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DIGITALIZATION IN OIL & GAS INDUSTRY
CASE STUDY OF KLAIPEDOS NAFTA

Master's thesis

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Abstract

"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change"
--- Charles Darwin

Digitalization is the word on everyone's lips today. It is becoming a primary topic for firms all around the globe since digital technologies are changing every industry and its operations. In fact, it is even anticipated that companies which are unable to adapt to the digital world will become victims of so-called "digital Darwinism" and only the most adaptable, responsive companies will survive (Schwartz, 2001). Thus, in order to stay competitive, companies must evaluate the importance of digital technologies and respond to the ongoing changes in the global business.

In response to changes that digitalization has created, many organizations have already started to engage in digitalization processes, however there are still many companies that struggle to understand how to set up a digital agenda. The aim of this thesis is to substantiate the importance of digitalization and its implementation opportunities and barriers in case company KN, which is specializing in oil and gas industry. This single case study explores the research question: *"What are the challenges for digitalization at KN and how to overcome them?"*

To answer this question, a literature review as well as interviews with middle and top management across the case company were conducted. The study investigates the main factors that challenge and enable digital changes and contributes with a framework for future evaluation and implementation of digitalization in a traditional industry setting.

Keywords: *digitization, digitalization, digital transformation, digital strategy, digitalization challenges, digital technologies, oil and gas industry*

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List of Abbreviations

BD – Big Data

CRM – Customer Relationship Management

DT – Digital Transformation

ERP – Enterprise Resource Planning

ICT – Information and Communication Technology

KPI – Key performance indicator

IIoT – Industrial Internet of Things

IoT – Internet of Things

IT – Information Technology

KN – Klaipedos Nafta

OKR – Objectives and key results

RFID – Radio Frequency Identification

TOE – Technology-Organization-Environment

List of tables and figures

1. Introduction

This chapter introduces the study by covering its background, problem formulation, purpose and the research questions. Also, the delimitation of the study, introduction to the case company, current outlook on the global oil market and structure of the thesis are covered.

1.1. Background

During the past few years the world has experienced more developments in technology than ever before. It has been identified that digitalization is one of the major trends that is affecting the society and businesses today (Parviainen et al., 2017). Various digital products and services have become an integral part of everyday life for both society and companies. A shocking statistic from United Nations Report reveals that today more people have access to mobile phone than to a toilet (UN report, 2013). Current fast-paced technological development is revolutionalizing the operations of companies and the phenomenon of digitizalition is becoming a reality for most industries. It is acknowledged that digitalization is disrupting established business rules and eroding traditional industry structures (Gimpel et al., 2018).

Since the year 2000, the impact of digitalization on products, processes, services and business models is the primary reason that more than half of the names of the companies on the Fortune 500 list have disappeared (Teigland et al., 2018). Traditional asset heavy firms are being replaced by technology-based companies. For instance, among the top five publicly traded firms back in 2000: GE, Citibank, Walmart, Exxon and Microsoft, Microsoft was the only technology company. In 2016, Apple, Alhabet, Microsfot, Amazon and Facebook, all five technology companies were taking the top of the list (Teigland et al., 2018). GE is a great example of a traditional company that has recognized the need to transform into a digital organization. As the Chairman and former CEO of GE Jeff Immelt put it back in 2014, emphasizing the speed of changes: *"If you went to bed last night as an industrial company, you're going to wake up in the morning as a software and analytics company"* (Clancy, 2014).

Thus, organizations need to react to changing business rules and leverage possibilities associated with digital technologies. In recent years, firms in many industries have been experimenting with cloud, data analytics, blockchain, Internet of Things, digital connectivity and other various smart devices to explore and exploit their benefits. This accelerating technological development forces companies to rethink their business operations and the technologies utilized.

Disruptive technologies are also changing the nature of the buyer-seller relationships, the role of information technology, organizational structures and tasks (Parviainen et al., 2017). Companies such such as Uber, Netflix, Airbnb, Amazon and Apple have radically changed the consumer-oriented business. What is clear is that growing role of digitalization is bringing new opportunities and is becoming a necessity for every company in order to meet the more demanding customer needs and business environments.

Economist Joseph Schumpeter in 1942, came up with a term called "Creative destruction", referring to the process where the creation of new ways of doing things, destroys the industry that has started it (Teigland et al., 2018). Creative destruction sweeps out the old product, service, enterprises or organizational forms to be replaced with the new ones (McCraw, 2007). Today this creative destruction is a well-known example in many industries: Uber and the taxi business, Airbnb and hotel business, music and movie streaming companies and many more (Teigland et al., 2018).

All in all, digital technologies provide both groundbreaking opportunities as well as existential threats to companies, thus they need to find ways to adapt to ensure the survival from the fast changes and potential future disruptions.

