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AMMATTIKORKEAKOULU  
*Yhdessä enemmän*

# Improvement of logistic center security

## Case: Fiskars Finland Oy AB

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Improvement of logistic center security  
Case: Fiskars Finland Oy AB

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**Logistiikkakeskuksen turvallisuuden parantaminen**  
**Case: Fiskars Finland Oy AB**

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Globalisaatio on tuonut haasteita logistiikkakeskusten toimitusketjuihin ja niiden hallinnoimiseen. Yritysten on tunnistettava logistisessa ketjussaan uusia riskejä ja kehittämisenäkökulmia. Tässä opinnäytetyössä on tutkittu case-yrityksen riskejä, joista yhtä tutkitaan kahden eri analyysin kautta. Tutkielman tavoitteena on tehdä kehittämis ehdotuksia siihen, miten case-yrityksen toimitusketjua olisi mahdollista tehostaa.

Tämä tutkielma painottuu logistiikkakeskuksen lähtevän puolen laiturin toimintaan ja siihen kohdistuviin riskeihin. Ne tunnistettiin havainnoimalla ja työntekijöiden kanssa käytyjen keskustelujen avulla.

Varaston turvallisuus on tärkeässä roolissa toimitusketjun parantamisessa. Tässä tutkielmassa käydään läpi erilaisia teknologioita, joita case-yritys käyttää varaston turvallisuuden ylläpitämiseksi. Nämä teknologiat vaikuttavat myös työntekijöiden turvallisuuteen merkittäväällä tavalla.

Tutkimus osoitti, että korkein riski tunnistettiin lähtevän puolen laiturin toiminnassa. Joka neljännessä lastauksessa kuljettajalta puuttui viitenumero, mikä varmistaisi noudon oikeellisuuden. Riskin korjaaminen vaikuttaa sekä työntekijöiden turvallisuuteen että toimitusketjun hallintaan. Tutkielmassa on esitelty kaksi vaihtoehtoa, joita tutkittava yritys voi harkita mukauttavansa nykyisiin prosesseihinsa lähitulevaisuudessa. Tässä tutkielmassa on esitelty myös kaksi muuta mallia, joita voidaan tulevaisuudessa soveltaa teknologian kehityksen saavutettua kansainvälisen tason.

Riskien tunnistamisen ja niiden analysoinnin perusteella voidaan sanoa, että case-yrityksen lähtevän puolen toimintoihin on puututtava. Tulosten esittäminen case-yritykselle johti toimenpiteiden aloittamiseen.

Avainsanat: toimitusketju, logistinen ketju, riskin hallinta, turvallisuus

**Laurea University of Applied Sciences**  
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**Abstract**

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Globalization has brought challenges in controlling and managing the supply chain. Corporations are forced to identify new risks and threats that could occur in their logistic chain and the aspects for resolving them. In this report there has been researched risks of the case company, which have been investigated through two different analyzes. The goal of this research was to make improvement ideas on how the supply chain could be enhanced.

This research emphasizes to the outbound platform of a logistic center and its risks. The risks were identified by observation and discussions with employees.

Warehousing security is in an important role when improving the supply chain. In this research there will be introduced technologies that the case company uses in order to maintain the overall security in the warehouse. These technologies have a significant impact to the security and safety of the employees.

This study showed that the highest risk was in the operations in the outbound platform. From pick-up situations one of four was missing a pick-up reference, which would ensure the correctness of the pick-up. Eliminating the risk would have an effect to the safety and security of the employees and to the management of the supply chain. Within this study there has been introduced to options that the case company could take in action in the near future. Two other options have also been introduced, but they might be adaptable in the future after technologies have improved more globally.

Based on the identification and analysis of the risks there can be said that the operations of the outbound platform need to be addressed. Presenting the results to the case company led to initiation of measures.

Keywords: supply chain, logistic chain, risk management, security

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## 1 Introduction

This study is about managing the supply chain risk in the case company Fiskars Finland Oy Ab. There was investigated the immediate risk point in the warehouse which would be a threat to the overall security of the supply chain. There was given recommendations for the case company on how to decrease the risks at the outbound platform. When investigating the risk point there was other improvement suggestions for the warehouse that are listed in the end on this report.

This report focuses on the outbound departure dock of Fiskars Finland warehouse in Hämeenlinna and the improvement points that it has and how the progression could be possibly conducted. The risk point was identified to be in the outbound platform, which has an effect to the overall operations of the distribution center.

Most problems have been built up because the lack of communication which is one of the remark that was made during the observations. Within this study there was also identified other threats that could effect to the security and safety of the employees, facilities and the leaving cargo.

This study centralizes to warehousing, departure dock, the process of outbound shipments, the process ordering transportations for shipments, technologies that the case company currently uses and the possible threats that the operations might face.

### 1.1 Goals of the research

The goal of this research is to improve the outbound platform to be more efficient and secure for both employees and cargo. The facility and the security measures have been taken into consideration.

In this research will be answered to questions:

- What is the risk point of secure transport chain? Why?
- How can it be improved?

The objective is not to take immediate actions. This will introduce ideas for improvements to be made at the outbound platform area in the future. For further actions to implement the ideas found in the study they need to be more tested in order for them to be adapted smoothly to the current way of working.

## 1.2 Boundaries of the research

This thesis and its research explain the processes and activities that the distribution center/warehouse has, but focuses the improvement suggestions to be made to the processes in the outbound platform. This area of the warehouse has been required to be improved by the organization in order to secure the safety and security of the employees, facilities and the leaving cargo. The risks are analyzed with Failure Mode and Effect Analysis (FMEA) and Strengths, Weaknesses, Opportunities and Threats (SWOT)-analyses. Opportunities that the warehouse could adapt are similar to processes that the companies Lidl, Valio and John Lewis have. These could be such as faster processing with fewer work forces or better just in time transport rate. Further down in the report the operations of the similar companies are introduced and compared to the case company.

## 1.3 Research methods

The research method is a case study. According to Aaltola and Valli (2010, 190), case study is characterized in the way that there are detailed information from one or more cases and it is intended to describe a phenomena. According to Yin (2009, 2) if the research tries to answer how and why questions, the researcher does not guide the flows of the events, and the focus area is a real-world phenomenon.

In a case study the researcher collects and analyses the data using a number of methods (Aaltola 2010, 190) and the typical data collections include observation, interviewing and investigation of documents (Hirsjärvi, Remes & Sajavaara 2004, 126). According to Hirsjärvi (2004, 202) observation can provide instantaneous and direct information about the operations of the individual or organizations in their natural environment. In participatory observation the weight is in the meaning of operations and systematic prevalence of activities. Gill and Johnson (2002, 144) divide the participatory observation into four categories according to whether the researcher participates or not and whether the researchers identity is revealed. In this research observation is categorized as the participating observer, in which the observer works transparently as a viewer and doesn't attempt to integrate to the group. (Saunders, Lewis & Thornhill 2007, 282-288).

## 1.4 Research process

Most of the research was conducted by observation of the current processes. The researcher has a 5 years' experience in the company, with the expertise in warehouse operations, warehouse management and export documentation. The discussions with the employees and drivers gave more depth to the investigation of the current operating model. Employees were frustrated about the lack of instructions in the loading platform and incoherent ways of working.

In 2016 there was conducted a tracking of the operation of the platform, where was investigated how many shipments were picked up from the warehouse without references. This was an eye opening situation for the employer, who wanted to improve the outbound operations based on that tracking.

### 1.5 Introduction of the case company

Fiskars Finland Oy AB is multicultural and international organization that has been established in 1649, which makes it one of the oldest western enterprises. In 1915 Fiskars was listed in the Helsinki stock market. The orange-handled scissors are the best known products of Fiskars which have been sold over billion pairs after they were introduced to the market in 1967. International brands that Fiskars is known are Fiskars, Iittala, Royal Copenhagen, Gerber, Wedgwood and Waterford. Operating segments are the Americas, Europe and Asia-Pacific.

Fiskars Group has four core values: integrity, accountability, innovation and teamwork. These values establish a basis for consistent decision making across the company. If people have the same values they tend to make decision using the same principles. The heritage of Fiskars Group is built on innovation which is seen through the brands and products. (Fiskars Intranet, 2017)

Fiskars Group supply chain support the business model by building an efficient supply network. This is organized by manufacturing/sourcing and logistics functions. Supply chain has been modified to be agile, cost efficient, scalable and responsive to the customers' needs. As the market grows, it needs to be able to be equally responsive throughout time. The supply network utilizes both external suppliers and own factories in Sorsakoski, Billnäs and Iittala. The supplier portfolio is managed through material areas in close collaboration with long term partners. Fiskars has unified processes and IT systems in most of branches in the world (UK, Netherlands, France, Italy, Denmark, Norway, Sweden and Germany) that provide real time information and transparency to fact based decision making. (Fiskars Intranet 2017)

The distribution center of Fiskars in Hämeenlinna holds functional and home products and runs a small wrapping department for business to business customers. The distribution center has three main areas: receiving area, storage area and the departure area. The center uses SAP ERP (Systeme, Anwendungen und Produkte) as the warehouse management system (active since 2013). The center has a U flow design where all the goods are received and departed from the same side of the building. This gives the opportunity to place products within a short distance from each other's and the loading dock, because there are several main corridors and the space that can be utilized more efficiently since the goods can be loaded in layers.

