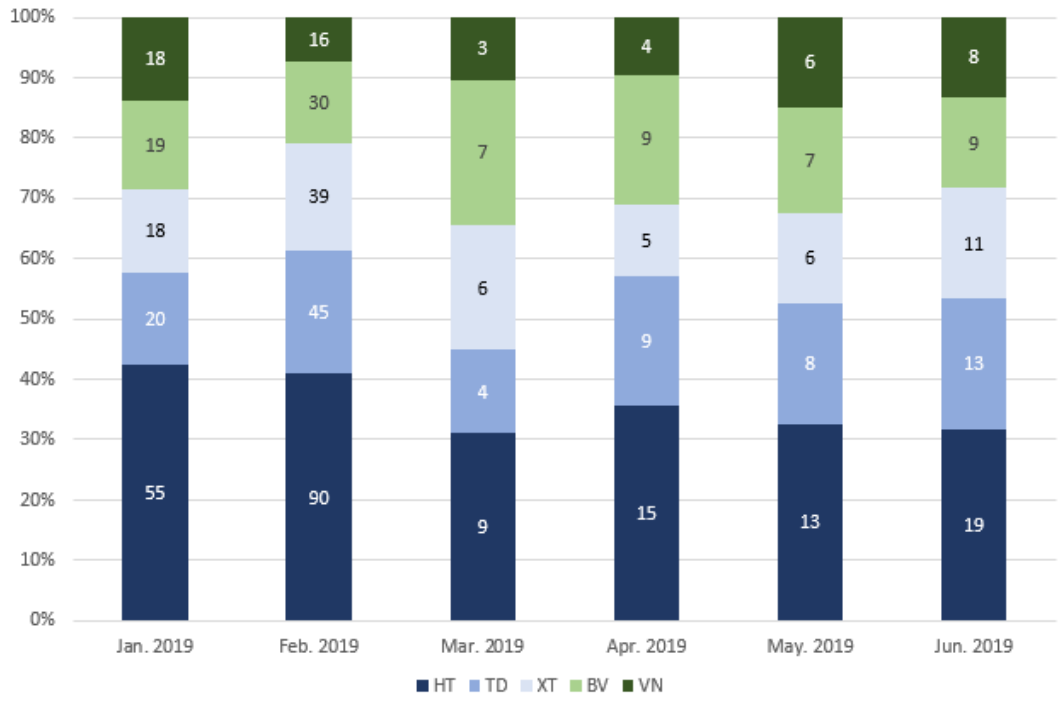

Figure 30. Late deliveries of vendors

Figure 30 demonstrates the quantities of late shipments responsible by all five logistics service providers. It is notable that vendor HT accounts for more than 30% of delayed shipments, especially in January and February when the numbers rose to more than 40%. The author conducted discussions with the transportation staff together with the representative from HT about the situation and figured out that the major rationale is congestion. To be more specific, the distributors HT is in charge of are in the urban areas where there is dense population. Therefore, traffic jam is a commonplace in the routes HT needs to take, which plays a part in its delayed shipments. (Heineken Hanoi Brewery's Transportation Staff & HT Representative 30 June 2019.) By the contrary, VN is the vendor that has delivered the best performance, making up for only around 10% of late deliveries.

In summary, the current level of delivery service comes up to the company's expectation. However, the author believes that there is some room for improvement and the service can reach a higher level of quality.

4.1.5 Vehicle availability

The research aims to provide a comprehensive view of the outbound delivery of Heineken. Therefore, in addition to on-time delivery, the author also investigates the vehicle availability of each logistics service provider even though it is not a key performance indicator of the company. Truck availability of all logistics service providers is analyzed and presented in five figures below.

