



Safety Park Kotka as a Factor in the Comprehensive Security of the City of Kotka

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The purpose of this thesis is to investigate how Safety Park Kotka answers to the City Strategy of the City of Kotka. Ultimately, this thesis researches the current level of harbor logistics occupational safety and occupational safety training and the relationship between occupational safety training and its effects on the comprehensive security of the City of Kotka by implementing Safety Park Kotka as a factor of the comprehensive security of the city. This thesis was commissioned by the City of Kotka.

The scientific approach of this thesis uses literature review, a survey and a semi-structured interview as research methods. The survey was conducted in cooperation with the Port of HaminaKotka Ltd during summer 2020.

The results of the research indicate that there is a significant need for improvement to the current occupational safety training culture provided in harbor logistics that introduces a more pragmatic and regular culture of occupational safety training. Safety Park Kotka together with the Virtual Safety Park platform provides a more inclusive selection of occupational safety training that is tailored for the user's needs. Safety Park Kotka supports the City Strategy of the City of Kotka in relation to operating as a communal educating environment, utilizing digital means and tools and supporting the sustainable values introduced in the City Strategy.

In the future there is a possibility to further investigate the effects of Safety Park Kotka in relation to the city's comprehensive security, when Safety Park Kotka is in full operation and the effects can be seen practically. Safety Park will launch in Kotka Old Port in 2022.

Keywords: Occupational safety, occupational safety training, safety park, harbor logistics

MeriSade Kuusela

Turvapuisto Kotka osana Kotkan kaupungin kokonaisturvallisuutta

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Tämän opinnäytetyön tarkoituksena oli arvioida, kuinka Kotkan Turvapuistohanke vastaa Kotkan kaupungin Kaupunkistrategian asettamiin arvoihin ja tavoitteisiin. Työn keskittyminen painottui satamalogistiikan työturvallisuuskoulutuksen nykytasoon ja työturvallisuuskoulutuksen vaikutukseen Kotkan kaupungin kokonaisturvallisuuteen sisällyttämällä Kotkan Turvapuisto osaksi Kotkan kaupungin kokonaisturvallisuutta. Työn toimeksiantajana toimi Kotkan kaupunki.

Työn tutkimukselliseksi lähestymistavaksi valittiin kolme tiedonkeräysmenetelmää: kirjallisuuskatsaus, kyselytutkimus ja haastattelu. Kyselytutkimus toteutettiin yhdessä HaminaKotka Satama Oy:n kanssa kesällä 2020.

Tutkimustulokset osoittivat, että satamalogistiikan nykyisessä työturvallisuuskoulutuskulttuurissa on huomattava kehittämismahdollisuus erityisesti koulutuksen käytännölläisyyden ja säännöllisyyden saralla. Kotkan Turvapuistohanke yhdessä Virtuaalinen Turvapuisto-hankkeen kanssa mahdollistavat koulutusalueen, joka tarjoaa laajat mahdollisuudet tulevaisuuden työturvallisuuskoulutuksessa, joka on muokattavissa vastaamaan laajaa käyttäjäryhmää. Kotkan Turvapuistohanke tukee Kotkan Kaupunkistrategiaa tarjoamalla yhteisöllisen koulutusympäristön, hyödyntämällä digitaalisia välineitä ja työkaluja, sekä tukemalla ympäristöystävällisiä arvoja, jotka on esitelty Kaupunkistrategiassa.

Jatkotutkimuksena Kotkan Turvapuistohanke vaikuttaa Kotkan kaupungin kokonaisturvallisuuteen voidaan, ja tulisi, tutkia, kun Turvapuistohanke on valmistunut ja käyttöön otettu ja hankkeen vaikutukset voidaan nähdä käytännössä. Kotkan Turvapuisto avataan käyttöön Kotkan Kantasatamassa vuonna 2022.

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List of terms, abbreviations and symbols

Safety - the condition of feeling and being protected from danger, risk or injury

Security - freedom from potential harm

Hazard - a danger or a risk

Comprehensive security - a state in which there is a comprehensive preparedness against threats and risks against the society

RDI - Research, Development and Innovation

PESTLE - Political, Economic, Social, Technological, Legal, Environmental

EAKR - Euroopan aluekehitysräho (European Regional Development Fund)

ESR - Euroopan sosiaalirahasto (European Social Fund)

EHSQ - Environmental Health, Safety and Quality

City Strategy - a strategy for the development of a city approved by the City Council

Occupational safety - the legal right of working under safe conditions

Occupational accident - an unexpected injury caused by an external factor in a working environment

Harbor logistics - the acts of organizing, shipping, transporting and operating in, to or from a harbor setting

Harbor Logistics Safety Park - an educational environment specialized in the occupational safety training of harbor logistic employees and operators

Virtual Harbor Logistics Safety Park - a virtual environment specialized in the occupational safety training of harbor logistic employees and operators

1 Introduction

This thesis introduces occupational safety training as a part of a city's, in this case the City of Kotka, comprehensive security. Comprehensive security in this thesis is defined by the definition of The Security Committee (2017) as a state in which there is a comprehensive preparedness against threats and risks against the society. The results of this thesis are based on literature reviews, questionnaires to harbor logistics employees, interview with Kotka Energy Ltd and observations made in the project Harbor Logistics Safety Park Kotka.

The Occupational Safety and Health Act states that the objective of occupational safety is to improve the working environment and working conditions in order to ensure and preserve the working capacity of employees as well as to prevent occupational accidents, which is defined as an unexpected injury caused by an external factor in a working environment, and diseases and eliminate other hazards from work and the working environment to the physical and mental health, hereinafter referred to as health, of employees (Finland, Occupational Safety and Health Act, 738/2002, section 1).

As defined by Kotka Old Port, safety is an active and constantly evolving act of cooperation. Safety Park Kotka will act as a training, educating and testing environment that aims to serve multiple target groups comprehensively. This development project started from a need to create an educational training space that serves as an environment for the practicing of occupational safety related operations. The functionality and accents of Safety Park Kotka are based to the strength of the Kymenlaakso regional area and the strategy of intelligent design (Kotkan Kantasatama, 2020).

This thesis is written in cooperation with Safety Park Kotka, South-Eastern University of Applied Sciences - Xamk and the City of Kotka. There is a clear need for a development project that serves the competitiveness and safety and security needs of harbor logistics operators in preventing occupational hazards and accidents and educating harbor logistics personnel in correct ways of operating when it comes to working safely. The central research objective of this thesis is to better the understanding of the relationship between occupational safety training and its effects on the comprehensive security of the City of Kotka by implementing Safety Park Kotka as a factor of the comprehensive security of the city and was chosen in cooperation with the director of technical services division of the City of Kotka. The results of this thesis will act as a part of the research base in the planning and implementing phases of the Safety Park, that will start its operations in Kotka in 2022, at the same time as the new Kotka campus of the South-Eastern Finland University of Applied Sciences, which is being built to the Kotka Old Harbor at the time of writing this Thesis.

1.1 Research partners

This thesis was conducted in cooperation with the City of Kotka and the South-Eastern Finland University of Applied Sciences - Xamk. In addition, the questionnaire completed during the research was conducted in cooperation with the Port of HaminaKotka, who distributed the questionnaire to their harbor logistics employees. This chapter shortly introduces the City of Kotka and the South-Eastern Finland University of Applied Sciences - Xamk. The Port of HaminaKotka will not be separately introduced to this chapter, since the questionnaire results are thoroughly investigated in chapter 6.

