



UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Urban consolidation centres impact on event venues

Applying Materials Flow Mapping and Actor-Resource-Activity on the
case study of Svenska Mässan Gothia Towers AB

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Abstract

Firms located in urban areas struggle with constraints on space, congestion, safety, pollution, and varying stakeholder demands. These constraints place added pressure on the logistics of these firms and will continue to amplify as populations in cities increase. Cities are major attractors for people and businesses alike due to the diversity, economic activity, events, and overall greater quality of life offered. For cities, events are a great revenue generator. Events are major population attractors creating peaks in tourism and thus boosting the local economy.

Events are complex in nature and have similar characteristics to temporary projects. The complexity occurs as a result of having short turn-around times, varying goods requirements and unforeseen occurrences needing flexibility. Coupled with these prerequisites for event hosts, event venues must also consider efficiency, sustainability, and client satisfaction for the overall success of the event. The logistics of events and the impact on the city's existing infrastructure, while important for local economies, is an under researched area. Hence it is critical to examine how solutions presented in the world of urban logistics such as consolidation centres, can be applied to local event venue firms to alleviate stressed filled peaks while keeping a focus on sustainability.

To examine the impact of a consolidation centre on an event venue firm a combination of two frameworks can be utilised, the Actor-Resource-Activity (ARA) and Materials-Flow-Mapping (MFM). The ARA framework looks at a firm as a network of interconnected parts while MFM examines a specific process to evaluate the efficiency of each step. The application of the frameworks on the case study firm, Svenska Mässan, will theoretically examine the potential of integrating a consolidation centre on a larger scale and the effects on the firm's employees. The study results demonstrate the successful application of the frameworks to identify areas of efficiency.

Keywords: Consolidation centre, Hub, Material Flow Mapping, Activity-resource-Actor, Sustainability, Events, Event logistics, Stakeholders, Congestion, Change management.

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List of Abbreviations

LSP	-	Logistics Service Provider
GHG	-	Greenhouse Gases
LTL	-	Less than Truckload
UCC	-	Urban Consolidation Centre
FTL	-	Full Truckload
ISO	-	International Organisation for Standardisation
KPI	-	Key Performance Indicators
CFTS	-	Cooperative freight transport systems
GCZ	-	Green City Zone
BID	-	Business Improvement District
MFM	-	Materials Flow Mapping
INA	-	Industrial Network Approach
ARA	-	Actor -Resource -Activity
SDGS	-	UN Sustainable Development Goals
LEZ	-	Low Emission Zones
4PL	-	Fourth-party logistics
CO ²	-	Carbon Dioxide

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1. Introduction

This chapter aims to give the reader a foundation of the research, beginning with a presentation of the topics of events and urban logistics. Followed by a description of the city of Gothenburg where the subject of the case study, Svenska Mässan Gothia Towers AB is headquartered. Continuing with the problem description of the firm's sustainability goals and upscaling challenges. The section further discusses the purpose of the research, research questions, delimitations and lastly presents the deposition of the thesis. Throughout the paper the terms consolidation centre and consolidation hub will be used interchangeably.

1.1 Background

Behind the scenes of an event there are several moving parts that require coordination such as the deliveries of goods, flow of empty goods, building of exhibitions and stages, event security, as well as traffic flows outside the event venue, to name a few. The logistics of events are therefore an operation that often is well hidden when functioning flawlessly. The economic rise of global markets and international trade has increased within the past decade, creating a greater need for the transport of goods (David, 2017). In addition to the internationalisation of commodities, events have also become global entities. Events can range in size from mega events such as the Olympic Games to smaller scale events such as a convention for a firm. Just as commodity logistics has been on the backburner, until the Covid-19 pandemic highlighted what occurs when supply chains experience disruptions, the logistics of events is a hidden but critical part that ensures the success of an event for all attendees and exhibitors. In the same way that the logistics within densely populated areas creates sustainability and safety concerns for the inhabitants, as the limited space within the city is shared by multiple actors, the same is experienced during events and fairs, which stresses the importance of a well-functioning logistics system.

Cities are major attractors for people and businesses alike due to the diversity, innovation, economic activity, events, and overall greater quality of life offered (Brettmo, 2021). Gothenburg, Sweden as a metropolitan area is no exception and hosts a multitude of events year-round, generating tourism for the city. The city of Gothenburg is the second largest city in Sweden with a current population of approximately 580 thousand inhabitants and expected growth to reach 660 thousand inhabitants by the year 2030 (Göteborgs Stad, n.d). The city holds a key location with its access to the largest port in Scandinavia, railway infrastructure, and airport terminal, essentially allowing for all modes of transport to deliver goods to and from the city. The port of Gothenburg can be considered a strategic logistics node with access to the Baltic Sea, Atlantic Ocean and receives approximately ten to fifteen percent of goods from outside of Europe (Göteborgstad, n.d). One of Gothenburg's largest access points is the Korsvägen area and its often congestion with 27

million vehicle kilometres annually (Göteborgstad, 2016; Nicklas Höjer, personal communication February 15, 2022)

Despite the benefits of hosting events in cities, there are also external barriers that affect urban logistics such as different regulatory policies including low emissions zones, restrictions on noise pollution, and sustainability regulations which freight carriers need to adhere to. Consequently, congestion is often a problem within cities as there is limited space to conduct a multitude of activities simultaneously (Browne, Behrends, Woxenius, Giuliano & Holguin-Veras, 2018). While there are methods to reduce the congestion and number of deliveries of freight transports this often entails collaboration between various actors. Furthermore, the collaboration among transport carriers is hindered by a lack of trust in the disclosure of internal data such as driver wages or indirect costs for instance thus presenting a significant barrier in the collaborative efforts between different firms (Holguín-Veras et al., 2015). These barriers require improvements for cities to be able to continue to grow and support peaks in tourism related to events.

As the city of Gothenburg is expected to continue to increase in population size it is evident that with the growth of cities will come increased freight transportation needs and methods to ensure reduced greenhouse gas emissions (GHGs). An initiative that the city of Gothenburg is currently working on to combat environmental concerns is the Green City Zone. Consequently, Svenska Mässan Gothia Towers AB, hereon Svenska Mässan, one of the biggest exhibitions and congress centres in northern Europe is located within the Green City Zone. Its unique location in the middle of the city centre of Gothenburg makes it very attractive to host different events and fairs. The combination of two hotels, several restaurants and amenities located in the same building offers an experience without having to leave the premises. Therefore, Svenska Mässan in relation to its location is required to adhere to the increased sustainability regulations as well as the expansion in activities and population.

1.2 Description of case company

The Swedish Exhibition & Congress Centre or Svenska Mässan, as it is referred to locally, is Sweden's oldest exhibition centre and was inaugurated in 1918 (Svenska Mässan, n.d.a). The purpose of Svenska Mässan was to offer a place where industry was able to interact with trade as previously there had not been any places like this. In 1918, the first day of the very first exhibition had almost 20 thousand visitors and a turnover of 4.8 million euros. For comparison in 2018, a centennial later, the turnover increased significantly to 136 million euros with more than 2 million visitors (Svenska Mässan, 2019). Svenska Mässan is owned by the Swedish Exhibition & Congress Centre Foundation and the private ownership allows the firm to operate its finances without major external decision-making processes.

The firm operates two business areas, hospitality and the second business area focus on hosting fairs and events. The overall vision for Svenska Mässan is to become Europe's most attractive venue by offering the best overall experience across the entire operation. The goal is to provide profitable growth that fosters conditions to develop towards the overall mission. The mission is to promote trade and industry, while the business model aims to provide memorable experiences and a profitable firm. The mission statement can be separated into six different focus areas that can help develop the firm which includes 1) sales and business development, 2) digitalisation, 3) facility development, 4) culture, competence, and work methods, 5) overall experience, and 6) sustainable development (Svenska Mässan, n.d.b).

1.3 Problem discussion

Svenska Mässan is a large commercial actor in the city of Gothenburg that has a large turnaround of different logistics parts that serves the fairs, exhibitions, 1200 hotel rooms and 5 restaurants in the building. Additionally, the firm is also involved with the logistics around the event venue which ranges from the Liseberg Amusement Park to the Ullevi Stadium in Gothenburg. During peak periods there are daily deliveries made to Svenska Mässan which could for example include towels to the hotel, food for the restaurants or equipment needed in the booths for fairs. Currently the firm is operating with 60 peak days with plans for upscaling this to 255 days packed with events or fairs. This extreme upscaling goal creates a multitude of challenges that the firm needs to address to make it achievable. Particularly with the fairs and exhibitions, it is key to have swift loading and unloading turnaround times at the commencement and ending of the events to not disrupt the public spaces, private vehicles, or public transportation in the Korsvägen area.

The internal and external logistics flows in relation to the fairs and exhibitions, during these high-volume peaks, requires careful logistics planning. The urban setting can quickly become congested with queues and the supply chain can be affected by possible disruptions. Currently, to make more efficient deliveries to the city's core, Svenska Mässan uses a small-scale consolidation centre located ten to fifteen minutes outside of Gothenburg's city centre. During peak periods, most of the smaller goods that bound for the event area are sent to the consolidation centre to be consolidated in larger trucks to attempt to minimise the number of deliveries. However, the decision-making process on how to utilise the consolidation centre is still largely based on practical knowledge, experience, and iterative processes. The growing need for transportation to firms in urban locations has generated new complex situations where several stakeholders are involved. For Svenska Mässan, which is currently in an upscaling process in terms of events as well as a fourth tower, the lack of efficiency in utilising the consolidation hub is becoming increasingly visible. It is estimated that Svenska Mässan has almost 35 thousand deliveries annually. These deliveries can be simplified into two in-flow flows, the fairs, and exhibitions in-flow and the "always on" in-flow depicted below in Figure 1. The fairs and exhibitions in-flow starts via the consolidation centre with multiple carriers delivering smaller sized goods, the consolidated cargo

then arrives at Svenska Mässan which can process at a rate of six trucks per hour before the goods enter the exhibition halls. The “always on” in-flow relates to the deliveries of fresh food, laundry, equipment, and exhibitions, to mention a few (N. Höjer, personal communication, January 4, 2022).

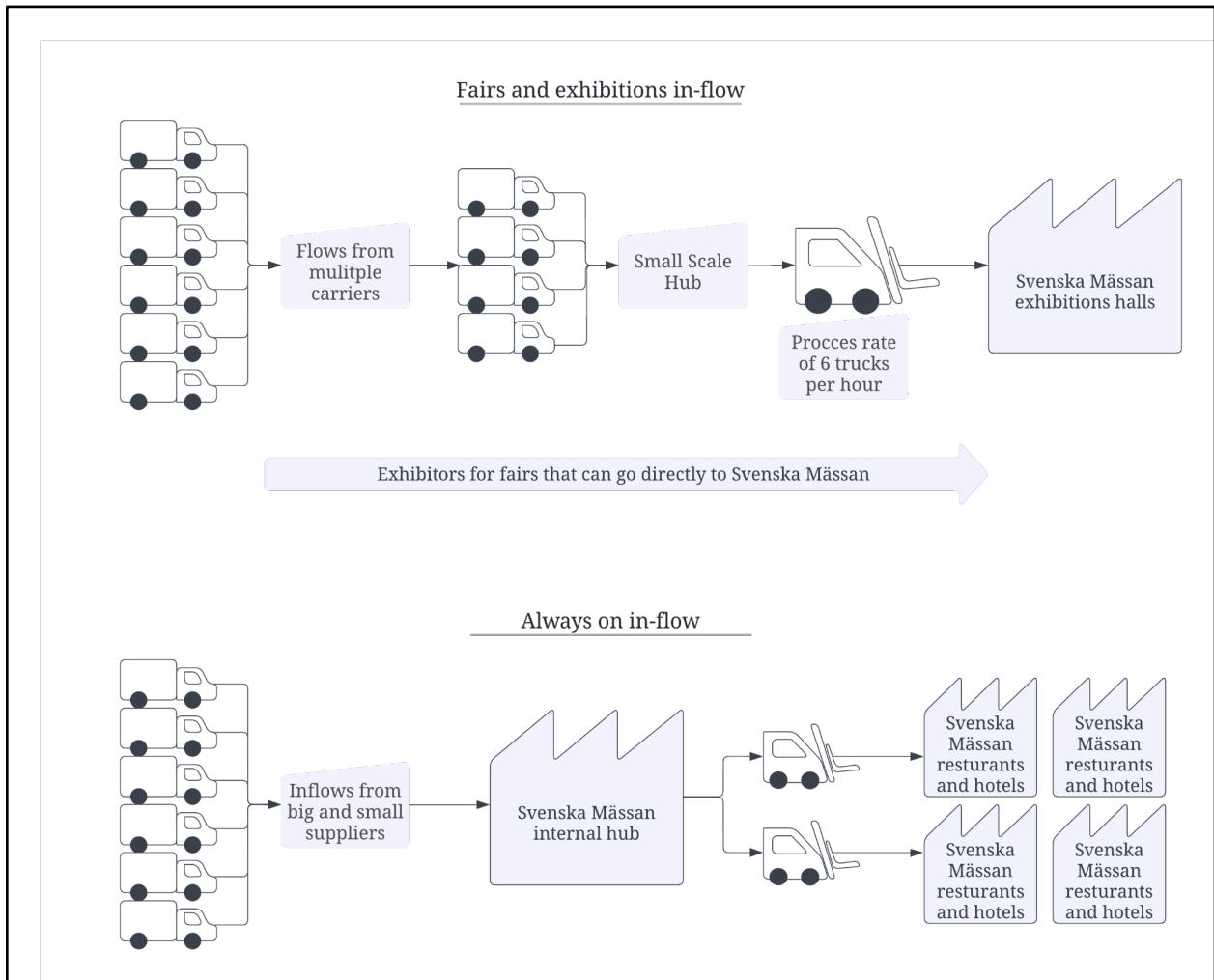


Figure 1: Current in-flows at Svenska Mässan simplified (Figure developed by authors, 2022)

The firm hosts a range of events for different firms with varying needs and one of the main challenges is to assure the specific requirements of each client while retaining efficiency. For example, when hosting certain clients Svenska Mässan must ensure that the client’s sustainability requirements are met by using less environmentally damaging transport solutions. About seven years ago, the firm implemented the addition of the small-scale consolidation hub to reduce the stress on the logistics as well as to alleviate the lack of storage space on-site. However, many of the suppliers delivering to Svenska Mässan, particularly for fresh-food deliveries, are currently operating a milk run logistics setup. A milk run delivery setup means that one vehicle collects and delivers supply along a predefined route (Arvidsson, 2013).

The planned upscaling and the upcoming construction of the fourth tower in the year 2026 will consist of 400 hotel rooms. This incremental increase entails that the logistic infrastructure needs to be revised and adopted towards Svenska Mässan's new organisational operations in the upcoming years (N. Höjer, personal communication, February 3, 2022). Therefore, the implementation of a large-scale hub located outside the urban area of Gothenburg is in the interest of Svenska Mässan. However, the current problem identified at the firm can be divided into three parts, the congestion occurring in the Korsvägen area during peak periods, the lack of control with the in-flow of goods and the resistance to change of employees within the firm. The ambitions of both the city of Gothenburg and Svenska Mässan are to continue expanding within the next few years. This presents a demand for a more efficient logistics system to ensure the seamless cohabitation of all stakeholders within the urban area. The objective of the researcher's collaboration with Svenska Mässan is to optimise the current logistics in-flows to the fairs and exhibitions with the full integration of a large-scale consolidation hub located outside of the city centre.

1.4 Purpose

The purpose of the research conducted is to contribute to the literature on the possible integration of consolidation centres for urban located event venues and the sustainability effects hubs may bring. The ambiguous focus of the research question allows the results to potentially be utilised or adopted by other fair and exhibition venues.

Hence the research questions selected are as follows:

RQ1: How can a consolidation hub improve the events logistics flow and create sustainability gains for a firm in an urban location?

RQ2: What are the main challenges with the implementation of greater use of a consolidation hub and to what extent could these be mitigated?

1.4.1 Gap between scientific knowledge and practice

The research questions identify a gap between scientific knowledge and practice regarding the relationship between urban consolidation centres and events hosted in urban areas. While there is a great deal of literature that focuses on urban areas and the use of consolidation centres there is limited research that demonstrates the utility that event venues in urban areas can have for consolidation centres. Additionally, while there has been research conducted on the logistics of mega-events such as the Olympics, there is overall limited research conducted on event logistics and the importance of events for a city, as well as the implications on the city's existing infrastructure experiencing these peaks in tourism. Furthermore, with the case study focusing on a local firm the researchers are able to identify the gaps between academic recommendations and how these ideas work in practice with the costs, benefits, and the effects on the employees within the firm.

1.5 Delimitations

There are two main in-flow flows of goods to Svenska Mässan, the “always on” which focuses on food for the restaurants as well as the hotel needs, and the other in-flow is related to events and fairs. The broad range of the entire system of the firm, while interesting to examine, is far too large for the purposes of this research. Therefore, attention will only be placed on Svenska Mässan's in-flow and outbound logistics flows in relation to fairs and events. Lastly, the focus will be on the utilisation of consolidation centres in optimising the logistics flows for fairs and events while reducing the environmental impact of the firm. Furthermore, as stated in the research questions the main scope of the research entails an investigation of whether a consolidation centre will create value for an event venue in an urban location, the possible challenges, and mitigations. Hence, the investigation of different information technology systems nor the placement or management of the hub shall be considered in the research.

1.6 Disposition of thesis

The outline of this research project is presented in Figure 2. The introduction provides a foundation for the logistics topic at hand, background information on the firm and the city of Gothenburg. The theoretical framework is introduced in section 3 along with how the research was conducted, and the choice of theoretical approach influenced the content of literature in section 2. The empirical findings contain the results of the interviews conducted and in section 5, the applied theoretical frameworks are evaluated. The analysis and discussion in section 6 will provide recommendations applicable for the case study company. Lastly, the conclusion summarises the main findings of the paper.