Figure 31. Truck availability of BV

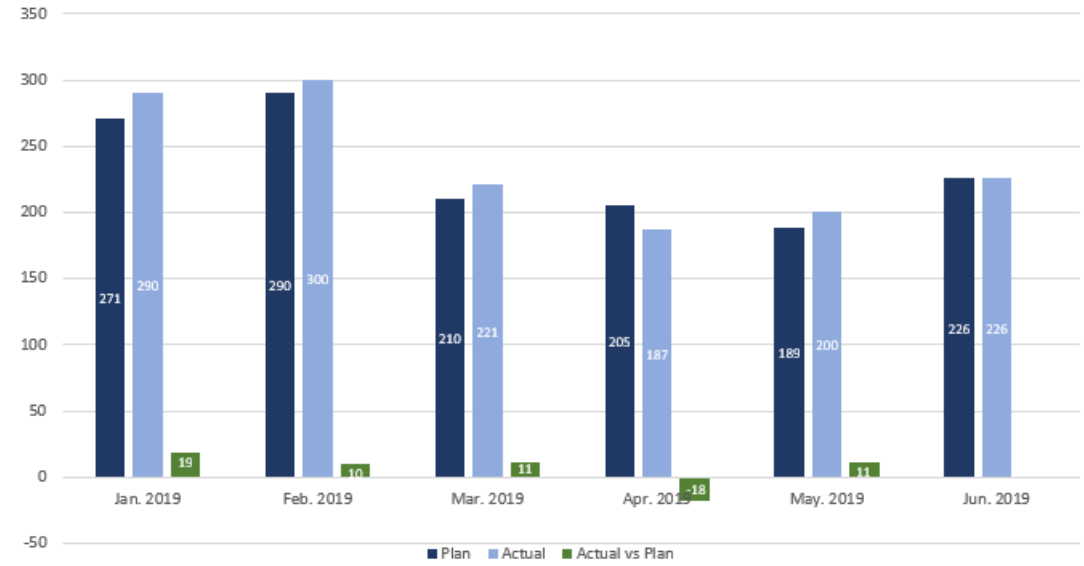

Figure 32. Truck availability of HT

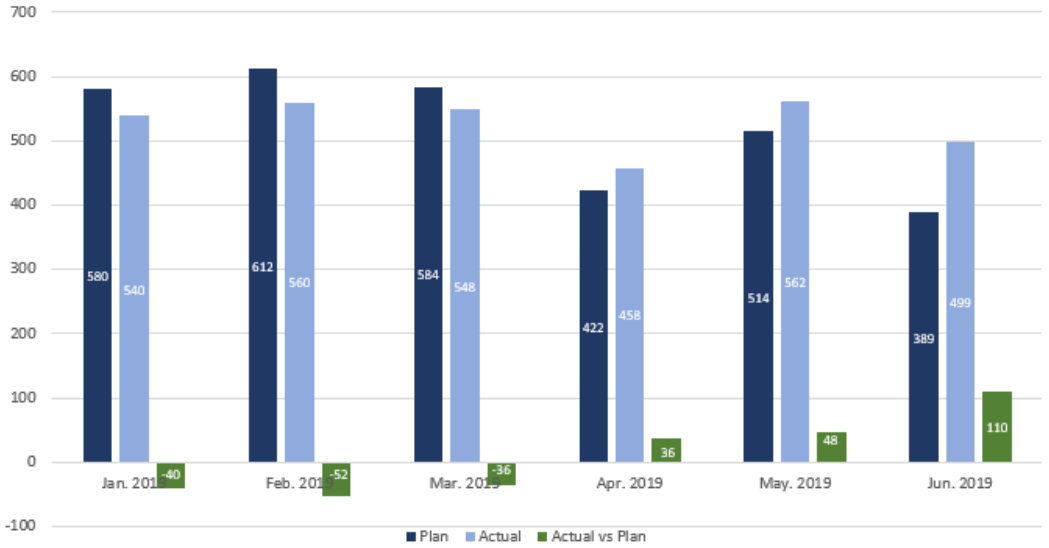

Figure 33. Truck availability of TD

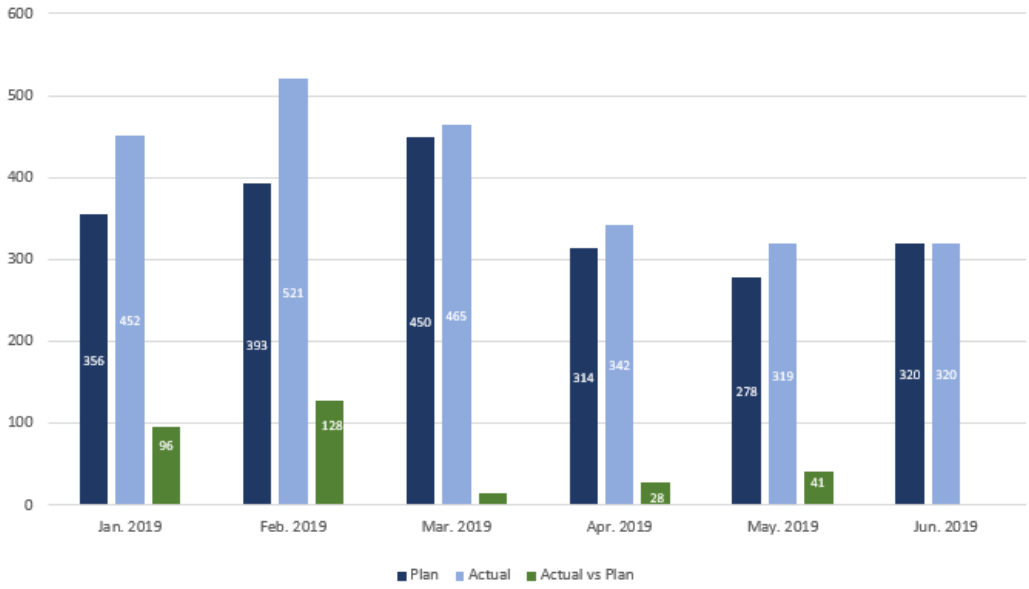

Figure 34. Truck availability of XT

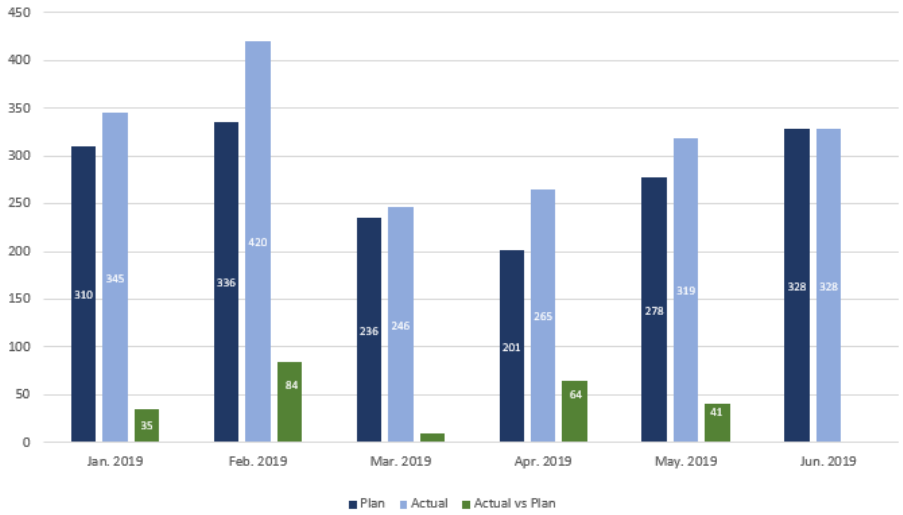

Figure 35. Truck availability of VN

As can be seen from all above figures, there is some deviation between the planned and actual numbers of trucks. There are two reasons for this difference. Firstly, some logistics service providers can not provide enough trucks, therefore, others need to offer more trucks to cover the delivery supposed to be handled by those vendors. The other reason is some orders are released and confirmed after the transportation staff book trucks. (Heineken Hanoi Brewery's Transportation Staff 18 June 2019.) It is discernible that XT and VN always meet or even exceed Heineken's demand, followed by HT which failed to provide enough vehicles in April. Besides, it should be noted that TD and XT are the two vendors that can provide the largest quantity of trucks with the former being able to supply up to approximately 560 trucks a month equaling 28 trucks a day and the latter managing to offer 521 trucks a month meaning 26 trucks a day. With such big capacity, TD still could not provide enough vehicles in the first three months of the year because there was a rapid increase in the total demanded beer volume as discussed earlier and TD was assigned the biggest number of shipments. Moreover, in terms of capacity, VN ranks the third with the ability to provide 420 trucks a month whereas BV can offer fewer than 380 vehicles per month. Being able to supply maximum around 300 trucks per month, HT comes last.

4.1.6 Vehicle weight capacity utilization

Vehicle utilization is a vital parameter which can oil the wheels of efficiency improvement and cost reduction. Weight capacity utilization is the ratio of the loaded weight in a truck and the maximum weight the truck can carry. It is ideal if the weight capacity utilization is 100%, which means the vehicle is fully utilized. On the other hand, lowly utilized vehicles

lead to waste in cost and resources. Despite its importance, weight utilization is usually overlooked. (Ma, Dalen, Zuidwijk & Blois 2011, 5; Malacarne 2018.)