1.1.1 The City of Kotka

Kotka is a city located in the southern part of Kymenlaakso region of Finland. The city is known for its major harbors and industrial field and has the volume of harbor traffic of 16,2 Million tons (2018) (Kotka City Strategy 2025, 2018). As an organization, the City of Kotka is directed by the city council. This thesis is done in cooperation with the director of technical services division of the City of Kotka, Vesa-Jukka Vornanen, in the Safety Park Kotka-project that started in early 2019. The city joined the project in January 2019.

1.1.2 South-Eastern Finland University of Applied Sciences - Xamk

South-Eastern Finland University of Applied Sciences - Xamk (later Xamk) offers education in 74 bachelor level degree programs and masters level degree programs. Xamk operates in four cities around Finland: Kotka, Mikkeli, Kouvola and Savonlinna. In addition, Xamk takes actively part in research and development projects and conducts up to 250 ongoing projects annually, focusing in four different areas, making Xamk the leading RDI-university of Finland. The focus areas are logistics and seafaring, sustainable well-being, digital economy and forest, the environment and energy. The research conducted in this thesis was done in cooperation in the area of logistics and seafaring, in the RDI-project of Virtual Safety Park Kotka.

1.2 Research questions

This study is divided into two areas of focus. The first category focuses to safety and security in the City Strategy of the city of Kotka, defining the values and goals that the city has laid out for the comprehensive security of the city. The second category focuses to the current level of harbor logistics safety and security looking broadly at the national level, but focusing in the Port of HaminaKotka, giving us a picture of the strengths and weaknesses that harbor logistic employees and operations are experiencing and the possibilities presented in the Safety Park Kotka project, which is a project conducted by the City of Kotka to create an occupational safety training platform focused in harbor logistics. These two categories will then give us the possibility to answer the questions

“Does Safety Park Kotka support the strategic plan of the City of Kotka?” and

“How does Safety Park Kotka support the strategic plan of the City of Kotka?”.

This thesis examines comprehensive security from the point of view of Safety Park Kotka and its operations and does not include other factors such as crime outside of the harbor areas, when examining the Safety Parks effects on the city’s comprehensive security.

2 Theoretical framework and knowledge base

This chapter will introduce the theoretical framework and knowledge base of the thesis by presenting known previous accidents related to logistics and harbor logistics operations, as well as introduce the key factors in harbor areas, such as the working environment and the most common factors leading to occupational accidents in harbor areas. The purpose of this chapter is to present the need for this research and the Safety Park Kotka project.

In Finland, during years 2005-2014 there were 77 reported workplace deaths related to logistics and transport, during year 2018 a total of 7 758 occupational accidents were reported, with 2019 continuing with very similar statistics with 7 759 reported occupational accidents. Most accidents were reported in the age group of 25-29-year old’s (Finnish Workers’ Compensation Center, 2019). Most usual working place accidents in logistics and transport are caused by falling, jumping, slipping or tripping, sharp objects, moving loads by hand and losing control of machinery or vehicles. These accidents most often result to dislocated limbs or body parts, cuts, scratches or other surface injuries, jolts, concussions or internal wounds and broken bones (Finnish Workers’ Compensation Center, 2019). Most of these accidents are preventable, which demonstrates the importance of effective safety training.

When investigating occupational accidents in the maritime logistics field, it is much harder to get a clear picture of the amount and severity of the accidents due to a lack of one specific reporting system. Stuuva operated as a maritime accident database during the years 2005-2009 and estimated a yearly amount of 500 occupational accidents with a yearly average of one occupational death in maritime operations and logistics. As presented in the figure (Figure 1) below, during 2008 out of the reports given to Stuuva, 1 % reported environmental hazards, 4,5 % material loss, 6,5 % minor occupational accidents, 19 % occupational accidents and 69 % dangerous situations. Harbors host pedestrians, cyclists, cars, machinery, trucks, trains and possibly ship passengers. Heavy loads, intersecting traffic and restricted visibility cause the most occupational risks in harbor areas. Most often the accidents in maritime logistics are related to harbor traffic causing the risk of collision, items left on tracks causing the risk of trains derailing from the tracks, carelessness in attaching cargo or handling cargo, neglecting protective gear and maintenance and employees being exposed to chemicals. As to work

place deaths in maritime logistics, the cause of deaths most often reported have been falling, slipping or being pushed to cargo holes causing a fall of several meters to a hard surface, getting crushed, being struck or impact between machinery due to a lack of visibility or neglect and drowning, due to falling or driving to the water from the pier (M. Salokorpi, J. Rytönen, 2010).

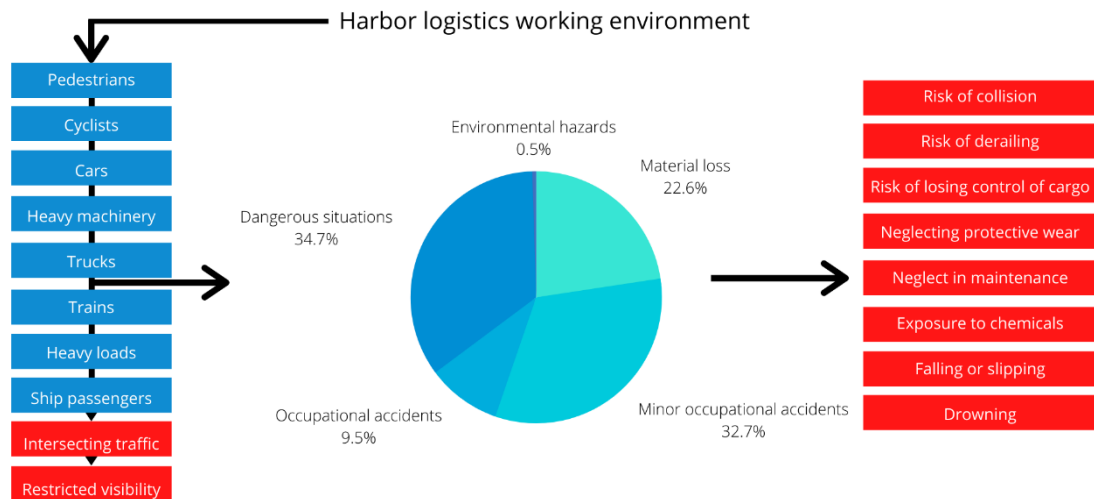


Figure 1 Harbor logistics occupational accidents visualized, Stuuva 2008

Ultimately, these statistics presented above validate this thesis as an aspect to better comprehend the need and value of the Safety Park Kotka project as a factor in bettering the comprehensive security of the City of Kotka as an element focused in occupational safety and wellbeing.

As discussed before, the research objective was defined in cooperation with Vesa-Jukka Vornanen, the technical director of the City of Kotka. The final research objective was a result of multiple meetings with Vornanen and other city representatives, Safety Park Kotka steering group meetings and discussions and research conducted in cooperation with Xamk. In this thesis, the theoretical framework is defined as the general research objectives and the knowledge base, that has developed throughout the conducted research.

In theory, to gain an overall understanding of the research objective, a research was conducted of the level of occupational safety on the national level in the fields of maritime and logistics, with the results being presented earlier in this chapter. To gain a more specific picture of the phenomenon, a questionnaire to the employees of Port of HaminaKotka took place early on in the research process, which was thoroughly analyzed by comparing different age-groups, differences in positions and through other factors, that have been further explained in chapter 5.2. A semi-structured interview with Kotkan Energia was conducted to better the

understanding of good occupational safety measures. Kotkan Energia was chosen due to the reason that their work in occupational safety has had a noticeable increase in the recent years. In addition, the City of Kotka's city strategy was investigated to gain an understanding of how the occupational safety training provided by Safety Park Kotka will answer to the city strategy as a factor in the comprehensive security of the city.