1.2 Problem Formulation

The most obvious change now is that the world is getting more and more digitalized and digitalization has become a central topic in most business strategies of corporations. The business environment is fast-changing and complex, and the traditional industry model has shortened from years to weeks because of digital disruption (Accenture, 2015). Emerging technologies highly influence firm's operations, products, services, business models by enabling new ways of working, collaboration, connectivity, automation and providing access to unexploited sources of data (Urbach et al., 2019). Internet of Things, interconnection of legacy and various new energy systems are bringing novel vulnerabilities for the energy industry (Equinor, 2018). Thus, it is expected that current operations in oil and gas industry will require new ways of working, driving value and growth. As the focus on digital solutions increases together with the speed of technological development, companies must battle conventional thinking in the attempt to stay competitive and meet increasing customer expectations. According to Smart et al. (2018), energy sector is placed high in the volatility quadrant and is rated as the most susceptible to future disruption out of the 20 industries assessed (Smart, et al., 2018), as shown in the Figure 1.

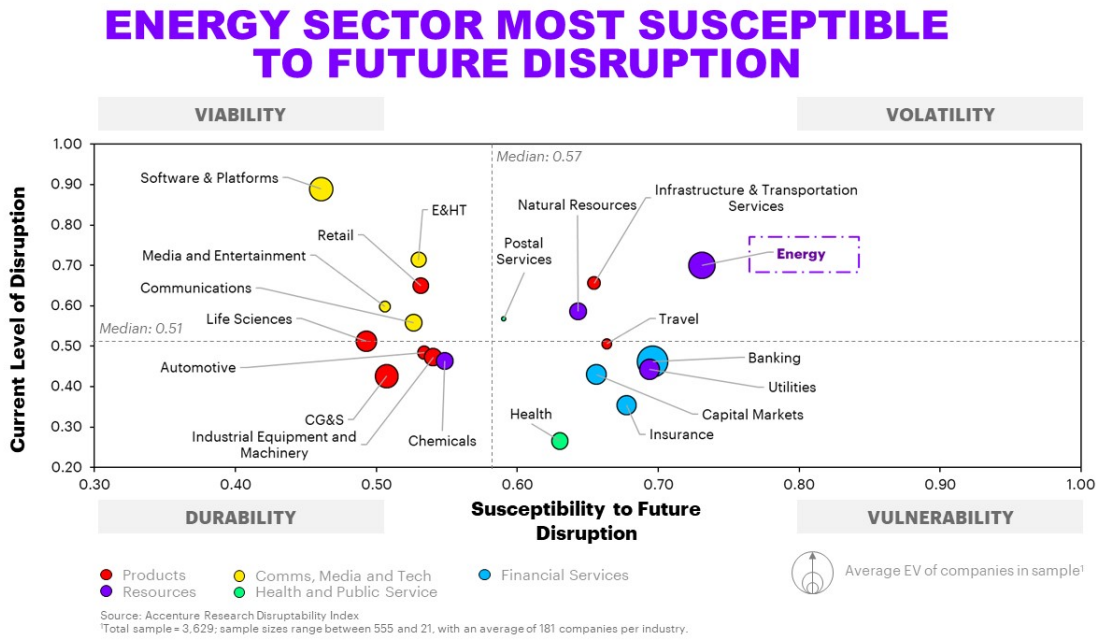

Figure 1. (Smart et al., 2018)

However, despite the emphasis given to it, most of the companies, especially operating in more traditional industries, lack coherent approach towards digitalization. Even though many established companies have already set up and defined their digitalization initiatives, digitalization still remains an uncertain concept and the journey towards it shows to be long and winding (Urbach et al, 2019). Many questions are constantly being raised on what the firm should look like in the future and how that state can be reached in agile and adaptive manner. Yet there still is a wide gap identified between intentions and the realization of successful digitalization initiatives (Ismail et al., 2017) .

It is different to change an already existing organization compared to creating a new digitalized business from scratch (Rogers, 2016). Companies that were established before the era of smartphones, social media or the web, face the challenge to take advantage of all the dynamics of the digital era. These new disruptions are challenging to detect and respond for long-established companies. According to Westerman et al. (2015), for companies in more traditional industries it is common to postpone digitalization and choose a safer follower's strategy instead of trying to be a pioneer, and that kind of thinking is wrong.

Klaipedos Nafta (KN) is the commissioning company for this research and also an example of a company struggling with this. Thus, the purpose of this study is to provide current understanding on

digitalization, digital strategy, emerging technologies of Industry 4.0 and their application and implementation challenges in a traditional industry setting.