The weight utilization rate has not been tracked and measured by Heineken. However, the company keeps records of types and quantities of goods delivered in every shipment. With the weight of distinct types of goods provided by Heineken Hanoi Brewery Transportation Staff, the author is able to calculate the weight of all shipments. By comparing the actual loaded weight of a truck to the maximum volume of that vehicle, the researcher can estimate the weight utilization rate of a shipment and calculate the average utilization rate of a month. Similar to on-time delivery and vehicle availability, data from January 2019 to June 2019 is selected for further analysis of weight utilization.

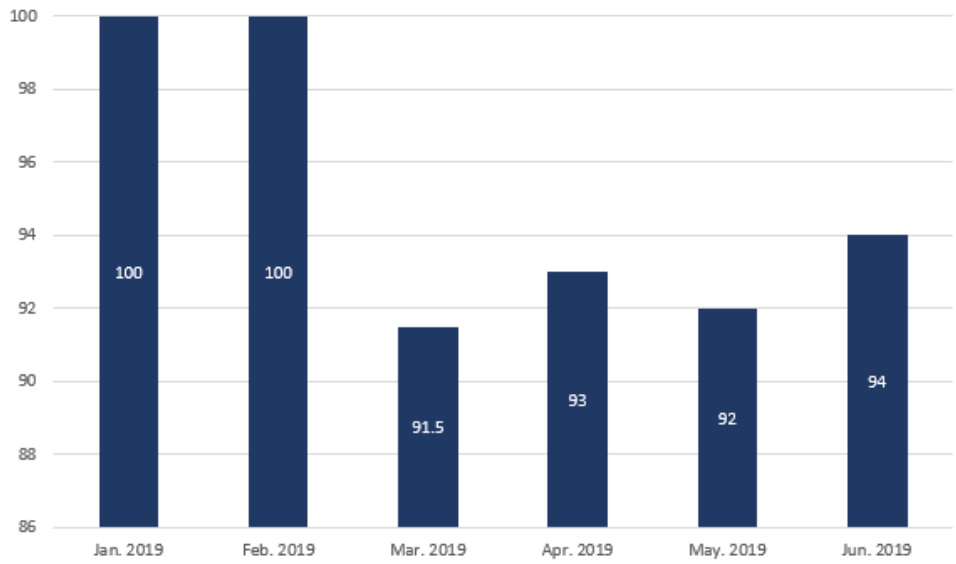

Figure 36. Average weight utilization rates

The average weight utilization percentages for the first six months of 2019 is illustrated in figure 36. In January and February when the demand for beer is high because of festivals, vehicles are fully utilized with absolute ratio. The major reason is the fact that as orders become bigger in volumes, it is more likely for them to fill vehicles' capacity. When the peak season passes, the average weight utilization rate sustains at roughly 92%. The trucks are not fully utilized because of limited consolidation practices with only shipments to the same distributors bundled. Even though 92% is acceptable, the researcher strongly believes that with more effort, the vehicle capacity can be better utilized and even reach full utilization.

4.1.7 Freight rates

Transportation cost plays an indispensable role in companies' profitability since it accounts for a high proportion of logistics costs. For firms that outsource delivery service like Heineken, transportation cost is directly affected by rates charged by logistics service providers. (Rodrigue & Notteboom 2019.)

As an attempt to have better control of freight rates, the company has recently calculated the reference rates for all truck types, taking into consideration all relevant cost elements presented below:

- Fuel cost
- Personnel cost
- Truck & trailer cost
- Tire cost
- Repair & maintenance cost
- Lubricant cost
- Tolls & road taxes
- Overheads
- Financial cost
- Estimated margin

(Heineken Hanoi Brewery's Logistics Manager 15 June 2019.)

The reference cost enables better negotiation and more effective management of freight rates as we know how much should be paid, who is overpaid and who is underpaid. A comparison of reference total costs and actual total costs paid to logistics service providers is carried out and presented in figure 37.