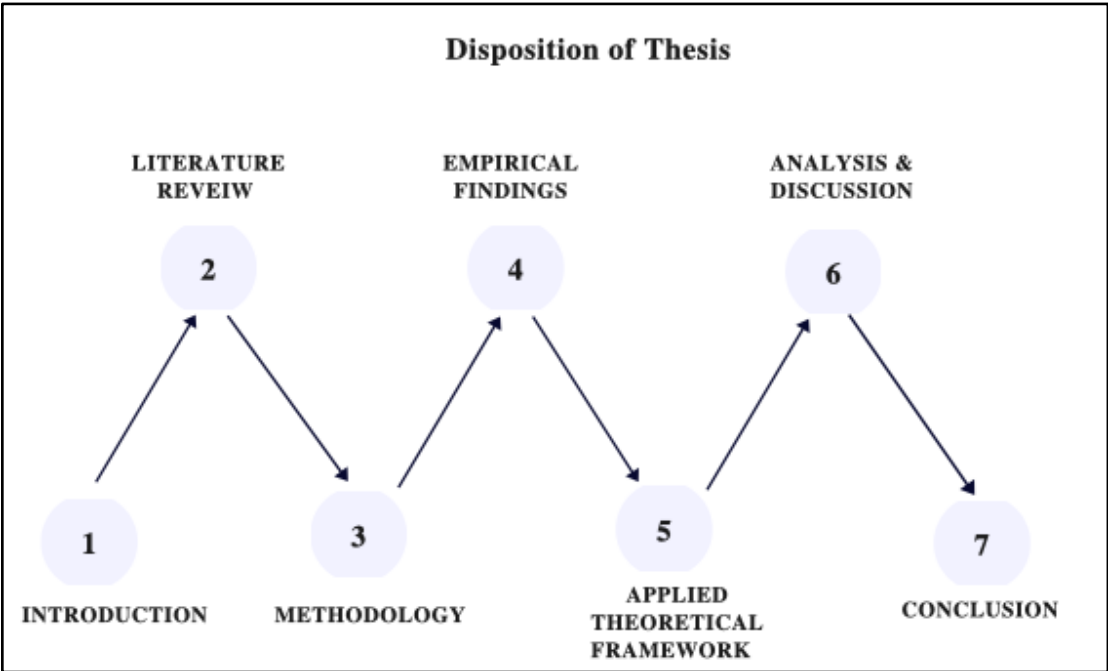


Figure 2: Disposition of thesis (Figure developed by authors, 2022)

2. Literature Review

This chapter sets a foundation to use throughout the thesis based on three themes; urban logistics, event logistics and change management. The three themes interlace as the research investigates the possible addition of consolidation centres in the supply chains of urban located event venues and the impact it can have on these firms. The urban logistics theme solidifies the importance of logistics within cities and discusses urban consolidation centres, regulations, sustainability, and joint logistics. The event logistics theme focuses on the impact of events on cities, performance measurements and the logistics flows of temporary projects. Lastly, the change management theme describes the importance of stakeholders, creating lasting changes within a firm and supply chain control.

The streamlining and optimisation of operations is a significant characteristic of business firms in recent years is the constant search for streamlining and optimising operations. This has led operations to evolve from function-oriented to process-oriented. In turn, the growth of supply chain management has increased and is a vital function of any firm operating in the modern business environment. The chain provides a metaphor for the importance of each individual link within the supply chain. If one individual were to fail the effect would spill down throughout the entire supply chain and cause a varying degree of obstacles. Thus, reflecting the importance of the interdependencies which a supply chain is composed of (Michlowicz & Smolińska, 2015; Weenk, 2019). The interdependencies of the supply chain results in decision making having an almost ripple-like effect on the different functions involved. For example, one small change in the supply chain could result in substantial effects in other functions and areas as seen with the 2021 Suez Canal obstruction or with the disruptions caused by the Covid-19 pandemic (Doerfler, 2021).

The foundations of modern society stem from the physical freight flows of the manufacturing and consumer economies. When discussing the supply chain, the use of “iron triangle” is a descriptive approach towards the constant weighing between the areas and functions. The triangle is representative of the supply chain and consists of cost, time, and quality (Holguín-Veras et al., 2015; Weenk, 2019). The importance of balancing the cost, time and quality must be in consideration with the fundamental principles of logistics. While supply chain management and logistics management are intertwined and concern the flow of goods as well as information, they are different in essence. Supply chain management involves the sourcing, procurement as well as delivery of goods to the end customer, while logistics management is defined as the movement and storage of goods at a firm. A fundamental principle in logistics to follow regardless of industry are the 7 R’s, which consist of delivering goods at the right place, right time, right quantity, right product, to the right customer, right price, and right condition (Rushton, Croucher, & Baker, 2017). Taking these variables into consideration within the value chain, while remaining efficient, optimised and sustainability focused is a challenge for firms as well as transport operators and carriers.

2.1 Urban logistics

Currently, 4.2 billion people live in cities and cities are expected to continue experiencing growth with half the population living in urban areas by 2050 (World bank, 2020). Coupled with the population increases in cities comes the increased demands for the movement of goods within these urban areas. However, little is understood about the intricate network that supplies cities with all its necessities for daily life. Urban logistics is defined as the movement and flow of goods within an urban setting. The most distinguishable activities are the deliveries and collection of goods that are essential for a business to operate within the urban environment (Cherrett et al., 2012; Dolati Neghabadi, Evrard Samuel & Espinouse, 2018).

According to Cherrett et al., (2012) there are four different segments of challenges that have implications for urban transportation. The first is the time aspect, referring to the time, day, and season in which the deliveries are made. The second is how and what vehicle is used to execute the delivery, for example using an electrified lorry or alternative methods such as bicycles. The third segment focuses on dwell times of deliveries that are made, while the fourth and final segment rather focuses on the unloading locations and its characteristics. Consequently, the increased complexity of logistics within cities creates higher demands for stakeholders to have their goals met as well. Discussed in the literature review conducted by Dolati Neghabadi et al. (2018) it is important to consider the trade-offs and objectives of the stakeholders involved. Entailing that there is a complex situation between the different stakeholders as each holds separate objectives and perspectives on the utilisation of the city logistics all while working towards various individual goals. Often the main goal for firms is to remain cost efficient, all while holding a competitive position on the market (Taniguchi, Thompson & Yamada, 2012). One way for firms to reduce costs is to consolidate deliveries of goods with competing firms. The cost reductions are possible through collaboration and can be beneficial to private companies as well as the society at large since the reduction in deliveries leads to less lorries entering an area. However, as with the management of the supply chain, the risk and return of these strategies needs to constantly be weighed against each other as stakeholder objectives often conflict (Taniguchi et al. 2012).

The delivery of goods from the warehouse to the doorstep of firms and consumers alike is often considered the last step in the supply chain and referred to as the “last mile” (Cherrett et al., 2012). In terms of urban logistics and the delivery of goods to the inner locations of the city, the last mile deliveries become more problematic. The difficulties with last mile deliveries are often directly connected to the cost and the effort consumed to be effective as well as providing customers a high service level (Taniguchi et al., 2012). Additionally, as mentioned, the complexity of the city logistics, with all the different stakeholders and congestion involved makes it hard to tackle the different challenges. An assumption could be made that larger firms and establishments are big generators of traffic and congestion. However, these firms and establishments can fill larger vehicles when making deliveries. Since larger firms are able to consolidate goods, this in turn generates a greater fill rate of the vehicles used in comparison to smaller firms (Cherrett et al.,

2012). The last mile delivery is therefore an ongoing problem that needs to be addressed to strategically optimise the deliveries made (Boyer, Prud'homme & Chung, 2009).

Implementations that can be made to increase the efficiency of the city logistics are for example introducing consolidation centres and better coordination of vehicles to optimise freight transportation (Crainic, Ricciardi & Storchi, 2009). Further, a proper design of the warehouse is one of the most important factors that can affect utilisation, cost, and efficiency, as the effective use of space is the goal for most firms. In reference to the production lines within the automotive industry, the importance of having the correct item at the right place is important to have a just-in-time setup with minimum amount of inventory. Using different sequencing models can help increase efficiency, reduce wasted space, and still allow the firm to be agile for production (Jin, Luo & Eksioglu, 2008). Additionally, the application of different transportation optimisation strategies through softwares for instance in a firm's warehouse management system to better plan the transports could be an alternative solution to increase efficiency (Taniguchi et al., 2012). These various implementations can be explored within urban logistics to improve last mile freight flows, reduce environmental impacts, and provide benefits to stakeholders involved.

2.1.1 Urban Consolidation Centres

The continuous expansion of cities increases the demands for both liveability and freight operations to coexist within urban areas. This becomes strenuous as the main method of transportation is utilising road infrastructure for both inhabitants and goods (Brettmo, 2021). In this regard, urban consolidation centres (UCCs) aim to provide some relief in reducing the number of freight vehicles entering the city centres. Consolidation centres are essentially areas where freight goods from various carriers can be compiled into larger units for delivery to an end destination thus optimising the truckload fill rate per delivery. Whereas a UCC is defined as a facility where goods can be sorted and consolidated, like a consolidation centre but that is located within a city relatively near the firm or actor where the freight deliveries should take place (Allen, Browne, Woodburn & Leonardi, 2015). A UCC therefore reduces the number of deliveries to a firm, the length of the freight trip and reduces congestion created in high traffic areas, consequently having an impact on greenhouse gases emitted.

The concept of a UCC is not new in practice as consolidation initiatives have been explored since the seventies (van Rooijen & Quak, 2010). Within this scope there have been three types of delivery goods supply systems identified; centralised, decentralised and hybrid (Cherret et al., 2012). The centralised system is akin to the consolidation centre as it allows firms to receive deliveries from a single dispatch point. Whereas the hybrid method allows for a combination receiving certain goods via a consolidation centre and decentralised deliveries. The other appeal of utilising UCCs are the value-adding activities that can occur during consolidation such as labelling, loading the goods in optimal order for the receiving firm and inventory management

(Allen et al., 2015). Stockholding services at UCCs can provide additional value to a firm as this equates to less space being utilised for storage onsite at the firm since space is a highly valued commodity within urban areas. Further value-added services that UCCs can provide are temporary storage, waste collection, e-tailing logistics, or specialised services such as breaking down pallets into smaller bundles for delivery (Allen et al., 2015; van Heeswijk, Larsen & Larsen, 2019). Firms working with UCCs may also become more agile as the firm can decide when goods should be delivered including during off-peak hours.

Despite the theoretical benefits, the usage of UCCs has not had a great deal of success in practice due to high operational costs and overdependence on governmental subsidies, to name a few factors. The use of UCCs are also not optimal for all types of inventories, for example fresh goods in a full truck load (FTL) where all items have the same end destination. Nor are UCCs suitable for perishable items if the correct infrastructure is not available such as cold and warm storage. However, the implementation of UCCs have proven to reduce environmental effects from freight transportation, assist in congestion reduction, and enhance customer satisfaction. The UCC can facilitate in-flow flows to optimise last mile deliveries in a scenario described by van Heeswijk et al., (2019) a truck loaded with less-than-optimal capacity utilisation can then be reloaded and bundled for a single delivery for higher efficiency gains. UCCs may further contribute towards decreasing environmental impacts by having last mile deliveries performed by electric freight vehicles or via alternative methods of transportation (Allen et al., 2015; van Heeswijk et al., 2019).

2.1.2 Sustainability in urban logistics

According to the European Environment Agency (2021) greenhouse gas emissions resulting from the transportation sector in Europe have continued to increase, with the latest jump being 0.08 percent in 2019. European road transportation alone has contributed 72 percent of the GHG emissions for both domestic and international transports (European Environment Agency, 2021). When additionally considering the warehouse operations and the material handling processes there is an estimated 2-3 percent of emissions added to the freight transportation process (McKinnon, Cullinane, Browne, Whiteing & Piecyk, 2015). These figures depict the large environmental impact that the transportation industry has on Europe alone. As there is an increase in demands for freight transportation globally, which will continue to rise as urban areas grow in population, a consideration for the negative effects that freight activity produces such as congestion, pollution, noise, and infrastructure damage should be accounted for (Holguín-Veras et al., 2015). Simply electrifying transportation fleets to reduce the emissions of freight is not a long lasting or feasible option. To make the logistics process more sustainable in the long term, greater efforts are needed.

Sustainability does not only focus on emissions and climate effects, but it also considers other aspects within the triple bottom line. The triple bottom line is a three-way trade off that focuses on the economic, environmental, and social aspects which are all interdependent on one another in

relation to the wellbeing of society (McKinnon et al., 2015). Kayikci (2018) explains the economic aspect in relation to transport systems that are affordable, effective, and collaborative, while offering a mixture of transport modes while being able to sustain the local economy. This emphasises the need for increased collaboration for sustainable and financial gains for firms. The environmental aspect focuses on the reduction of greenhouse gas emissions, pollution and waste that are generated by freight. This can be done for instance by minimising the usage of non-renewable fuel resources and focusing on renewable energy sources. Lastly, the social aspect focuses on the health of people, supports good standards of living and safety (Kayikci, 2018). During the latter years the attention to these topics has significantly increased as the negative effects of city logistics has grown in the public opinion.

The increase of environmental concerns from the public have pushed for the adoption of environmental logistics operations since it is not only important for general health of the public but for the reputations of firms as well. One of the most discussed topics is the ineffectiveness of transportations and the large number of deliveries combined with the low utilisation of vehicles. Consequently, urban freight has substantially negative effects on sustainability which can be reduced through various strategies or initiatives (Brettmo & Sanchez-Diaz, 2021). Methods that can alleviate the sustainability qualms within urban logistics can include the use of electric freight vehicles, urban consolidation centres, or alternative methods for last mile deliveries (Brettmo & Sanchez-Diaz, 2021). Another sustainability approach is to ensure that the transportation industry is connected and digitised. This creates greater control within the logistics by optimising the workflows, increasing efficiency and visibility in areas such as the planning, sourcing, delivering as well as in the reverse logistics process (Kayikci, 2018). The implementation of algorithms is becoming more extensive to achieve a “greener” approach towards the logistics. By implementing a digital system, it could result in overcoming a multitude of issues with urban logistics systems. The benefits of implementing digital systems are to enhance service time, load times, carbon dioxide emissions, fuel consumption and time optimisation (Ng, Lam & Choi, 2019).

2.1.3 Regulations

In the past decade there has been a magnified emphasis on sustainability across the value chain from consumers, firms, and regulatory bodies. As a response cities and firms are increasingly seeking ways to manage urban logistics as well as reduce the environmental impacts of freight deliveries. As mentioned in section 2.1.2, the negative impacts are well known including reduced air quality, increased congestion, and emissions as well as reduced safety for the city's inhabitants. In this regard, freight traffic is often considered problematic for the city rather than a lifeline of the local economy (Wainwright, 2019). Hence, governing bodies are working towards implementing regulations to control the movement of freight and reduce environmental impacts.

The complexity of urban logistics places pressure on policy makers to form regulations that promote the development of sustainable logistics. As argued by Cherrett et al., (2012) there is a lack of understanding in the operations and significance that the transportation industry faces. The absence of interest in city logistics during the past years is now shown in some cities with the effects of poor planning that results in congestion, lack of unloading/loading spaces, goods-handling problems, and traffic fines to mention a few (Cherrett et al., 2012). Tadić, Krstić & Kovač (2022) argues for the same case that there has been a rare occurrence of regulators participating in urban logistics decision making. Regulation at the national, regional, and local levels have been introduced impacting the movement of urban freight. For instance, low emission zones (LEZ) have been introduced to improve air quality and reduce the exposure to dangerous particles that could be harmful to humans. Low emission zones (LEZ) are areas where certain vehicles are unable to enter based on the vehicle's configurations and the level of emissions generated (Holguín-Veras et al., 2015). Typically, within European cities LEZ are popular initiatives. An example of a city that is currently using LEZ to improve the urban environment is the city of Gothenburg (Urban Access Regulations, n.d). Additional implementations made to reduce emissions include parking restrictions, road- and bridge usage charges and bus lanes that only allow low emission vehicles to utilise the same lanes (Holman, Harrison & Querol, 2022).

At a local level, cities are attempting to work in cohesion with larger global environmental goals such as those included in the UN Sustainable Development Goals (SDGS). The SDGS focuses on improving the overall health, reducing inequality, and boosting economic growth in areas in which it is implemented (United Nations, n.d). One initiative to reach the SDGS can be seen in the city of Gothenburg in Sweden through a project called Green City Zone (GCZ). The GCZ initiative is focused on aiding the second largest Swedish city in reducing environmental impacts with the goal of emission free goods transportation by 2030 (Business Region Göteborg AB, n.d). This local initiative is therefore encouraging the use of greener transport solutions such as electric freight vehicles as well as for local businesses to collaborate towards achieving the city's joint goal.

2.1.4 Joint logistics

Logistics research tends to focus on the relationship between the shipper and the receiver. However, there is a three-way relationship between the shipper, carrier, and the receiver. Often the carrier is referred to as a logistics service provider (LSP) providing services such as warehousing and transportation. In later years, the LSP has expanded its service portfolio further to offer better value for clients (Stefansson, 2006). Modern LSP firms can offer a better adopted service towards customer needs, often referred to as fourth-party logistics (4PL). In some instances, 4PLs could even act as the shipper in the design and management of the supply chain (Fabbe-Costes, Jahre & Roussat, 2018). Benefits of using LSP's include but are not limited to; affordable logistical solutions that customers could not afford individually, access to the best practitioners and knowledge that the individual firm might lack such valuable strategic decision-making materials

(Fabbe-Costes et al., 2018). The LSP is a growing phenomenon that has shown great profitability as there has been a growing need for logistics service. This has led to increased mergers and acquisitions to add value for the customer, in the form of offering door-to-door service. The aim is to cover the entire spectrum of the supply chain to offer as much value for customers as possible (Kiesel, Ries & Tielmann, 2017).

There is a constant trade-off between the cost, service, and efficiency of a logistics system. Implementing a collaborative strategy could help reap the benefits of operational cost savings while also having superior logistics capabilities. The growing connectivity using different information systems has led companies to be connected to both suppliers and customers forming a large network. In a global enterprise network, the firms can control the whole supply chain. Although partner companies often share the same supplier creating a large, connected network, there is little to no collaboration between the different parties involved (Li, Wang, Cao, Du & Luo, 2014; Wang, Huang & vanden Broucke, 2018).

Furthermore, there are four different themes of potential barriers for collaborative logistics, presented by Lindawati, van Schagen, Goh & de Souza, (2014). The first is the expected benefits of collaborative urban logistics. For successful collaborative urban logistics, the first barrier to overcome is to prove the overall benefits for the actors involved. For example, this can be in terms of cost or IT-investments, but mainly that each individual stakeholder should see the benefit for their respective firm for collaboration to be possible. The second theme identified is the internal capability, this refers to the capability to meet the demands of urban logistics. This focuses for example on the firm's ability to adopt the organisational structure. The third theme identified is trust. The absence or lack of trust amongst competing firms may result in a negative effect on the stakeholder's willingness to participate in collaborative urban logistics efforts. The fourth and final theme that is identified is the intelligence risks or the fear of leaking information that has a great beneficial impact on the firm's success. Lindawati et al., (2014) concluded that the greatest barrier is the perceived benefits and the risk of losing business intelligence towards competitors. This is further confirmed by Holguín-Veras et al., (2015) with the mention of confidentiality and disclosure of internal data, such as driver wages or indirect costs for instance, presenting a significant barrier in the collaborative efforts between different firms.