Kananen (2013, 131) defines theoretical framework as the knowledge that previously exists from the researched phenomenon. The knowledge base for this thesis has developed throughout both the planning phase and the research process and is a combination of working life experiences, discussions, research conducted in the Safety Park Kotka and Virtual Safety Park Kotka projects, literature and other, previous research conducted in the field.

2.1 Kotka City Strategy

This chapter introduces the City Strategy of the City of Kotka, to create a basic level of understanding of the subject, by introducing the aims and values of the Strategy and considering what parts of the City Strategy are supported by the Safety Park project, which is further introduced in chapters 2.1.2 and 2.1.3. This chapter will focus on only parts of the City Strategy, concentrating to the themes that are linked to the comprehensive security of the city.

The values in the 2025 City Strategy of Kotka are stated as courage; enthusiastic, daring and renewed, love; caring for the homeland and its residents, through joy, and fairness; which means equality, sustainably and acting with a local attitude. The values are realized by the vision and five strategic choices, which are introduced as buoys. In its vision, the city expresses its will to be a pathway to new opportunities. The vision refers to the common will that political decision-making implements. The buoys are translated in this thesis as "learning and striving Kotka" (oppiva ja yrittävä Kotka), "the gorgeous environment of Kotka" (upeat elinympäristön Kotka), "everyone's Kotka" (yhteinen Kotka) and "eKotka". The five strategic choices, or as the strategy expresses, "the buoys" and the vision refer to a safe course of action in line with the service promise. Together, these six points can be used as PESTLE perspectives to evaluate the implementation of the city strategy in all circumstances. The service promise indicates the way to operate: "We manage the city group's finances in a balanced way and safeguard competitiveness. We implement a responsible and long-term ownership policy. We consider the environment, sustainable development, safety and accessibility in everything we do".

Buoy 1, *learning and striving Kotka* aims to bring the city, its residents, entrepreneurs, universities and other educating parties together to conduct open-minded cooperation and to create new ways of working in cooperation with national and international partnerships, working life representatives and educational communities. In addition, creating healthy and inspirational learning environments with the users of public spaces and developing the

requirements of operating in cooperation with companies, concerns and educational communities. The city of education, lifelong learning and entrepreneurship creates the conditions for a good life and encourages renewal.

Buoy 2 and Buoy 3, *everyone's Kotka* and *the gorgeous environment of Kotka* work to create community spaces and utilizing them in the city operations. These community spaces aim to create discussions between different actors, such as decision makers, city personnel, residents, companies and other stakeholders while leading an open and transparent change in the work- and operational culture. The city of first-class living environment, culture and events gets people moving and in a good mood. Working together and experiencing good spirited encounters, the city inspires action and supports the well-being of all.

Buoy 4, *eKotka* utilizes digital means and tools to bring different actors together and to support dialogues between these actors.

Buoy 5 refers to a sustainable economy that creates the basis for the vitality of the city and the well-being of its residents.

2.1.1 Harbor logistics

According to Logistiikan Maaailma, a harbor is the crossing point that connects the traffic at sea and on land. Harbors contain a numerous amount of different actors, that affect harbor logistics. At best, a harbor is a strong infrastructure of docks, storage facilities, communication channels, railways and people, who create a solid base for reliable harbor logistics services.

Authorities, such as the Finnish Transport and Communications Agency Traficom supervise ships and are responsible of the condition and proper markings of fairways. The border patrol, police and environmental authorities monitor the legality of the actions in harbors and execute, e.g., crime prevention in their respected areas of responsibilities (Logistiikan Maaailma).

Harbors are the most significant factor in the foreign trade of Finland. The competitive edge that Finland offers in logistical performance is a combination of seamless international and national chain of operations, that is supported by information sharing and online platforms. According to Statistics Finland, during the year 2019 an amount of 101,3 million tons of cargo passed through Finnish harbors, accompanied by 19,1 million passengers (Statistics Finland).

2.1.2 Safety Park Kotka

The South-Eastern University of Applied Sciences Xamk, the Joint Authority of Education of Kotka-Hamina Region Group EKAMI, Steveco Ltd, the Port of HaminaKotka Ltd and the City of Kotka have prepared a Safety Park-project. The focus group of the project consists of

companies that operate in the harbors, authorities, workers, Ekami and Xamk students, and even the residents of the city. Funding from EAKR- and ESR-sources has been applied to carry out the project. The Safety Park aims to support the innovation strategy KYMRIS3 and the controllability of the comprehensive security of the city through a focus of harbor logistics, by improving and standardizing the controllability of occupational safety and security, especially in harbor areas. The safety park is a whole, a portfolio of possibilities, where the first project is a Virtual Harbor Logistics Safety Park. Standard SFS ISO 45001:2018 provides a guideline in improving the health and safety of employees, reducing workplace risks and creating a healthier and safer working environment based on systematic planning of actions taken in the workplace, controls, measurement and improvement.

The Safety Park will be placed in Kotka Old Port (Figure 3), in a port's storage building with an area of 8,800 square meters and a volume of 90,000 cubic meters. Approximately 35 % of the building will be in terminal- and authorities use and 65 % will be in the use of the Safety Park. The surface of the Safety Park will be over half an acre, that will be used in training and testing activities. A cafe, training areas, lavatories and technical spaces will be placed in the heated areas of the building. I-5 (Figure 2) provides a possibility of all year around use of the Safety Park and its services.