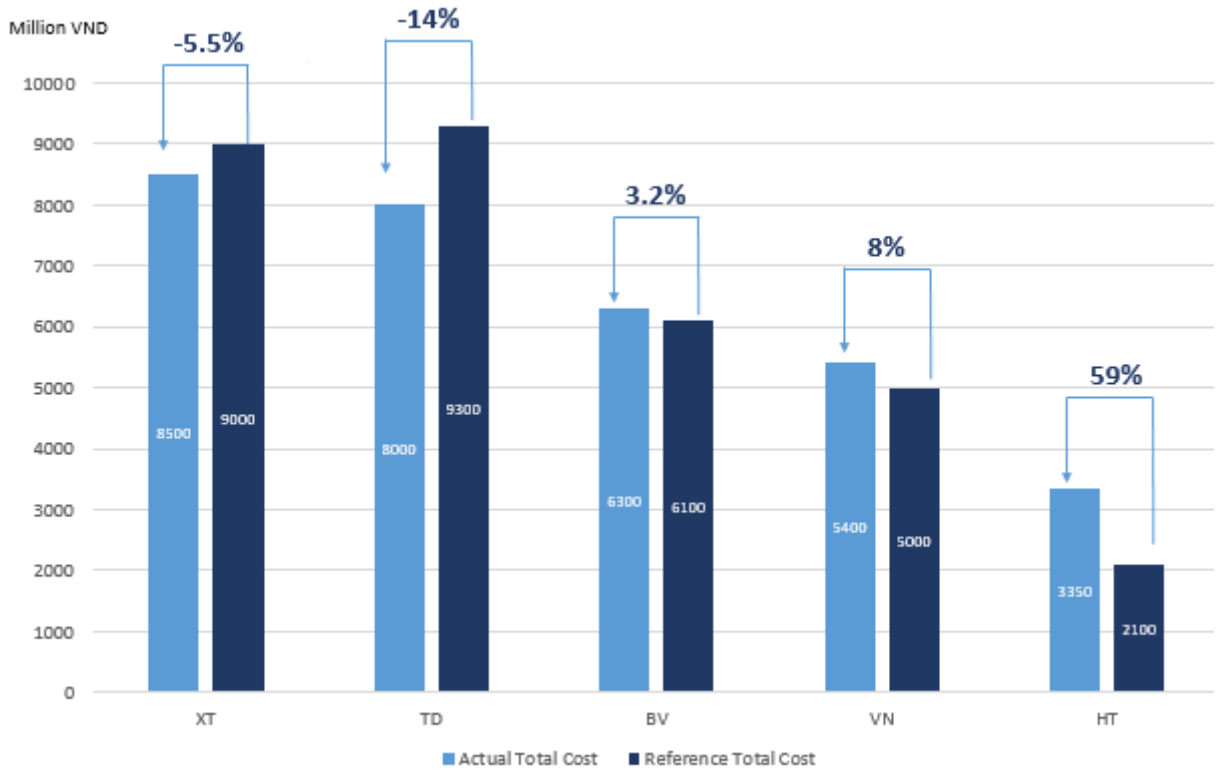

Figure 37. Comparison of actual total cost versus reference total cost

As can be seen from above figure, the company benefits from the business with XT and TD as the total costs paid to them are lower than the reference costs. This can be explained by the fact that they cover the largest proportions of delivery and their shipments are usually transported in big trucks, which results in savings thanks to economies of scale. By contrast, BV and VN are slightly overpaid while HT receives a significantly higher payment than it is supposed to. Therefore, negotiation is needed with these three vendors, especially with HT to close or at least reduce the gap.

4.1.8 Customer satisfaction

It is undeniable that customers are the ultimate judges of service performance. Therefore, evaluation of delivery service can not be thorough without taking distributors' point of view into consideration. As a result, the researcher creates a survey which is presented as an appendix. The survey is comprised of 11 questions the first three of which are basic questions to gather distributors' information. Question 4 helps clarify the frequency of delivery to the respondent whereas question 5 covers distributors' perception of good delivery service. Moreover, questions 6, 7 and 8 provides more insight into distributors' overall satisfaction with the service and more details about what they are contented and not contented with. Questions 9 and 10 are included in the survey to understand how

customers and the company deal with unsatisfactory shipments. Last but not least, question 11 reflects distributors' opinion how the outbound delivery can be enhanced.

The distributor network of Heineken consists of 177 distributors to all of whom the survey was sent and 131 distributors responded. Roughly half of them receive shipments every working day while 30% receive shipments every two days. For the rest, orders are delivered twice a week. It is noticeable that distributors who have higher delivery frequency are located closer to the plant. Thus, placing smaller volume orders is a better option for them as it does not take much time for delivery and they do not have to bear higher inventory. On the other hand, distributors who are less frequently delivered are further away, for example in the Central region whereas the plant is situated in the North. Therefore, they are willing to carry safety stock due to long delivery time.

When it comes to ideas of good delivery service, all of the respondents mention punctuality of delivery. Around 15% of respondents add that the type of goods and the quantity delivered should be correct. Besides, 12% of participants in the survey state goods should arrive undamaged for delivery service to be considered high-quality.

The result of question 6 is of high importance because it directly demonstrates delivery performance in customers' eyes. Three fourths of distributors are satisfied with the company's delivery service whereas 12% are highly satisfied. Unfortunately, approximately 10% are dissatisfied. Further investigation indicates that among these 10%, most distributors belong to HT's delivery scope. Therefore, one assumption could be that they are dissatisfied because of late deliveries because as discussed earlier, HT is responsible for the largest number of delayed shipments. This can be verified through their answers to question 8 which will be analyzed later in this session.

The answers to the next two questions address the strengths and weaknesses of Heineken's outbound delivery. Around 90% of respondents who are satisfied or highly satisfied as mentioned in question 6 declare that they are pleased with the punctuality of delivery service. Moreover, they skip question 8 and do not state what they are dissatisfied with. For the rest 10% of participants who are dissatisfied, supportive attitude of transportation staff is satisfactory, however, there should be enhancement in on-time delivery.

How customers and the company deal with disappointing shipments is reflected in question 9 and 10. Only 6% of respondents have filed complaints to the company. 4% claim that they complained about wrong types of beer delivered and all of the complaints

have been resolved to their contentment. To be more specific, the company apologized and exchanged the goods. The other 2% complained about late deliveries and they are not satisfied because according to them, the company apologized but the situation keeps going on. It is notable that these 2% are under HT's responsibility and located in populous areas. Therefore, it is probable that congestion is the reason why the situation has not been improved.