The distribution center in Hämeenlinna operates with FIFO principle (First In First Out) and has turnover from two months to two years.

The control of supply chain in distribution centers is located in the loading docks. Trucks arriving and departing bring security risks when the drivers are unknown and come from different countries. For example the drivers from eastern countries are given instructions in Russian, Ukrainian, Lithuanian, etc. language from their transportation company, in which the employees in the distribution center don't have expertise. Language barrier between drivers and employees highlight the difficulty to control the platform.

## 2 Logistics

According to Paul R. Murphy logistics means "that part of the supply chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements." (Murphy, 2010, 22)

Logistics aims to create a plan for the flow of products and information through a business. Supply chain management is built upon the framework of logistics. It seeks to achieve cooperation and links between different processes of other entities i.e. customers, suppliers and the organization itself (Christopher 2016, 2-3). The flow of material and data consists of several different actors, data management and who has the information in different stages of the chain is relevant in the terms of security. The information flow is always ahead of the flow of the goods, as the information is shared electronically.

Logistical service providers sell services to corporations which have outsourced their logistical actions or their whole logistical process. Logistics systems are facilities (manufacturers, warehouses, distribution centers, terminals, retail outlets, etc.) that are linked by transportation services (trucks, trailers, containers, cars, etc.) (Ghani 2004, 1-2)

Globalization is an emerging trend in logistics which has increased the number of companies and it has given the advantage of lower manufacturing costs in other countries. Globalization has also increased the need of transportation and corporations have put more emphasis on the efficient design and management of their supply chains. (Ghani 2004, 16)

Logistics is a corporate livelihood when it works and is efficient. In Finland logistics have special requirements because of long distances, narrow national flow and dependency of sea transport. The main objects of logistics is to deliver products in place, time, qualitatively and quantitatively as agreed. Deliveries are performed in the compliance with the defined service

level, which the company has chosen in order to achieve the best financial results. (Logistiikan Maaailma, 2016)

Logistics can't be fully understood unless there is an overall picture of the business environment. It isn't enough to view only one part of the area of business without considering it as a whole. For example sourcing solution has an impact to inventories, production and distribution. Logistics should be seen as an overall process which aims to develop the whole supply chain competitiveness.

## 2.1 Supply Chain

According to Closs D.J. supply chain is "combination of organizations and service providers that manage the raw material sourcing, manufacturing and delivery of goods from the source of the commodities to the ultimate users" (Closs D.J. 2004, 8). 21st century has brought factors that require companies to enhance their supply chain security in order to be competitive in the market. Co-operation between different companies and forwarding agents is essential in securing the supply chain from the manufacturer to the end customer.

Different organizations direct material and service lines in co-operation with each other's and enhance the related money and information flow. The supply chain combines corporations and suppliers to distribution organizations. The focus is to bring more value, cost effectiveness and customer satisfaction (Logistiikan maailma, 2017).

Supply chain management focuses to strengthen the competitiveness of corporations by answering to the needs of customers. This requires for the company to reduce costs in the logistic chain and deliver the products to the customer in time that has been earlier agreed. Globalization and competition between corporations has given the customers the assumption that all products will be delivered earlier (Logistiikan maailma, 2017).

In supply chain there are different parties: retail stores, customers, manufacturers, suppliers, the suppliers of the suppliers, etc. Each step in the transport chain adds more costs and time. The supply chain has to be reviewed per-action and to consider ways of storing and shipping.

Large batches of products ensure that there is no disruption in production and the availability is secured. Warehouses that have a wide range of products leads to better customer service and sales. In the same time products stored bind themselves money and raise the unnecessary inventory value (Logistiikan maailma, 2017).

## 2.2 Inhouse Logistics

Inhouse logistics means the internal material handling and storage steps and the controlling measures associated with earlier actions. The boundary between inhouse and outbound logistics is located in the junction of the transport and the internal processing, i.e. the loading platform. The content of inhouse logistics can be considered as a wide-range operational entity, which main process involves several stages including receiving and identification of products and material, shelving, collecting, combining and packing and transferring the packages to the transportation equipment, production of to a consumption point. In order for the operations to work smoothly they need to be measured and managed accordingly. Personnel and services need to be utilized in order to support the practices the warehouse has. Figure 1 outlines the inhouse logistics process flow. (ESLogC 2012)

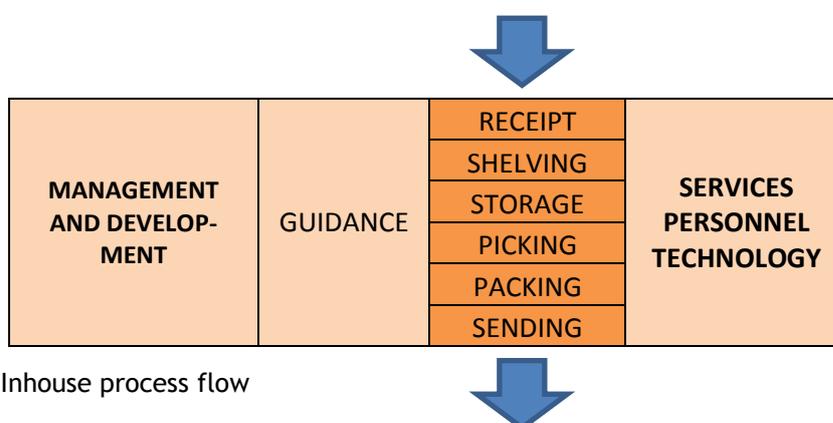


Figure 1: Inhouse process flow

## 3 Security

The corporations need to be prepared to different threat situations due to globalization. Corporations need to address threats that focus to the company, facilities and its employees. The threats can vary among different companies, in the country it is based and the kind of partners they have. The management of information exchange is extremely meaningful to the security of the supply chain.

Logistical security includes parts of every-day life, for example road safety and the security of the transportable and storable goods. In recent years the functionality, flexibility and speed have been important factors in succeeding in the global markets. Distribution centers are more vulnerable to internal theft. They are also targets for burglary and pilferage depending on the value of goods that are stored. Facilities with new merchandise in their original packaging are the most desirable for thieves. (Vesterinen 2011, 25)

All the risk points in the supply chain are the moments when the goods stop moving, these moments can be harbors, terminals, warehouses or any other point in the logistical chain.

Competitors and criminals may be interested in the company's data, people, goods or property. Unauthorized data collection in Finland isn't unheard of but very unlikely. This explanation may be in the size of Finland; country is relatively small in terms of population and competitors are well known. Some employees change jobs between the limited number of companies, which enables for the information to move with that person. If the passing information includes any trade secrets, and if is exploited it will break the law. (Vesterinen 2011, 51)

In overseas the situation is different, where business intelligence is a lawful activity. The line between illegal and legal data is vague and depends on the legislation of the country. Companies in Finland that have international business activities, they should accept the fact that even though the physical premises of the company in Finland the operations of competitors and government agencies can be very different from what we are accustomed to. (Vesterinen 2011, 51)

Information security is a large part in logistics, and the information about the movement of the products is a major factor when planning criminal activity. The information security is based on where the data is unchanged at their disposals that are entitled to it. The information is distributed only to those who need it. All employees are mandatory to sign a certificate of confidentiality if they are able to access the confidential information of the corporation that is not available for persons outside the company. (Vesterinen 2011, 163)

When planning crimes towards a company, the preparations made include monitoring the target, conducting surveys, checking possible security arrangements, inappropriate movement in the premises and asking irrelevant questions to ascertain any details needed. Criminal actions can be theft against property, crime against company's information, employees or other damage towards the company. (Vesterinen 2011, 83).

Crimes against logistics have changed over the years due to a rapid globalization. Technology has developed fast and the intention of efficiency and streamlining of operations has gained foothold in different fields. Seeking efficiency has enhanced and facilitated the fulfillment of various issues in different areas of life in national and international level. All changes globally have shaped the behavior of people in many ways, which opens up also new opportunities for crime. Since the situations where parties need to trade face to face become rarer. (Vesterinen, 2011, 89)

### 3.1 Warehousing security

Warehousing security focuses on two primary issues: protecting products and preventing their theft. The threats that any warehouse can encounter are thefts, pilferages, heat and humidi-

ty, fire, loss of electricity, etc. These threats can cause losses in the range of four to five times the value of the products. This leads also to lost sales opportunities, customer dissatisfaction, the costs associated filling claims, etc. (Murphy 2010, 208-209)

The interest to provide building security for warehouses is a primary concern for organizations that have products stored. The facilities should have a number of low-tech and high-tech devices for protecting security. Electronic devices are helpful in providing building-related security functions, for example surveillance and access control. (Murphy 2010, 208-209)

The security of the facilities consists from different zones. Outside areas of the facility need to be protected in order to prevent criminal acts against the company. The environment should be active and clean that it stands out in good condition comparing to environments with very little traffic and neglected estate. The environment might give an opportunity to easily follow loading and unloading situations. (Canadian shipper, 2002)