Figure 2 Harbor Logistics Safety Park, Kuuri I-5, Kotkan Kantasatama

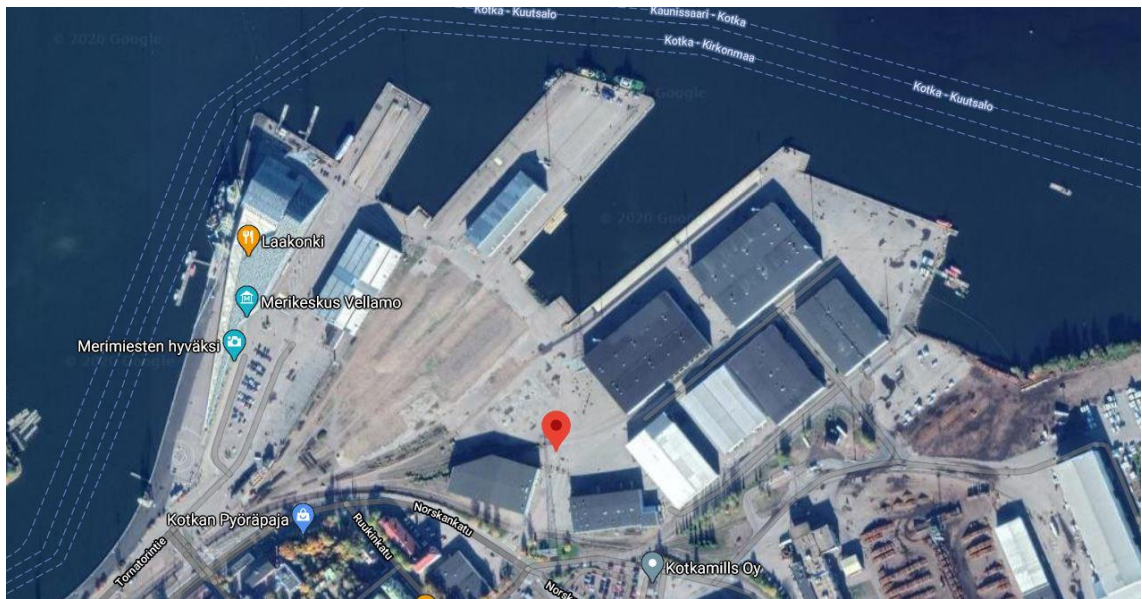


Figure 3 Google Maps picture of the area, Kotkan Kantasatama

2.1.3 Virtual Harbor Logistics Safety Park

In addition to the Safety Park, a Virtual Harbor Logistics Safety Park (later Virtual Safety Park) is in development at Xamk. The virtual platform will act as a supporting element to the Safety Park by combining elements from the real and the virtual world (Figure 4). Evidently, the Virtual Safety Park is a gaming platform that simulates combined threats and their consequences. The gaming platform is based on a physical as built model. The Virtual Safety Park provides the possibilities for a cost-effective way for different organizations safety training. The Safety Park and Virtual Safety Park create an internationally unique concept in occupational safety training, and which support the implementation of city's strategic aims, core functions and systems. (Vornanen, 2017;2018;2020;2021, Vornanen et al, 2018).



Figure 4 Virtual Harbor Logistics Safety Park, view from a virtual straddle carrier

2.2 Occupational safety

To better the understanding of occupational safety and the importance of occupational safety training, this chapter explains occupational safety as a whole. The aim of this chapter is to introduce the requirements of both employers and employees to ensure a safe working environment to all.

Every employee has the right to work safely. Occupational safety aims to ensure everyone's wellbeing and safety at workplaces, and laws and acts, such as the Occupational Safety and Health Act, protect these rights and create a baseline for measures, requirements and implementation of occupational safety for employers and employees. The Centre for Occupational Safety states that "the occupational safety and health policy defines the goals for the occupational health and safety work in the workplace and for activities that promote the working capacity of the staff".

The general objective of occupational safety is to, voluntarily and partly under law, prevent, lessen and remove hazards and factors that negatively affect to one's health from the working environment. At its best occupational safety improves the physical and mental health and safety and security of an employee, while supporting work morality. Occupational accidents can also have a financial affect, not just directly to the employee's financial well-being, but also to the company's and to the society (The Centre for Occupational Safety).

As stated in the Occupational Safety and Health Act regarding occupational safety training, employers shall give their employees necessary information on the hazards and risk factors of the workplace and ensure, taking the employees' occupational skills and work experience into consideration, that the employees receive an adequate orientation to the work, working conditions at the workplace, working and production methods, work equipment used in the work and the correct method of using it, as well as to safe working practices, especially before the beginning of a new job or task or a change in the work tasks, and before the introduction of new work equipment and new working or production methods (Finland, the Occupational Safety and Health Act, 736/2002, section 14). According to the Centre of Occupational Safety, the employer is responsible in ensuring that the place of work is safe and promotes health. This means that the employer must be aware of the hazards and dangers of the workplace, as well as the management of these hazards and dangers, as well as ensure that all employees have the necessary information and skills to perform their work safely. The employee's responsibility in occupational safety is to follow the safety instructions provided and to promote their own and other employee's safety by acting in a well behaved and attentive manner (The Centre for Occupational Safety).

3 Research process

This chapter will introduce the research process of this thesis, which took place in 2020, to gain a general understanding of the steps taken to reach the knowledge base and the valid results of the research.

The research process began with the selection of the scientific approach in cooperation with the client. The following phases of the process, planning and creating a knowledge base, which included multiple researches such as creating an overall picture of the national level of occupational safety in maritime and logistics, investigating the Safety Park Kotka projects planning phase and the city strategy of the City of Kotka, defined the nature of the research process and the implementation of the research, which then was analyzed to create a baseline of what the aim of the research would be and within what limitations the research process would be conducted in. The second section, semi-structured interview with Kotka Energy Ltd and Port of HaminaKotka employee's questionnaire broadened the existing knowledge base and when analyzed, gave a realistic picture of the level of occupational safety in the City of Kotka in maritime and logistics. The analysis phase and final reporting provided answers to the research questions.

The research process has been visualized in the figure (Figure 5) below.

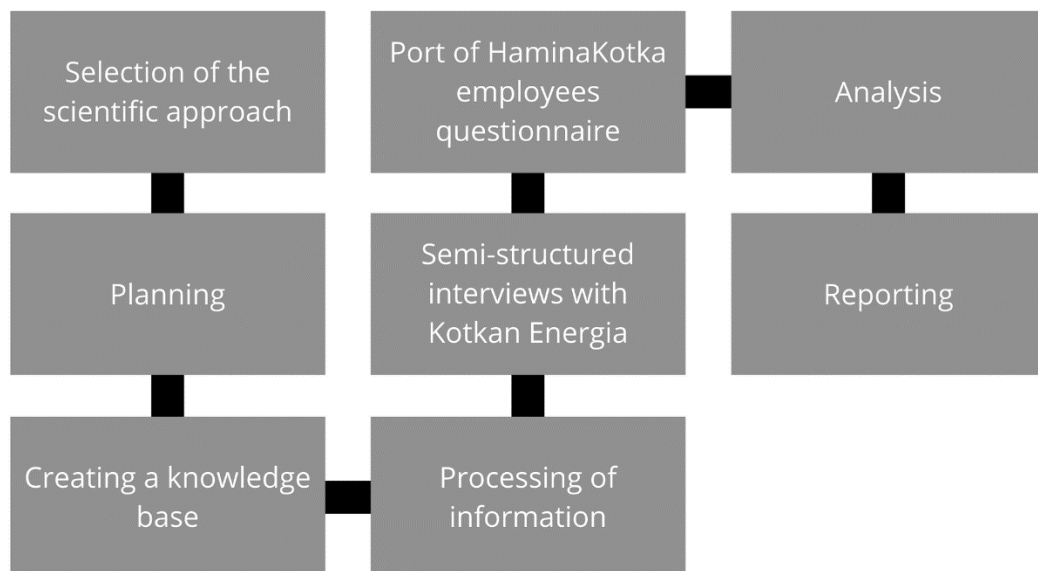


Figure 5 Research process

3.1 Scientific approach

Scientific approach, or methodology, answers a question, or questions, that have been extracted from a problem to solve the initial problem. The scientific approach of this thesis is

research. According to Kananen (2013, 20) research is not a scientific approach itself, but is a mixture of multiple research methodologies including qualitative and quantitative research methods. This method can also be referred to as “mixed methodology”. Hesse-Biber (2010, 3-4) states that the mixed methodology includes collecting, analyzing and integrating data, both quantitative and qualitative, in a single- or multi-phase study, by examining one research question by using multiple methods that improves the conclusions that are withdrawn from the research.

The research methods used in this thesis are literature review, questionnaires and an interview. The aim in combining these three methods is to gain a comprehensive understanding of the phenomenon and gain answers to the research questions chosen in cooperation with the client.