The answers to question 11 express distributors' advice on how the company can improve outbound delivery service. Unfortunately, only 8% reply to this question. The most popular answers are improved communication and better checking of products to avoid delivering wrong products.

4.2 Developing proposal

In this session, the third investigative question "What recommendations can be made to enhance the company's outbound delivery service?" is answered. Combining theoretical research and data analysis, the author recommends practices that are expected to improve outbound delivery service at Heineken Hanoi Brewery.

4.2.1 Improvement proposal 1: Cost-cutting strategies

It is proved that economies of scale and economies of distance are the two key principles exerting considerable impacts on transportation cost as there is direct relevance between freight costs and shipment size and haul length (chapter 2.3.4). Economies of scale is practiced to a certain extent as a result of the bundling of shipments to the same destinations whereas economies of distance is not witnessed at Heineken. Therefore, there are more opportunities for the implementation of both principles which can be achieved by freight consolidation.

Compared to large shipments, small shipments not only cost higher but also lead to more handling and likelihood of dock congestion. Therefore, freight consolidation is more advantageous. (Bowersox & al. 2002, 372.)

There are two types of freight consolidation: reactive and proactive. Reactive consolidation aims to combine shipments without affecting the timing and nature of delivery flow while proactive consolidation requires all parties involved to realize the advantages of consolidation, collaborate with each other and actively take part in the activity. (Bowersox & al. 2002, 374.)

There are three ways to attain reactive consolidation. One of the first methods is market area which involves the combination of small shipments to distinct customers in the same area. (Bowersox & al. 2002, 374.) This method can be enabled by implementing milk-run or distribution centers. For example, regarding Hanoi which has the highest distributor density, milk-run is more appropriate as the city is close to the plant already. On the other hand, distribution centers should be set up in far areas such as Central area and Coastal area. And it should be noted that distribution centers should be as close to those areas as possible so that the consolidation saving from the plant to the distribution centers is maximized and cost of separate shipments from distribution centers to distributors is minimized.

Another method to accomplish reactive consolidation is scheduled delivery which means shipments will only be delivered on selected days. It is commonplace that customers prefer to have their orders shipped as soon as possible, so mutual benefits of scheduled delivery should be well communicated to customers in order to achieve their consent. When applying this strategy, Heineken Hanoi Brewery should set a clear cut-off time and ensure the transportation of shipments confirmed before the cut-off time on scheduled delivery dates. (Bowersox & al. 2002, 374).

Moreover, pooled delivery can also support firms to achieve reactive consolidation by allowing logistics service providers to consolidate shipments of various customers with the same market area (Bowersox & al. 2002, 374). Since the packaging of beer is similar to that of soft drinks, which facilitates product loading and stacking and there is little to no risk of food contamination, it would be the most appropriate for Heineken's shipments to be bundled with soft drink companies' shipments. The researcher conducted some short discussions with Heineken Hanoi Brewery's vendors and figured out that they also carry out delivery service for such soft drink firms as Coca-Cola and Pepsi to almost all of the firm's distributors. Besides, the discussions also indicate that all the vendors are willing to participate in pooled delivery plan. (Representatives of HT, XT, BV, VN, TD 15 July 2019.) Therefore, the author believes that this is a method worth looking into. Nevertheless, it should be pointed out that more parties are involved and a higher level of cooperation is essential.

Proactive consolidation is a more advanced form of consolidation than reactive consolidation. There are two major methods to consolidate shipments proactively: preorder planning and multifirm consolidation. The key concept of preorder planning is that the shipment sizes and times are planned before orders. One important factor of preorder planning is that the release of orders shall no longer be limited to standard

timing. Multifirm consolidation, as the name suggests, refers to consolidating shipments of various irrelevant companies. Proactive consolidation possesses wider scope of involvement and higher complexity. (Bowersox & al. 2002, 375.) Therefore, the thesis author recommends that Heineken should focus on reactive consolidation first.

Transportation cost is directly influenced by the rates charged by logistics service providers. Hence, so as to reduce transportation cost, rates need to be decreased. As presented in chapter 4.1.7, based on Heineken's calculation, XT and TD are slightly underpaid. Opposedly, BV and VN are marginally overpaid. Moreover, the rates charged by HT are substantially higher than the reference rates. The author proposes that HT should be eliminated and the number of vendors is reduced to four, which simplifies the shipment coordination and vendor management. Besides, the other four logistics service providers will receive more business, giving Heineken some negotiation leverage. Even if the negotiation does not go smoothly and no rate reduction is obtained, cost reduction is still ensured because HT's responsible shipments will be handled by other vendors at cheaper prices. In addition, although Logistics department is supposed to reduce the rates as much as possible, for the sake of sustainable relationships, logistics executives should look for fair rates (Bowersox & al. 2002, 375). Therefore, the researcher recommends that Heineken should pay XT and TD what they deserve. The company may need to sacrifice an amount of money but in return, a win-win situation is achieved and relationships with vendors are strengthened.

4.2.2 Improvement proposal 2: Establishing a more comprehensive system of Key Performance Indicators

Performance measurement is the process of monitoring and reporting companies' achievements. It is of significance as something can not be managed unless it is measured. Key performance indicators (KPIs) are defined as quantifiable metrics that measure firms' progress towards their targets (KPI Org 2019). In other words, KPIs are tools that support the management and enhancement of performance. By dint of an effective KPI system, we can understand the current level of our performance, whether targets are met and areas in need of improvement. (Franceschini, Galetto & Maisano 2019, 9.)

Effective KPIs should comply to SMART principle, meaning they should be specific, measurable, attainable, realistic and timely (University of California 2017, 3).