Many elements are needed to create an effective protection of the facility. Structural burglary protection, a fault notification system, recording camera surveillance, lighting and local surveillance must be satisfactory to that the property is protected. Structural protection includes a fence and gates surrounding the property. With good lighting, access blocking system (including camera surveillance and alarm systems) reduces the risks of burglaries and damage. Once all the above has been done correctly, the unauthorized persons are more likely to be caught before they have access to the warehouse storages. (Hovinen etc. 2007, 78)

Fenced area is a clear message about the boundary of the real estate. The access to the yard area can be restricted by a vehicle gate, where the identification can take place with a key card or an identifier that can be installed to the vehicle. Exit from the gate can happen by using identification or an opening door button. A vehicle gate can be a part of the access control system or separate from it. (Hovinen etc. 2007, 62). The fence needs to be sturdy and sufficiently high. Gates on the leading road to the estate restricts access of vehicles when premises are unoccupied. The yard area needs to be spacious and furnished such way that there is no vegetation providing visual protection for criminals intending intrusion or vandalism. (Canadian shipper, 2002)

When enhancing the warehouse security the focus is on people, facilities and the processes. To prevent any theft or pilferage the hiring process for the warehousing workers should be improved. Currently use of hired workers from labor rent companies has become more common. This has caused that the history of the workers are not always known. These workers might get only few shifts, which gives the opportunity to steal products without anyone necessarily noticing. (Canadian shipper, 2002)

The management of visitors is also part of the security of the warehouse. Different contractors, such as cleaners, facility maintenance personnel and other personnel that are company's point of view outsiders, should be equated as close as random visitors. More regularly and continuously any outsider visits the premises, they come more familiar to permanent workers and their attitude towards this person changes. This enables that the procedures of visitors is easily forgotten. (Canadian shipper, 2002)

All visitors should have instructions what technical equipment is allowed to the premises and employees need to be given instructions on how the visits are organized and how visitors are monitored during the visit. Rarely a visitor is a real risk to the company, but the status of the visitor attracts parties that want to gather information about the company for one reason or another. (Canadian shipper, 2002)

Companies need to maintain awareness of the employee integrity and their commitment to protect profitability. Employees need to be introduced to operational policies which can address a variety of issues including locker, package and vehicle inspections, drug and alcohol use, trash disposal, violent behavior, consumption of inventory and the misuse of company property. (Canadian shipper, 2002)

Employees' lockers, vehicles and packages can be inspected by the company. There are possibilities that there is concealed merchandise in the premises, which should lead to unannounced cycle counts by different employees. Employees who witness any inappropriate behavior should inform to the management, but they can fear either revenge from the coworker who is violating the rules or possible recrimination from the management. (Canadian shipper, 2002)

Internal thefts are usually undetected, which requires that the key staff needs to be trained to notice any signs of dishonesty, product consumption or tampering, collusion and alcohol and substance abuse. If any internal theft is discovered it might reveal even more elaborate scheme by observation and investigation. (Canadian shipper, 2002)

Electronic surveillance cannot be relied strictly, because it might not detect product theft from the distribution center. A strong presence of the management on the floor is more effective than CCTV. Security procedures should be reviewed annually to ensure that there are no vulnerabilities raised during the year. Facility needs to be checked physically to ensure that all equipment is working correctly including all alarm and access control systems. (Canadian shipper, 2002)

The shipping and departure areas should have video surveillance in order to keep track and alternatively check if there has been any inappropriate behavior or suspicion of theft. Cameras should be placed to view the entrances as well as the interior areas of the distribution center. (Silva Consultants, 2016)

### 3.1.1 Access control system

Access control system includes computers, electronic readers, routers, electromechanical locks and cabling. The purpose of the access control system is to ensure the safety of the staff, protect the building from thefts and destructions, to guide to workers routes and prevent unauthorized movement within the area. (Hovinen etc. 2007, 41-43)

Within the access control system it is possible to make limitation for the users' access areas. The staff of the warehouse can go more freely than for example visitors. To the key identifier there can be set time limitations from a few days to a year. When taking an access control system in use, there is no longer need for switching the lock as a precaution if one key gets lost; a single key can be amortised. Additionally the number of keys can be dropped to one because it can be connected with other electrical key identifiers within the company. If the use of the premises change or the layout is altered, with the access control system the routes of employees can be changed accordingly. (Hovinen etc. 2007, 41-43)

The key management process should be photographed, documented and instructed for possible changes of employees in order to raise awareness of the importance of personal of the keys. There can be used electronic keys, access cards and codes to use in movement. All guests and customers should register themselves to the reception where they are picked up by the host. (Canadian shipper, 2002)

### 3.1.2 Access control software

The access control software can usually be used on a compute. It enables new key identifiers to be activated, edit the existing data, manage door locks, create new access routes and move alerts. The program can also be saved and print reports that show events of the keys. Although many different manufacturers offer different access control software's, their operating principle is almost identical. (Hovinen etc. 2007, 43)

When activating key identifiers, it is important to fill in the key holders' information as accurately as possible. From the reports mentioned above it is possible to see which doors have been used and at what time. When defining areas of interest, certain doors can be selected for a specific group of people. When setting boundaries, the emergency exit points need to be open for everyone. The resting and dressing rooms will to be included in the employee's ac-

cess area. Workers in different departments of warehouse can use only the doors that they need. Employees need to be aware of the principles of operations in order to avoid any misunderstanding about the limitations of access. (Hovinen etc. 2007, 53)

### 3.1.3 Access control doortypes

Access control doors can be divided into five different types depending on the security needs of the premises. The door types are:

- Reader + unlock button
- Keyboard lock + unlock button
- Keyboard lock + reader
- Reader + reader
- Worktime-end + opening button + reader (Keyboard reader) (Hovinen etc . 2007,56.)

The doors will open to the user, if there has been granted the right to access and the passage to the area is carried out within the time limits. (Hovinen etc. 2007,56)

Reader + unlock button door requires that the key identifier is shown when accessing inside the building. To exit from the premises can be used the unlock button. The number keyboard is used for doors with a high security level, for example exterior doors. Keyboard locks can also be connected to the alarms. Reader + Reader type of solution is used to register movement in both directions to maximize the security of the facility. There can be added a zone control system to this type of solution, which would force the user to use the reader each time. (Hovinen etc. 2007, 56)

### 3.1.4 Video surveillance

Video surveillance is about surveillance technology where a specific subject is filmed with a surveillance camera. The filmed material can be displayed also in real time elsewhere than the facility i.e. in a control room. The video can also be viewed later as the monitored film has been stored for later use. The angle of the surveillance cameras can be adjusted from the control room manually, or there can be set to an auto-scan subject change. This ensures that the blind spots of the cameras are kept as small as possible. When setting up camera surveillance, there needs to be considered the number of cameras installed and their positioning. The video surveillance is not about the number of the cameras, but their optimum placement (Takala 1998, 4-5). Automatical analysis of authorized personnel will make the video surveillance more effective.

Surveillance cameras must be aimed at objects that allow the access to the facility; the main entrance, possible rear doors and the area leading to the storage area. When the surveillance cameras are located in visible locations, it can prevent some of the break in's, because the visible cameras have a psychological effect. (Takala 1998, 23).

### 3.1.5 Video surveillance use and maintenance

Within the company there should be trained a group of administrators, users and developers to use the surveillance system. Administrator will manage the user functions, creating profiles, managing records, creating camera maps in the system and modify the settings of the recorders. The user can see the recordings, controls the cameras and is able to scan and transfer the data to the authorities. The developer has the same rights as the administrator, but takes care of the updating of the software and manages the devices the way the main user desires. (Ellonen etc. 2011, 45).

If the company doesn't have enough staff trained to manage the video surveillance system, the control may be inadequate and possible crimes can't be resolved. In the worst case scenario, the person that is trained to manage the surveillance system might be intercepted during the holidays. Users should be familiar with all types of cameras and their features. In addition of controlling the surveillance cameras, the responsible persons should be able to modify the stored data and forward it to authorities if necessary. (Ellonen etc 2011, 45)

### 3.1.6 Alarms and other security systems

Alarm systems that are used in facilities include fire detection, fire alarm systems, burglary and robbery detection systems, access control systems and camera surveillance systems. When a notification transfer system is added to the above systems, there will be a connection from the supervised facility to the alarm center. (SFS-handbook 670-1 2010, 6).

A large warehouse is often divided into different alarm zones. When the alarms are turned on or off, they need to be remembered to be connected from all areas. Alarm activation can be performed either with remote control using the access control software or by a keypad reader at the door. The alarm sounds must be clearly distinguishable, for example, the sound of the burglar alarm system needs to be different than the fire alarm. (SFS-handbook 670-1 2010, 120).

## 3.2 Crime security

Crime security work focuses on preventing crimes. The criminal actions can be directed to operations, personnel or the property inside and outside the territory. According to Kauppakamari (2012) research 34 percent of large companies (over 250 employees) stated

that the offences against business and abuses have increased over the last three years. The most common crimes against facilities are vandalism, theft, robberies and frauds.

(Kauppakamari, 2012)

Preventing crimes include risk assessment, the safety culture and the employees safety issues. Training of employees, regular announcements, checks and monitoring have an effect on the safety and security of the employees and the warehouse. Possible risks that a logistic center can encounter are: property crimes, crimes of violence, drug-related crimes, occupational safety offences, economic crimes and crimes against information security.