3.2 Research methods

The first method used in this thesis was the literature review. The literature review took place during spring and summer 2020 and was finalized in July of 2020. This phase of the research built a general knowledge base of the subject. Partly simultaneously a questionnaire was conducted in cooperation with Xamk and the Port of HaminaKotka, that collected information related to the subject on a local level. The third method was a semi-structured interview, which gathered information related to improving occupational safety at a workplace. The following chapters will provide a more in-depth explanations of the methods used during this research.

3.2.1 Literature review

The purpose of a literature review is to get acquainted with all already existing material that is relevant to the research subject to build a comprehensive level of understanding of the topic. Literature review collects all the data necessary to form a foundation for a new research and new results. A literature review serves as a foundation for new research results or, in case of similarities, as a means of validation of the new conducted research. This thesis used literature review as an introduction and a knowledge base to the primary research topic. Due to the fact that there are no known prior researches done that examine the relationship of occupational safety training in relation to the comprehensive security of an area, the literature review acted as a base of general knowledge instead of a comparison between previous research and this research thesis.

3.2.2 Semi-structured interview

According to an article by the Balanced Careers (2020), a semi-structured interview is a meeting in which the interviewer and the interviewee discuss the topic in a more open setting. A

semi-structured interview does not follow a strict list of questions but utilizes open-ended questions to allow two-way communication between the participants. The interviewee can also present questions during a semi-structured interview, which offers the possibility of a deeper understanding of the topic to the interviewer, rather than the gained information being strictly being limited to certain questions and key words. (The Balanced Careers, 2020)

3.2.3 Questionnaire

A survey is an excellent instrument when measuring attitudes and orientations of large amounts of people in a short period of time. A survey often consists of multiple questions that are often modified to the target audience and can be conducted in person, traditionally with a pen and paper or online, and can include both open-ended questions, which collect qualitative data and can be answered freely without restrictions, close-ended questions with, for example, yes or no-choices, multiple-choice questions, which is a type of close-ended question and scaling questions, which ask the respondent to give a value to a certain topic or question.

4 Semi-structured interview

During the research, a semi-structured interview was conducted with the EHSQ director of Kotka Energy Ltd, Niina Lehtonen. Kotka Energy Ltd is owned by the City of Kotka and produces energy, providing e.g. electricity and district heating services. The interviewee was chosen from Kotka Energy Ltd, since the company has succeeded in making remarkable improvements in their occupational safety statistics in the recent years and in 2019 was rewarded by Nolla Tapaturmaa (translation “zero accidents”)-organization for continuously improving their occupational safety. (Kotka Energy Ltd, 2020) The interview focused in the company’s occupational safety training habits, most usual occupational accidents at Kotka Energy Ltd, the changes in their occupational safety guidelines that have improved the occupational safety and the occupational safety statistics of recent years. The interview results have been translated from Finnish to English. The original interview answers can be found in Appendix 3. The interview acted as a supporting factor in answering the research questions by providing an example of successful occupational safety measures. The results of the interview were compared with the results of the questionnaire introduced in chapter 5.3 to better understand the occupational safety training needs expressed by the questionnaire respondents and the effective measures to answer these needs through Safety Park Kotka.

According to Niina Lehtonen, Kotka Energy Ltd organizes continuous occupational safety training for all their employees. Every employee of the company has an Occupational Safety Card and takes part in the online introduction training of the facilities. Every person who intends to work in the facilities must take part to the introduction training. In addition, the company

offers multiple competence trainings, such as hot work courses, electrical safety, road safety, first aid training and other trainings, that are only valid for a set amount of years, which requires the employee to participate in the trainings regularly.

Lehtonen also stated that the company continuously communicates safety related issues through their online platforms, meetings and info-sessions. Management level employees and occupational safety and health management execute safety walks in all locations and actively communicate with the employees of safety related matters.

According to Lehtonen, Kotka Energy Ltd defines an occupational safety accident as the following: accident that happens to an employee of Kotka Energy Ltd that requires attention from a medical professional and/or absence from work. During 2019, Kotka Energy Ltd had two occupational accidents, of which one led to absence from work. This accident was related to a strained back, which is listed as the most typical occupational accident in the company, accompanied by slipping or stumbling in stairs and accidents related to working with hot water or chemicals.

Lehtonen detailed that the reason to the improved safety of the company is that employees know not to take pointless risks and safety culture as a whole has been improving. The management, which is the base for occupational safety, is committed to safety and personnel has been successfully integrated into the development of the company's safety culture. Occupational safety matters are developed in a systematic matter and safety is a factor in the daily operations and discussions.

The results of the interview show that effective, pragmatic, regular and tailored occupational safety training supported by the commitment of the management will result to a higher level of safety culture at a workplace. Management commitment encourages employees to have a positive effect in the workplace safety, which will show as a decrease of occupational safety accidents.

5 Questionnaire

“Survey of occupational safety and security in harbor logistics operations” was conducted in cooperation with Xamk's RDI-project Virtual Harbor Logistics Safety Park and the Port of HaminaKotka in July 2020. The aim of the questionnaire was to gain an understanding of harbor logistics employees safety attitudes and safety culture, as well as the current level of occupational safety training in the Port of HaminaKotka. The questionnaire was distributed to all HaminaKotka harbor employees through a liaison. The questionnaire received 42 answers.

The Port of HaminaKotka is the biggest harbor in Finland, that hosts regular connections to all significant harbors in Europe, and through European harbors to all around the world, which makes the Port of HaminaKotka an effective subject of research. During 2017 the Port of HaminaKotka hosted over 2 500 ships and has over 170 operating companies in the harbor areas (Port of HaminaKotka, 2020). The following chapters will introduce the structure and the results of the survey.

5.1 Questionnaire structure

The questionnaire was created to further the understanding of safety attitudes, values and experiences of harbor logistics employees, focusing to matters of occupational safety and occupational safety training. Employees of various positions and experience levels from the Port of HaminaKotka took part in the questionnaire, which was conducted between June 6th of 2020 and July 13th of 2020.

The questionnaire was composed of 15 questions that were divided into three themes: basic information, experiences related to occupational accidents and experiences related to occupational safety. Both open ended questions and closed-ended questions were asked. The full questionnaire can be found in Appendix 1. The questions were formed with the assumption, that we would be able to gain an understanding of harbor logistics employees, foremen and operators view of the level of safety in the working environment and the level of current offered occupational safety training, as well as the safety attitudes and culture of harbor logistics employees, to gain an understanding of how Safety Park Kotka can bring value to harbor logistics occupational safety training.

5.2 Questionnaire analysis

As a method of analysis, classification was used, since it best serves as an analysis method when analyzing large amounts of information. The method provided the possibility of forming various parses and groups, that described the texture and substance of the results. The questionnaire analysis utilized quantitative research methods, since numeral values provide a clear understanding of the phenomenon and can be presented with the help of figures.

The answers gained from the questionnaire was analyzed in three groups: positions, age groups and the amount of experienced occupational accidents. The groups were decided based on an expectation of the results, that the questionnaire would show regarding each groups safety attitudes and culture. The answers of the questionnaire were divided into smaller sections in each group to allow comparison inside the groups. The division was the following: age groups (category 1); 30-39-year old, 40-49-year old, 50-59-year old and 60+ year old, job titles (category 2); longshoremen, foremen, harbormasters, safety and security personnel, operators, service workers and others. The group that investigated the effects of

experienced occupational accidents (category 3) towards safety attitudes and safety culture was divided into three groups, 0 occupational accidents, 1 occupational accident and two or more occupational accidents.