- Specific: Indicators should be as focused and clear as possible and various measurements should not be included in one KPI to avoid confusion.
- Measurable: Good KPIs should be quantifiable and comparable as well as conducive to useful data analysis.

- Attainable: Data collection for the KPIs should not be complicated or costly.
- Relevant: There should be an alignment between the KPIs and the organizations' strategies and targets.
- Timely: KPIs should measure performance within a specific time frame.

(University of California 2017, 3).

Another significant issue that should be considered when establishing a system of KPIs is the quantity of indicators to be implemented. Franceschini & al. (2019, 146) argued that a large number of indicators will be detrimental as a consequence of hindering managers from focusing on core KPIs and identifying potential connections between KPIs. Thus, they recommended the "critical few" method which translates into the fact that firms should concentrate on only a few essential metrics on the condition that the comprehensiveness is ensured. According to PwC (2019, 5), between four and ten indicators are a good option. Peterson (2006, 14) had the same opinion, stating that the number of KPIs should be less than ten.

On grounds of theoretical research and understanding of practical outbound delivery operation at Heineken, the researcher prepares a list of most essential KPIs which aim to cover the measurement of quality, efficiency and cost.

- **On time in full**: Calculated by dividing the number of orders delivered on-time with the right quantity and quality to the total number of orders delivered during a specific time frame (Criton 2015)

- **Vehicle availability**: Calculated by dividing the number of available trucks provided by vendors to the number of trucks booked. It is preferred to use this KPI to measure performance of each logistics service provider.

- **Vehicle weight capacity utilization**: Calculated by dividing the transported weight to the maximum allowable weight capacity of the vehicle (KPI Library 2019).

- **Freight cost per unit shipped**: Calculated by dividing the total freight cost to the number of units shipped (KPI Library 2019).

- **Claims as % of freight costs**: Dividing cost of loss and damage by total freight costs. Usually it is used to measure in total and for each vendor (KPI Library 2019).

In addition, the author suggests that Heineken Hanoi should pay attention to how KPIs are presented. According to Peterson (2006, 9), presentation is one of the key factors that determine the effectiveness of KPIs. It is recommended that when preparing KPI reports, companies should include historical comparison so that people are better aware of the progress. Besides, application of visual indicators such as arrows and signal colors is more likely to draw readers' attention and increase their engagement. It is advisable that companies should set thresholds and include warnings in KPI reports. For example, if

there is a drastic fall of 30% in on-time delivery rate, a warning “RED FLAG” can be shown. Moreover, comparison against targets is beneficial and should also be included. Below are examples of standard KPI report and preferred KPI report.

Key Performance Indicator	This Period	Last Period
AVERAGES		
Average Page Views per Visit	2.5	1.6
Average Visits per Visitor	2	2.5
Average Time to Respond to Email Inquiries (Minutes)	10	15
Average Cost per Visitor	$40	$60
Average Cost per Visitor	$20	$24
Average Cost per Conversion	$125	$80
Average Cost per Visitor	$40	$60
Average Revenue per Visitor	$20	$10
Average Revenue per Visit	$10	$4
Average Order Value	$25	$8
Average Items per Cart Completed	50	50
Average Clicks per Impression (Email)	0.08	0.032
Average Clicks per Impression (Banner Ads)	0.06	0.016

Figure 38. Standard KPI report (Peterson 2006, 8).

Key Performance Indicator	This Period	Last Period	Change	% Change	Target	% of Goal	Warnings
AVERAGES							
Average Page Views per Visit	2.5	1.6	▲	56%	5	50%	
Average Visits per Visitor	2	2.5	▼	-20%	5	40%	Off Target
Average Time to Respond to Email Inquiries (Minutes)	10	15	▼	-33%	5	200%	Precipitous Drop
Average Cost per Visitor	$40	$60	▼	-33%	$30	133%	Precipitous Drop
Average Cost per Visitor	$20	$24	▼	-17%	$10	200%	
Average Cost per Conversion	$125	$80	▲	56%	$100	125%	
Average Cost per Visitor	$40	$60	▼	-33%	$40	100%	Precipitous Drop
Average Revenue per Visitor	$20	$10	▲	100%	$30	67%	
Average Revenue per Visit	$10	$4	▲	150%	$10	100%	
Average Order Value	$25	$8	▲	200%	$10	250%	
Average Items per Cart Completed	50	50	▲	0%	$10	500%	
Average Clicks per Impression (Email)	0.08	0.032	▲	150%	1	8%	Off Target
Average Clicks per Impression (Banner Ads)	0.06	0.016	▲	275%	1	6%	Off Target

Figure 39.Preferred KPI report (Peterson 2006, 9).

There is a substantial difference between the two reports. The second report takes advantage of comparison and visual indicators, hence communicating more information and more effectively.

In conclusion, the establishment and proper communication of critical key performance indicators play an indispensable part in improving the measurement and management of outbound delivery service of Heineken Hanoi Brewery.

4.2.3 Improvement proposal 3: Building a system of rewarding and penalty associated with KPIs

As Heineken Hanoi outsources its delivery service to logistics service providers, their performances substantially affect the company’s performance. Therefore, enhancing vendors’ performance is of utmost importance. One of the key factors that determine performance improvement is motivation which can be provided by rewarding and penalty.

Wisner, Tan & Leong (2012, 123) stated that rewarding suppliers is beneficial to multiple parties. All suppliers are motivated to fulfil or even exceed performance targets. At the same time, unrewarded suppliers have incentives to continuously strive to reach expected goals. Moreover, suppliers can be inspired and share the rewards with their suppliers. As a result of stimulating various participants in the supply chain to enhance their performance, rewarding can contribute to better supply chain overall performance. (Wisner, Tan & Leong 2012, 123.)