To solve some of the problems with urban transportation and its challenges, a system has been developed named cooperative freight transport systems (CFTS). It is defined as a system that several entities operate and corporate to make use of their transport elements and logistics activities (Yamada, 2015). The usage of a CFTS could therefore help reach the goals of city logistics. Some of the benefits explained are reduced number of vehicles used, increased vehicle utilisation and a decrease in travel time. The result from a study shows that there is a benefit of cooperative transportation. There was a cost reduction from implementing CFTS, although clients expressed some concern such as information leakage and lack of track-and-trace. Also shown from the study

there was a significant reduction in carbon dioxide emissions from the use of CFTS. The implementation was also able to identify a possible 20 percent reduction in truck deliveries (Yamada, 2015). This entails that collaborative logistics have a positive impact on reducing emissions and is a strong argument to improve the collaboration between different partners despite the barriers presented.

2.2 The logistics of events

Events or fair logistics are complex as there is a large variety in the goods transported that is dependent on the event occurring. It can be defined as the flow of goods planning and challenges that an event-setting such as fairs or concerts brings (Haugen, 2011). For cities, events are a great revenue generator as it is a major population attractor and can increase the local economy. There are different characteristics of events, but often events do not require any public funds to perform. Notable benefits of events are separated in two aspects, first the direct value the event creates such as revenue, tourism, and the direct experience. Second, there are socio-economic effects of hosting events, in the form of reputation and pride for the host city (Ambrecht, Lundberg, & Andersson, 2017). While event logistics is expected to continue growing, is complex in nature, and important for cities on a business level, it has been a lesser researched area (Salgado-Barandela, Barajas & Sánchez-Fernández, 2019; Creazza, Colicchia & Dallari, 2014). However, it is of mention that the Covid-19 pandemic has greatly impacted events on a global scale and caused the industry to reflect as well as rework its business model to include hybrid events (OECD, 2021). For the past three years events have been continuously cancelled or postponed due to restrictions imposed on large gatherings of people, which has negatively impacted the industry as a whole.

Events can range from exhibitions, concerts, sports, fairs, competitions, and conventions. There are two main aspects within event logistics, the exhibitors of the event and the venue, where the event takes place (Haugen, 2011). The variety in events coupled with an urban location creates further logistics complexities for venue firms as many stakeholders are involved in the implementation of events. Stakeholders can range from freight forwarders, exhibitors, visitors, venue firms, and restaurant services (Haugen, 2011). Venues for events in cities face a multitude of issues, similar to those that urban logistics faces including congestion, lack of parking as well as lack of space for loading and unloading freight vehicles.

Improvements in events and venue logistics can range from overly complex to smaller changes, such as changing the IT systems used. For example, the Exhibition centre of Basel, which is the largest in Switzerland, is a case study that demonstrates the positive effects of utilising a new logistics booking system in conjunction with having all goods first checked-in at another designated checkpoint 15 minutes from the venue (BESTFACT, 2013). The new booking system enabled the firm to reduce congestion, optimise delivery planning and improve the efficiency with

reductions in cost and time spent. This case study embodies changes that can be reproduced across other venues that are also in urban locations.

2.2.1 Measurability

To strengthen long-term competitiveness, firms need to ensure that production systems are outstanding, moreover focusing on the performance related to reliability, sustainability, flexibility, and productivity. This attention to innovation and the creation of a new focus on logistics performance is a direct consequence of the economic crisis in 2008. A structural framework of different performance measure points is crucial to understand the distance between current performance and the desired performance and operations (Ante, Facchini, Mossa & Digiesi, 2018). There are different tools that can be used to implement a performance measurement system. It is possible to track and evaluate the performance of the firm and it also gives a better understanding of certain areas of the company. Having the ability to oversee the firm better by measuring the correct operations can lead to increased value for clients (Ante et al., 2018). This is of importance since the primary target in logistics is to satisfy the customer's requirements in a cost-effective manner.

There is a constant trade-off between cost, quality, and time. Specifically, when it comes to customer satisfaction there is a trade-off between the target service level and the cost input it would require meeting the desired service level. To achieve great customer service the investment of capital is necessary. Once great customer service is achieved it is possible to add value throughout the supply chain (Bowersox, Closs, & Cooper, 2002). Therefore, a trade-off between the invested capital and the desired level of customer service can be seen (Bowersox et al., 2002). Furthermore, the main challenge for many firms is to identify which types of performance indicators to measure (Ante et al., 2018). There are different international standards and the International Organisation for Standardisation (ISO) that help firms evaluate and systematically implement the correct performance indicators for the firm. Moreover, key performance indicators (KPI) play a crucial role in recording and ensuring that deliverables are met. For example, ISO 22400-1:2014 and 22400-2:2014 are recommendations made to follow when implementing KPIs into the firm. A hierarchical approach towards the usage of KPI is recommended as this gives a strategical, tactical, and operational perspective. There are also ISO standards for event logistics in relation to environmental efforts in this industry, including ISO 20121:2012 which centres on sustainability management (ISO, 2012).

Different actions that firms can take to align towards a common goal such as the GCZ initiative is by introducing a quality management system. This influences the firm in a positive way in many cases and adds value for customers of the firm. Continuous improvement of processes and product quality often leads to increased revenues as well as reduced cost (Tari, Molina-Azorin & Heras, 2012). The diversification of events allows for many different measurement points to be

implemented, resulting in a large array of potential possibilities to monitor the performance of events and therefore increase the amount of control over the operations.

2.2.2 Logistic flows and events logistics

With the large production of events, services and products generate great requirements for the simultaneous operations that need to be performed to ensure the success of the event. It is rare that all these requirements or specifications are met within a single firm, hence there is a need to rely on resources outside the boundaries of the firm. For many firms the value creation aspect is important, therefore the focus of the firm is often on the core activities, while the rest of the activities are outsourced. As a result of this, the firm tends to rely on the relationship between the supplier and the firm itself to keep the operations running (Snow, Miles & Coleman, 1992). The interconnected networks between firms and suppliers are referred to as supplier networks. There is typically more than one supplier involved resulting in a large web of suppliers. The complexity of the entity produced also reflects the number of suppliers that are involved in the network. The tendency is that the more complex the end product is, the more suppliers are involved thus forming a larger network.

To produce customised products and services in a short period of time such as events or construction sites for example, a unique combination of skills and specialists are required. Firms strive for customer satisfaction and value creation, resulting in networks of suppliers to perform the needed tasks. Subsequently, the demand to organise these suppliers is critical to be able to perform the products and services timely. The transport and handling of material flows are important as the time window of where the supply stream can create value is very limited particularly during events or temporary projects. For example, a late delivery of windows during a construction project can cause construction failure and delays (Modig, 2007). The same can be applied to an event, if the speakers do not arrive in time for a music concert there is a high risk of customer disappointment. Aside from customer dissatisfaction, delays in deliveries can result in higher cost or delays in the project or event.

For the logistics in and around events the conclusion can be drawn that some of the characteristics are shared with other industries that face the same type of problem, which is the amount of outsourcing to other parties. The need for coordination is essential in larger projects and events to be successful. A solution could be to standardise material handling and consolidate to use fewer suppliers which in turn would utilise the effects of economies of scale (Modig, 2007). However, it is also mentioned that a standardised system often has a lower amount of efficiency and agility. The consolidation of services relies on the provider being able to operate a vast amount of material in different shapes. Opposite of this argumentation, the standardisation makes it easier for firms to adopt and reconfigure the logistics system to fit certain requirements for events better. Furthermore, events can be categorised as having the same logistics needs as projects in the

construction industry due to the irregular and varied deliveries. These deliveries prove the need for an optimised material flow handling that is coordinated seamlessly as events tend to have an increase in the flows to and from an organisation's location as the event date grows nearer. The increased amount of outsourcing to service partners has led to a border supplier network stressing the importance of good planning and execution. However, events have the advantage that the deliveries are made to the same locations despite the variation in the goods and quantities delivered (Modig, 2007).

2.3 Change Management

The ever-changing business environment requires firms to continuously adapt, innovate business models and processes to maintain a competitive edge as well as market share (Gardner, Anand & Morris, 2008). Therefore, indicating that the way a firm manages the transitions that these changes bring becomes essential. Change management is an entity that spans across industries as organisational adaptation is a result of changes in workforce, globalisation, and maintaining a competitive advantage. The implementation of new strategies or projects within a firm require focus on the change management aspect as the resistance to change can hinder the overall results or adaption of a project (Olfen, Maas, & Visser, 2019). Consequently, a difficulty that firms often face is the addition of meaningful and long-lasting changes (Stouten, Rousseau & de Cremer, 2018).

The aim when implementing changes within a firm is for the change to be accepted by employees to ensure the success of a project. As discussed by Stouten et al., (2018) the change of vision or reason should be feasible, easily communicated, and appeal to a range of stakeholders. A common misconception of implementing change is to have it occur all at once with limited transition periods; however, it is more effective to introduce the change gradually (Olfen et al., 2019). Change management within logistics can for example relate to optimising a process within the firm's supply chain, a company-wide change in IT systems or changing strategy toward adapting more sustainable practices. Furthermore, as discussed by Gardner et al., (2008) the concept of the degree of cognitive legitimacy or the level of understanding of the new idea or venture within the firm and the effects of it can either help or hinder the adoption of the change across stakeholders and consumers. Reiterating that it is necessary for all actors or stakeholders in a firm to understand the reasoning behind the proposed change.

An aspect of change management is risk management, which entails mapping out the possible hindrances that a project's implementation can create to plan for mitigation tactics. A risk assessment can help in identifying the main areas of concern along with the degree of impact that the risk can create to monitor or mitigate the risk accordingly (Teller, Kock & Gemünden, 2014). Resistance to change is one of predominant reasons for failure of process changes (Simoes & Esposito, 2012). Managing stakeholder's expectations can also alleviate the risk of resistance to

proposed changes as resistance to change generally occurs from uncertainty within projects and the degree of tangibility of the project (Atkinson, Crawford & Ward, 2006). Atkinson et al., (2006) also describes a delineation between projects with tangible measures such as the creation of a building in comparison to end products where the result is not as clear for example in changing an internal IT system.

2.3.1 Stakeholders in urban logistics

There are a variety of stakeholders that need to be considered in urban logistics activities. Stakeholders can include businesses, inhabitants, property owners, pedestrians, local authorities, and freight forwarders. Therefore, these stakeholders and expectations need to be managed while at the same time monitoring and correcting the negative effects city logistics entails, such as noise, congestion, pollution, and safety concerns (Dolati Neghabadi et al. 2018). Furthermore, different stakeholders will often have varied definitions for measuring performance alongside how to utilise the metrics (Holguín-Veras et al., 2015). The stakeholder's involvement in urban logistics is often overlooked by different city authorities, the focus is typically only on the movement of people and not the movement of freight. Without the involvement and engagement of the different stakeholders it is hard to motivate change in the urban freight movement and logistical system (Browne, Brettmo & Lindholm, 2019).

For initiatives to be successful an extensive understanding of the freight movements that are serving the supply chains in urban areas is necessary. To have successful change in the freight initiatives it is important to involve the private sector with the public sector's decision makers (Browne et al., 2019). It might sound rather straightforward, however there are many conflicts between the different stakeholders involved. Stakeholders can be categorised into three different groups that are able to implement changes including public policymakers, freight transport companies and receivers. The public policymakers for instance can implement changes through the usage of different regulations such as low emission zones. The regulators often do not consider the needs of the private sector when designing and enforcing new regulations. Second, freight transport companies have the tendency to implement the initiatives if there is a benefit for the firm's operations such as through economic advantages or reduction of costs. Lastly, as receivers create the demands for freight transportation, these stakeholders have a great impact on the initiatives being made such as off-peak deliveries or upscaling the usage of emissions free transportation solutions (Browne et al., 2019).

The use of freight partnerships can help increase the initiatives to address the problems in urban logistics. These types of partnerships meet on a regular basis to discuss and try to solve urban freight problems. Outcomes of the freight partnership are separated into four different target areas: collaboration, information, regulations, and projects. Another approach is the use of business

improvement districts (BID). BIDs are formed to improve a defined business area where local businesses create a partnership with the joint goal of improving the area (Browne et al., 2019).

2.3.2 Control within logistics

The set-up of logistics for events can also be seen as temporary project organisations as each project has its own set of requirements. The transferability of the logistics knowledge across different projects would be beneficial as often temporary organisations are missing formal logistics training and hold strong traditions (Modig, 2003). Despite planning measures taken prior to the start of the temporary projects there are often unexpected problems that can happen including delays, staffing changes or shortages. As previously mentioned, the narrow delivery window for certain projects presents a challenge since deliveries cannot be too early as this can increase the risk of theft or damage but when delivered too late delays can also result in higher costs (Zudor & Holstrom, 2005). Indicating that there is a high level of uncertainty that needs to be dealt with during temporary projects and events. Resulting in the demand for a high degree of control on both the physical aspects including inventory, as well as digitally monitoring the performance and utilisation of the resources.

According to Ballou (2004), there are three aspects that should be looked at when focusing on control within logistics which are input, the process and output. The input can be a combination of internal and external activities, whereas the process output focuses on the performance of the activities including the cost of the activity and the service level (Ballou, 2004). Performance measures should therefore be placed to monitor the activities to be able to adjust the activity performance accordingly or identify areas where process efficiency can occur. Perfect planning and execution of plans would result in not needing a control mechanism. However, with the large number of variables a temporary project has there is a need for a control network to ensure that goals are continuously met. Control is a way of monitoring that the desired performance goal is reflective of the firm's service level (Ballou, 2004).

One way to increase the level of control a firm has over its supply chain is through increased visibility. Visibility has often been cited as a common problem across the logistics industry, where low visibility often leads to poor allocation of resources, high inventory cost, low levels of internal and external trust (Wisner, Leong & Tan, 2019). Uncertainty in a supply chain often results in overcompensation in terms of capacity. Simplified logistics systems are easier to control and monitor but are limited in efficiency or flexibility. As a result, the efficiency of the supply chain can be limited to its ability to be controlled (Modig, 2003). High visibility throughout the supply chain often equates to a greater level of control in logistics and the value chain. The reason being, that when deliveries of goods for example arrive at the time indicated then the receiving firm has time to prepare for an efficient unloading of the goods.

Service level, according to Ballou (2004) for the logistics department in a firm this can be referred to as delivering products at the right time, avoiding stock-outs, and maintaining high levels of accuracy in its operations for example. For temporary projects it can be difficult and costly to have high availability of all possibly needed materials. Furthermore, what can occur, as temporary projects require vast quantities of goods from various providers, is that items are physically present in the location but cannot be located due to a poor overview of the delivery chain (Zudor & Holstrom, 2005). Hence, implementing a control mechanism the logistics of an organisation can be better prepared to fluctuations such as delivery failure and stock out, a common framework to implement to monitor performance is ISO.

2.4 Key takeaways from the literature review

Throughout the section there has been a plethora of information provided relating to the research questions. This section serves to clarify for the reader the key takeaways from the literature review. The importance of the three themes is to demonstrate the effects that stakeholders have on change management, urban logistics as well as the logistics of events. The themes intertwine with the research question of adding a consolidation centre and the internal world of urban logistics as well as the consequences a venue in an urban location faces with the logistics of events.

The continuous growth and expansion in cities also highlight the need for reduced congestion in these urban centres as well as increased efficiency throughout the logistics value chain. Despite the importance of the freight sector, it is generally seen as a major contributor towards congestion problems and greenhouse gas emissions in urban areas. Implying that urban logistics has a large impact on the triple bottom line and the overall wellbeing of society. Hence, based on the environmental effects coupled with the increasing regulations as well as local initiatives there is a growing need for less environmentally damaging transport solutions that goes beyond electrification. As mentioned, the initiatives can include consolidation centres, the addition of initiatives such as Green City Zone and changing the internal processes of a firm. Sustainability for the research focuses on the triple bottom line in terms of the effects on the environment, the economy of the city and the safety of its inhabitants as well as employees of a firm.

Events hold an importance for cities as events attract a multitude of individuals and tourism, essentially boosting a city's economy for short periods of time. Thus, due to the social and economic gains that a city gets from hosting events it is vital to ensure that the logistics related to events and event venues flows seamlessly. Disruption such as congestion, loss of control in the freight flows as well as increased emissions can downcast the positive effects of events on cities, particularly if an event is delayed or cancelled as a result. The deliveries to event venues can be akin to construction sites as both are temporary projects with the goods required varying on a large-scale. Managing both types of temporary projects require a significant amount of control within the supply chain. Control can be achieved physically and digitally through increased visibility of the supply chain as well as measuring processes to reduce uncertainties. Lastly, for events to run smoothly all the involved stakeholders must cooperate and set aside separate interests to achieve a common goal.

3. Methodology

This section will explain the methodology and the formal applications for conducting the research. The section begins with the theoretical framework selected and explains the topics from the literature review. Followed by a description of the research approach, design, and structure. The section continues with the methods for data collection. Lastly, the chapter concludes with the reliability and validity of the research.

3.1 Theoretical approach

The theoretical approach chosen by the researchers is based on both the Industrial Network Approach (INA) and the Materials Flow Mapping Methodology (MFM). Parts from both the theoretical approaches were adapted to better suit the research purpose. A goal of the research was to gain a deeper understanding of the case study firm and conduct a structured analysis in a systematic way. According to the INA, the business networks should be seen as a network that is connected through business relationships (Håkansson, Ford, Gadde, Snehota & Waluszewski, 2009). In better understanding the interconnected business relationships it is then possible to identify areas where efficiency could be increased and where bottlenecks are present.

The INA is a broad research approach; hence the focus will be on the Actor-Resource-Activity (ARA), a subsection of the INA research approach. The strengths of the ARA model are that it highlights the importance of the different types of interplays between the interactions that can take place in business networks. A central idea behind the ARA-model is that resources can be shared between different actors and activities. When a change is made, it will affect the entire network as the three layers are interconnected. Table 1 demonstrates a sample of the activities, resources and actors identified in the case study firm. Activities consist of the physical activities that the identified actors are conducting respective to the in-flows of the fairs and exhibitions which can include logistics, production, deliveries, or information handling for instance. The activity pattern includes all the activities that are needed to perform the end goal. In the specific case of Svenska Mässan the activity pattern can be grouped as the fairs and exhibitions coalition which consists of a network of the internal departments that are needed to produce the activity which is a fair or exhibition. The resource level focuses on the utilisation of the physical and intangible resources such as knowledge by the actors identified and how the resources can be adapted based on the actors' interactions (Håkansson et al., 2009). Lastly, the actor's level identifies the stakeholder that is conducting the activities. With the application of ARA, the interview framework has been designed in the same order, in relation to the different interlacing relationships.