(ESlogC 2012)

#### 4 Tehnologies in logistics

As earlier mentioned, the supply chain views a wide range of actions that start from the source of raw materials to the actual consumers. The different parties are conducting purchase and sales transactions, invoicing and payment transactions, transportation and storage as well as the order and delivery transactions. These activities have been developed by the companies and to their own systems and premises. The tools for information exchange have been in the past paper-based letters, telex, fax machines and phones. (Pohto, 2005)

The description of traditional supply chain is relevant but with the difference that number of functions can now be used by using modern technology, such as Electronic data interchange (EDI), Internet and e-voicing. The flow of information is passing through more efficiently and faster. (Pohto 2005)

Organizations use telematics, which utilizes data processing and telecommunications simultaneously when transferring information. Data processing can be divided in four sub-areas: traditional data processing, office automation, telecommunications and production automation. Data processing covers the handling of various files and records on the monitors. Office automation exploits computers in office routines. In telecommunications the data is electronically transmitted either wirelessly or by cable in the telephone or electricity network. Production automation includes all production-related data processing; it covers complicated processes with narrow data volumes. (Hokkanen 2014, 225)

The future development of information and communication technologies is undeniable. The proportion of the technology as a tool in successfully operating actions is difficult to be measured. Companies can use a number of electronic tools, phones, and Internet or EDI messages, but the physical supply can operate either smoothly or may be completely unfit. The investments in technology don't guarantee smooth flow of goods, information and services. (Pohto 2005)

The internal efficiency is built on material and information management. Typical information technology investments are wide ERP (Enterprise Resource Planning) applications. The aim of ERP systems is the automation of various functions, such as design, manufacture, storage, sales and the flow of information, as well as the anything relating to the integration of the system. The internal efficiency can be achieved by technology that requires modest investments and making use of the simplified procedures. Small ideas can lead to significant cost saving and improving the internal efficiency of operations. Most of the development projects are related to the pursuit of efficiency or cost savings. (Pohto, 2005)

#### 4.1 Barcodes

To identify objects, companies can utilize barcodes, which consist of different black and white beams. The code can be numeric or alphanumeric. Alphanumeric means that the code has both number and letter combinations. If there is a slight need of information, the code should be a one-dimensional numeric code. When the information required is raised, the needed code will also become more complicated. (Hokkanen 2014, 228)

The most used code in Finland is a one-dimensional, numeric 13-character code called the EAN-13-number, which is used to label retail items. (EAN = European Article Numbering). The code consists of twelve digits and one check digit. There is also an 8-character version, which is used when the space is limited. (Hokkanen 2014, 229)

In transportation packaging the unit load is identified in the transportation chain according to the ISO/IEC15459-standard through an 18-character extension Serial Shipping Container Code (SSCC). To the pallet, carton, or other unit is attached the specified barcoded label containing the SSCC code. The SSCC code can be read by a laser reader that can be a fixed handheld laser. In addition to the reader, the system needs an interface to the information system and a program that is capable to interpret the desired barcode. The reader is linked to the desired application, where it can be controlled from a specified information processing system. (Hokkanen 2014, 229)

The benefits of data capture using barcodes include error-free data collection, speed of operation, and ease of use, affordable system and compatibility with different systems. The disadvantage is poor readability occasionally. If a printer makes a weak mark, reading the code fails. If the contrast between the dark and white density is too small, it also causes unsuccessful reading of the code. In storage operations reading can be unsuccessful if the codes are attached negligently or there is a wrinkle on the label. (Hokkanen 2014, 229)

The cost of using barcodes is inexpensive compared to other authentication systems. In addition the code is versatile and its interpretations are highly reliable if the above mentioned disadvantages are not taken into consideration. (Hokkanen 2014, 229)

#### 4.2 RFID Technology

Radio Frequency Identification (RFID) technology has become more popular worldwide, as it enables the capability of track and trace. According to Bartneck RFID system “comprises of at least one reading device and one mobile data storage unit that can be read contactlessly by a reading device using a high frequency transfer procedure.” (Bartneck, 2009, 24). But the challenge to use this technology is the costs of it and possible implementation.

The RFID tag is more durable than the barcodes, and there can be applied more actions than just holding the information. RFID tags are placed in a desired spot. They can be either passive or active. The passive RFID tag include an own power supply, but not their own transmitter. There can be written information more than once into a working RFID tag. In a barcode the information cannot be changed and the coding of the information is more limited. (Hokkanen 2013, 91)

### 5 Managing supply chain risk

For managing the risks of the supply chain the understanding of the supply chain is important. Some companies haven't perceived the wider supply network of which the organization is a part. But mapping the entire network in the supply chain isn't efficient, it would be appropriate to only look in detail the “critical parts” of the supply chain. (Christopher, 2016)

To improve the supply chain it is about simplification, reducing complexity, reducing process variability and improving the reliability of the process. Long-established businesses have their supply chains planned or designed in a holistic way. Companies develop ways to response to the needs and opportunities of present time. The suppliers are chosen because of their ability to meet the demands for lower price than for their reliability of their supply chain. (Christopher 2016, 224-232)

Networks are complex chains of “nodes” and “links.” Nodes are the entities i.e. factories, distributors and warehouses. Links are the means by which all entities are connected to each other. These links can be flows of information, financial information or the movement of the physical items. The vulnerability of the supply chain is defined by the risk of failure in the nodes and links that the supply chain owns. Identifying the critical parts of the supply chain gives the opportunity to manage threats and prevent risks. The critical parts of the supply chain are identified by the severity of the effect of the failure that could arise. The risk

points in the supply chain can be the transportable and storable goods, the transportation equipment, the company and its employees and the infrastructure and the society. (Christopher 2016, 224-232)

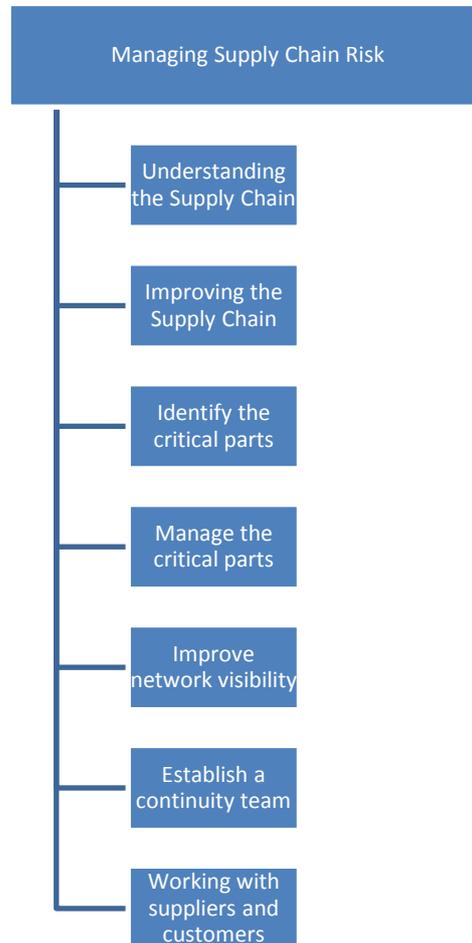


Figure 2: Managing supply chain risk

Once the critical part/risk point is identified, the next step is to manage them by removing it or finding ways to mitigate it. The supply chain needs to be re-engineered or develop a contingency plan of actions which need to be taken in event of failure. To provide more systematic approach for reducing the risk there can be used Failure Mode and Effect Analysis (FMEA), it contains the possibility to ask questions about probability, severity and detection:

- What could go wrong?
- What effect would this failure have?
- What are the key causes of the failure?
- What is the severity of the failure?
- How likely it is to happen?
- How likely it is to be detected?

This rating system is used to create a priority score by multiplying the three scores together. (Christopher 2016, 224-232)

SCORING SYSTEM	
S = Severity	<ol style="list-style-type: none"> <li>1. No relevant effect on the operating service level</li> <li>2. Minor effect in operating service level</li> <li>3. Definite reduction in operating level</li> <li>4. Serious deterioration in operation</li> <li>5. Disastrous effects in operational level</li> </ol>
O = Probability	<ol style="list-style-type: none"> <li>1. Extremely Unlikely (once a year)</li> <li>2. Remote (Once in many months)</li> <li>3. Occasional (Once in weeks)</li> <li>4. Reasonably possible (weekly occurrence)</li> <li>5. Frequent (daily occurrence)</li> </ol>
D = Detection	<ol style="list-style-type: none"> <li>1. Very high</li> <li>2. Warning of failure before occurrence</li> <li>3. Some warning before occurrence</li> <li>4. Little warning of failure before occurrence</li> <li>5. Detectability is zero</li> </ol>

Figure 3: FMEA scoring system

The risk class can be calculated by multiplying the severity level by occurrence level. The risk factor is countable by multiplying the risk class by the non-detectability level (Christopher 2016, 232).