The objective of this thesis is to identify the challenges for digitalization at the company, evaluate the creation of the digitalization strategy, explore employee views and practises related to digitalization and formulate managerial implications on the digitalization issues through a qualitative single case study. Therefore, the following research question will be addressed:

RQ: What are the challenges for digitalization at KN and how to overcome them?

The following sub-questions will help the researcher to answer the main research question:

- ◊ *How can digitalization improve business processes in oil and gas company?*
- ◊ *Which digital technologies have the most impact on oil and gas industry?*
- ◊ *How to formulate digitalization strategy?*

1.3 Delimitation

Business activities of the case company are divided into two main areas: Oil terminals and Liquefied natural gas (LNG) terminals. This thesis is focused on the KN's Oil Terminal. Besides, this research has been limited to only cover a few of the digital technologies that are considered the most interesting and relevant for the case company. Also, the study was performed on a conceptual level and does not include a very high level of technical focus.

1.4 Introduction to the case company

Relevance for the study

The company of this single case study is called KN (Klaipedos Nafta), which is one of the largest companies of energy resources logistics in the Baltic States, specializing in oil and gas industry (KN, 2019a). KN is an interesting and well-suited case company for this study because its digital development is still in its infancy within the organization. Even though many industries are exploiting the opportunities to improve their operations through digital transformation, oil and gas sector has been lagging behind (Dudley, 2017).

As a result, there is a clear emphasis on the importance of it at the company now and various digitalization activities have been initiated. KN has shown a great interest towards digitalization and

started considering it a necessity, thus began creating an innovative ecosystem that enables the organization to change and evolve. The objective of this study is not only to investigate digitalization on a general level, but to find out the digitalization challenges faced at the company and find the answers on how to tackle them.

About the company

The beginning of Klaipedos Nafta (KN) activities can be traced back to the old terminal in Klaipeda, Lithuania where oil export and transshipment base was operated in the current KN territory for over 50 years. Oil products were transported to Klaipeda from nearby oil refineries in Russia and other neighboring countries (KN, 2019a). After Lithuania regained its independence, it was decided that KN should continue the activities at the terminal. During the period of 1995-2002 the whole infrastructure was rebuilt and developed (KN, 2019a).

Today the company is engaged in two types of activities - Oil terminals and LNG terminals. The company operates four separate business fields: loading of oil products in Klaipeda Oil terminal, long-term storage of oil products in Subacius oil terminal, LNG terminal management and development of LNG-related activities (KN, 2019a).

Oil terminal – the transshipment process consists of reception of oil products from railway tanks, temporary oil storage in terminal's containers and transshipment of products into tanker ships (KN, 2019b). The multi-functional terminal is situated in Klaipeda, the city that has the northernmost non-freezing port of the Baltic Sea. The purpose of the terminal is to provide reliable and efficient handling of oil products from oil refineries and storage of such products in the storage tank park of the terminal (KN, 2019b). Oil products are also imported through KN Oil Terminal which involves the services of transferring oil products from oil tankers to the client's facilities.

Figure 2. Supply Chain of oil and its products at KN (source: KN, 2019)

The main supply chain at KN terminal consists of: Railway tank → Storage tank → Oil Tanker and accounts for about 90% of all logistic schemes at the company. The annual handling capacity of KN Oil Terminal is up to 7 million tons of imported/exported petroleum products and crude oil (KN, 2019b). KN oil terminal is one of the most rapidly developing oil terminals on the Eastern coast of the Baltic Sea and holds a leading position in the regional market for oil product handling and storage services based on the results from 2018 (KN, 2019b).

Figure 3 shows the major oil terminals in the Baltic States:

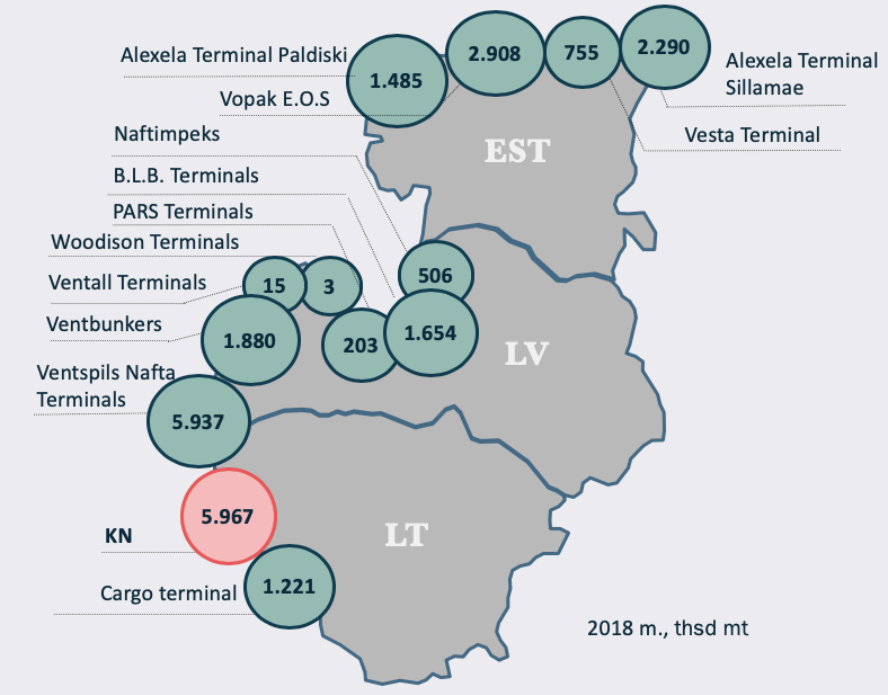

Figure 3. Oil terminals in the Baltic States (Source: KN, 2019)

LNG terminal is operating LNG transshipment and gasification services. The process consists of LNG carrier's admission and mooring next to the LNG Floating Storage Regasification Unit, LNG transshipment, gasification and supply into the natural gas transmission system (KN, 2019c).

Subacius fuel storage facility provides a long-term storage service. The basis for operations includes oil product transshipment, fire-prevention safety measures and maintenance of equipment (KN, 2019d).

Figure 4 summarizes all types of activities of the company:

Figure 4. Activities of the company (Source: KN, 2019)

Oil and its products reach KN terminal from 8 countries and later are being exported to 13 different directions as shown in the Figure 5 below. Fuel oil product flows are directed to the ARA (Amsterdam-Rotterdam-Antwerp) region and to the Far East (Singapore, China). It is expected that from 2020 and onwards, some of the flows will be directed to Africa and the Middle East for energy production. Most of the oil products (diesel, JET) are sold in Europe. It is planned that for the next 10-20 years it will remain the main outlet for these products, with a few exceptions. In 2017, most of the products from KN were exported to Poland.

Most of the petrol is exported to Middle and Far East regions. Part of the flow is also exported to the US Atlantic Coastline, especially to Puerto Rico (South America).

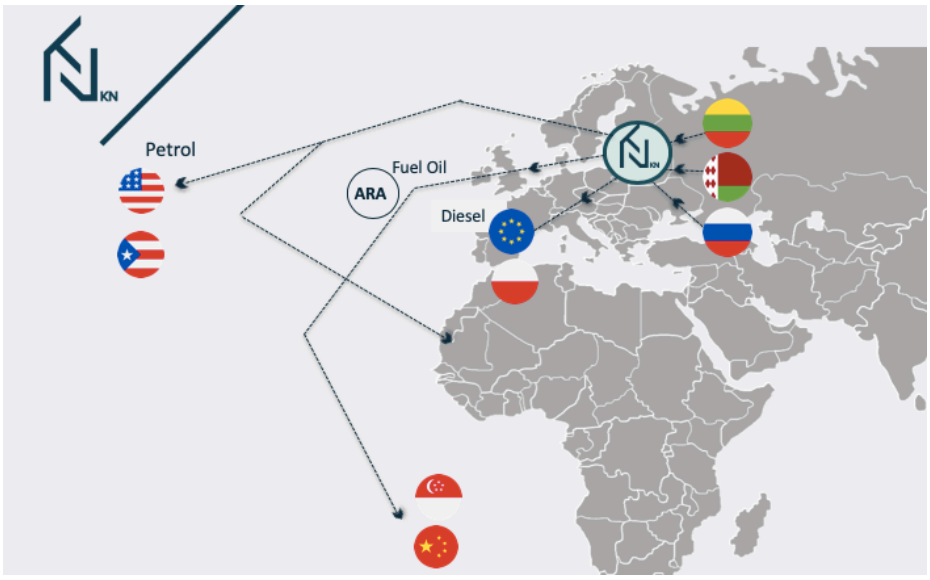

Figure 5. Oil Product flows through the terminal (Source: KN, 2019)

Organizational Structure

KN is listed on the Nasdaq OMX Baltic stock exchange since 1996. 72.32% of the company's shares are state-owned and represented by the Ministry of Energy of the Republic of Lithuania, 10.24% are owned by The Concern Achema Group and remaining 17.44% are owned by the minority shareholders (KN, 2016). Organizational structure is shown below in Figure 6.