ARA within Svenska Mässan			
<i>Actors</i>	Logistics department	Client interactions and contracts	Svenska Mässan staff, clients, and freight forwarders
	<i>Organisational structure</i>	<i>Actors bond</i>	<i>Web of actors</i>
<i>Resources</i>	Logistics staff and elevators to second floor	Logistics planning	Loading and unloading dock
	<i>Resource collection</i>	<i>Resource ties</i>	<i>Resource constellation</i>
<i>Activities</i>	Fair and exhibitions in-flows	Event set-up and deconstruction	Fairs and exhibitions coalition
	<i>Activity structure</i>	<i>Activity links</i>	<i>Activity pattern</i>

Table 1: The ARA-Model applied to the case study firm (adapted by authors, 2022)

The MFM identifies and assesses the performance within the supply chain with the target of creating operational improvements in the flow of the materials. Therefore, MFM goes beyond value stream mapping as an analysis of the various parts of the supply chain is conducted. It identifies the activities by video recording of the process flow, conducting interviews and sorting activities into categories such as waste, value-adding, non-value adding and non-value adding but essential, to examine the flows (Finnsgård, Medbo, Johansson & Wanstrom, 2011). There are four aspects that the MFM model looks at which are sustainability, productivity, quality, and flexibility. The MFM was adapted by the researchers to better match the research purpose while still maintaining the essence of the method, to improve the operations.

Consequently, MFM examines four aspects which the literature review describes since the topics are important in understanding the logistics flows of the case study firm. Despite the event logistic flows of Svenska Mässan not instinctually appearing similar to a production line process, there are parallels in how the event logistics system works. During an event the flow of goods and empty goods needs to work seamlessly as there are typically short turnaround times between events and during the set-up of events, all while remaining flexible enough to accommodate for unforeseen occurrences. The need for efficiency and quality is further influenced by the sustainability aspect which has become increasingly important for firms to consider. Lastly, the combination of these

two theoretical approaches aids the researchers in both mapping the logistics flows but also allowing for identification of areas where efficiency can be improved. This will be demonstrated further in section 5 in the application of the theoretical framework.

The literature review captures the internal workings of event logistics and consolidation centres in relation to city logistics, while being reflective about the involvement and power that stakeholders possess in practice. The first section of the literature review focuses on creating a foundation for the reader to be able to better understand the research question at hand and identifies the key resources such as consolidation centres. The second section defines event logistics which can be seen as the activity that the researchers are studying. The last section then focuses on the actors within the system and the importance of identifying as well as managing stakeholder's relationships. The combination of the ARA and MFM theoretical approaches have aided the researchers in selecting the relevant literature in section 2 of the research.

3.2 Research approach

In relation to the research purpose, a hybrid application with qualitative and quantitative research methods was utilised. The qualitative approach rather focuses and emphasises on words than on the collection and analysis of data. The qualitative approach does not aim to offer a definitive truth rather the aim is to increase the understanding of the subject studied. As part of the hybrid method aspects from quantitative research methods are included. The quantitative approach allows researchers to validate and test theories with aid from statistics or other numerical data. It offers a type of measurement to study a problem or situation in depth. By applying quantitative and qualitative methods in a hybrid approach the theories that the qualitative approach offers can be validated using quantitative data. This offers more in depth understanding of different dilemmas; therefore, this has led to a triangulation of methods to find the best possible answer to a complex situation. The findings of this research aim to generate a theory rather than testing an existing one that could be applied for further research. Throughout the research process, abductive reasoning was applied. The use of abductive reasoning allows the researcher to select the best explanation from different competing explanations or interpretations of data that has been collected (Bell, Bryman & Harley, 2019).

When discussing the research approach, it is important to implement a research paradigm which is a philosophical framework on how scientific research should be conducted. The two main research philosophies are positivism and interpretivism. Positivism has its roots in the realisms and the interpretivism is sprung out of the idealism. The interpretivism rather focuses on gaining an understanding of the complex social phenomenon, to conduct this the researcher adopts several ranges of methods to try to seek to describe, translate and otherwise come to terms with an understanding of the subject studied. The interpretative approach also allows for interaction and involvement during the research process, allowing the researchers to interpret and analyse for a

deeper understanding of the topic studied. Applying via a case study for example this type of philosophical framework would favour the generation of theories and ideas (Collis & Hussey, 2021).

The benefits of the case study-approach allow the researchers to establish and evolve an in-depth understanding of the complex situations. This allows the researchers to focus on a phenomenon in a single context. A consequence of this it is possible to collect detailed information about a single type of setting. A case study is adequate to perform when further understanding of the real-life context is needed. The case study should be structured as follows, with the question of how and why, followed by the propositions, the case itself, then the link between the data collected to the case and lastly conclude with an interpretation of the findings. The researchers identified two possible types of approaches suitable for the case study, illustrative and experimental. An illustrative approach is where the researchers attempt to illustrate and innovate pre-existing issues within a particular company. Whereas the experimental case study examines the difficulties in implementing new techniques and procedures thereafter evaluating the benefits. Due to the nature of the case study chosen, a combination of the different approaches was deemed most suitable (Collis & Hussey, 2021; Yin, 2018).

3.3 Data collection

The usage of primary and secondary data was important to build the theoretical foundations for the research. The research commenced with preliminary research conducted in collaboration with the Director of Logistics at Svenska Mässan and the Logistics and Supply Manager. External data has also been collected, including from actors not directly involved with Svenska Mässan's operations.

3.3.1 Preliminary research

To perform adequate internal and external interviews, it was of high importance that the correct type of data was collected. As well as that the researchers were up to date with the case study firm's structure. Initial guidance was also necessary for the researchers to decide upon respondents to interview. The Director of Logistics served as the main contact and the connection to some respondents for interviewing, by helping coordinate meetings and introductions respectively. This served to gain an understanding of the firm and the problem being researched. The use of the informational interviews allowed the researchers to apply a snowball approach to the sample of respondents. By doing this, the researchers noticed how the sample grew and allowed for new insights to be discovered. Clearly stating the circumstances and criteria of the research the respondents were able to recommend other people to add to the sample, this process was repeated until the researchers were content with the sample size (Heckathorn, 1997).

3.3.2 Observations

To get a first-hand perspective of the potential problems and the variety of in-flow goods that Svenska Mässan encounters, it was the intention of the researchers to attend the set-up of multiple fairs. The expected three fairs which happen annually in the spring at Svenska Mässan are the Boat Fair, Eurohorse Show and the Beer and Whiskey fair. These three large-scale events all come with diverse goods and as a result a variety of issues that can occur during the logistics process. The intention was to observe the in-flow flows to the event venue to try and determine which processes might be able to move to the consolidation centre or which processes could be more efficiently done. The observations would not only provide a better understanding of the variety of goods and how the logistics performed but would also support the argumentation of the need or lack thereof a consolidation centre.

Observation is a good way to collect unbiased data since it allows one to record people's actions as well as behaviours in a natural setting for example (Collis & Hussey, 2021). However, due to the Covid-19 pandemic and restrictions imposed by the Swedish government at the time, large-scale events were restricted and Boat Fair, Eurohorse Show were ultimately cancelled. The cancellations and lack of events limited the possibility for observations of the intended fairs. To counter this obstacle the observation of the construction and deconstruction of three different fairs was conducted. The fairs varied in size of exhibitors, goods, and complexity. Lastly, observations were also made of the in-flow deliveries to Svenska Mässan from various food suppliers for a general view of the “always-on” flow.

3.3.3 Interviews

The interviews were conducted in a semi-structured way and interviewees were based on the recommendations received from conducting the preliminary research. There were two types of interviews conducted, exploratory and semi-structured (Collis & Hussey, 2021). The exploratory interviews provided guidance on which individuals to select for the recorded and semi-structured interviews. The style of the exploratory interviews was informal but with notes taken during the discussions. The 19 unique respondents were asked a standard four open ended questions to gain general knowledge of the respondent's positions within the firms, value-added services of the respective departments, how each respondent defines service level and the respondent's opinion of utilising a consolidation centre. From the 19 exploratory interviews seven respondents were chosen for the recorded semi-structured interviews. The sample of seven respondents was chosen to ensure a range of academic, external, and internal respondents from the case study firm. This range increases the validity of the study as the information is not collected from a single source or viewpoint.

The semi-structured interview approach typically includes a set of predetermined questions that the interview will focus around (Collis & Hussey, 2021). During the seven interviews the

researchers stayed as objective as possible to let the respondent finish their reasoning around certain areas. The questions asked were developed based on the theoretical framework ARA and all interviews followed the same framework of questioning, a sample of questions can be seen in Appendix 1. However, some questions were tailored to better match the relevant area of work of the respondents all while focusing on consolidation centres.

As a result of the Covid-19 pandemic the researchers utilised different ways to conduct the interviews, either in-person meeting or via video conferencing tools. This was done to keep a high level of comfort for the respondents (Collis & Hussey, 2021). Prior to the interview a consent form was sent to the respondents, to view the consent form see Appendix 2. By signing the consent form, the interviewee agreed to be recorded and that the information given during the interview could be applied within the work. If the respondents did not feel comfortable being recorded the researchers took notes during the interview instead to ensure that the interview data would be available to reference afterwards. The interviews were conducted in English and then transcribed from the recordings. The statements made throughout the research reflect the original statements from the respondents as closely as possible.

3.3.4 Secondary data

In line with the interpretivist paradigm a significant amount of secondary data needed to be collected from books, articles, and web pages. The use of the University of Gothenburg library search engine and Google Scholar allowed the researchers to systematically retrieve and review vast amounts of secondary data. To analyse and apply the secondary data, the assorted analysis was implemented which is the usage of material that is derived from a mix of qualitative sources. The assorted analysis approach of secondary qualitative data is helpful in underlining the primary research. The secondary data is an aid and should support the primary research resulting in a better overall understanding of the qualitative approach but also to validate the result (Heaton, 2004).

3.4 Research quality

The validity of the research design focuses on the accuracy of the research findings whereas the reliability is centred on the consistency of the research. These aspects are often more difficult to prove for qualitative research and are considered for the project as a large portion consists of this type of research. To keep the research quality as high as possible, and due to the large portion of qualitative research, the focus therefore is on increasing the trustworthiness of the project. Trustworthiness comprises credibility, transferability, dependability, and confirmability (Collis & Hussey 2021; Bell et al., 2019). However, the application of triangulation is proven to reduce bias and should lead to greater validity and reliability while increasing trustworthiness.

To establish reliability and credibility within qualitative research methods the technique of respondent validation can be utilised. It is done by repeating back information to the interviewee to solidify the understanding of the researcher and confirm that the main point has come across correctly. During the interviews conducted the researchers repeated back information and explicitly asked if this is what the respondent was stating. Transferability refers to the external validity, which determines how well the study could be generalised and applicable for other settings. To increase the dependability the researchers conducted an auditing approach that includes for example retaining interview transcripts, fieldwork notes, data analysis decisions (Bell et al., 2019).

Bias in conducting research should always be taken into consideration and remaining as objective as possible. It is impossible to have complete objectivity as there is always a degree of subjectivity, however researchers should aim to act in good faith and not be clouded by personal interests. To ensure that subjectivity levels were low, the researchers formulated the interview questions with as neutral wording as possible where little explanation would be required for the respondent to understand the inquiry. The respondents tended to focus on the year 2019 as this is the last time that most operations functioned at full capacity. The researchers are aware of the possible memory bias that may influence the data collected and transparency. However, to mitigate the subjectivity risk the respondents selected were from different functions both within the firm and external parties. Regarding transparency as mentioned, detailed records of the interviews including notes, transcriptions and recording were maintained (Bell et al., 2019).

Throughout the research there were various problems which were ultimately mitigated by the researchers. First, the Covid-19 pandemic presented a challenge in observing events and fairs. The workaround for this hindrance was to obtain internal data recorded from previous fairs. This was utilised to calculate the average time goods spent on the dock, determine the complexity of the different fairs as some include live cargo, and identify the number of steps in the current process of the case study firm. Second, there was difficulty in finding an ideal framework that would allow for process optimisation as well as identifying all the moving parts of the firm. These requirements for the researchers lead to the choice of applying and adapting two different frameworks. Third, the lack of research on events and event logistics was a barrier for the researchers. This however was solved by creating comparisons to similar industries in which there are short turnaround times, like the construction industry, and researching temporary projects. Lastly, within logistics research there is an absence of information and consideration on the organisational effects that changes within the logistics flows can have on employees. Hence, literature from the concept of change management was collected and integrated for applicability towards the case study firm.

4. Empirical findings

This section will explain the empirical findings, based on the interviews conducted both externally and internally. First, there will be a description of the respondents. The interview findings are categorised following the three themes utilised in the literature review (section 2) of consolidation centres, events and change management. Lastly, the current flows of Svenska Mässan will be described and mapped out graphically.

4.1 Introduction of interview respondents

To better grasp the findings from the interview respondents a brief presentation will be done in this section. The interview questions were based on the ARA framework and from the 19 exploratory interviews conducted seven respondents were selected for semi-structured interviews. As mentioned, the sample of seven respondents provides a range from academia and the industry as well as viewpoints from outside of the case study firm. Table 2 below presents the seven respondents' affiliation's, roles, and interview procedure.

Date	Respondent	Affiliation	Role	Interview Procedure	Time (minutes)
2022-02-16	Carlsson	Kungsbacka Municipality	Logistics Coordinator	In person	45
2022-02-18	Dahl	Svenska Mässan	Logistics Supervisor	In person	40
2022-02-28	Angelbäck	Svenska Mässan	Logistics & Supply Manager	In person	60
2022-03-01	Elb	Volvo Group	Senior Innovation Manager	Video meeting	30
2022-03-02	Forsell	On-site Exhibitors	Project Manager	In person	80
2022-03-04	Dablanc	University Gustave Eiffel	Director of Research	Video meeting	45
2022-03-04	Höjer	Svenska Mässan	Director of Logistics	In person	60

Table 2: List of interview respondents (Table developed by authors, 2022)

The following respondents have an external perspective coming from both industry and academia to provide a nuanced perspective outside of the case study firm. Carlsson has implemented a consolidation centre system in the municipality of Kungsbacka, Sweden. While the size of the consolidation hub in the Kungsbacka municipality is on a smaller scale, in comparison to having one in Gothenburg's city centre, the concept and goals are overall the same, to decrease the environmental effects by strategically including a hub. Dablanc is from academia and is currently

located in Paris, France conducting local and global research projects within the urban logistics domain. From the industry Elb, works within the automotive sector on innovation projects. Next, Foresell works at a freight forwarding company specialising in the logistics in and around fairs and exhibitions. He has several years of experience from the industry and is a recurring client for Svenska Mässan. This gives a perspective from how the clients experience the fairs and provides a comparison to larger fairs in Europe.

To obtain a holistic view of Svenska Mässan, internal respondents were needed as well. Angelbäck, Dahl and Höjer all work at the Svenska Mässan within the logistic and production department in various roles. Dahl works directly with coordinating the in-flow and outbound flows. Angelbäck is the logistics and supply manager working closely with Dahl overseeing the in-flow and outbound flows for exhibitions and supplies to other departments such as the hotel. Höjer is the Director of the logistics and production department and has a holistic view over the operations as well working with strategic decisions making.

4.2 Consolidation Centres

Various types of consolidation setups have been used in larger cities to reduce congestion and provide firms with increased efficiency but are often discontinued due to the high operating costs. When looking at urban transport in Paris, as a city that is larger than Gothenburg, the problem is often the lack of profit from consolidation efforts, the non-existing data sharing between private companies and the high level of efficiency within transports that are already in place. In the case of Paris there is a shortage of drivers, resulting in the need for high fill rates of trucks. If the trucks are not utilised to its full capacity there is need for operational changes, indicating that there are gains to be made in this area. It all comes down to the vehicle kilometres driven as measurement to discover inefficiencies, sustainability improvements and cost savings (Dablanc, 2022). Also considered by Dablanc (2022) is information sharing as this is one of the main reasons the consolidation of cargo is not profitable. To be successful with a consolidation setup it requires commitment from all the involved stakeholders, which results in the need for a high level of communication. Presented by Elb (2022), the project she is currently working with is a system that allows stakeholders to input their freight capacity without the data being shared between the stakeholders. The system then uses the input data to optimise planning. The reasoning behind this is to have more efficient transportations and to increase the freight fill rates to the specific area in Gothenburg. It has been calculated that the system Elb (2022) is working on can reduce vehicle kilometres driven and carbon dioxide emissions, if fully implemented.

By implementing a consolidation centre in a logistic network there is an increase of efficiency. Consolidation centres have also proven to reduce the vehicle kilometres driven, gain better control over transports as well as control over the emissions and achieve net carbon emissions. A

successful implementation of this can be seen in Kungsbacka, Sweden where the goal was a reduction in the number of transports made, to increase the safety in and around the areas it operates in while achieving environmental benefits.

“When all our suppliers do their own transports, it's hard for us to control what kind of fuel that they are using, how many miles they drive, transport planning [...] we wanted to get 100% control over that. So, we could eliminate unnecessary CO² emissions [...] the safety reasons (Ed, of reduced transports) were important as well.” (Carlsson, 2022)

According to Carlsson (2022), the concept has been introduced in other municipalities in Sweden and shown a reduction in emissions and vehicle kilometres for example in Växjö. Efficiency of consolidating transports has been shown in Kungsbacka, as the number of deliveries was reduced from 420 to 170 per week. This also meant that the firm was able to switch to more climate friendly delivery trucks to further reduce the GHG emissions. During 2018, it was estimated that 301 tonnes of goods were delivered and without the consolidation centre this would equate to 60 thousand deliveries. However, with the implementation of the hub it was reduced to approximately 14 thousand deliveries annually. Carlsson (2022) states that the cost of using the consolidation centre has not proven to be higher than the previous system. The idea of sharing resources between the different stakeholders has been successful in Kungsbacka. However, for firms that work with fresh produce there is a requirement on the infrastructure of the consolidation centre which includes capabilities for refrigerated storage.

The implementation of a consolidation centre is straightforward according to Carlsson (2022). During the implementation of the consolidation setup, the focus was on data collection which allowed the firm to find the right solution for their delivery operations to the schools in the municipality. The next step was to find areas where efficiencies could be made, for example Carlsson, started by onboarding the larger suppliers prior to the smaller ones. Not only did this reduce the number of deliveries but also allowed the firm to have a better control over the logistics flows. For the municipality in Kungsbacka the cost was not a barrier in adding the consolidation centre and the decisions were made upon the main goals to reduce the emissions caused by transportation while increasing the safety around the schools.

“When I look back on it, there were not many barriers, it's not so hard. You need to get control of what kind of demands you have as an organisation. Data collection is important to make the correct decisions [...] we had pretty good data as well, when we started. Which helped us with mapping the organisation.” (Carlsson, 2022)

A topic discussed with all interviewees, is that there is a significant amount of resistance around the usage of consolidation centres. Mainly due to the number of stakeholders needed to be involved

as well as the resources that are needed. Cost is mentioned as the main barrier to why there are so few consolidation centres operating.