5.3 Questionnaire results

The questionnaire was answered by 42 harbor employees from the Port of HaminaKotka. 52 % of respondents had never experienced an occupational accident, 26,2 % had experienced one occupational accident and 21,4 % two or more occupational accidents in work related to harbor logistics operations. 100 % of the respondents had witnessed a hazard or an accident in the working place. Most witnessed hazards and accidents were related to risk of collision, neglect of safety gear or -vests, actions against safety instructions and neglect in maintenance. The results are presented in the figure below (Figure 6).



Figure 6 Questionnaire results, witnessed hazards and accidents in a harbor logistics working environment

The next chapters will introduce the results gained in each category individually.

5.3.1 Age as a factor in safety culture

When examining Category 1 (age groups), the expectation was that older employees (50-59-year old and 60+, which will be referred as group A) would rank the importance of

occupational safety training lower than younger groups. The expectation was based on an assumption on the changes in safety culture in the recent decades.

When asked about the current level of occupational safety in the workplace, group C (40-49-year old's) ranked the workplace safety with the highest average of 7,9 on a scale of 1-10. Group A and group B (30-39 year old's) both reached an average of 7,7. When the respondents were asked to evaluate the importance of occupational safety training and the current level of occupational safety training that their employer provides, group A and B gave the lowest singular answers that lowered their averages. The lowest average in estimating the importance of occupational safety training was in group B with an average of 7,7. Group B was also the least satisfied of the current level of occupational safety training in their place of work.

In general, there are very little differences in the results when comparing the responds of different age groups. As a conclusion, when comparing the differences between age groups, group A experienced harbor logistics as a working environment especially safe, even though group A had experienced significantly more occupational accidents than the other two groups. Group B ranked the importance of occupational safety training as the lowest and was also the most unsatisfied to the current level of occupational safety training, which possibly affects the attitudes towards the importance of occupational safety training. Group B gave the lowest averages throughout the questionnaire, which indicates a lower level of safety culture. Group B was the only group in the comparison that reported zero occupational accidents, unlike groups A and C. The results in Category 1 proved the initial assumption as false. The results are pictured in the figure below (Figure 7).

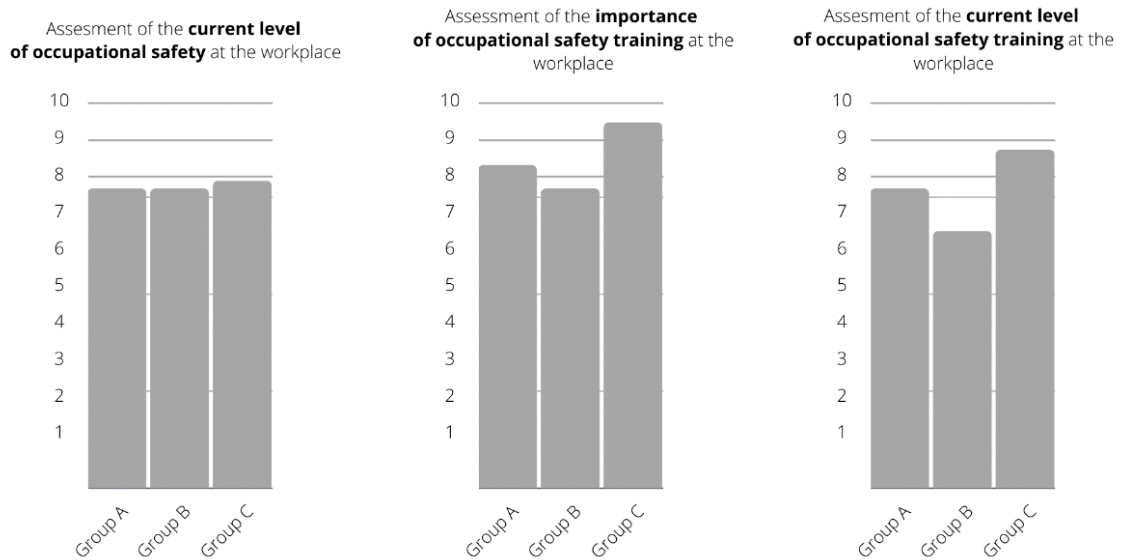


Figure 7 Comparison of age groups average values of the questionnaire results

5.3.2 Differences in safety culture between positions of work

Category 2 compared differences towards safety matters in comparison of positions of work. The assumption was that employees who rank lower in the organizational chart would see occupational safety and occupational safety training as a lesser factor than managers and other employees in higher positions. The biggest representation, a total of 13 respondents, reported “longshoreman” as their position of work. The rest of the respondents were, based on their position, divided into six groups: management (10), harbor master (5), safety and security employee (4), operator (4), services (3) and other (3).

Longshoremen reported the most experienced occupational accidents, with 92,3 % of the group having experienced at least one occupational accident in their harbor logistics place of work. The second most occupational accidents were experienced in services. All respondents in service positions reported, that they had experienced an occupational accident that resulted to absence from work.

When asked of the current level of occupational safety at their workplace, the differences between groups were much bigger than when comparing differences between age groups. Safety and security employees ranked the level of occupational safety highest with an average of 8,7, followed by management level employees and harbor masters with averages of 8,5. The lowest averages came from longshoremen, 7,5, service employees, 7,3 and operators with an average of 7. The theme continued when asked about the importance of occupational safety training. Service employees ranked an average of 6,7, while safety and security employees gave an average of 10 and management level employees an average of 9,7. The most

dispersion was within longshoremen, who landed an average of 8,3. Four out of thirteen respondents of the longshoremen ranked the importance of occupational safety training as 6 or lower. Following the pattern, safety and security employees and management level employees ranked the current occupational safety training provided by their employer with the highest averages, with an average of 9 or higher. All other groups ranked the current safety training with an average lower than 8. Groups that ranked the current level as low hoped for a more comprehensive training entity, guiding to mental well-being at work, harbor safety walks, improvement in safety supervision and learning from examples of hazards that have already happened. The results are pictured below (Figure 8).

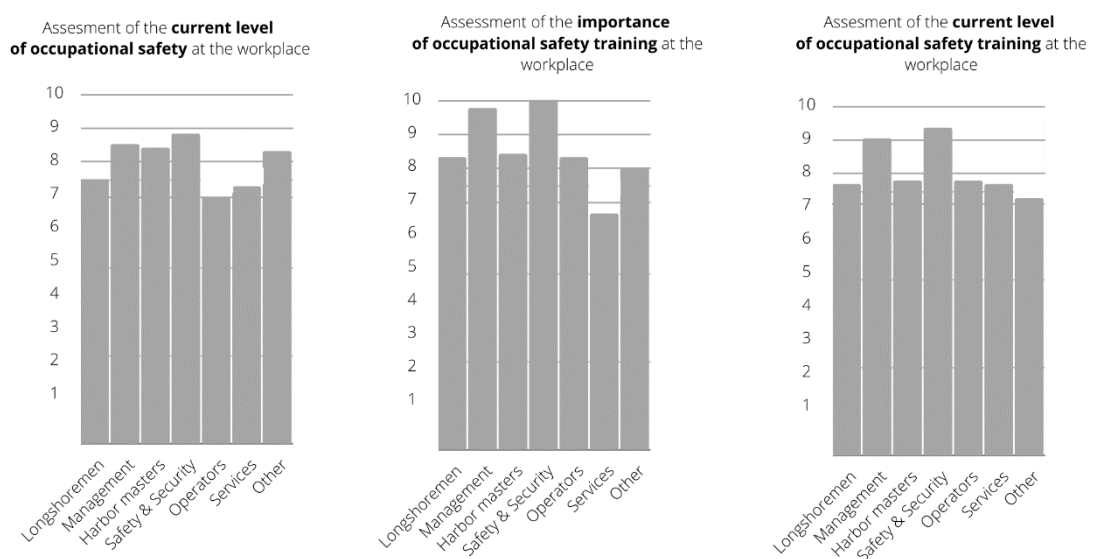


Figure 8 Comparison of the questionnaire results showing the average values given by the respondents from the examined occupations

Throughout the comparison in Category 2, management level employees and safety and security employees ranked all the factors the highest. Neither of the groups had respondents that had experienced occupational accidents. Category 2 had the most dispersion between the groups. The results confirmed the initial assumption: management and specialist level employees find harbor logistics comprehensive security to be on a much higher level than representatives of the positions that are lower in the organizational chart. This can be explained by the fact that occupational accidents more often are experienced lower in the organizational chart and occupational hazards are more visible at this level in the daily operations.