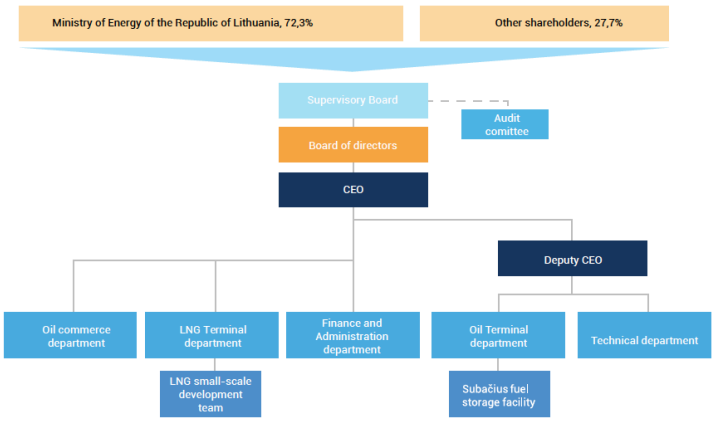

Figure 6. Organizational Structure of KN (Source: KN, 2016)

1.5 The global oil market

The future of energy sector is uncertain, therefore three "R" scenarios (Reform, Reneval and Rivalry) have been created to provide possible outcomes for the future global market developments (Equinor, 2018). These scenarios describe how emerging technologies, policies and market conditions could move the development in different directions. Economic development, climate policies, market forces, technology, energy efficiency, geopolitics have been identified as the main scenario drivers (Equinor, 2018).

In the Reform scenario, technology developments and market forces are emphasized. In Renewal scenario, climate policies take the priority, while in Rivalry scenario a volatile geopolitical environment plays the central role. It is stated that out of these three scenarios, only Renewal regards a sustainable future from the climate perspective (Equinor, 2018).

It has been estimated that energy market developments will remain similar in all three scenarios until the year 2020, from that year they start to diverge (Equinor, 2018), as shown in the Figure 7:

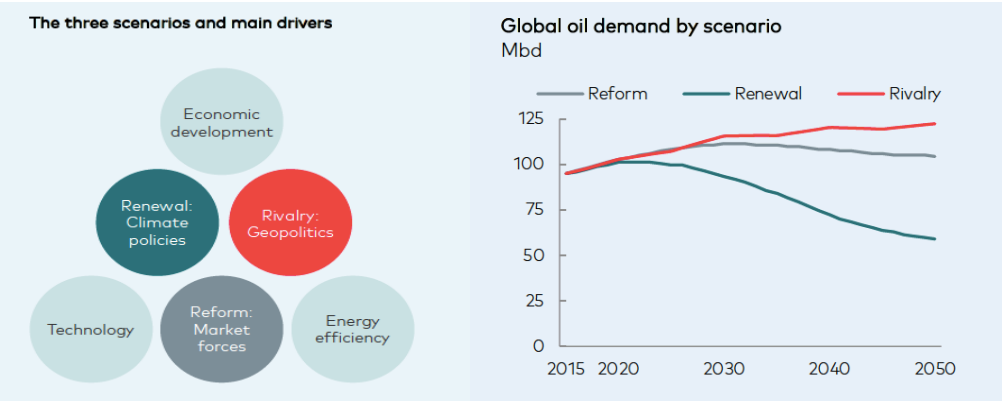

Figure 7. Global oil market scenarios (Source: Equinor, 2018)

Global oil demand by 2050 is uncertain and the scenarios range from almost 60 mbd for the Renewal to around 120 mbd for the Rivalry scenario (Equinor, 2018). It is shown in the graph that oil demand will increase robustly through the early 2020s, then levels out in the second half of the decade, peaks at around 2030 and then starts to decline. The decline is predicted due to efficiency gains in different transportation sectors (Equinor, 2018).

The evolution of oil demand depends on various macroeconomic and behavioural factors such as environmental targets, factionalism and geopolitical tensions. Another factor is the speed at which technologies will replace products or allow new business models to emerge. According the report, *"electrification of road transport and other sectors and efficiency gains in all sectors offset the effect of continued growth in the petrochemical industry and aviation"* (Equinor, 2018).

Besides, various policy measures aimed at addressing the climate change also affect the demand for oil products, this is especially of a high importance in the transportation sector (FuelsEurope, 2018) Majority of the oil refinery products are used in transport and fulfill the needs of both citizens and businesses. As shown in the Figure 8 below, about 65% of the crude oil processes in the European Union refineries are transformed into transport fuels, about 10% goes to petrochemical feedstocks and about 25% is used for other products (FuelsEurope, 2018). According to the report, while renewable energy will continue to play an important role in the energy sector, for the near future electrification will not occur for all modes of transport, therefore oil products will continue to be attractive for use in transportation sectors (FuelsEurope, 2018).