4.2.1 Control and visibility

As Carlsson (2022) discussed, the use of a consolidation centre allowed the firm to get a better understanding of the internal requirements making it possible to create a map of the in-flows and outflows. This meant that it was possible to control and optimise the supply chain to the different schools. The implementation of the consolidation centre has resulted in better control and visibility as well as efficiency. The staff were accustomed to ordering supplies in a just-in-time fashion and the suppliers were flexible to this. Hence, there were several transports made each day to the same school, often caused by poor planning.

There are numerous methods according to the literature to ensure that a firm is in control of its logistics, one being effective supply chain management. Through the interview with Dablanc (2022) it is noted that most firms hold control over their goods in-flows and outflows with efficient supply chain management. Supply chain management can entail for example KPIs, visibility in the supply chain and up to date warehouse management systems.

“Integrated places are different as the last mile is actually a few metres, meaning you just need to go to the final boutiques of the airport.” (Dablanc, 2022)

In terms of consolidation centres, Dablanc (2022) discusses that integrated places such as an airport, will benefit the most from consolidation centres as the number of deliveries are reduced, deliveries become more efficient which in turn can reduce freight traffic, pedestrian traffic and even increase security conditions. This is possible as the last mile deliveries are within the integrated space and are often very short distances similar to the set-up of an exhibition hall.

4.3 Events at Svenska Mässan

The events and fairs that are hosted at Svenska Mässan are planned well in advance of the execution. The logistics department is assigned to execute the plan that is created between the client and sales personnel involved. The overall goal for all departments at the firm is to strive for customer satisfaction, success, and growth.

There are two different types of setups at Svenska Mässan, often determined by the size and volume of goods. For larger events and fairs where the cargo is over ten cubic metres and four tonnes, transports are made directly to the firm. This cargo is often more complex and requires increased handling, for example large boats for the Boat Fair. Cargo under ten cubic metres and four tonnes, are delivered to and from the firm via a small-scale consolidation centre where the goods are then consolidated for final delivery. Deliveries made to the consolidation centre are marked and scanned in the same procedure as if it were to be checked-in at the firm. Clients that are using freight forwarders will be directed to the consolidation centre, this often due to the uncertainty of when deliveries will be made, and that the consolidation centre is able to process deliveries immediately offering more flexibility. In Figure 3 freight forwarders are seen in two areas of the flow mapping as the deliveries from the freight forwarders are needed for the process to begin but are not a central part of the internal flow mapping.

The consolidation centre uses the same warehouse management system offering Svenska Mässan the ability to monitor the check-ins without having to be physically present at the external partner. This allows Svenska Mässan to sequence the deliveries and plan what resources are needed and where the goods should be placed in the exhibition hall. Svenska Mässan has also been able to operate during off-peak hours as needed with the consolidation centre. The short time windows involved in the construction and deconstruction of fairs and events, it is clear that time has been the overall priority. To avoid congestion of deliveries made from the consolidation centre these trucks have a “priority lane” with a separate entrance set-up by Svenska Mässan giving the truck the option to skip the check-in steps. Figure 3 visualises the complex current flow mapping, which is also described in detail below.

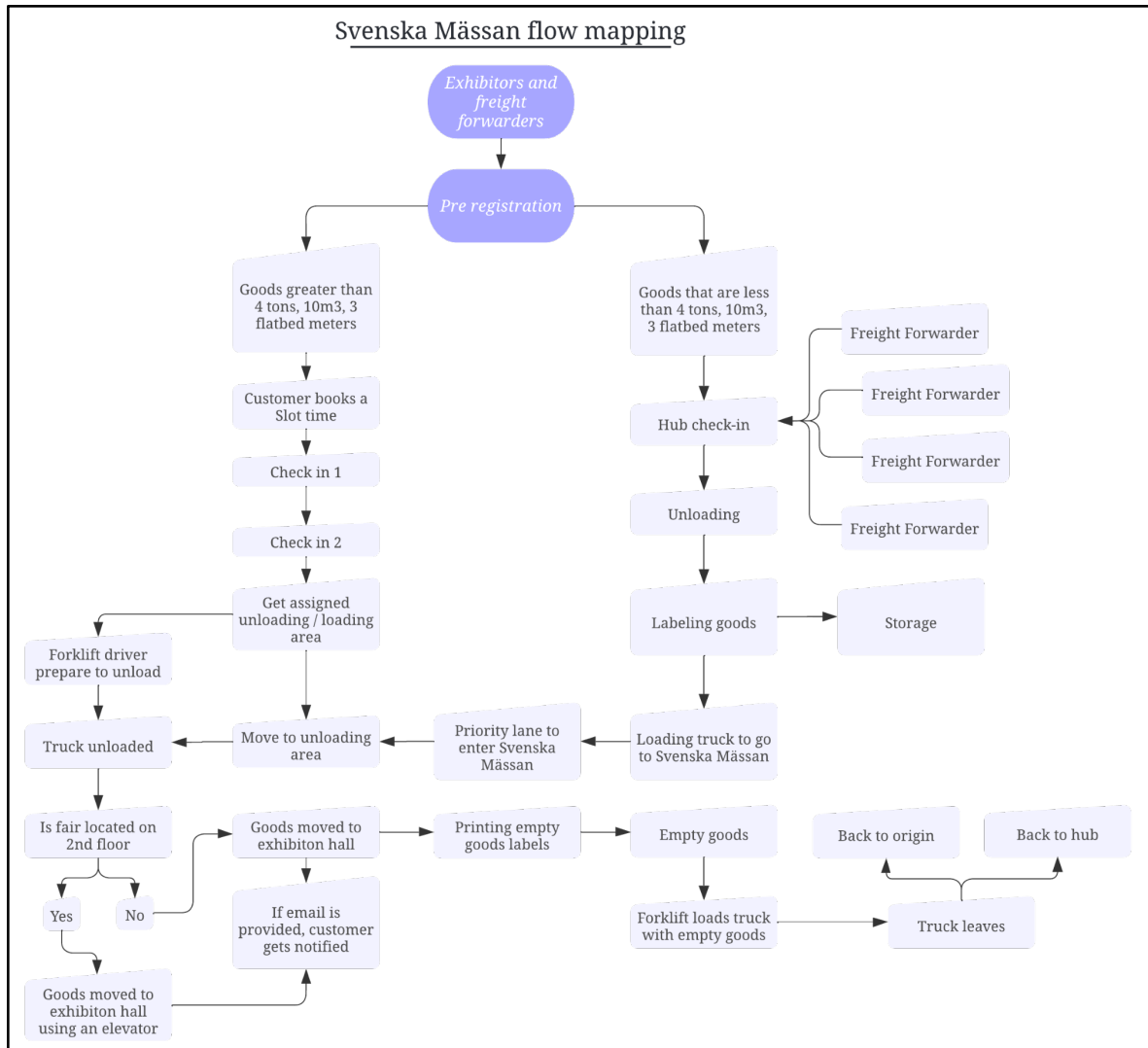


Figure 3: Flow mapping of Svenska Mässan's event logistics (Figure developed by authors, 2022)

To make deliveries to Svenska Mässan all suppliers need to book a time slot in Svenska Mässan's warehouse management system. This allows the supplier to select an available slot and then each transport is assigned a unique booking reference number. The booking reference number is important, as this is connected to the exhibition booth number. The booth number is labelled on the goods and describes where in the exhibition hall the customer should be. When the truck driver arrives on the premises, the driver needs to register their arrival at a check-in point. When the driver states the unique reference number the operator at the check-in desk can assign the driver to the right unloading area. At Svenska Mässan's unloading area there are 26 slots where cargo can be placed. These are marked alphabetically, for example a truck can be assigned to unload at spot "R". The forklift driver then can pick-up the goods from spot "R" and deliver them to the correct exhibition booth. When the cargo is in place the forklift driver scans the reference number. After being scanned, a message is automatically sent to the customer notifying them that the goods have arrived only if there is an email associated with the booking. Additionally, the customer is

also notified once the goods have been loaded back on to the trailer after the fair or exhibition. Combined Svenska Mässan possesses approximately six thousand square metres of loading and unloading space. Four thousand square metres are designated to driving lanes to offer mobility in and around the exhibition area, resulting in two thousand square metres dedicated strictly to the loading and unloading of goods.

Once the exhibition is all set up the forklift driver picks up the packaging material and moves it back to the loading area. During large fairs this packaging material can be taken to the small-scale consolidation centre to save space. For some smaller fairs the packaging materials can be stored at Svenska Mässan, this is often the case for fairs that last between one or two days. All the empty goods that will be handled by Svenska Mässan are required to have a unique label that is printed out via a manual input process. To acquire the labels the exhibitor must ask someone working at Svenska Mässan for empty goods labels. Next, the exhibitor provides a main contact responsible for the goods as well as contact information. Once this data is entered manually by the Svenska Mässan employee, then the number of labels requested are printed and given to the exhibitor. Depending on the number of empty goods per exhibitor, the printing process is time consuming. Once the empty goods are labelled and the forklift then transports it to the consolidation centre. At the end of the fairs the packaging material is then delivered back to Svenska Mässan from the consolidation centre, to be moved out to the booths when tearing down the exhibitions. The cargo that was delivered to the consolidation centre will be returned to the consolidation centre for customers to pick up. The cost of using the consolidation centre is covered by Svenska Mässan and offered as a value adding service to clients.

Svenska Mässan uses a flexible staffing setup where they can combine permanent employees with external third-party workers from a staffing agency. The firm uses the same staffing agency each time, this in turn has resulted in the same third-party workers returning and building knowledge around the operations of the firm.

“I hope that the same people come back to work for us, if we only have a return rate of 60-65% of the previous staff that worked here, then we will be all set for the Fall when the exhibitions really kick-off.” (Angelbäck, 2022)

As a result of the Covid-19 pandemic the operations in and around Svenska Mässan have been significantly reduced, resulting in a low utilisation of third-party workers. The staff are being aided by some technology to improve their efficiency and to find their way around the exhibition halls. For example, staff operating pallet jacks will be given a tablet for directions where to place pallets as well as confirming the pallet is placed at the right booth.

4.3.1 Complexities with events

The complexity varies from event to event and the amount of work that is required depends on the complexity of the event. As a result of the complexity, more time is spent on moving goods in and out of the exhibition halls. Comparatively, with smaller or less complex events where the goods might be palletized and stackable, the setup time is reduced.

“The only fair where we handle perfectly packed pallets is the Book Fair, otherwise there is a wide range of odd-sized pallets making the handling more complex and time consuming - requiring more well-trained staff to solve these complexities.” (Angelbäck, 2022)

The control over different flows is monitored using a warehouse management system that allows suppliers to make time bookings, this in turn means that Svenska Mässan somewhat knows when deliveries are scheduled to arrive. This allows the firm to allocate resources to the right place at the right time. If more complex cargo arrives it often results in more resources needed, this can in turn disrupt the time schedule outlined for the day. This type of disruption causes a bullwhip effect through the supply chain during peak events as the delays will further create congestion at the loading and unloading areas. Another activity that has a risk of causing congestion that has shown to be important is the fact that some of the fairs and events are located on a second floor of the exhibition hall. Therefore, when moving goods from the unloading and loading area it requires the use of an elevator to the second floor. The elevator is limited by its size and the weight restrictions. Once the elevator is full it needs to be sent away immediately, the elevator fits approximately 18 pallets and 34 seconds to move from first floor to second floor. The elevator is operated around the clock to keep the material flows moving.

“A large part of my job is to plan ahead, so we have the right number of staff, trucks, forklifts, and even plan the traffic, the traffic guards. If we need a bigger forklift, then we have to order it from another company for example. If it's difficult to bring it in, we must plan for it.” (Dahl, 2022)

Svenska Mässan has an “always on flow” that includes supplies to the restaurants and hotels which can include laundry, food, and beverages. Svenska Mässan has deliveries made six days a week, every week of the year, although the volume of these shipments can vary a lot depending on the season as well as the different peak periods. The trucks and vans must enter the premises the same way as clients do and need to pass the same check in point as the goods bound to the exhibition halls. As mentioned by Dahl (2022), this requires good planning and control over the deliveries made to meet the requirements from both clients and suppliers to have their goods ready when the exhibitions start. Höjer (2022) also describes the control over the different logistic flow to and from Svenska Mässan. Höjer emphasises on the fact that the transport remains a five out of ten based on the pre-registration that the customers and suppliers must do.

“I would say for the “always on flows”, such as laundry and food for example probably are a seven (7/10). For the events because of the transports maybe a five (5/10). For everything else, a two (2/10) because I know that everything else is uncontrollable, but we know that they do not end up offloading at the dock without us knowing. That's why it's not zero (0/10) so that's why it's probably a two (2/10).” (Höjer, 2022)

It is not possible to do a delivery to Svenska Mässan without the firm knowing based on the warehouse management system in place. Although, there are some other areas that do not have the same amount of control, that could be areas to improve to overcome some of the problems identified according to Höjer.

4.3.2 Client interaction

The geographic location of Svenska Mässan, being in Gothenburg's city centre, makes it very attractive to host different types of events and fairs. Seen from the client's perspective, it is quite difficult to host fairs located in urban areas due to the transportation required. Large companies tend to contract freight forwarding companies that are specialised in events logistics. This is due to the time constraints large fairs have set and the small windows of one or two days where it is allowed to move goods in and out of the fair.

Forsell (2022), who has experience from working at many different fairs ranging from rural to urban settings, discusses that the urban fairs are often the most complex. There are also large cultural differences in how fairs are organised globally. Forsell (2022) for example, mentioned that fairs in Germany are often stricter when it comes to time slots. If the time slot is missed by the exhibitor, the exhibitor is then penalised and needs to book a new time slot. If the exhibition goods are not picked up fast enough after the end of the fair, the host will arrange transportation at the client's expense to another warehouse. Often the large exhibition halls have short turnaround times meaning that the time planning is essential. Forsell (2022) also mentions that strict time planning is often appreciated, if the time scheduled is not followed it causes problems in the client's relationship with hauliers in terms of increased waiting times. This happens since they have already booked the transport according to the selected time slot and the haulier that is contracted often has other engagements afterwards.

When a truck arrives at Svenska Mässan, there often is time spent waiting for unloading. Forsell (2022) makes a comparison between the check-in system at Svenska Mässan and the Bauma Fair in Germany. The Bauma fair is a large-scale event that takes place annually at Messe München in Munich, Germany. Bauma is ranked as the best planned fair according to Forsell's and operates a pull system, meanwhile Svenska Mässan is operating a push system. At Bauma the venue decides on when the exhibitors are allowed to make deliveries based on the characteristics of the goods. This allows the venue to allocate the correct resource and work at the correct pace that is needed

to avoid congestion build up. Forsell (2022) also discussed, the more relaxed approach that Svenska Mässan has applied to the delivery is nothing like the stricter time slots that are applied in other European venues, even for smaller fairs. Forsell, who has a great understanding from different fairs, knows that the time slots are hard to keep up with if they are not strictly followed. Discussed during the interview, it can be hard for less experienced people to understand why they need to book a time slot that in the end is not used as planned. Additionally, there is also an inconsistency in the usage of the current consolidation centre from Svenska Mässan's side. One plausible explanation of this can be due to clients not having a full picture of what is going on in the background.

“It's probably not so easy for an external client to understand since to them it's the same exhibition as last year. But last year, they had to move via our hub and then this year, they are told they can come whenever. That is why we're also trying to find a way where we always use a hub, to reduce confusion. Today's usage of the hub has to do with what's before and what's after (ed. planned in the exhibition halls). For example, okay you can leave it here (ed. at the hub) two weeks ahead but when you pick it up, you only have two hours.” (Höjer, 2022)

4.4 Change management in practice

A common occurrence that is evident at any firm when a change is made in how things are done is the reaction from staff to this change. Discussed in the literature, there can be resistance to change from staff at the firm which makes adapting the new process and the transition more difficult. There are proactive methods to mitigate the degree of the resistance to change as described in the literature but in practice it may differ. The addition of a larger scale consolidation centre to the logistics flow of an organisation can be considered an impactful change, particularly if the organisation has been functioning well without one before. An example given by Carlsson (2022) regarding the addition of the consolidation centre, is that not all staff were immediately receptive to the idea despite explaining the positive impact it would create for the firm.

“The toughest point really was to change people's behaviour and the way they think. A lot of people were not that satisfied with the idea before we started but once we got going, they saw that it was pretty good.” (Carlsson. 2022)

In line with the sentiments expressed by Carlsson (2022), internally there has been notice of a degree of resistance towards implementing a consolidation centre at a wider scale at Svenska Mässan. Although Svenska Mässan does use a consolidation centre on a smaller scale, Höjer (2022) describes one of the main challenges encountered by the firm is the widespread lack of understanding as to the benefits the consolidation centre can offer and the lack of solidarity from each department.

“That's also a way to manage the teams in that case, even though it's a quick change, someone won't like it, but you involve them.” (Höjer, 2022)

When asked about how changes have previously been approached within the firm Höjer (2022) discussed that the experience with resistance to change within the logistics team has been mostly managed via communication and having staff feel involved. Furthermore, Angelbäck (2022) has experienced that the longer one has been within a firm or a certain role the harder it is to get these individuals to accept changes even if it directly benefits the individuals in question.

“For those who worked here for 20 years, I think when you look at the building of the fourth tower, it's easy for everyone to understand that now it's something new, and we must change.” (Angelbäck, 2022)

However, with the addition of the fourth tower, Angelbäck (2022) suggests that it will be easier for the logistics and production department to solidify the addition of the larger scale consolidation centre.

5. Applied Theoretical Framework

This section presents the adoption of the theoretical framework. Followed by the application of the framework to identify areas where Svenska Mässan's efficiency can be increased with the introduction of a consolidation centre or consolidation hub as the terms are used interchangeably. Lastly, a description of the current and future states of the in-flows to the fairs and exhibitions will be made regarding the goods handling and interactions.

5.1 Adapting the frameworks

There is a combination of frameworks applied, the Actor-resource-activity (ARA) and the Materials Flow Mapping Methodology (MFM). The ARA framework is a part of the Industrial Network Approach (INA) which looks at a firm as a network of interconnected parts. The MFM examines a specific process with the aim of evaluating the efficiency of each step in the process to find redundancies or inefficiencies. The strength in the MFM is identifying potential areas to increase efficiency and holds a focus on the four target areas of sustainability, productivity, quality, and flexibility. However, MFM is specific regarding the evaluation of the process and does not provide a holistic overview when it comes to stakeholders for instance. Furthermore, the MFM framework requires video surveillance of the process to be able to associate specific time increments to each movement. While this is possible for a standardised process in a factory setting for example, this proved to be inadequate to apply to an event process with several activities occurring simultaneously. The strength of the ARA framework is the ability to give a strategic view of what is happening as it is part of the industrial network approach. While it identifies the actors, resources, and activities in the network it does not evaluate areas for increased optimisation (Finnsgård et al., 2011; Håkansson et al., 2009). Hence it was advantageous to combine and adapt the frameworks.