Wisner & al. (2012, 123) further suggested that rewards could be an increase in business volume, longer contracts or a proportion of the cost savings that the focal firm can achieve thanks to the supplier's enhancement. Moreover, vendors can also be rewarded with public recognition or access to the focal firm's resources. A good example would be the Nebraska Medical Center in the USA. The organization gave its consulting vendor an incentive of 30% of the savings they could create, which motivated the vendor to come up with strategies resulting in the reduction of millions of dollars. (Wisner & al. 2012, 123.)

It is worth noting that in addition to rewards, incentives can also be in the form of punishment. Vendor punishment can include a decrease in future business volume or a financial fine. For instance, in an attempt to reach on-time delivery goal, Wal-Mart imposed a penalty of 3% of costs of the goods sold for late deliveries. (Smith & Nassauer 2019; Supply Management 2011.)

The author recommends that Heineken Hanoi Brewery put more emphasis on motivating logistics service providers by applying a reward and penalty scheme associated with KPI results. To be more specific, vendors' performance will be evaluated based on the KPIs proposed in the previous session. The company needs to set two thresholds: upper and lower. After that, rewards and penalties should be defined. For example, if suppliers exceed the upper threshold, a fixed amount of money will be given as a reward whereas suppliers with performance below the lower threshold will have the business volume decreased. Vendors falling into the middle category between the upper and lowers points receive neither rewards nor punishment.

Besides, when implementing rewards and penalties, there are some issues that Heineken Hanoi should bear in mind. Firstly, visibility and transparency should always be ensured (Supply Management 2011). Vendors should be well aware of the goals, metrics and the reward or the fine they will receive in case of exceeding or failing to meet targets, which can be enabled by detailed service level agreement and regular communication.

Secondly, it is imperative that fines should be paid shortly after vendors' failures to maintain the close link between poor service and penalties and draw timely attention to the failures (Willis 2004). Thirdly, determining the values of rewards and penalties requires a large deal of caution and consideration (Overby 2009). If the fine is insignificant, logistics service providers may ignore the problems rather than fix them. On the other hand, if the penalty is too aggressive while the reward is low, the system may be punitive rather than motivational.

4.2.4 Improvement proposal 4: Changing delivery timeframe for distributors located in urban areas.

As discussed previously, Heineken Hanoi Brewery has various customers situated in Hanoi, the capital as well as other crowded urban areas. It is challenging to maintain on-time and reliable deliveries to these distributors due to congestion.

Since it is not a new problem, many companies have tried to come up with solutions to cope with congestion. One of the first solutions is to relocate operations or warehouse to the rural areas, which supports firms to avoid congestion and reduces the amount of traffic in urban areas simultaneously. Some other companies redesign the routes to avoid roads where frequent congestion takes place. Another method is to spread out operation sites. For example, instead of one centralized warehouse, companies have various smaller warehouses to create shorter delivery distances. Furthermore, some firms tackle congestion by rescheduling delivery to very early morning, at around 4 a.m or late night to avoid peak traffic hours while others may invest in technology. One prime instance would be Amazon which is developing its drone delivery system. In the future, the company's delivery will be carried out by electric and automatic drones, which will exempt Amazon from congestion. (Hitti 2019; Nichols 2018.)

After careful consideration, the researcher finds delivery time adjustment the most feasible and least costly for Heineken Hanoi Brewery to avoid traffic jams. Observation and studies show that the peak hours in Vietnamese cities are from 7.00 to 9.00 and 17.00 to 18.00, however, from 9.00 to 10.00 and from 15.00 to 16.00, congestion is also highly likely to occur (Vietnam Online 2019). Therefore, the company can take advantage of the period from 10.00 to 15.00 to deliver shipments to distributors in the urban areas.

5 Conclusion

In this chapter, the author summarizes the key findings and recommendations as well as suggests future directions for further research. In addition, the author's learning during the thesis process is also reflected.

5.1 Key results and recommendations

The thesis concentrates on reviewing the outbound delivery operation of the case company, identifying areas with limitation and providing developing proposal accordingly.

In general, Heineken Hanoi Brewery is currently working with 5 logistics service providers to carry out outbound delivery. The company's staff are in charge of shipment scheduling and allocation whereas the actual delivery activity is done by vendors. The economies of scale is practiced at the company but only to a limited extent when only shipments to the same distributors are bundled together. When it comes to transportation network, the company implements direct shipment network to a single destination which refers to delivering products directly to the customers without application of milk runs or any intermediate distribution centers. This type of network can save the company from investing time, effort and financial resources in setting up more facilities as well as allow faster delivery. However, it adversely affects the delivery cost as it is challenging to reach full truckload.

The company attempts to effectively monitor its delivery service and logistics service providers' performance. However, only one metrics: on-time delivery is tracked because it is the most important indicator in the firm's perception. Another rationale is that the information is gathered and recorded manually, which is time-consuming and laborious. Nonetheless, there are various aspects which play important roles in the company's delivery service, hence they should as well be measured and monitored.
Heineken Hanoi Brewery's on-time delivery ratio meets its expectation, stabilizing at around 96 % in non-peak season. Besides, the largest percentage of late deliveries is caused by congestion because around one-third of the company's distributors are located in urban areas with high population density. The capability to accommodate the client company's demand of all vendors is also evaluated. The vendors with the highest flexibility who are the most likely to provide additional trucks when required and the suppliers with lower vehicle availability are identified. The average weight capacity utilization maintains at roughly 92%, which is satisfactory to the case company. However, there is still potential for higher utilization. With better planning and freight bundling, it is

likely that the capacity utilization can go through an improvement. Moreover, the firm recently calculated the reference freight rates, considering all relevant cost elements. Thanks to the reference rates, the company has a more specific idea of how much it should pay as well as identifies who it is overpaying and underpaying.