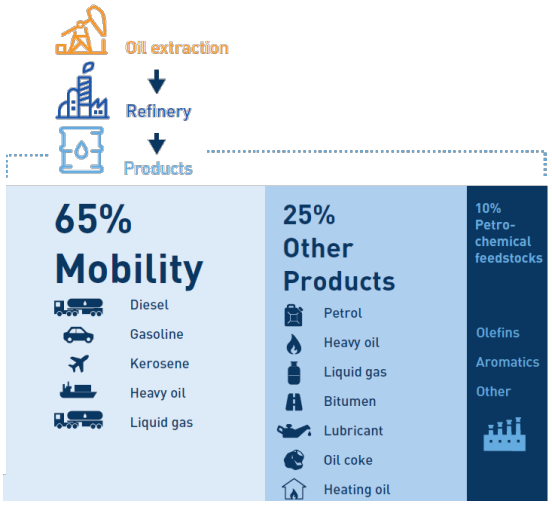

Figure 8. EU Average refining production (Source: Fuels Europe: Vision 2050, 2018)

Industry forces and various emerging technological innovations are reshaping oil and gas industry, yet compared to other industries, digitalization is expected to be evolutionary rather than revolutionary (Dudley, 2017). It is perceived that over the coming years, digital technological disruptions will make energy sectors around the world more connected, reliable, sustainable, efficient and intelligent (Equinor, 2018). It has been calculated that the widespread use of digital technologies could result in lower oil and gas supply cost between 10% and 20%, 5% saving in annual power generation costs and increase in technically recoverable resources by 5% (Equinor, 2018). According to the report, advances in data analytics and connectity are resulting in increasing production, energy efficiency, higher oil and gas recovery, improving safety and enabling a digital move towards a more sustainable future of the energy sector (Equinor, 2018).

Artificial Intelligence, digital platforms, blockchain, quantum computing, additive manufacturing, virtual and augmented reality, digital twin are the technologies that may have a disruptive effect on how the energy industry operates (Equinor, 2018). On the demand side, digitalization is seen to have an impact on markets and future business models, thus customers will gradually see energy in combination with other digital services (Equinor, 2018).

Another insight is the green shift, which is interconnected with a rapid digitalization of the energy industry. Fast technological development increased the growth of renewables and enabled the costs of wind and solar power to go down (Equinor, 2018). This resulted in attractive sector for industrial developers.

Besides, it is noted that green investments are more attractive compared to traditional energy investments and also yield higher return (Equinor, 2018).
Successful digitalization can boost the profitability and create significant value for the industry. It has been calculated that digitalization in the Oil and Gas sector coud be worth between 1,6 to 2,5 trillion dollars for the industry, its customers and wider society over the next 10 years (Dudley, 2017).

1.6 Structure of the thesis

This thesis consists of eight chapters in total.
In the opening chapter one, *Introduction,* problem formulation and research questions of the study are presented to provide the reader with the focus of the research and its delimitation. Also, introduction to the case company and current outlook on global oil market are covered.

In the second *Methodology* chapter, the research approach and design are described. The chapter provides information on how the empirical data was collected and analyzed. It also explains the validity, reliability and generalizability of the results.

In the third chapter, the *Theoretical background* regarding digitalization, its impact, capabilities and challenges, Industry 4.0 and its main technologies are presented.

In chapter four, the main *Empirical findings* are presented and analyzed.

The fifth chapter presents the *Discussion* of the study based on the main findings. Also, a conceptual framework which was designed based on the literature review and the findings is introduced and explained.

Chapter six, *Conclusion* presents the conclusions of the study based on the main findings and the discussion. Furthermore, managerial implications as well as recommendations for future research connected to the subject are included.

Bibliography of the thesis is presented in chapter seven and appendices in chapter eight.

2. Methodology

In this chapter the reader will be introduced to the methodology of the thesis based on the research onion model by Saunders et al. (2016). The model highlights the steps involved in the research process and serves as a framework to fulfill the research objectives in a structured manner.

The research onion consists of multiple layers that have to be peeled from the outside to the inside to formulate the methodology (attached in Appendix 1). Firstly, different layers of the model will be described. Thereafter, each layer will be applied to the research presented in this paper. This chapter begins with a presentation of the research design which is followed by an introduction of the case study. Further, this chapter also describes how data was collected and analyzed. The chapter ends with a discussion concerning the reliability, validity and generalizability of the results.

2.1 Research philosophy

2.1.1 Ontology

The first layer represents the research philosophy, which explains the development and nature of knowledge. Ontology is about the nature of the reality, it is our image of how the world works (Saunders et al., 2016). In this stage, the researcher states important assumptions in which way the world is seen, which later underpin the research strategy and the chosen methods (Saunders et al., 2009). Ontological assumptions shape the way in which the research object is seen and studied and usually consists of two different aspects: objectivism and subjectivism (Saunders et al., 2016). Objectivism portrays the position that social entities exist in the reality that is external to social actors and states that there is only one true social reality (Saunders et al., 2016). Subjectivist view claims that social reality is created from the perceptions and consequent actions of the social actors, meaning that there is no truth outside of one's own experience (Saunders et al., 2016).