The focus was on first identifying the different activities within the business network at Svenska Mässan, the stakeholders or actors involved, and the resources needed to complete the activities. To see an example of how this can be applied, see Table 1 in section 3. Once the parts of the network were identified the next step was to pin-point possible areas where efficiency could be increased with the addition of the larger-scale consolidation centre. By modifying the two frameworks, it is possible to present a holistic view of the material flow during events as well as the resource allocation of said flows. Thus, it is possible to identify weaknesses and inefficiencies that are well hidden in current operational processes. The modified framework allows for a better suitable approach towards the purpose of the research. To successfully apply the combination of frameworks, first interviews were conducted, second a mapping was created of the current flows, and third observations were made to confirm the assumed mapped process of the flows as well as to validate the findings through the collection of data points from various fairs.

5.2 Increasing efficiency and identified bottlenecks

Based on the application of the MFM and ARA theoretical frameworks an improved flow mapping was created. Table 3 below provides comparison of the Flow mapping of Svenska Mässan’s event logistics (Figure 3) and the Improved flow Mapping of Svenska Mässan’s event logistics (Figure 4). In the current flow mapping, it is evident that there are three main bottlenecks present that could be alleviated with the addition of a consolidation centre. The improvements will be discussed in further detail below. To view the visual comparison of the differences in the mappings of Figure 3 and Figure 4, see Appendix 4.

Step	Original Flow Mapping Figure 3	Step	Improved Flow Mapping Figure 4
a	Pre-registration	a	Pre-registration
b	Customer books slot time	b	Check-in at the hub
c	Check-in 1	c	Goods unloaded
d	Check-in 2	d	Goods labelled and sequenced based on fair
e	Dock space assignment made	e	Loaded truck goes to Svenska Mässan
f	Truck with goods moves to dock	f	Truck moves to dock
g	Forklifts are directed to the dock	g	Forklift waiting at dock to unload
h	Forklift unloads cargo	h	Goods moved to exhibition halls
i	Goods moved to exhibition halls	i	Customer notified
j	Customer notified (if applicable)	j	Moving empty goods
k	Empty goods labels printed	k	Empty goods picked up and taken to hub
l	Labelling empty goods		
m	Moving empty goods		
n	Storing empty goods		
o	Empty goods picked up to take to hub or origin		

Table 3: Comparison of the flow mapping changes between Figure 3 and Figure 4 (Developed by the authors)

The first part of the improved flow mapping in Figure 4 below, requires the distinction between special needs cargo and regular cargo which dictates what goods will go via the consolidation centre. The special needs cargo is defined as live animals and goods requiring special transport or resources that Svenska Mässan does not normally possess, such as third-party cranes to lift heavy and odd-sized equipment. In general, the special needs cargo requires more careful planning. For example, a large boat requires special handling procedures and as a result it would not be beneficial

to move it via the consolidation centre. Consequently, not all cargo can be transported via the consolidation centre, instead an evaluation of the resources is needed to determine the effectiveness.



Figure 4: Improved flow mapping of Svenska Mässan's event logistics (Developed by the authors, 2022)

The first bottleneck identified is the current setup of the docking space where goods must pass through different check-in points. The process is inefficient and can be re-thought to increase efficiency, save time and space. Observation shows that between the check-in points there is often congestion as trucks wait for permission to move forward to the dock for unloading. Moving this process to the consolidation hub would allow for better control over the in-flow of trucks subsequently removing problems that the check-in causes. Instead, it is possible to operate the

dock in a configuration where it pulls the goods when there are resources available to process the pallets. Through the interviews it was also discovered that there are issues with the priority lane access with the current small-scale consolidation hub since despite being asked repeatedly the firm does not record all the data accurately in Svenska Mässan's transport system (P. Dahl, personal communication, April 19, 2022). Consequences from the lack of information from the small-scale hub could potentially disrupt the flow during events and makes it difficult to accurately analyse the data for the future planning of the event. Greater utilisation of the consolidation hub would in turn remove the use of a priority lane, but it requires a better flow of information to create visibility and control. The implementation of the hub will remove the risk of having unwanted individuals at the dock and increase the safety of the operation.

The second bottleneck is the lack of efficient elevator usage. There are 6 elevators in the exhibition hall varying in size and capacity which require use if an exhibition or fair is located on the second floor, regardless of the size of the fair. It takes approximately 27 to 34 seconds to ascend depending on which elevator is used. However, observation shows that the elevator utilisation is often low and only a few of the elevators are used at the same time. The elevator is deemed a bottleneck as it causes disruptions throughout Svenska Mässan's supply chain due to a build-up of congestion as a result of poor resource allocation. A consequence of this is the increased time spent for a pallet to be processed and subsequently hinders new trucks from unloading at the dock. Furthermore, during an observation of a fair on the second floor, it was noted that the time constraint led employees to enter the elevator with only one pallet which is poor utilisation of the resource. The integration of the consolidation centre will alleviate this bottleneck as the planning of the goods in-flows will change. The use of better sequenced trucks arriving could help increase the efficiency of moving goods between the floors. The control over the sequencing would be conducted at the consolidation centre, keeping the limits of the elevators in mind. Another value-added service that can occur at the consolidation centre is to fill the trucks by grouping the cargo that needs to go to the second floor. Thus, allowing the elevators to be better utilised, increase efficiency and reduce congestion, especially under peak periods.

The third bottleneck identified is the manual printing process of the empty-goods labels which are needed for the handling of the exhibitors' empty goods. This is currently a tedious time-consuming process that can be improved to allow for better resource distribution. Currently, each individual empty goods package needs to be labelled by Svenska Mässan to keep track of its location in storage and its associated booth number. This process must be manually performed by Svenska Mässan employees to ensure that there is an individual from the client's side that assumes responsibility for the empty goods, prior to Svenska Mässan providing storage. Observations made have shown that the processes of labelling goods can take several hours to perform depending on the size of the exhibitor. During events there are several moving parts which require attention from staff working with the logistics coordination and the printing process takes time from these staff. Therefore, with the addition of the consolidation centre the labelling process can be completed

prior to arrival at Svenska Mässan. For this to function during the pre-registration phase an individual will be appointed from the client side to assume responsibility and should receive notifications once the goods arrive on premises and where to place the empty goods at the end. Automating the labelling process to occur at the consolidation centre will also allow for the reallocation of resources for Svenska Mässan during the fairs.

Aside from the three bottlenecks identified there are other bottlenecks within the network where efficiency could be increased. Another bottleneck that could be improved for instance, is the information sharing between Svenska Mässan and its exhibitors, as this often causes confusion at the dock. For now, these three are the most prominent bottlenecks for Svenska Mässan, which faces congestion, space, and time as main problems to solve.

5.3 The impact on goods and resources

To create Table 4, the arrival and departure times of goods from five different fairs were extracted from Svenska Mässan’s internal system, where 43 data points were selected at random (Appendix 3). To quantify the amount of time spent per pallet during various fairs, the average time in minutes that a pallet is stored on the loading and loading dock was calculated.

Fair	Description of Fair	Fair start date	Fair end date	Average time pallet at dock (Minutes)
D-Congress	Congress for e-commerce innovation.	2021-10-28	2021-10-28	68
eCarExpo	Electric car fair.	2021-12-03	2021-12-05	106
NSK	Congress for leading individuals in school.	2022-03-22	2022-03-23	232
Senior Fair	Fair for senior citizens to acquire new experiences.	2022-04-05	2022-04-07	110
Beer and Whisky fair	Fair that allows visitors to explore new breweries and distilleries.	2022-04-08	2022-04-09	50

Table 4: Average time a pallet spends on the loading/unloading dock (Table developed by the authors, 2022)

There are several simultaneous processes occurring at the dock, the loading-and-unloading of trucks, relocation of the goods to the exhibition hall booths, storage of goods and labelling of empty goods. From observations made it is evident that the extra time the pallet spends prior to

being relocated accordingly is a result of waiting for other processes to conclude. An example can be seen when one fair is done but is still occupying the exhibition hall while another fair is setting up simultaneously. Until the prior fair has loaded all the goods onto the truck in the loading deck the assigned space is unavailable for the next client. Another instance is the congestion around the main elevators utilised for delivering the goods to and from the exhibitions. A resource occupying activity is the storage of goods at the dock after a fair is completed. When Svenska Mässan is not in charge of returning the client's pallets an issue encountered is that the goods end up being stored on the dock for several days. Resulting in manual labour by Svenska Mässan, employees needed to contact each individual client to remind them to pick-up pallets still waiting on the dock.

Svenska Mässan has approximately six thousand square metres of loading and unloading space. Of the six thousand square metres, approximately four thousand square metres are designated to driving lanes in and around the exhibition area. Resulting in two thousand square metres dedicated strictly to the loading and unloading of goods referred to as dock space. With the integration of the consolidation centre in the logistics flow there are alternative revenue streams that can be made. Currently, the dock space is currently poorly utilised as clients often forget to retrieve their goods in a timely fashion. The resource of the dock space of approximately two thousand square metres could instead be converted and rented as exhibition hall space at a price of 11.5 thousand SEK. This price estimate is derived from an average of the years 2017, 2018, and 2019 (Höjer, personal communication, April 27, 2022). If Svenska Mässan were to have this additional space to rent out the potential revenue generated would be approximately 23 million SEK. Hence freeing up the space, the area can be used for other activities that generate income to the firm rather than solely generating costs. This supports that the implementation of a consolidation hub could generate alternative value streams for a firm.

5.3.1 Number of times handled and interaction of goods

Another factor to consider, with the addition of the consolidation centre, is how the improvement of the bottlenecks will impact the number of times handled and interactions with the goods. Additionally, the possible impact this can have on the time a pallet spends on the dock. Therefore, Table 5 was created to depict the current handling and interaction state in comparison to how a future scenario with the consolidation centre could look. The number of times handled is defined as the number of times the goods are physically touched from the start when it arrives at the event venue, to the end when it reaches the exhibition booth. The number of interactions are defined as the amount the pallet is both handled physically and processed within the internal management system from arrival to departure.

Performance Comparison	Current state	Future state (Consolidation centre)
Number of times handled	8	5
Number of interactions	15	9

Table 5: Comparison between current and future states (Table developed by the authors, 2022)

The handling of the pallets is currently eight times. This includes the two check-in points when the truck arrives, unloading at the dock, moving from the dock to the exhibition hall, unloading at the correct booth, placing the labels on the empty goods, reloading the empty goods, and lastly unloading the empty goods for storage. Applying the suggested changes of restructuring the dock, overlooking the manual work procedures, and replanning the usage of elevators it reduces the number of times handled to five times. The reduction is made with the removal of the two check-in processes and the labelling of the empty goods which will be done at the consolidation centre instead.

There are fifteen interactions: including; pre-registration, the system deciding if the goods go directly to Svenska Mässan or via the hub, clients booking a slot time for arrival, two physical check-in points when the truck arrives, the dock space assignment for unloading, forklift arriving at the correct dock, the truck going to the unloading space, unloading at the dock, moving from the dock to the exhibition hall, clients receiving an email of the arrival of the goods, unloading at the correct booth, printing and placing the labels on the empty goods, reloading the empty goods, and unloading the empty goods for storage. The integration of the consolidation centre and a re-allocation of resources reduces the interactions from 15 to 9. With the consolidation hub the pre-registration would remove the check-in process, the need for assigning a space and the labelling of the empty goods. The reduction would then consist of the following interactions: pre-registration, forklift arriving at the correct dock, the truck going to the unloading space, unloading at the dock, moving from the dock to the exhibition hall, clients receiving an email of the arrival of the goods, unloading at the correct booth, reloading the empty goods, and unloading the empty goods for storage. A reduction in the number of interactions allows for better control of the in-flows and out-flows of the goods at Svenska Mässan. The firm’s planned upscaling from 60 peak days to 255 peak days in the coming years requires operations to be efficient in its handling procedures thus resulting in more moved goods with fewer processes completed onsite.

5.4 Improved flow mapping

Mapping the flows in a systematic way creates the possibility to identify efficiency losses through the in-flow and outbound logistics flows that can be improved with the addition of a consolidation centre. Improving the logistics not only creates an increase in efficiency but subsequently an improvement in the firm's triple bottom line. Beyond this, the MFM also reflects the productivity, quality, and flexibility of the firm's logistic operations. The benefits of the improved flow mapping will be introduced but will be further analysed in section 6.

The improvement can offer several advantages for the firm's overall business model. Productivity is scalable, meaning that resource utilisation often has a direct impact on the productivity levels. Increased productivity can for example yield faster turnaround times of fairs and reduce the required time for processing goods. In terms of the improvement of quality, from the redesign of the logistics network, a more efficient and systematic check-in system would increase the delivery precision as well as client satisfaction levels. Due to the unpredictable nature of fairs, flexibility is a key success factor for exhibition venues. The reason being as there is a large variation in the size and amount of goods which requires the firm to be able to adapt its operation towards a fair's needs. The improvements can offer greater flexibility thus allowing the firm to focus on long-term flexibility. As the control over the in-flow and outbound logistics is increased it overall adds stability and increases the agility of Svenska Mässan. This is possible as integrating the hub on a full scale can improve visibility and control over the logistics. The implementation of the consolidation centre could potentially better prepare the firm for the larger upscaling in the coming years.

Sustainability on the other hand is a more nuanced performance measurement. However, as a result of the improvements made there is an impact made on the triple bottom line in relation to the firm. For the social dimension the improvements will offer greater safety, a better work environment, as well as controlled and systematic workways. The environmental dimension of the improvements entails a higher fill rate of trucks, fewer deliveries, lower GHG emissions produced and the possibility to reduce congestion. For the economic dimension, the improvements would liberate space that can potentially be reallocated and generate economic gains instead of creating additional costs.

6. Analysis and discussion

This section will analyse the empirical findings and the adaption of the applied theoretical framework. It will follow the same three-part structure that has been used throughout the research. There will also be a focus on the sustainability effects the consolidation centre can have on Svenska Mässan. Additionally, the terms consolidation centre and hub will continue to be used interchangeably.

6.1 Urban logistics and consolidation Centres

To conduct this analysis, the data collected from both primary and secondary sources will be utilised such as the literature review, observations, interviews, and quantitative data. By doing so, the previous research on the topics and integration of a full-scale consolidation centre can be validated through the experience of studying the current working operations at Svenska Mässan. Generally, throughout the literature, consolidation centres while providing sustainability benefits have rarely been successful in practice long-term. The difficulties in successfully implementing a hub are primarily a result of the required information sharing between firms and the operational costs of the hub. However, through the interviews conducted it is evident that there is a more nuanced argument as to why the consolidation centres are not more widely implemented. The information gathered via the interviews also supports argumentations from the literature presented in section 2. Together with the use of the data collected it is possible to apply the theory from the literature and present a greater picture of the challenges a consolidation centre can bring but also the opportunities this can offer a firm such as Svenska Mässan.

It is evident that Svenska Mässan experiences many of the challenges that a firm in urban location would face such as congestion and lack of space. As gathered during the interviews, the current setup of the logistic network is not optimal for the projected future expansion of the firm, nor the sustainability goals within the business model. This indicates that the problem Svenska Mässan faces requires a long-term solution. Thus, in this case, the use of the consolidation hub could potentially offer benefits as suggested in the literature, for example increased control of the supply chain and reduced emissions.

6.1.1 Challenges and benefits with the use of consolidation centres

The literature review presents the challenges by implementing a consolidation centre, one of the hardest to overcome being the collaboration between different stakeholders. This refers to both the utilisation of physical resources and the information sharing between stakeholders. The information and resources are often associated with strategic leverage. Thus, making it a sensitive area for many firms to share with competitors. For Svenska Mässan the first step would be to

implement a consolidation hub to be able to cope with the current logistics challenges and relieve the bottlenecks that have been identified. The firm would not be as reliant on external parties as it currently is for the small-scale consolidation hub. The integration of the large-scale hub creates an interest in collaborating and utilising the hub with other businesses in the area. It can also be argued that a consolidation centre can increase the visibility of the supply chain for a firm. The challenge for Svenska Mässan is instead to prove the effectiveness of implementation of a consolidation hub and what impacts it can have on the day-to-day operations. Cherrett et al., (2012) discusses the perception of the general public, that large companies generate a significant amount of freight transports. However, large companies often have a greater fill rate for the trucks due to the need of having an efficient transport network. Furthermore, Allen et al., 2015 discusses that the use of consolidations centres are not optimal for all types of inventories despite the items having the same end destination. This can be further extended to perishable items as well if the correct infrastructure, such as refrigerated storage is not available.

The literature on consolidation hubs is optimistic regarding a hub's effectiveness and sustainability gains. This claim has also been strengthened by the successful implementation of a consolidation centre in the municipality of Kungsbacka. The anomaly in the case of the Kungsbacka municipality is that the cost was not a considerable factor in the implementation and continued operations for the municipality. Rather the focus in Kungsbacka was to increase the control of the supply chain and the safety for all stakeholders. The implementation came with the added benefits of a large reduction in vehicle-kilometres driven and better planning of transports. As suggested by Allen et al., (2015) the implementation of UCCs have proven to reduce environmental effects from freight transportation, assist in congestion reduction, and enhance customer satisfaction.

The application of the large-scale consolidation hub could potentially offer these efficiency gains to Svenska Mässan while allowing the firm to perform better in areas that were deemed bottlenecks. For example, the elevators have been a well-known bottleneck for several years. However there has not been a permanent solution to fix this bottleneck, but the replanning with the hub can alleviate some of the queuing peaks. While the literature mostly focuses on large-scale consolidation of shipment to several different receivers in urban areas, the need for Svenska Mässan's consolidation would be for reducing the number of transports and consequently the firm's carbon footprint. Reducing the emissions would in turn mean that Svenska Mässan can meet the set requirements of emissions control by different regulations. Therefore, it would theoretically be possible for the firm to achieve the city of Gothenburg's target of carbon neutrality in the Green City Zone by the year 2030.

6.2 The logistics of events

Events are great generators of revenue and tourism for cities. Coupled with these economic gains the city also reaps social benefits, further stressing the importance of events. As with most logistics processes the logistics of events are often behind the scenes when functioning seamlessly. However, there are many simultaneous complex processes occurring to make it possible for the events to come to fruition. Events can be seen as temporary organisations, as discussed by Modig (2003), with a multitude of stakeholders and a great deal of uncertainty to consider. Furthermore, with the firm's planned upscaling from 60 to 255 peak days, the complexity of logistics in events increases. This is a result of the addition of many more fairs, which will potentially include live animals, more heavy machinery, and odd-sized goods. Therefore, this will require greater attention that all the items that can be directed to the consolidation hub go directly there to allow for sufficient space on the loading and unloading dock for the increase in special needs goods.