Occurrence Level	Severity level		
	Low	Medium	High
High	Medium	High	High
Medium	Low	Medium	High
Low	Low	Low	Medium

Risk Class	Non-detectability		
	Low	Medium	High
High	Medium	High	High
Medium	Low	Medium	High
Low	Low	Low	Medium

Figures 4 & 5 Risk class & risk factor

The visibility of the network should be enhanced, since there are entities that are not able to see the status of the upstream and downstream operations or the flow of inventory as it progresses throughout the chain. Within this process all the participants need to have the ability to successfully track and trace the shipments (customers, sales personnel, customer service assistants, etc.). (Christopher 2016, 232)

To go even further in the management of the supply chain the company could be able to establish a supply chain continuity team. The team would have all the necessary skills to initiate an analysis and implementation that is involved in the supply chain risk management. The team would also be in close co-operation with suppliers and customers. (Christopher 2016, 232)

### 5.1 TAPA and ISO 28000

In order to secure the logistic chain many organizations have allied with each other's. The Transported Asset Protection Association (TAPA) combines different manufacturers and transport companies. This organization has an auditing system that can be used to define the level of security in the organization. Risk management refers to the actions that reduce the risks and the possible damages. Risks need to be identified and assessed before the risk management. In each supply chain the risks are different, which means that they have to be evaluated separately. Unidentified risks can't be controlled. It is important to calculate what it might cost if a failure occurs. (Logistiikan Maailma, 2017)

ISO 28000 -standard has been created to ensure the supply chain's operations. The standard helps the company to identify key security issues in the supply chain. Risks can be found in financial matters, manufacturing, data protection, packaging, storage and transportation. The ISO 28000-certificate indicates to other parties that the company takes security matters seriously. Collaboration with a company that owns the certificate ensures a reliable relationship. The company with an ISO 28000 certificate has identified their security threats and is aware of risks that can occur. (International Organization for Standardization, 2017)

## 6 Research

The objective of this research was to find ways to improve the fluency of the operations and security at the loading platform in such way, that the overall process would be altered only partially. This study has benefitted from the researchers own work experience in the company, observation and discussions with employees and drivers.

There will be introduced risks that came up while observing the operations at the loading dock, from these risks there has been chosen one for further investigation. The risk investigation was conducted by the researcher in co-operation with the platform employees. Further down the report are the suggestions that the employer could consider in order to improve the control of the supply chain.

The identified risks were analyzed through SWOT and FMEA analyses. FMEA analysis is more systematic technique to analyze possible failures. Based on the analysis the company is able to create preventive actions. SWOT analysis is used to identify, evaluate and develop problems and challenges. This is a useful tool in planning projects and businesses. The object of this analysis can be one activity of an enterprise or competitiveness of a product or service. Within this research the SWOT analysis identifies the challenges found in the outbound platform. The strengths, weaknesses, opportunities and threats are introduced further down the report.

Benchmarking was used in order to find ways to improve the operations of the warehouse. The overall process of the warehouse is in an adequate level, but it needs continuous improvement in order to meet the customers' growing needs. Securing the supply chain will help the warehouse to answer these needs.

This chapter will introduce the case company and its operations, the overall security of the premises and analyzes the risks that had been identified during the observations.

#### 6.1 Case company: Distribution center Hämeenlinna

There are two offices, a common rest room, changing rooms and three meetings rooms. There is approximately 35,000 square meters that covers the whole building. The largest traffic is at the corridors on the both outbound and inbound docks.

Three main corridors and 28 racks have a lot of traffic from forklifts. Safety shoes are mandatory for all employees because of the heavy machinery in the distribution center.

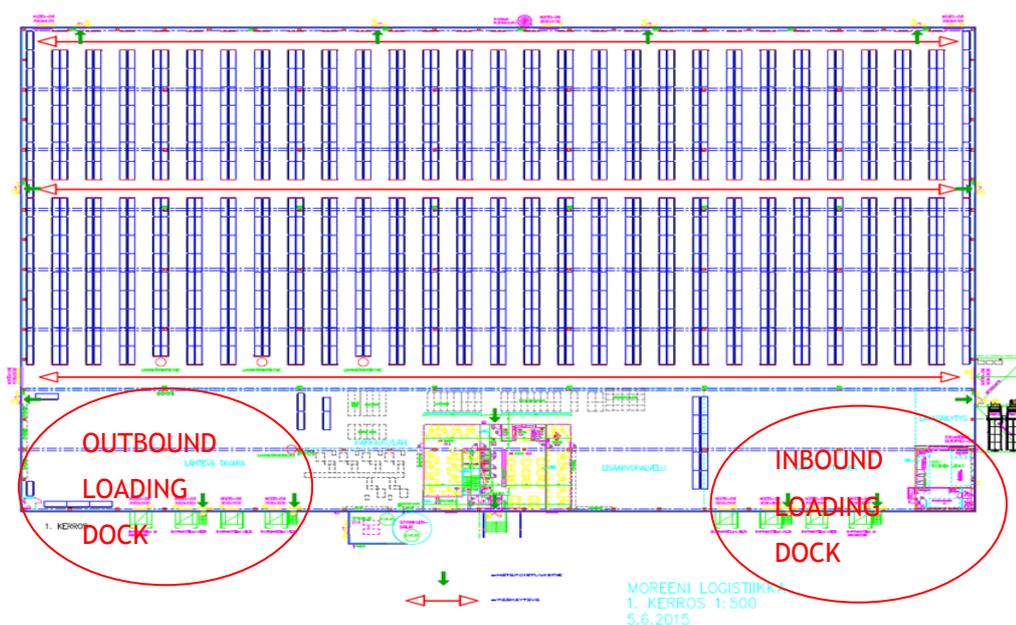


Figure 6: Layout of the distribution center

The distribution center operates with a First-In-First-Out principle, which means that the goods are collected in the order of their arrival. The older products are shipped out first and the value of the distribution center is kept low, which reduces the attractiveness from the criminal point of view.

#### 6.1.1 Overall security in the warehouse

Earlier in this report was mentioned security and warehouse security. While observing and investigating the processes of the warehouse, it came clear that the security issues were handled as they should. One threat which was found was in lack of surveillance of the outside persons that arrive to the warehouse.

The warehouse is surrounded by a high fence, which defines the boundaries of the area. The area can be accessed from the gate that is open 12 hours a day between 7-19; the gates are closed on weekends. Outside of this time range, employees and other personnel can access the area with their personal electronic key or the gate can be opened from inside the facility.

Earlier in this report was discussed about the access control system and software's, which can follow the movements of each used key. This has enhanced the security in the facility, when no unauthorized people can access the area without the key outside the time range.

Other risk that was identified was in the return of the electronic keys when the employment contract was over. The electronic keys might have not been returned, which created a minor risk point. As mentioned earlier in the report, the electronic keys can be amortised. But if there is insufficient documentation that who has the keys and are they returned, the keys might not be amortised immediately when needed. This would allow the former employees still to access the building as unauthorized personnel.

Employees, service workers and cleaners can have their own electronic key. Each key is programmed to have access to the commonly used rooms (front doors, side doors and dressing room doors). All electronic keys don't have access to engine rooms or other similar rooms that have higher security measures. Each key is personal and all employees use them for logging in to the workplace in the start of the shift.

The building has nine doors which each of them has a reader and an unlocking button. The doors open only from the outside with the electronic keys and the unlocking button is used to exit. There are two loading docks on both side of the building (arrival and departure) which have sliding doors. These doors open only from the inside of the warehouse. CCTV is used to monitor the outside of the facility, and some of the areas inside the warehouse.

Alarm systems are programmed to be turned on when there are no shifts operating. These moments are at night and on weekends. If the alarm goes on when there are no personnel inside the warehouse, a guarding company will come to inspect the warehouse. Alarm codes are only accessed by management and the guarding company.

## 6.2 Operations of the warehouse

There are inbound and outbound processes in the warehouse, which have different types of actions. Inbound process is about receiving products and the shelving of those items. Outbound process is about picking and packing of products and the departure dock operations.

### 6.2.1 Inbound process

On the arrival platform, each truck has a certain time booked when they are accepted to unload the goods. The drivers need to have a list of what products they are unloading and a reference that.