Having in mind that the primary data of this thesis is gathered from differing individuals, subjectivist view is the most applicable for this study. The researcher is interested in different opinions that give explanations to different realities of the social actors (Saunders et al., 2016). It is expected that differing personalities will provide subjective opinions, which will be finalized and interpreted to create a common meaning for digitalization and its challenges.

2.1.2 Epistemology

Epistemology is the theory of knowledge (Solem, 2003). It deals with assumptions about knowledge, what constitutes it and how can it be communicated to other people. The ontology (our worldview) suggests the epistemology, meaning that the way we are thinking about the reality has an effect on the way we are learning about it (Solem, 2003). Positivism, critical realism, pragmatism, postmodernism and interpretivism are the five major philosophies of epistemology (Saunders et al., 2016).

This thesis takes its philosophical stance in pragmatism, which suggests that the research aims to contribute with practical solutions that inform the future practise (Saunders et al. 2016). The ontology of pragmatism is that reality is the flux of processes, experiences and practices. Its epistemology has focus on problems, practices and relevance and is integrating different perspectives to interpret the data for informed future practice. Pragmatists are interested in practical outcomes rather than abstract distinctions (Saunders et al., 2016). Besides, pragmatism position also allows flexibility to conduct the research in exploratory way which is needed to answer the research questions of this case study (Saunders et al., 2016).

2.2 Research approach

Research approach explains the way how the theory will be developed. There are three main research approaches: deduction, induction and abduction (Saunders et al., 2016). Deductive approach starts with the theory and hypothesis that is usually developed from academic literature and then the research strategy is designed to test it. Deduction is usually used in scientific research as it involves theory development that is based on testing and involves highly structured methodology and large sample of subjects (Saunders et al., 2016). With induction, data is collected and then a theory is developed as a result of the data analysis. The approach of abduction moves back and forth from induction to deduction, the collected data is used to explore the phenomenon, find patterns and identify topics in order to generate a new theory or make changes to an existing one (Saunders et al., 2016).

This thesis is going to apply the inductive approach, because it allows to better understand the nature of the problem and make sense of the collected data with the purpose of producing reasoning and increased understanding of the results (Saunders et al., 2016). Besides, a small sample of subjects is used for the data collection for this study and that is another characteristic of inductive approach (Saunders et al., 2016). In addition, research through induction allows more flexible

research structure, which is appropriate for this study since the investigated phenomenon is not clearly defined (Saunders et al., 2016).

2.3 Research design

Research design covers the next three layers of the onion and includes methodological research choice, research strategy and time horizon for the research. Research design drives the choices of methodology and explains the purpose of the study (Frankel et al., 2005).

2.3.1 Research choice

The choices presented in the research onion include the mono method, multiple methods and mixed methods (Saunders et al., 2016). Mono method uses only one type of method, either qualitative or quantitative. In contrast, multiple methods use more than one data collection technique, but is restricted to either quantitative or qualitative. Finally, mixed methods use both quantitative and qualitative data collection techniques (Saunders et al., 2016). This study is based on qualitative mono method in the form of semi-structured face-to-face qualitative interviews.

2.3.2 Research strategy

The research strategy used to address the research will be the case study strategy as it enables the investigation of a particular phenomenon in the real-life context (Saunders et al., 2016). In addition, case study helps to generate answers to the “how”, “what” and “why” questions. Case study allows a thorough examination of different perspectives and views of a specific topic or company (Boyer et al., 2008). Also, according to Saunders, et al. (2009), case study approach is suitable when conducting exploratory research. In terms of the case study type, Yin (2013) categorized the case studies as descriptive, explanatory, exploratory and also differiantiated between single, holistic or multiple case studies. This thesis adopts a qualitative single case study as the central research method. Also, this case study is exploratory as it is conducted by search of literature and followed by interviews with employees from different positions within the company. Also, exploratory approach is suitable since the digitalization research is still immature and has a futuristic character, thus the aim this study is to gain insights with the area that has not been academically studied to a large extent by looking for patterns and ideas rather than testing a hypothesis.

2.3.3 Time horizon

The time horizon considers the timeframe within the research will be completed. The project could follow either a cross-sectional or longitudinal time horizon (Saunders et al, 2016). Cross-sectional studies involve the study of a particular phenomenon at a particular time, meanwhile longitudinal studies refer to study change and development over a longer period of time (Saunders et al, 2016). The time horizon of this research is cross-sectional as the thesis is time constrained. Moreover, Saunders et al. (2016) posit that case studies are usually based on the interviews that were conducted over a short period of time.