To understand the amount of time the goods spend on the loading and unloading dock, a matrix of complexity was created to evaluate if there is a correlation between the complexity of the event and the amount of time goods spend on the dock. There is a varying degree of complexity for each event as some events only have palletized cargo while others involve live animals or large boats that require special handling. Complexity for this figure can be defined as the variety in the size, quantity, and types of goods. To visualise the comparison between the complexity and time needed for the different events a coded matrix was developed, Figure 5 below. The letters in Figure 5 represent 15 of the 35 different events that Svenska Mässan hosts annually, and each varies in complexity as well as in the amount of time that it takes the logistics team to handle. 15 events were selected as the sample to get a holistic representation of types of fairs conducted. A full description of the events that were included in Figure 5 can be found in Appendix 5.

For example, L for the Senior Citizen Fair, is both low in complexity and time consumption despite having 100 exhibitors present at the fair. The level is low since the amount of goods are relatively less in comparison to other fairs and the time spent constructing and deconstructing the fair is about two days. On the other side of the spectrum, P for the Power Electrification Summit has 400 exhibitors and requires a large amount of goods to be moved between floors in the exhibition hall. Additionally, it takes three days to construct and two days to deconstruct the exhibitions. This trend continued throughout the evaluation of the 15 selected fairs, and it can be inferred from the data that the less complex the event it is often a result of less goods and less exhibitors.

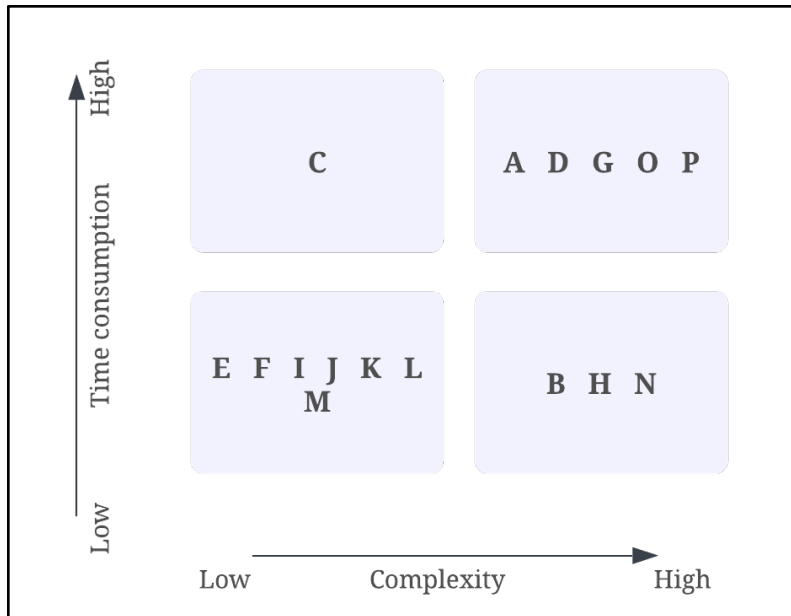


Figure 5: Complexity ranking of fairs at Svenska Mässan. (Table developed by authors, 2022)

When cross-examined with Table 4, the *Average time a pallet spends on the loading and unloading dock*, the suspected trend can be further supported. Taking the Senior Citizen Fair once again as an example, as it is low in complexity and time consumption, in Table 4 it is seen that the goods spend an average of 110 minutes. In comparison C, the Beer and Whisky Fair, where the complexity is considered low, but time consumption is higher, it is seen that the goods only spend an average of 50 minutes on the dock. During observation of the Beer and Whisky Fair, there were a large amount of goods, however the goods were typically of the same size thus making it not as complex in nature. Hence, it can be concluded that the less complex the goods needed for the fair or event then the longer time the goods remain on the dock. In comparison the larger the event and the more time consuming the process with the goods becomes the goods then spend less time on the dock. This could perhaps be seen because of the revenue of the fair since a lower paying fair often has less amount of staffing which in turn increases the time spent on the dock.

6.2.1 The impact of increased control of the supply chain for event logistics

A large part of executing events involves rigorous planning. For an event to be successful the right goods, in the right quantity and at the right time should be delivered to the event venue. A failure would be a result of not having the goods in place for when the event commences which in turn affects the event attendees, exhibitors, and the venue staff. The time window for deliveries is extremely small thus reliability is an important factor. The logistics of events can be compared to other industries where tight deadlines and a variety of goods are the norm, for example the construction industry. There is a high interrelation between the logistics behind events and construction, for example the construction of a building would not be possible if the materials did not arrive in time and the same would happen if speakers were not delivered to a music concert.

Like the construction industry, in event logistics planning is of high importance and offers great control of the logistics flows. At Svenska Mässan currently there is an identified low level of control. Argued by Ante et al., (2018), a good measurement system is needed to be able to find problems within the firms but also being able to oversee the operations and offer greater understanding of certain areas. Transparency towards the firm's clients would therefore yield better values. As mentioned in the empirical findings Forsell, a client, would rather see stricter but more transparent time slots to better adjust his firm's operations to be in line with Svenska Mässan.

To regain control over the large number of transports made to an event Modig (2007) suggests standardising the material handling, consolidating to fewer suppliers which would result in utilising the effects of economies of scale. The consolidation of services relies on the provider being able to operate a vast amount of material in different shapes. In the case of Svenska Mässan, which already has a large amount of experience handling a variety of odd-sized goods, the goods could be transferred to the consolidation hub first. The standardisation makes it easier for organisations to adopt and reconfigure the logistics system to fit certain requirements of events. It would allow Svenska Mässan to adopt the logistics system towards its needs. To gain a deeper understanding of the logistics system, stricter KPIs could be implemented. A measurement system allows the firm to identify improvement areas that potentially enhance the value offered for its clients. For example, stricter time schedules could improve the control of over the in-flows, allowing for better time planning to avoid a queue build-up.

One argument the logistics department at Svenska Mässan stated for not maintaining strict KPIs or tighter time schedules is a result of the firm's desire to remain flexible for customers when possible. While this can help with customer satisfaction on one end, to a certain degree encourages more transports and contributes to the congestion concern. The increased congestion then results in increased waiting times for customers to load or unload goods thus decreasing the overall customer experience. It could be inferred that with the addition of a consolidation centre to Svenska Mässan's logistics set-up the flexibility increases as deliveries can be made directly to the consolidation centre whether it be one pallet or several if these are not needed immediately onsite. Another concerning factor is as there is a large emphasis on the timely arrival of transports since event logistics requires strict planning and turnaround times, the price is paid with less than fully loaded trucks arriving at Svenska Mässan. A consequence of not meeting the narrow delivery windows for temporary projects such as events can result in higher costs both by being too late or too early for a delivery as discussed in the literature by Zudor & Holstrom (2005). Hence further placing an emphasis on timing. A remedy for transporting less than fully loaded trucks while maintaining the time factor could be to have other items stored at the consolidation centre year-round which can then be added to the LTL destined for Svenska Mässan if those items were needed at the time as well.

6.3 Change Management

Discussed by Atkinson et al., (2006) uncertainty in projects typically causes resistance to change. However, if the vision of the firm is communicated often and the benefits are clearly stated this can mitigate some resistance. While Höjer (2022) states that the change visions are communicated within the logistics team, the action must be spread company wide. This can be achieved with the help of a person that understands the full benefits of a change for each department and that can advocate for the benefits to increase the solidarity of the departments within the firm or a “change champion” as referred to by Olffen et al., (2019). In the literature by Stouten et al., (2018) a clear vision and the reason why the change is necessary increases the success chances of the proposed change. For Svenska Mässan it would in practice mean that there is a need to prove the benefits of the consolidation hub for the firm’s business model. Thus, by having an easily communicated change vision the implementations would be more effective.

Simoes & Esposito, (2012) discuss that resistance towards change is the predominant reason for failure in process changes. The resistance to change often ties back to the visions of the implementation and that there are areas of uncertainty for stakeholders. Limiting these areas of uncertainty would then reduce the risk of failure. Svenska Mässan must prove the efficiency gain of using the consolidation hub to limit the risk of failure. Consequently, the decisions made around the consolidation hub must be explained throughout the firm's different departments. Integrating the consolidation hub will also create similar expectations for stakeholders year after year. Currently Höjer (2022) states that the overall flows are perhaps difficult to comprehend for clients as one-year clients are expected to deliver goods in a manner different to the previous year. If the hub is implemented on a full scale and the client normally does not have goods that require special handling, then they will have the knowledge that each year they are expected at the consolidation hub.

In the interview with Angelbäck, it was made clear that Svenska Mässan embraces new ideas that can be efficiency savings for the logistics department. Every year Angelbäck performs “efficiency rounds”, these are meetings where staff are invited to present ideas regarding efficiency saving tasks. The best-in-class ideas are then implemented in the day-to-day operations to test the overall impact. This exemplifies how keeping the employees as part of the changes made, will generate a better understanding of why the changes are being implemented. Furthermore, this also creates a reduction in resistance to change as discussed by Stouten et al., (2018).

6.3.1 Implementation and change management

For firms to remain competitive in the current climate the business model should consistently be innovated and there should be a focus on sustainability. Firms that embed sustainability as a core value can rapidly adapt to the increasingly stringent regulations and satisfy environmental

concerns that clients have. This not only strengthens the business model and increases morale throughout the firm but also the public perception of the brand all while benefiting the triple bottom line. At Svenska Mässan it was observed that the staff who are engaged in the sustainability concerns have positively reacted to the idea of using a consolidation centre if the output of the flow of goods remains the same. For example, the executive chef for Svenska Mässan Gothia Towers, can see the potential benefits this could bring for the kitchen staff. To successfully include the kitchen flows, the change would need to be implemented gradually meaning that the deliveries would decrease incrementally instead of all at once (F. Andersson, personal communication, February 25, 2022). His statement further validates the literature by Olffen et al., (2019) as gradual implementation is the key to creating lasting changes.

A challenge that Svenska Mässan is facing is creating a unified strategy around the usage of the consolidation hub. A discovery from the research conducted is that there is a large concern around the consolidation hub and its benefits. Currently, all the departments within Svenska Mässan are not practising cross-border cooperation, which in turn has created a lack of trust between the departments. As a result of this, it is evident that each department chooses to focus on the contributions to the individual department's success, neglecting what could be done for the entire firm. Instead, the focus would be on increasing the knowledge of each department of the benefits that the consolidation hub can provide and how it would increase the efficiency for the firm. Noted from the research from within the firm, there is a strong level of resistance from the different departments for example the purchasing department and the after-sales department. The obstacle appears in that both departments could not see how it would increase the efficiency for the respective departments and how the integration of the consolidation hub would work in practice. However, this could for instance create opportunities for the other departments to sell additional services to clients creating another revenue stream.

For the consolidation hub to be successfully integrated, the different stakeholders would need to collaborate and see past each single department's immediate requirements. The three departments that were very positive towards the addition of the large-scale consolidation centre are the property, logistics and culinary. The property and the logistics departments are already aware of how the hub can be beneficial for reaching the environmental goals as the small-scale hub has provided this benefit as well. However, the large-scale hub will also further reduce congestion and allow for better usage of the space at Svenska Mässan where space is a coveted commodity. The culinary department focuses on the increased reliability of being able to plan around when the goods are expected to arrive. Therefore, if the overall vision behind the integration of the consolidation centre is communicated effectively to all stakeholders, resistance to the change can be mitigated and the initiative has a better chance at being a long-lasting change.

6.4 Analysis of the applied framework

The application of the chosen framework needed to be geared towards the purpose of discovering inefficiencies that could enhance the operational performance of Svenska Mässan's event logistics flows. As discussed in section 5, a combination of two frameworks the MFM and ARA were utilised, and three bottlenecks were captured. The three bottleneck areas would be alleviated with help from the consolidation centre. Thus, creating efficiency gains and reducing the impact of the main challenges that Svenska Mässan is currently facing. The main challenges being congestion, time, and space constraints. Additionally, the efficiency savings made on the current 60 peak operating days will have a greater impact once the firm upscales to the targeted 255 peak days per year with events and fairs. Thus, the implementation of these improvements can yield further benefits in the future.

A takeaway from the research conducted within the firm is that a prominent problem is the control of physical and information flows, both internally and externally. For example, there is a risk of confusion coupled with congestion when exhibitors arrive without utilising Svenska Mässan's transportations services as the firm does not keep strict loading and unloading times. Relocating all possible deliveries to the consolidation centre would aid in gaining increased control over the logistics flows as it would allow for more optimised planning. A further recommendation to increase transparency and the information flows would be to include a check-out system that records data not only for unloading done by the firm but also by exhibitors as it can improve the planning process for the next fair. The transparency in recording the check-in and check-out times of exhibitors can aid in the integration of the consolidation centre. This has proven to be successful in other exhibitions centres, for instance the Bassel Massan one of Switzerland's largest exhibition centres with the introduction of a new booking system and a check-in point. Overall, the new system reduced the congestion, optimised the delivery planning, and improved the efficiency with reductions in cost and time spent.

Implantation of a system, much like Bassel Massan's booking system, would increase Svenska Mässan control over the flows. Introducing ways to measure the day-to-day operations will have a positive effect on efficiency. A result of digital planning and route optimisation, fixed times can then be set for deliveries made at Svenska Mässan. The fixed times would allow for better staffing allocation at the time of delivery. Today, staff are working ad hoc with receiving deliveries, causing interruptions in their regular duties when unplanned deliveries are made. Better planning would free up more resources focusing on value added activities and offering better resource planning for peak periods when shipments arrive. The measurability would make it easier to discover hidden inefficiencies that can be targeted as bottlenecks and reduce time spent processing goods. Noticed from the interviews there often is a miscommunication on where goods should be placed in the exhibition halls or how the temporary staff should navigate the exhibition hall. A simple way to increase the efficiency of the third-party agency workers is to provide them with the information they need to execute the job prior to arriving at Svenska Mässan. This can be done for

example by adding a requirement for the staffing agency that stipulates that the temporary workers should receive and study a layout of the exhibition halls prior to arrival onsite. This aspect will further increase safety onsite and allow for increased control from the firm.

6.4.1 The triple bottom line at Svenska Mässan

The addition of a consolidation centre will impact Svenska Mässan's triple bottom line. To reiterate the triple bottom line in sustainability refers to the social, environmental, and economic effects on the wellbeing of society. The literature shows that there is a large amount of potential savings to be made based on emissions, congestion, and time. Applying MFM and ARA as theoretical frameworks shows the potential efficiency savings that can be made. MFM compared to other frameworks only focuses on certain flows within the firm. MFM is also helpful in identifying productivity, flexibility, quality, and sustainability. While ARA focuses on the resources and allocation, this in turn limits the amount of waste produced.

Safety is an important aspect to consider, in this case safety can be increased by better control over the logistic in-flows. The dock is currently being shared between forklift drivers and exhibitors. This is an area where both parties meet when unloading and loading goods. When the exhibitors have opted not to use Svenska Mässan's transportation service and they deliver the cargo by themselves, the cargo is unloaded by forklift drivers operating under Svenska Mässan. As a result of this individuals have access to the dock without the proper safety equipment needed. Increased control over the in-flows and outflow while removing unnecessary individuals from the dock decreases the risk of accidents.

Svenska Mässan's central location, while attractive for events and tourism, creates environmental concerns when congestion is created due to queuing for the loading and unloading dock. The large amount of congestion build-up increases the emissions from the firm. Implementing the suggestions in section 5 allows the firm to better plan the in-flow of goods. As also suggested a more sophisticated booking system would mean better planning and subsequently reducing dwell times. A positive effect of reduced dwell times by freight vehicles is the reduction of the overall GHG emissions. The consolidation of goods would also increase the fill rate of the trucks operating to and from Svenska Mässan as the current fill rates could be improved. Increasing fill rates while maintaining the strict turnaround times becomes a positive contributor for the firm towards a reduction in congestion. While it is hard to measure the firm's exact CO² footprint without historical data present, the literature provides sufficient evidence that a reduction in vehicle kilometres driven and the number of transports arriving to the firm will produce less emissions. The addition of a large-scale consolidation centre could allow for collaboration between Svenska Mässan and the neighbouring firms. This would ultimately decrease the overall transports that are going into the city centre. Since the neighbouring firms are also within the Green City Zone the collaboration will potentially aid the firms in reaching the GCZ target of being carbon neutral.

This is where the concept of business improvement districts could be encouraged to increase the collaboration between the firms in the event venue area.

The implementation of a consolidation hub would help alleviate the space constraints that Svenska Mässan is currently experiencing. As presented in section 5, the alternative revenue for the possibly new exhibition space can outweigh the arguments of not implementing a consolidation centre. There are several different additional value streams that become available to Svenska Mässan with the addition of the hub. Proven in the case of Kungsbacka, the introduction of the consolidation centre was a net trade-off in the aspect of cost. It would also mean greater revenues for the firm, allow them to offer a more consistent schedule, reduce the staffing needed to construction and deconstruct fairs and reduce the cost of storing goods at the dock that is not bringing any value to the firm. Collaboration with the neighbouring firms in the utilisation of the consolidation hub provides a reduction in the operating costs for each firm. With operating costs being the largest detriment for most consolidation centres this trade-off can be alleviated either by complete collaboration or via providing services for other firms in the area. Lastly, with Svenska Mässan's future goal of upscaling to 255 peak operating days the addition of the consolidation centre will better prepare the firm for the increase in clients, events, and goods.

The benefits of the addition of a consolidation centre to the firm's logistics will impact Svenska Mässan's triple bottom line which also supports the firm's business model and overall mission. Sustainability is a core concern for the firm both internally and externally as the firm is located within the Green City Zone area. Furthermore, with the strategic location of Svenska Mässan there is the opportunity for collaboration with neighbouring businesses to further reduce the number of transports in the local area and the overall operating costs of the hub.

6.5 Summary of research findings

The removal of the bottlenecks identified allows for not only the opportunity for the optimisation of the workflow but for a positive impact on Svenska Mässan’s contribution towards its sustainability goals. Figure 6 below depicts the key takeaways from the analysis and discussion section.