5.3.3 Experienced occupational accidents as a factor in safety attitudes

Category 3 analyzed differences between respondents who had not experienced any occupational accidents (group D), had experienced one occupational accident (group E) and had experienced more than one occupational accident in harbor logistics (group F). The hypothesis

was, that respondents who had experienced one or more occupational accidents would value the importance of occupational safety training more, than respondents who had not experienced occupational accidents.

When comparing the groups in the assessment of the current level of occupational safety at their place of work, the dispersion of the answers was as expected, although value 8 was the most answered value in all groups. On scale from 1 to 10, group D gave an average of 8,2, group E an average of 7,9 and group F an average of 7,3, supporting the hypothesis. The same pattern between the groups continued when asked of the importance of occupational safety training, group D giving the highest average of 8,9, group E an average of 8,5 and group F an average of 8,3. Some differences occurred in assessing the current level of occupational training provided by the employer, with group E giving the highest average of 8,3. The lowest average came from group F, with an average of 7,4. The lowest singular values were given in group D with values 3 and 5, but the average rose to 8,1 with 9 being the most popular value.

The hypothesis was that groups E and F, that had experienced occupational accidents prior to the questionnaire, would have a higher level of consciousness of occupational safety than group D, that had not experienced occupational accidents, was only partly correct. The hypothesis was correct when asked to evaluate the current level of occupational safety that groups E and F ranked lower, but, for example, group F was the most reluctant of the groups to report possible hazards at the workplace. The results from the question of the importance of occupational safety training did not support the hypothesis, which might be connected, similarly to Category 1, to the experienced dissatisfaction in the current provided occupational safety training. The comparison of the results is visualized in the figure (Figure 9) below.

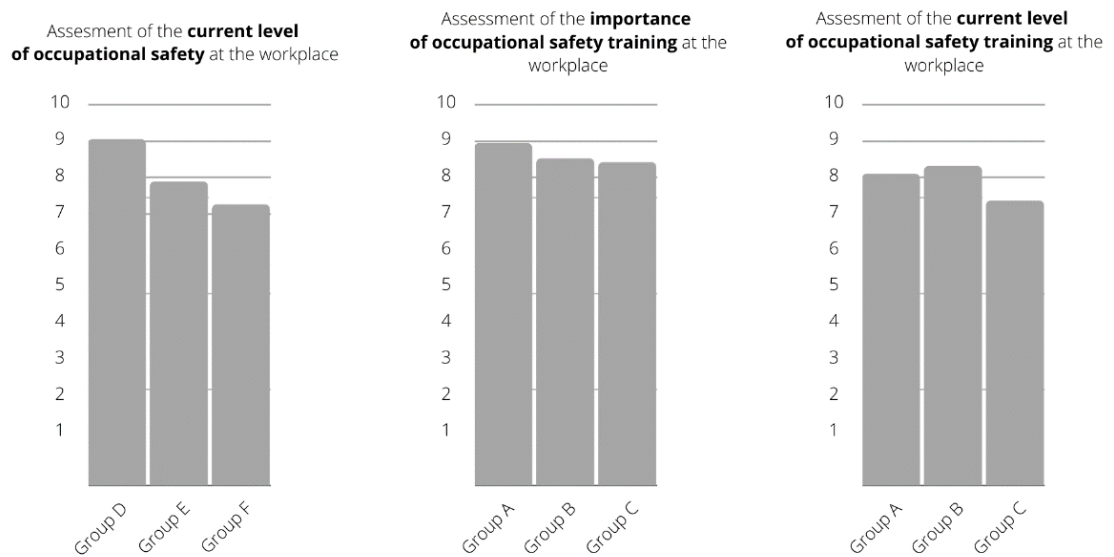


Figure 9 Contrast between average values given between groups in comparison of experienced occupational accidents

6 Conclusions

The purpose of this thesis was to research the value of the Safety Park-project in correlation with the City Strategy of the City of Kotka. Different factors were investigated throughout the study to gain a general understanding of the relationship of the two. The societal impact of this thesis is to validate and raise awareness of the importance of occupational safety training, especially in harbor logistics operations. Based on the results of the study, occupational safety training supports comprehensive security in a multi-layered way. However, further investigation of the topic is needed to see the concrete effects of Safety Park Kotka to the comprehensive security of the city, once the project is finished and in use.

6.1 Answering the research questions

The research aspect of the study was based on two central research questions:

- Does Safety Park Kotka support the City Strategy?
- How does safety park Kotka support the city strategy?

This chapter attempts to answer these research questions based on the conducted study.

From the results of the research it can be stated that Safety Park Kotka is a positive factor that supports the City Strategy of the City of Kotka in multiple ways by supporting the service

promises of the City Strategy. The Virtual Safety Park platform answers to the digital values given in the City Strategy by implementing the virtual educating platform as a part of the training provided. Safety Park Kotka is a communal training and educating environment that supports learning and well-being through occupational safety training that has an effect to the comprehensive security of the city of Kotka. This statement is supported by the survey results collected during the research process: 23 out of 42 respondents wished that their employer would improve their occupational safety training policies. The answers varied, but two common themes occurred: regularity and pragmatism in the training, which have been proven to be effective factors in occupational safety training at Kotka Energy Ltd, which is confirmed by their extremely low amount of occupational accidents. The respondents of the questionnaire also reported that learning from previous events, training that is tailored for their position and work and practical safety training would be useful in their field of work. Safety Park supports all of these learning models through the physical environment and the virtual environment.

To support regularity and pragmatism, the respondents requested continuous safety training in the model of, for example, safety walks, safety talks and monthly safety meetings with the whole staff. Out of specific trainings, First Aid 1 and 2, chemical training, safety management training and occupational safety training-card were requested. Safety Park Kotka has the possibility to offer a varied selection of occupational safety training, that would support regularity, pragmatism and practical training, through both the physical learning environment and the virtual environment, that can technically trace any previous occupational accident, including exceptional crisis situations simulations, to educate employees and managers, students and authorities of the correct actions and percussions.

Safety Park Kotka is still in the planning phase and has not yet been implemented. The results presented in this thesis open varied possibilities for future research in the subject and as the author of this thesis, I believe that future research should be conducted, especially after the implementation of the Safety Park to compare the concrete effects of the project in relation to the comprehensive security of the city.