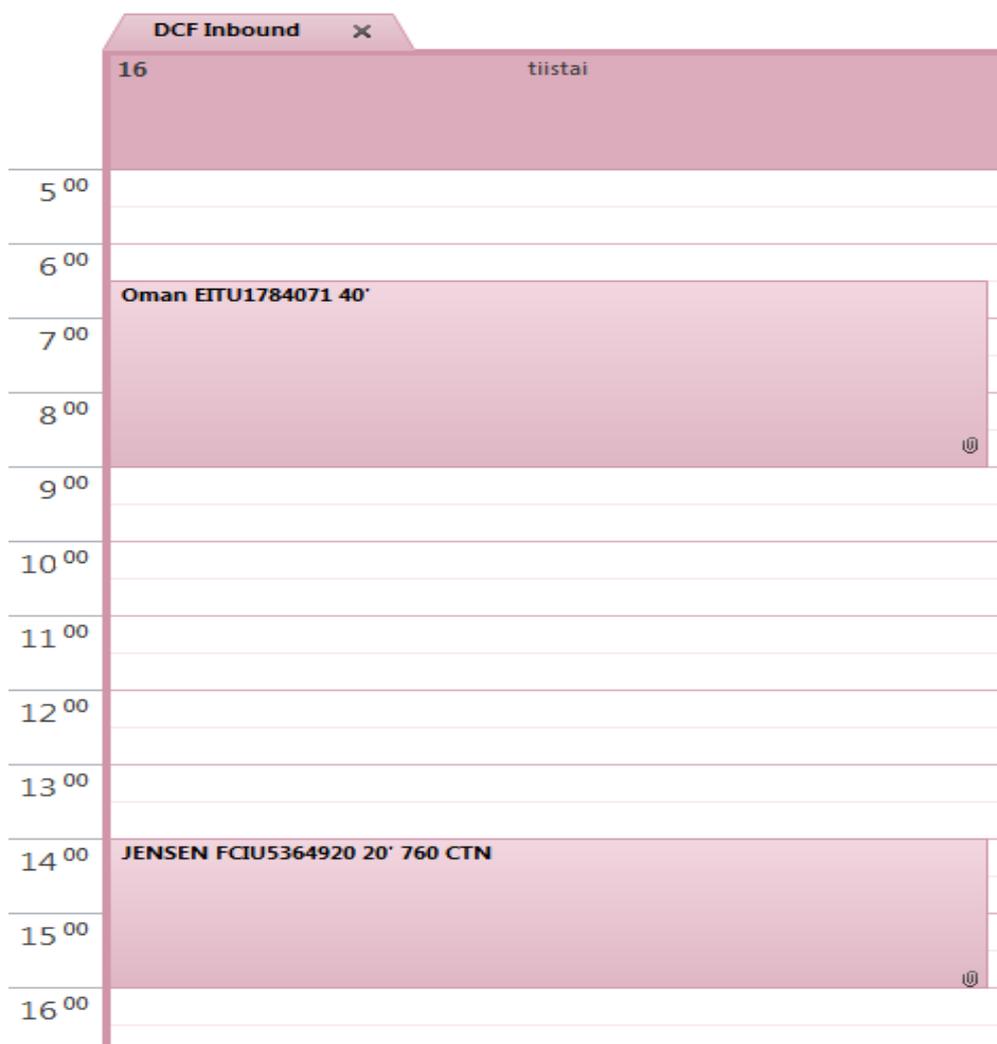


Figure 7: Example of the timetable at the inbound platform

The arrival dock accepts all return shipments from the EU and outside of the EU. All returnable products are given a “return delivery” from customer services, which identifies that specific shipment and gives the opportunity to handle the shipment accordingly to the return process.

After the goods have been accepted they are placed in stock for further actions.

### 6.2.2 Outbound process

The current outbound process is:

1. The order is placed to the system
2. After entering the order to the system customer service will provide the distribution center the outbound delivery which can be picked and packed, that is used to enter to the voice-collection system.
3. After receiving the outbound delivery made by the customer service, the assistants at the office will inspect the delivery and its correctness. If no alterations are needed, the assistants check the customer, country and required shipping type (airfreight, sea freight or road transportation). This information will determine the packing instructions that is given to the employees and the picking and packing time.
4. After making the packing instructions, the delivery is transferred to the voice-collecting system (Voicelink) and prioritized accordingly with the other workload available. After the picking and packing is completed, the loading dock employees will stack the pallets in their own queues.
5. After picking and packing the employees will provide assistants the measurements, weights and other possibly needed information of the pallets (i.e. the carton amount of each pallet). The assistants are then able to make needed paper work for shipments. When documents are completed, the assistants will order transportation from forwarders. Most of the information is transferred with EDI message. The forwarders are provided a reference which is required to be shown when picking up the shipment. All shipments have their own unique reference.
6. After all above is completed, the shipment waits for pick-up from one day to even up to three months. As earlier mentioned the drivers will be handed the shipments only if they provide the earlier given reference. All leaving pallets or cartons are scanned

to an excel workbook by their SSCC codes and filed away when pick-up has occurred. The scanning of the SSCC codes gives the opportunity to prove that the goods have been scanned to truck.

### 6.2.3 Identified strenghts and risks in the outbound process

All risks were identified by observation of the whole process and how the warehouse operates within the outbound platform and its employees. As the operations in the inbound area are sufficient and working correctly, there is no need for analyzing it further.

The first steps of the outbound process are working smoothly. There have been time to time challenges in the last steps where all shipments are ready for transportation. The most challenging part of the process is the pick-up process. Currently there are hardly any ways to identify drivers when they arrive to the warehouse. The reference system has been created to secure the pick-up of the shipments in order for them to be transported to the correct destination.

The platform workers are responsible for handling over the shipment when they are being collected. Some of the platform employees don't follow the instruction that the reference is mandatory to be asked. This has caused for the operations in the platform to be insufficient from time to time. This problem can be caused because the forwarding companies are not transferring the data given by Fiskars to the drivers.

As earlier mentioned, the information flow is usually in front of the physical flow of the goods. The flow of the information might not be sufficient from another transportation company to another, which can create difficulties in the clients end. This might cause for the shipment to be delayed, because the goods are not handed over to the driver and the pick-up will be rescheduled.

Language barriers have been seen as a problem earlier, which has been one of the reasons why the reference system has been set up. The reference system still doesn't eliminate the human errors that can occur during the pick-up. The high risk situations are for example the same amounts of pallets are shipped to the same port but to different vessels and counties. The wrong pallets are handed over to the drivers without realizing it at that time. This error will result to extra costs to the company when searching the pallets but also additional freight costs when shipping the goods to the correct customers.

Scanning the SSCC codes of the shipments to the excel files and storing them to the hard drives gives only a sense securing the cargo. The files are stored by date and name. If the files need to be review later, finding them has been a challenge. This way the warehouse can

proof that the certain pallets have left with the same shipment with the other pallets, if there is something unclear later on. This still doesn't give the certainty that the goods have been loaded into the correct truck.

CCTV cameras outside the loading docks can provide the license plate of the truck. But the foreign trucks are almost impossible for the warehouse to identify. Finnish license plates can be identified and usually tied to a certain forwarding company. This still doesn't remove the risk of having stolen license plates, but the recorded data can be given to the police for further investigation.

Foreign truck can conduct scams where unknown truck picks up the goods before the correct truck, which leads the goods to be sold at the black market. Fiskars is selling home and garden items, which aren't as appealing to the criminals than for example medicine or electronics. The retail price for the items is quite small, which would not be that profitable for criminals, but the risk has to be taken into consideration.

After persons are allowed to enter the warehouse, there is hardly any guarding of those people at the loading dock. The employees can be loading goods to the trailer, while the drivers are given the opportunity to wander around the warehouse. This creates a security risk for all employees at the distribution center. This is a situation that needs to be solved by either not allowing the drivers to enter the facility or creating a fenced area for them to wait for the loading to be complete. Keeping the doors locked and doorbells installed outside of the doors have limited for the driver's access the loading dock on their own.

### 6.3 SWOT Analysis of the outbound platform

I have gathered a SWOT analysis of the process in the outbound platform. This analysis is based on the observation of the operations in the platform and the discussions with the employees. I found this to be useful when identifying the risk points and how to use these different strengths in order to improve the weaknesses.

#### Strenghts

The loading dock has a layout, which gives more room for the pallets to be stacked in lines. After the installation of doorbells to the door leading to the platform, unauthorized persons cannot reach the platform on their own. There is a small amount of employees that work in the platform area, which enables for the knowledge to be gained over time and the information that has been obtained will remain with the employees.

### Weaknesses

The sharing information between the platform employees is inadequate in the turnaround of shifts. Training new employees is challenging because there are hardly any common practices that have been agreed. If there has been a way of working agreed some of the employees don't follow it. Sharing information between the office workers and platform employees has been deficient because on the manual work that needs to be done for shipments. This has brought an opportunity for human errors to occur. Language skills are weak for most of the employees, which makes the communication with foreign drivers challenging.

### Opportunities

Since there are a small number of people working in the platform, their know-how can be utilized to continuously improve the performance of the area. Small number of people is also easier and faster to train if needed. Technology hasn't been yet utilized to a great extent, so considering this possibility could enhance the operations in the outbound platform.

### Threats

The value of the inventory is kept low, but it does not prevent from criminals to get interested. There are high quality items in their original packing, which can be appealing to criminals. Stealing can be successful in a 35000m<sup>3</sup> storage without anyone noticing it; whether the thief is an employee or an outsider.

Drivers arriving to the platform may be a threat to the operations of the warehouse because they are allowed to freely walk in the warehouse without surveillance as earlier mentioned. This will cause a threat to all employees in the distribution center. There are obvious shortcomings in the platforms actions, which lead for human errors.

## 6.4 Benchmarking

Comparing activities between different facilities gives the ability to find different ways to improve the control of the supply chain. All operations are specific to each facility and can't be copied as they are to with similar operations. All facilities are individuals and their operations serve their own potential.

In this research Fiskars has a long history in supply chain management and even small improvements have their own effect in the efficiency of the operations. Improvement of the distribution centers and warehouses require co-operation between different parties in the supply chain including employees, forwarders, and customers and used subcontractors.

In this chapter there are compared the operations in warehouses of LIDL, Valio and John Lewis. And the possible implementation of the operations to the distribution center of Fiskars.

## LIDL

The warehouse of LIDL in the southern Finland is open 24 hours a day and is larger than the distribution center of Fiskars. This has an effect to the operations, since LIDL controls the warehouse more continuously around the clock and is open each weekday.