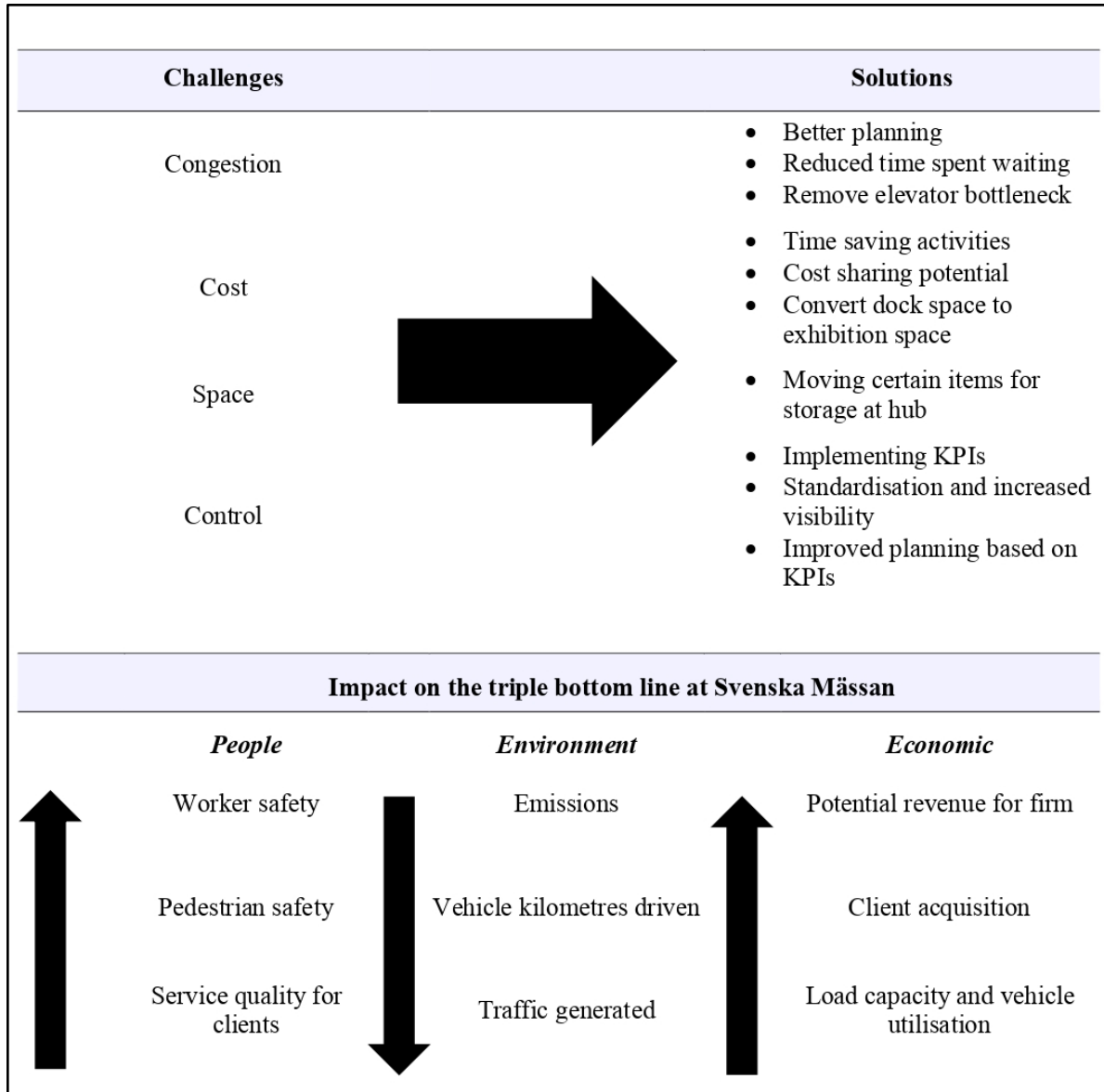


Figure 6: Key takeaways from analysis and discussion. (Figure developed by authors, 2022)

7. Conclusion

This section will provide the overall conclusions of the research conducted on the possible integration of a large-scale consolidation hub, the challenges, and resolutions. Followed by recommendations for the case study firm, Svenska Mässan, to increase efficiency. Further studies that can be examined as well as research limitations.

7.1 Key takeaways from the research

Events generate social and economic gains for the host city. Cities face many challenges when it comes to logistics and freight transportation. Thus, with events happening in city centres it is vital that the logistics of event venues works seamlessly. On one hand the transportation industry is seen as a major contributor to congestion and greenhouse gas emissions. This implies that urban logistics has a large impact on the triple bottom line. Further disruptions in the city from freight flows caused by congestion, loss of control as well as the increased emissions. These repercussions can downcast the positive effects generated by events for cities. Stakeholder involvement is also necessary to create a long-lasting impact in improving the repercussions from freight transports. Collaboration between stakeholders including the private sector is key to implementing changes and ensuring sustainability within urban areas.

The research investigates the potential effects and challenges of adding a large-scale consolidation centre to the operations of an event venue firm located in the heart of Gothenburg, Sweden. The combination of frameworks with the ARA and MFM within the research, have essentially created a unique method to examine the efficiency within the logistics of an event venue. This entails that the chosen frameworks are applicable within a logistical network to identify bottlenecks and resource allocation. A reapplication of the framework is therefore transferrable to other industries that also suffer from lack of efficiency and that are in the pursuit of enhancing the firm's sustainability. The integration of sustainability concerns will become increasingly relevant with the changing climate and thus research for events and event venues looking to revamp business operations accordingly.

7.1.1 Improvements of a consolidation hub on events logistics in an urban location

Events are a large generator of goods that are time sensitive due to the nature of events. A consequence of this is that timing becomes of the utmost importance for its success. To cope with the demands that event logistics requires while coexisting with stakeholders, a solution for event venue firms could be to implement a consolidation centre. The integration of a consolidation hub will result in different impacts on logistics flows. The main impacts can be related back to efficiency gains in terms of the daily operations with consideration that urban located firms face

are cost, control, congestion, and space. Firstly, implementation of a consolidation hub could help alleviate some of the challenges firms face. Secondly, the hub would allow for efficiency saving activities. Positively impacting the firm's triple bottom line. The implementation of a consolidation hub has shown that the logistical network for a firm can be reworked. The findings demonstrate that the consolidation hub can help increase efficiency, reduce cost, decrease the amount of greenhouse gas emissions, and increase the firm's overall control of the supply chain.

7.1.2 Main challenges and mitigations of implementing a consolidation hub

The main challenges with the implementation of a consolidation hub consist of cost, change management, and the various stakeholders. These three aspects are the predominant challenges coupled with the increased complexity that upscaling brings. First the high operating costs is typically the main reason, according to the literature, for which consolidation centres fail in the long-term perspective. Second, when implementing a change within a firm there is always an ambivalence or resistance to the change from employees which needs to be mitigated regardless of the industry. Lastly, urban areas are shared by various stakeholders including pedestrians, firms, and governmental bodies all which have different demands on the space.

There are different proposals toward mitigating the challenges presented. Specifically in the case of Svenska Mässan the consolidation centre could be utilised to generate additional revenue streams by creating more exhibition space to rent out for example. Other firms within the private sector can also work towards creating revenue by offering the use or service of the consolidation hub. Additionally, the municipality of Kungsbacka's consolidation centre project, as described during the interview with Carlsson (2022), demonstrates the effectiveness of a hub for the firm and that the support from regulators removes the cost concern. The city of Gothenburg is sustainably conscious and as a result is implementing initiatives such as the Green City Zone. A step further could be to partially subsidise sustainable initiatives such as a consolidation centre. Next, uncertainty in projects creates the resistance to change within employee's industry wide. Change management entails reducing the uncertainty employees feel towards new initiatives. Therefore, uncertainty can be reduced by effectively communicating the change vision and ensuring that all staff members understand the benefits the change brings either individually or for the overall benefit of the firm. The communication between stakeholders is also vital in tackling the challenges with the implementation of the consolidation hub as each stakeholder's goal may vary.

7.2 Recommendations for Svenska Mässan

The case study firm, Svenska Mässan currently has 60 peak working days but the firm plans to upscale this in the future to have 255 days filled with events. This extreme increase in peak days creates a multitude of challenges to make it achievable. The logistics complexities will increase as the number of fairs upscales. A result of this will be a greater number of fairs including live animals, heavy machinery and odd sized goods that require special handling.

With the construction of the fourth tower, it becomes more pertinent to have the additional space, sustainability foundation and control that the consolidation centre will provide for the firm. Hence, the addition of the consolidation hub better prepares the firm in upscaling operations in the future. In the short-term the addition will ease the stress-filled peaks the firm experiences, reduce congestion, allow for improved logistics visibility as well as optimising the logistics flow to and from Svenska Mässan. However, it is evident that for the long-term success of the integration of a large-scale hub within the logistics flow all stakeholders should hold a common vision and understand the benefits of the hub. The results of the observations, interviews and applied frameworks have proven that there are areas for improvement that can strengthen as well as better prepare Svenska Mässan for the integration of a large-scale consolidation centre

Although only three bottlenecks were targeted as areas for improvement within the case study there have been many areas identified where efficiency could be increased. First to target some of these pain points it would be the most optimal for Svenska Mässan to update the warehouse management system to allow for increased visibility of the supply chain. Secondly, to remain in line with the firm's sustainability mission and the Green City Zone initiative, the consolidation centre can create opportunities to add more renewable energy sources to the logistics flow such as electric freight vehicles. Third, as the consolidation centre allows for value-added activities to occur prior to arriving at the exhibition hall this can be considered to strengthen efficiency. For example, to reduce the round-trip transport of empty goods, kitting can be used to limit the amount of packaging material. The construction of the fairs is often the most time sensitive process. By adopting kitting, some of the goods could potentially be assembled at the hub and once the exhibition hall is ready to receive the goods it would not require the same time to unload and process.

7.3 Further studies

The field of events logistics is a severely under researched area. One further study to provide clarification on ways to increase sustainability for event venues could be to follow the journey of a pallet. The combined application of the MFM and ARA frameworks can be utilised to observe the pallet beginning from the client, then to the exhibition and lastly to its return destination. Through the study further opportunities for optimisation can be identified and evaluated based on the potential sustainability impact.

7.3.1 Limitations

The lack of research in the event logistics sector was a hindrance in creating a clear vision for the incorporation of consolidation centres for event and venue focused firms. In this regard, the Covid-19 pandemic has severely limited and reduced the number of events globally that were allowed to take place. Thus, the event data utilised for the case study with Svenska Mässan is primarily from 2019 as this representative of a typical year. Consequently, as Svenska Mässan holds a central location in Gothenburg, Sweden the focus is also placed on this region and is a geographic constraint. Furthermore, as the research was conducted as a master thesis project there are clear limitations on time, resources, personnel, and financial aid.

Reflection on working with a case study company

The collaboration with Svenska Mässan began in the late autumn when the researchers emailed the Director of Logistics to pitch their idea for a master thesis topic. Svenska Mässan was very receptive to the idea the researchers pitched, which centred around urban logistics and sustainability. As the topic was selected by the researchers there was a high degree of flexibility, investigative work and independent data collection involved. It was an overall positive experience for both researchers and the support from Svenska Mässan was valuable in completing the thesis.



Picture of Svenska Mässan and the Gothia Towers in Gothenburg (Courtesy of Svenska Mässan Gothia Towers AB)

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9. List of appendices

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Appendix 1: Interview framework

Month- date-year. Name of respondent- Interview Framework

1. Introduction

5 min

Purpose of this meeting, reason for seeking out individual and repeating larger thesis project objective as well as the research question.

2. Consolidation centre and role focus

20 min

a) Origin

- a1) Could you start off by telling us a little about your role?
- a2) How long have you been working with (specific role) ?
- a3) What is the main bottleneck that you experience in your role?
- a4) Can you tell us what is the main contribution that your department makes?
- a5) Who are the main actors involved in your operations?

b) Client role

- b1) Can you tell us about the consolidation hub and how it works currently?
- b2) What are the main challenges that you had to overcome when setting the process?

b) Client interaction

- b1) How do you communicate with the suppliers?
- b2) How often do you need to meet with each supplier?
- b3) How does the warehouse management system work from start to end?

C) Impact

- c1) To make sure everything works smoothly in your department, what do you and your team keep track of? Can you give us an example?
- c2) What do you think are the key things you need to do your work successfully?
- c3) Can you share some internal goals that you need to meet?

3. Pain points & opportunities

15 min

a) Pain points:

- a1) What are currently the most frustrating challenges for you?
- a3) What are currently the most frustrating challenges for the freight forwarders that you work with?
- a4) If you could change one thing about the organisation, what would it be?
- a5) If you could change one thing about the industry, what would it be?

a6) What do you think is stopping others from also using consolidation centres?

Opportunities:

b1) What could potential next steps be for the future of the company?

b2) What technological innovations or developments and opportunities do you see as most important in the short term for being able to use the consolidation centre more?

b3) And in the long term?

4. Conclusion

5 min

a) Is there anything we forgot to ask or that you want to add?

b) Is there someone else you can refer us to speak to on the matter?

Appendix 2: Consent form

Consent Form

Information and Purpose: The interview for which you are being asked to participate in, is part of a writing assignment for the master thesis at the School of Business, Economics & Law by the University of Gothenburg. The researcher is interested in “What impact would the increased integration of a consolidation hub have on events logistics flows for firms in an urban location? Secondly, what would be the main challenges with the implementation? ”

Benefits and Risks: The benefit of your participation is to contribute to the academic and logistics community with your personal experiences and viewpoints, to better understand the impact of the urban consolidation centres and their challenges. The thesis will be public.

Your Participation: Your participation in this study will consist of an interview lasting approximately thirty minutes to one hour. You will be asked a series of questions about the usage of consolidation hubs. Participation is voluntary and you have the right to terminate the interview at any time. The final assignment will be available to participants upon request.

Confidentiality: Your real name will be mentioned in the written thesis and your words and responses may be quoted or paraphrased as part of it. The interview will be audio-recorded for transcription and later analysis, and to help capture your insights in your own words. Your interview responses will be kept confidential and will not directly be shared with anyone, other than the course supervisor for supervision purposes if needed. Data collected as part of this assignment may be used for other research purposes as authorised by the School of Business, Economics & Law by the University of Gothenburg. Confidentiality will be preserved.

If you have any questions or concerns, please contact the researchers*

By signing below, I acknowledge that I have read and understand the above information. I am aware that I can discontinue my participation in the study at any time.

Name of participant
Signature
Date

Researcher
Signature
Date
.....

Researcher
Signature
Date
.....

* *Project contact details for further information: Names, phone, email addresses, etc.*

Appendix 3: The different fairs and time the items spent at the dock

Fair	Arrival Date	Arrival time	Departure Date	Departure Time	Total minutes at the loading/unloading dock (based on working hours from 7:00 to 16:00)
eCarExpo	2021-12-01	11:03	2021-12-01	12:15	72
	2021-12-01	11:06	2021-12-01	12:18	72
	2021-12-01	8:13	2021-12-01	15:36	443
	2021-12-01	6:58	2021-12-01	08:03	65
	2021-12-01	8:32	2021-12-01	09:50	78
	2021-12-01	11:05	2021-12-01	12:13	68
	2021-12-01	11:22	2021-12-01	12:15	53
	2021-12-01	11:03	2021-12-01	12:15	72
	2021-12-02	14:20	2021-12-02	15:14	54
	2021-12-01	9:41	2021-12-01	09:46	5
	2021-11-29	15:48	2021-11-30	09:50	189
NSK	2022-03-18	10:20	2022-03-18	11:53	93
	2022-03-16	12:27	2022-03-16	12:44	551
	2022-03-18	10:08	2022-03-18	12:45	157
	2022-03-18	10:02	2022-03-18	12:57	175
	2022-03-21	12:13	2022-03-21	15:18	185
Senior Fair	2022-04-08	07:27	2022-04-08	12:48	321
	2022-04-04	09:48	2022-04-04	10:29	41

	2022-04-01	12:09	2022-04-01	13:58	109
	2022-04-04	10:58	2022-04-04	11:41	43
	2022-04-04	12:30	2022-04-04	13:05	35
	2022-04-04	11:46	2022-04-04	14:15	149
	2022-04-04	09:47	2022-04-04	10:08	21
	2022-04-04	11:02	2022-04-04	11:38	36
	2022-04-04	09:41	2022-04-04	10:05	24
	2022-04-01	11:22	2022-04-04	08:55	321
	2021-10-27	09:15	2021-10-27	09:19	4
	2021-10-27	14:38	2021-10-28	07:07	209
	2021-10-26	13:36	2021-10-26	15:49	133
	2021-10-26	14:55	2021-10-26	15:28	33
	2021-10-29	14:01	2021-10-29	14:14	13
	2021-10-26	07:13	2021-10-26	07:27	14
	2022-04-05	11:06	2022-04-05	11:47	41
	2022-04-07	11:22	2022-04-07	11:28	6
	2022-04-06	08:40	2022-04-06	09:19	39
	2022-04-06	09:41	2022-04-07	14:58	317
	2022-04-04	10:04	2022-04-04	10:12	8
	2022-04-08	09:21	2022-04-08	09:23	2
	2022-04-08	07:59	2022-04-08	08:02	3

	2022-04-07	14:25	2022-04-07	15:14	49
	2022-04-07	11:06	2022-04-07	11:07	60
	2022-04-07	08:40	2022-04-07	09:06	26
	2022-04-07	09:57	2022-04-07	10:40	43
	2022-04-07	11:23	2022-04-07	11:37	14
	2022-04-07	10:15	2022-04-07	10:45	30
	2022-04-07	10:13	2022-04-07	10:27	14
	2022-04-07	09:26	2022-04-07	11:00	94

Appendix 5: Ranking of the fairs

Fair	Number of exhibitors	Difficulty (1-10)	Complexity reason?	Days to set-up	Days to deconstruct	Code
Boat Fair	300	8	Many large goods including boats that are driven in by truck. Third party equipment is needed/rented, e.g., cranes and forklifts.	3	3	A
Euro Horse	200	6	Large number of exhibitors that want to unload by themselves. This in turn requires a lot of space.	1	1	B
Beer and Whisky Fair	200	4	Many small special deliveries that require separate handling, especially when it is alcohol.	2	1	C
Scanpac	400	10	Large fair with a high amount of goods. Varying in range from small packages to large machines.	4	2	D
NSK	80	1	A small congress with not so many goods.	1	0.5	E
Quality Fair	150	3	A small congress but requires many lecture halls.	1	1	F
Book Fair	450	8	An extreme amount of goods compared to other fairs.	2	1	G
Mydog	150	5	Not so many goods involved due to the small amount of exhibition area needed. This fair has other requirements due to the live animals involved.	1	1	H
Forever Living	10	3	Not many goods involved.	1	1	I

Wedding Fever	50	1	Exhibitors perform most of the work themselves. Not many shipments of goods were involved.	1	1	J
Buying Houses Abroad	50	1	Small amount of goods involved.	1	1	K
Senior Citizen Fair	100	2	Small amount of goods involved.	1	1	L
Samtit	100	4	First time this fair will be conducted. It is not really known what to expect.	1	1	M
D-congress	100	5	Located on the second floor, therefore careful planning is needed when using the elevators.	1	1	N
Car Fair	250	6	Large amounts of goods that are large, for example cars.	3	2	O
Power Electrification Summit	400	8	Many goods that need to be moved between the different exhibition floors, requires detailed planning.	3	2	P