Customers' evaluation of Heineken Hanoi Brewery's performance is also examined. In customers' opinion, on-time delivery is the most important characteristics of high-quality delivery service. It is also vital that the products should arrive in the right type, quantity and condition. The firm reaches the customer satisfaction rate of 90% with the rest 10% being dissatisfied with the punctuality of delivery. Nevertheless, the supportiveness and cooperation of transportation staff is appreciated.

The author has offered four proposals which are expected to help the case company improve its delivery service performance. The first recommendation aims to result in cost saving by means of reactive freight consolidation, elimination of the logistics service provider with significantly high rates and rate negotiation. Freight consolidation can be achieved by scheduled delivery, market area and pooled delivery. Moreover, if the vendor charging the highest rates is eliminated, their business with Heineken Hanoi Brewery will be handled by other vendors at lower costs. It also gives the firm more negotiation power when negotiating the rates with other suppliers. Even though cost reduction is one of top priorities, the researcher recommends that the company should increase the rates of currently underpaid vendors to build win-win long-term relationships. In the second proposal, it is suggested that the company should set up a set of KPIs to better track, monitor and develop delivery performance. Besides, visual indicators and color codes should be implemented in KPI presentation for more effective communication of the intended message. The third proposal recommends that the firm should motivate logistics service providers to deliver a higher level of performance by rewarding and punishing. The last recommendation is created to address on-time delivery challenge caused by congestion. The author proposes an adjustment in delivery timeframe to avoid peak hours which is simple but expected to be influential.

5.2 Suggestions for further research

In this sub-chapter, the author recommends potential topics and directions for future research into transportation management.

The thesis aims to provide a comprehensive view of delivery management, covering different aspects such as cost, quality, efficiency, performance measurement and outsourcing. However, due to the limitation of the thesis, sustainability aspect is not

investigated. It would be valuable to carry out further research on how sustainability in transportation can be increased, especially when transportation is one of the most polluting industries (Raval & Spero 2019).

Besides, outsourcing is a vast field which has various interesting aspects. Studies conducted on supplier evaluation and selection would be useful as choosing the right vendors will have a positive influence on the case company's service quality and cost saving. Another topic could be vendor relationship management which can be beneficial to strengthening the relationship and increasing the collaboration between the firm with its logistics service providers.

5.3 Reflection on learning

The process of carrying out this study has a positive impact on the author's personal growth.

Firstly, to complete the thesis, the author has done a thorough study of different relevant theories and literature, which is favorable to her understanding of supply chain management and logistics in general and transportation management in particular. Besides, the thesis process allows the author to apply the knowledge gained from university courses and personal reading into a practical case.

Secondly, the researcher has enhanced various skills such as data collection skill and analysis skill as the thesis requires the author to collect and analyze an immense amount of data. Besides, during the process, the author faced a challenge due to the internship in Japan which is one of the countries with the longest working hours. However, the author created a detailed timeline with major milestones to facilitate the thesis writing process. Therefore, the author could overcome the obstacle and attain time management skill while learning how to work well under pressure. Moreover, since the process has been quite long, spreading over several months and full of distraction, conducting this research has instilled in the authors good qualities such as patience, carefulness and self-discipline.

To sum up, the whole fulfilling and educational process has helped the author grow into a better person. Thanks to the thesis, the researcher has gained valuable knowledge and skills which are vital to her future career in supply chain management.

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Appendices

Appendix 1. Interview questions for Logistics Manager

1. Does Heineken Hanoi Brewery outsource its delivery operation or keep it in-house?

2. Why does the company choose that approach?

3. (In case of outsourcing) How many logistics service providers are hired? Who are they?

4. What kinds of transportation network are applied by the company?

5. Does the company measure and monitor its and logistics service providers' performance?
   If no, why not?

6. If the answer to question 5 is "Yes", what KPIs does the company track and monitor?
   Why are those KPIs chosen?
   How are those KPIs tracked and monitored?

7. What are the targets for those KPIs?

8. What will happen if logistics service providers meet/ exceed or fail to meet those targets?

9. What are your comments on each logistics service provider's capacity and capability?

10. How does the company reduce transportation costs?

11. What are your future plans to improve outbound delivery service?

Appendix 2. Interview questions for Transportation Staff

1. What is the current overall process of outbound delivery?
   What should be noticed about the process?

2. What are your daily tasks?

3. Who are you in contact with for your daily tasks?
   And for what purposes?

4. How do you allocate shipments and schedule deliveries?

5. With so many types of trucks and different kinds of products, do you have any tips to effectively allocate shipments and schedule deliveries?
   Are there any tools that support those tasks?

6. How do you save transportation costs?

7. What are your comments on each logistics service provider's capacity and capability?

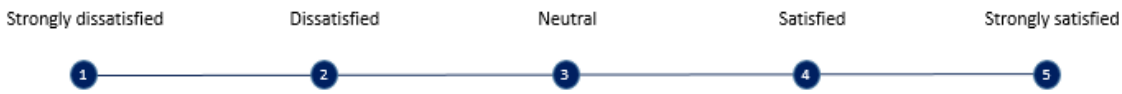
8. From the interview with the Logistics Manager, I become aware that you're in charge of tracking on-time delivery. How do you track and monitor it?

9. What are the challenges that you encounter at work?

10. What are your suggestions to improve Heineken Hanoi Brewery's delivery service?

Appendix 3. Survey about customer satisfaction

1. Please enter the distributor name.
2. Please enter the distributor address.
3. Please enter the distributor phone number.
4. How often do you receive order delivery from Heineken?
5. What are the most important criteria for good delivery service in your opinion?
6. How would you rate delivery service of Heineken? (1 is strongly dissatisfied, 5 is strongly satisfied)



7. What are you satisfied with regarding delivery service of Heineken?
8. What are you dissatisfied with regarding delivery service of Heineken?
9. Have you ever filed a complaint?
10. If yes, have your complaints been resolved?
11. How can Heineken improve its delivery service?