6.2 The validity and reliability of the study

The thesis used multiple research methods, including literature review, a survey and an interview to collect data from multiple sources, which created a traceable chain of information. The research steps are described in the thesis to allow the reader to comprehend the conducted research which lead to the conclusions. This research as a whole can be seen as successful and reliable. The research gained effectively a knowledge base that allowed answers to the research questions presented priorly and gained an adequate picture of the level of

occupational safety related to harbor logistics and its affects to employees. While the research is reliable, some issues were detected in the research process.

While the survey had a standard selection of question that was sent to all respondents, the respondents had understood some of the questions differently, as expected. This resulted in not gaining answers from all respondents to all questions or gaining rather vague answers. The survey was only sent to Port of HaminaKotka Ltd employees and can only represent the current situation of other harbors in Finland partly.

This research was conducted in cooperation with the City of Kotka and the South-Eastern Finland University of Applied Sciences - Xamk with the goal of gaining a better understanding of the possibilities and needs of the Safety Park Project in the preparation and implementation phases. As a conclusion of the validity and reliability of the study it can be stated that even though the survey in the research had some minor issues and the lack of existing knowledge base related to the continuity and organization of recordings of occupational safety in the harbor logistics field, the researcher believes that the needs and possibilities of Safety Park Kotka have been studied thoroughly. This study can be utilized to conduct more in-depth research in the future, as well as a base for other similar projects.

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Appendix 1: Timetable

Date	Function	Participants	Material
10.9.2019	Initial contact to the client	City of Kotka	
19.3.2020	Partner meeting 1	City of Kotka	
20.3.2020	Steering group meeting 1	Safety Park Steering group	
27.5.2020	Beginning of the thesis	Laurea UAS	Research plan
28.5.2020	Steering group meeting 2	Safety Park Steering group	
28.5.2020	Thesis guidance	Laurea UAS	Research plan
29.5.2020	Virtual Harbor Logistics Safety Park steering group meeting 1	Virtual Safety Park Steering group	
2.6.2020	Thesis seminar	Laurea UAS	Research plan and thesis plan presentation
16.6.2020 - 14.7.2020	Questionnaire	Port of HaminaKotka	Questionnaire materials
6.11.2020	Interview	Niina Lehtonen, Kotka Energy Ltd	Notes
17.11.2020	Thesis seminar	Laurea UAS	Final presentation

Appendix 2: Questionnaire structure

1. Age
2. Gender
3. Profession
4. Years of experience in work related to Harbor Logistics
5. Have you experienced occupational accidents related to Harbor Logistics?
6. If answered yes, did the occupational accident require a sick leave? If yes, how long (in days) was the sick leave?
7. How many occupational accidents yearly would you assess to happen at your place of work?
8. Which of the following occupational accidents/close calls/hazards have you witnessed at your place of work? You can choose multiple.
 - Risk of collision
 - Items on train tracks
 - Derailing from train tracks
 - Neglectections in maintenance
 - Poorly attached cargo, accidentally discharged or falling cargo
 - Neglections in wearing proper safety or reflective gear in the harbor area
 - Exposure to chemicals or a chemical leak
 - Falling, slipping or being pushed to a cargo hole
 - Man overboard or a person otherwise falling into water
 - Actions against safety directions
 - Other, what?
9. What policy does your place of work have in place in reporting dangerous situations, hazards and/or occupational accidents?
10. If you witness a hazard or a close call, how likely would you report the situation to your manager?
11. On a scale of 1-10, how would you assess the current level of occupational safety at your place of work?
12. On a scale of 1-10, how important is occupational safety training in your opinion?
13. On a scale of 1-10, to what level would you assess the current level of occupational safety training your employer provides?

14. What type of occupational safety training, and how often, does your employer provide?
15. What type of occupational safety training you would hope your employer would provide in the future?

Appendix 3: Interview results in Finnish

Minkälaista työturvallisuuskoulutusta Kotkan Energia tarjoaa työntekijöilleen? Kuinka usein työturvallisuuskoulutusta järjestetään?

Niina Lehtonen: Kaikilla on työturvallisuuskortit ja laitosten turvallisuusperehdytys on sähköisenä koulutuksena. Sen suorittavat kaikki ketkä tulevat työskentelemään laitoksilla. Meillä on paljon erilaisia pätevyyskoulutuksia, mm. tularityöntekijöitä, sähköturvallisuutta, tieturvaa jne., joissa on tietty voimassaoloaika. Henkilöstömme osallistuu eri sidosryhmien turvallisuusaiheisiin tilaisuuksiin, mm. Energiateollisuuden tilaisuudet. Ensiapukoulutuksia järjestetään säännöllisesti.

Työturvallisuuskoulutuksen lisäksi, minkälaista ”päivittäistä” informaatiota Kotkan Energian työntekijöillä on saatavilla turvallisesta toiminnasta työpaikalla?

Niina Lehtonen: Intrassa tiedotetaan turvallisuusasioita säännöllisesti. Turvallisuus on mukana erilaisissa kokouksissa ja infoissa. Johtoryhmä ja työsuojelutoimikunta tekevät turvallisuuskierroksia toimipisteissä ja keskustelevat turvallisuusasioista henkilöstön kanssa. Tietysti turvallisuusasiat on mukana työ- ja toimintaohjeissa.

Mitkä työtapaturmat ja/tai vaaratilanteet ovat tyypillisimpiä Kotkan Energialla?

Niina Lehtonen: Selän venäytykset nostoissa, liukastumiset ja kompurointi rapuissa (meillä on paljon ritilätasoja) ja kuumien vesien ja kemikaalien kanssa työskentely.

Mitkä aikaisemmat toiminta- tai työtavat ovat aiheuttaneet työtapaturmia tai läheltä piti-tilanteita, jotka eivät enää ole käytössä?

Niina Lehtonen: Minulla ei historiatuntemus riitä siihen, että osaisin kertoa ihan yksittäisiä työtapoja. Työturvallisuuskulttuuri on kehittynyt ylipäättään ja riskejä ei oteta samalla tavalla kuin ennen. Ennen kuin käytettiin suojalaseja, silmiin kohdistuvia tapahtumia on ollut enemmän. Tikastyöskentely on myös ollut vaaranpaikka aiemmin.

Kuinka monta työtapaturmaa Kotkan Energialla tapahtui vuoden 2019 aikana? Kuinka suuri osa edellä mainituista työtapaturmista johti sairaalomaan?

Niina Lehtonen: Otetaanko tähän mukaan myös ulkopuolisen henkilöstön meidän työpisteissä sattuneet tapaturmat? Työmatkoja ei ilmeisesti lasketa tähän? Meillä tapaturmaksi lasketaan tilanne, jossa henkilö joutuu hakeutumaan terveydenhuollon ammattilaiselle ja oma ensiapu (esim. laastari) ei riitä ja/tai tapaturmasta aiheutuu poissaoloa. Näissä määritelmässä saa olla aika tarkkana, että kaikki puhuvat samoista asioista. Tapaturmien lukumäärää parempi mittari ylipäättään on tapaturmataajuus, jossa henkilöstömäärä tulee huomioitua. Jos puhutaan

pelkästä Kotkan Energia Oy:stä eikä Kotkan Energia -konsernista, omalle henkilöstölle työpaikkatapaturmia sattui vuonna 2019 kaksi kappaletta. Näistä toinen aiheutti poissaolon. Tämä poissaoloon johtanut tapaturma johtui selän venäytyksestä ja osa yhtiöitä ei tilastoi näitä tapauksia tapaturmiksi, mutta meillä tilastoidaan.