The drivers are given a route and the shops along the route, where the specific amount of goods need to be delivered. If the trucks drive the routes at night, they are given electronic keys in order for them to be able to access the shops and unload the goods and switch off the alarms for the certain time period. After finishing the route, all keys are returned to the main warehouse, drivers give reports how long the unloading has taken and what has been delivered to each destination.

This could be a possibility for Fiskars if there would be only few forwarders. Fiskars differs from LIDL in such way that the customers aren't only the shops around Finland, but all consumers and companies are able to purchase products.

If the pick-up's at the Fiskars distribution center are outside the opening times and no corresponding staff available, it would require giving electronic keys and the alarm code to the drivers. This is not an ideal situation and it is recommended to have at least one responsible employees present when goods are picked up.

This method works in the chain of LIDL, because the goods are picked up from the main warehouse and delivered to their own shops in Finland. Fiskars differs from this, because the delivery times to the outlets are during working hours, when there are employees receiving the goods. It should not be necessary to provide transportation companies keys to the outlets because they accept goods only within working hours.

## JOHN LEWIS

When sending goods to John Lewis, companies need to book a time of delivery from John Lewis. This booking contains the day and time it needs to be delivered and a specific booking code that John Lewis provides. If the booking time is not complied, John Lewis will grant fines to the company selling the goods to them.

Similar reference system has been currently in use in Fiskars, which has worked satisfyingly, but needs to be improved in order to secure the supply chain. Fiskars can either give their own reference or transportation companies provide their reference. Without a reference the goods are not handed over to the drivers, but as earlier mentioned that pallets are given to the drivers by the employees without references contrary to the given instructions.

All container and daily shipments have a pick-up timetable that has been agreed in the contract between the forwarder and Fiskars. This logic with container pick-ups could be implemented more to the other shipments, which would ease the management of the warehouse.

## VALIO

Valio's warehouses are surrounded by fences and the gate will open automatically by scanning the registration plate. The gates open only for registered trucks of certain transportation companies that have an agreement with Valio. The drivers have been instructed to drive to a certain dock where they need to park the vehicle. The centers are large and there can be docks on each side of the huge buildings. There are different functions in each dock, which means that the given loading dock is mandatory, comparing to Fiskars Finland where the vehicles can be parked in any available dock. The drivers are not allowed to wait inside the building of Valio and possible waiting time has to be spent inside the trucks cabinet. After loading or unloading the driver is allowed to enter the building to pick-up the papers of the shipment.

Implementing this to the Hämeenlinna distribution center would require a total change in layout of the yard, gate and fences. In the current situation this would bring challenges because the warehouse is located next to a road, where placing a camera is impossible. The installation of cameras, motion sensors and gates is the responsibility of the property owner. This means that the property owner needs to see this as a necessity. Fiskars has leasing time until 2019, which means that change in this scale isn't profitable as an investment, because the processes needs to be changed radically for the automation to work.

### 6.5 Risk analysis - Outbound operations

The highest risk point has been identified to be in the outbound loading dock. This risk point is caused mostly because of the lack of communication between employees and ambiguity of the process.

If there are drivers waiting for loading, they are served in the order they have arrived to the distribution center. This will enable for the drivers to wander around the distribution center without any monitoring of employees, because there is no specific waiting area at the dock.

This should be solved by either making a fenced area for the drivers to wait in or requiring the drivers to wait in their car and to come in when invited.

PROCESS STEP	FAILURE TYPE	POTENTIAL IMPACT	SEVERITY	POTENTIAL CAUSES	PROBABILITY	DETECTION MODE	DETECTION	RPN
Step to be analyzed	What could go wrong	What is the impact?	How Severe the effect is to the customer?	What causes this to go wrong	How frequently this is likely to occur?	What are the existing controls to prevent or to detect?	How easy it is to detect?	Risk priority number
Departure dock	Wrong goods to the forwarder	Goods get lost, or delivered to the wrong customer	4	Miscommunication between employees, missing reference	2	Demanding earlier given references from the driver	4	32

Figure 8 : FMEA analysis of departure dock

The step that is analyzed is in the outbound departure dock, where the risk point has been identified. There have been cases where the shipments have been given to the wrong forwarder, but found later on from the incorrect terminal of another transportation company.

The risk is that the goods could get lost or even been delivered to the wrong customer. This needs to take in notice and avoid. The severity of the error to the customer is high, because the items arriving are not what they have been invoiced of and might be even products that they are unable to sell forward.

The normal process is working with the unique reference system. A unique reference of a shipment is given to the forwarding company and during pick-up this reference needs to be provided to the platform employees.

There was conducted a tracking in the the end of the year 2016 about the reference usage. The tracking was conducted of 412 pick-up during the time range from June to December. 94 of these shipments were picked up from the warehouse without an reference. Three pick-ups were unclear, which means that there wasn't a reference asked by mistake.

So between this time range there has been 23,5% when the goods have been released without the unique reference. This means that one in four of the shipments did not have the certainty that is the correct pick-up.

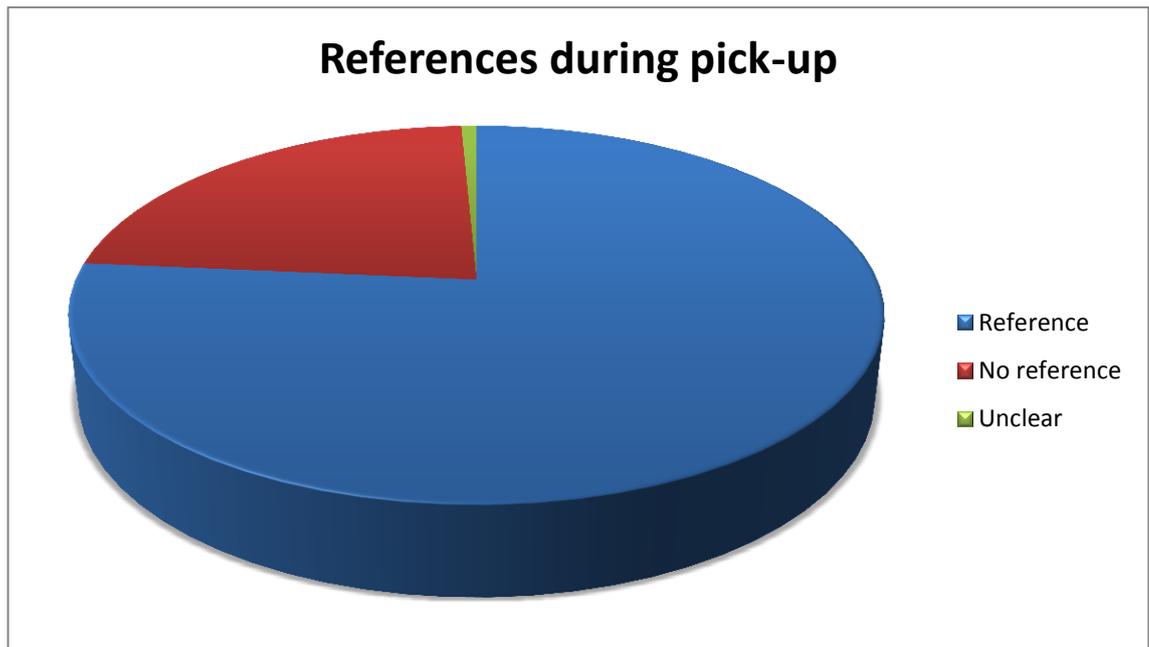


Figure 9: References during pick-up in 2016

The miscommunication between employees is one cause why this is able to happen, and the negligence of the employees has a significant impact to the probability for this to occur. When dealing with manually checking and identifying the drivers the human error is high, the occurrence is low, but the severity that it causes is high for both Fiskars and the end customer. As the failure is caused by a human error the detection low before the goods have been shipped onwards.

In the below figure is shown the categories of operations, the current state and recommendations. The current situations are rated from 1-5:

- Rates 1-2 are situations that need immediate actions
- Rates 3-4 are situation that are working average and need some improvement
- Rate 5 is an ideal situation

CATEGORIES	CURRENT STATE	RATE FROM 1-5	RECOMMENDATIONS
ACCESS CONTROL	Is working as it is supposed to	4	Warehouse needs better surveillance of the electronical keys
VIDEO SURVEILLANCE	CCTV is working and has almost none blind spots	5	No needed actions
ALARMS	Co-operation with the guarding company is working as it should and times that are set for alarms to go off and on are correct.	5	No needed actions
VEHICLE GATE	CURRENTLY BROKEN	1	IMMEDIATE REPAIR
ISO 28000	There is no currently a ISO 28000 - certificate	No rate, since this is not an necessity	Hiring a company to audit the warehouse in order to have the certificate at some point.
INBOUND PROCESS	Working smoothly	4	No needed actions
OUTBOUND PROCESS	Otherwise working well, except there are deficiencies in the outbound platform	2	Creating a development team of platform employees and find ways to improve the platform

Figure 10: Table of operations

In the above figure the outbound process has been colored red. This means that this operation of the warehouse needs the most improvement. The improvement ideas have been intro-

duced in the next chapter. Vehicle gate is currently broken, but this has already been taken into account and is handled as a priority.

The following tables show the risk class and risk factors of the identified risk. The risk class can be calculated by multiplying the severity level by occurrence level. The risk factor is countable by multiplying the risk class by the non-detectability level.

Occurrence Level	Severity level		
	Low	Medium	High
High			
Medium	Inbound operations		Outbound operations
Low		Vehicle gate	Access control CCTV Alarms

Figure 11: Risk class of the identified risks

Figure 11 explains the risk class of the identified risks in colors. Highest risk is the outbound operations because the severity level of the occurrence is high even though the occurrence of the actual risk is medium. In the case company access control, CCTV and alarms are working correctly. But the risk class of this is still medium, because if the operations fail, they can cause enormous problems to the company.

Inbound operations and vehicle gate have the lowest class of the identified risks. The vehicle gate is currently broken, but it doesn't affect the security of the facility in a high level due to other security measures. If operations in the inbound area fail, the risk class is still small. The failure doesn't affect the security of the facility in an significant level.

Risk Class	Non-detectability		
	Low	Medium	High
High	Access control CCTV Alarms		
Medium	Inbound operations		Outbound loading platform
Low	Vehicle gate		

Figure 12: Risk factor of the identified risks

When the risk class has been obtained the risk factors can be identified. The highest risk factor for the company is the outbound loading dock. The non-detectability of the failure makes this a risk for the total operations for the warehouse. Inbound operations and vehicle gate are low as a risk factor to the company. If the access control, CCTV or alarms fail, it can bring significant damage to the security of the warehouse.

## 7 Conclusions for further actions

Truck drivers can pose a security risk to facility. The receiving and shipping areas should be restricted and not allow the truck drivers to wander in the warehouse. Alternatively there could be provided a lounge, which the drivers would be free to use. If waiting lounges aren't possible, the employer can require for the drivers to wait outside the facility and in their truck's cabin.

Fiskars Finland needs to be able to control its supply chain efficiently as possible and reduce the risk of human errors. Improving the outbound process is a necessity in the future, as the current situation is functional but not fully assured. The possibility for human errors is greater because there is hardly any automation in the process at the moment. Below are few scenarios that could be implemented to the distribution center in the near future, and two other scenarios that need the co-operation of other parties and are more futuristic.

### Option 1

First option would be to improve the existing reference system to similar type that the inbound area has. All pick-ups are ordered by the office workers, which gives the opportunity to manage timetables with the pick-ups. Inbound area is given a vehicle/container number and the incoming purchase order which they can enter to their calendar system. This way any employees are able to check what cargo the vehicle has and can start working on it immediately.

On the outbound side the calendar system would give more guidance on the pick-ups of each day, at the moment only the timetables of previously ordered containers are given to the platform employees. Specific timetables would be difficult to conduct, because the timetables of the transportation companies and the routes they sign for their vehicles vary each day.

This scenario would be most easily to be adapted to the existing operations and give more possibilities to control the supply chain. The SSCC codes of the pallets would still be scanned to the excel files and filed. This will give the opportunity for Fiskars to prove that the pallets and cartons have been picked up from the warehouse in a certain pick-up, because all the SSCC numbers are individually created for each pallet or carton and can be found from the SAP ERP system of Fiskars.

### Option 2

Second option would be to check if there is a possibility to adapt a new system that requires the drivers to enter the required reference number to a computer, which would give the exact information of that specific shipment. This would leave the human errors to a minimum because the drivers will be forced to use the references.

The employees at the loading dock would not need to investigate what the driver is picking up from the distribution center. This gives the employees the opportunity to concentrate to the management of the overall process at the dock.

If this type system would be adapted in the warehouse, it would need that the assistants working in the office would enter all needed information of the specific shipment. The export and import formalities would be handled directly with the transportation companies.

As the problem has been that the drivers don't have the references nor are they willing to resolve it. This system would remove the optionality of having the reference and makes it mandatory to all entering drivers.

#### Option 3

Third option would be to optimize RFID technology to the distribution center. But when investigating this more thoroughly for it to be adaptable to the operations, which the picking and packing process should be only mainly full pallet collection. At the moment the picking and packing process includes cartons, mixed pallets (which means that different stock keeping units (SKUs/products) are packed to the same pallet) and full pallet collection.

The RFID tags could be placed to the full pallets when they arrive to the warehouse. But if any mixed pallet or carton shipments, this would need to make new tag to the shipment. RFID technology is extremely expensive at the moment, but it would improve the track and trace process to be more secure. This RFID technology would need the co-operation of all forwarders or the change to only one forwarder.

#### Option 4

Fourth option is more futuristic and could be adapted maybe after 10-15 years. As the globalization gives the opportunity to ship goods to globally, it also enables the risk of persons arriving to the warehouse without identification as the situation is currently. This scenario would use biometrics such as facial recognition and fingerprint technology in order to identify the drivers from any country.

This is a hypothetically thought if it would be adaptable in a medium sized distribution center. This would bring the problem of the classification of the data, because all drivers have private security and the information cannot be allowed to be used by everyone at the distribution center. The employees that have access to the classified data need to have their backgrounds checked and have the obligation of confidentiality that they will not distribute that information forward in the company or to outside the company.

## 8 Recommended actions

Even though the operations in the outbound loading dock are working as they are at the moment, there are potential ways to improve the actions. The security and safety of the employees is a priority and improving the operations and restricting the movements of the outside persons will enhance it further.

The operations of the platform should be more closely investigated with the employees and think about ways how above suggestions could be slowly adapted to the current operations. The first step the Fiskars needs to do is improving the communication between workers and making coherent ways of working. When all employees are working coherently, the operations in the loading dock will be able to be more controlled.

The reference system has been revealed itself to be a working system, but Fiskars needs to ensure that the reference is required by the platform workers in each occurring pick-up. If the drivers don't have the unique reference of the system, they need to be turned away from the warehouse and request a new pick-up time. A situations where the employees aren't sure about the shipment what is being picked up but they release it anyway needs to be eliminated.

The control of the drivers wandering in the warehouse has to be enhanced. As earlier mentioned, when the drivers get in the warehouse they aren't guarded. Fiskars can require for the drivers to wait in their trucks' cabin, or other solution is to make a fenced area for them to wait in.

One other risk point was found to be the lack on tracking of the electronical keys. The client should create more efficient way to keep track of the keys and the time that they are able to be used. The risk is small, but it still needs to be taken into consideration.

Earlier in the report was mentioned the ISO 28000 standard, which the case company has not taken into practice. This standard would give the company better understanding of their security issues and them to be checked annually. With the supply chain security management systems the company could find the supply chain risks easier. The organization could carry out risk assessments and apply necessary actions of control through other management tools i.e. document management, performance indicators, internal audits and training. Fiskars could also consider joining to the TAPA-organization.

By auditing the operations of the entire warehouse, it could have a significant impact to the safety and security of the case company.

## 9 Future development

Fiskars has the potential to enhance and improve its supply chain. The improvements will also enhance the security and safety of the employees which is a priority. The knowledge of the employees working in different sections of the warehouse gives opportunities to improve the actions in more operative way.

The next step is to create a development team of the platform employees, management and office workers for finding different ways to improve the co-operation and actions. There needs to be a coherent way of working that all employees follow without exceptions. If any of the above suggestions are considered by the employer, there should be created instructions for the outbound workers of what needs to be done in each possible situation that they could face.

If there is a situation that there aren't the unique reference given, the employer should find out if there is a possibility to copy and archive the drivers passport or driving license. There are legal issues that should be taken into consideration but this could be an option if there is an unclear situation and no reference available.

The objective is to minimize the possibilities that the supply chain would have any risk points. The co-operation between forwarders has a significant impact to the smooth operation of the pick-up. The ideas given to the employer are simple, but even small ideas can have a significant impact in the operation model that they have.

Globalization will bring more challenges to secure the supply chain more efficiently. Technology will improve which will give more opportunities for organizations to have better management systems of operations and facilities. If Fiskars decides to move the warehouse after the leasing is over, it can be an opportunity to change the layout and operations of the facility more efficient than what it currently is.

## 10 Self assessment and employers comments

The topic of this research was a both personal the creator of this thesis and the employers interest into improving the current ways of working. Working at Fiskars has given an opportunity in seeing the problems in more depth than as an outside person. This thesis has given new aspect to my own ways of working in the Fiskars warehouse and the interest to improve the actions in order to make my own work easier. When talking with employees it gave more aspect to the problems that are currently occurring.

Even though I am an office worker at Fiskars and I have a lot of experience about logistics and supply chain, this study has widened my perspective about the total process and what needs to be taken into consideration.

The ideas that I gave to the employer were very simple, but I had the idea that even small improvements could have a significant impact to the process of the warehouse. These ideas could also secure the supply chain further. I would like for all employees to work in each section of the warehouse, to widen their perspective as well.

When discussing about the issues with the head manager of the warehouse, he agreed with idea about the coherent ways of working. This is a simple action, but it will clear the ways of working for the employees. After presenting my case and suggestions, he reviewed and gave his estimate of the usability of the research:

*“This work is a pragmatic review of the safety and security of the distribution center. The models presented in the work have been the starting point for improving certain security and safety issues. For some of the proposals, measures have already been taken to.”*

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