2.4 Data collection

This section will describe how the data has been collected throughout the research process. In this study, interviews worked as means for data collection. In order to answer the research questions, sources of primary data consist of face-to-face semi-structured interviews with the employees of KN, who are in this case also called the interviewees or respondents. The goal of the interviews was to gather data that would allow gaining insights about the current digitalization outlook and strategy, digitalization initiatives, potential solution tools, challenges, current technologies and their impact on the company now and in the future.

The interviewees were selected based on their positions within the organization as well as through recommendations of previous interviewees, thus this resulted in sort of snowball sampling where the initial contact persons were asked to recommend people linked to KN's digital initiatives.

Also, it was of importance to get inerviewees with varying positions and backgrounds in order to achieve a comprehensive result of the empirical study. For instance, some interviewees emphasized more information technology related view and others business related point of view, allowing to cover the topics from a wider perspective. At first it was considered to interview one person in charge of the digitalization at KN, however it would have not fully reflected the cross-functional approach to digitalization at the company. Interviewing employees in different roles and parts of organization allowed to understand different ways of thinking and levels of knowledge, also to identify opportunities and challenges within digitalization and make strides towards better understanding of the current situation at the company.

The interviews were conducted between late January and early March in 2019. The main data consists of eight interviews in total. The following Figure 9 shows the summary of the data collection, introducing the position, date and duration of each interview:

Position	**Date**	**Duration of the interview**
Commercial Project Director	2019-01-24	0:42
Business Process Director	2019-01-28	1:18
Logistics Manager/ KN Digital Ambassador	2019-02-05	1:08
Chief Administrative Officer / General Counsel / Founder of KN Digital	2019-02-07	1:24
Business Process Analyst	2019-02-07	0:47
Head of Logistics Unit	2019-02-12	0:53
Head of IT Unit	2019-02-27	0:58
Oil Business Director	2019-03-01	1:06

Figure 9. Summary of the data collection

The interview process started by contacting the interviewees through e-mail, introducing the researcher and describing the goals and objectives of the thesis. To ensure informed consent to this thesis, the researcher contacted all of the participants personally. Then the interviewees replied with their preferred date, time and location. All the interviewees expressed enthusiasm and availability to talk about the topic. To conduct the interviews, one-hour slot was booked for each interview.
All of the interviews took place at the headquarters of the case company in Klaipeda, Lithuania, for the convenience of the interview participants.

The interviewees received the interview guide by email, a week before the interviews, in order to leave some time for preparation on their part as well as to minimize time waste during the interviews. Another reason for that was to promote credibility to the participants of the interview by enabling them to consider in advance what kind of information will be requested (Saunders et al., 2016). To a large extent the interviews had a similar structure, with some adjustment made in order

to match the specialization of the interviewee. The reason for having the same interview guide was to be able to compare the results afterwards in the adequate way.

Before starting the interviews, permission to record on a voice recorder was asked. All the interviews were recorded with the interviewee's consent. Besides, all the interviews were conducted in Lithuanian language, as that is the native language of all the interviewees and the interviewer and this ensured that the interviewees could express themselves as well as possible. Afterwards, with the help of the recordings, the interviews were transcribed and translated to English and can be found attached in Appendix 2. As the interviews were recorded, it allowed the reseacher to listen to the discussions again and therefore direct quotations could be used in the analysis.

The interviewer started out with introduction regarding the study and general questions such as the background of the employee and his/her responsibilities at KN in order to encourage interviewee to talk more freely. The interview guide mostly consisted of questions regarding the role and significance of digitalization, digital strategy, digital initiatives and digitalization challenges. The interviews were guided conversations aimed to collect relevant data, but the discussions were flexible rather than rigid and allowed the interviewee to bring out the important matters for him/her, hoping to find unexpected results or points of view towards digitalization.

Researcher's goal was to keep interview questions open and avoid asking leading questions to make sure that the respondents share experiences that they see meaningful for the company. Besides, interview questions were not always asked in the same sequence as in the interview guide, just to ensure a smooth flow of the conversation.

After the interview, the respondents were offered the possibility to contact the researcher in case they had any questions or comments regarding the research. Secondary data of the thesis includes company's material that deemed relevant for the research, such as company's reports and information found on the firm's website, press releases and various internal presentations received from the interviewees.

2.5 Data analysis

When the data has been collected, the next step is to analyze it. According to Saunders et al. (2016), qualitative data is more difficult to analyze in comparison with quantitative data, as the gathered qualitative data is less standardized, there is a vast amount of it and it is also complex in its nature and thus should be summarized, categorized or restructured in order to support meaningful analysis

(Saunders et al., 2009). Besides, the collected data should be processed in a critical way through an open and reflective analysis (Blomkvist et al., 2015).

To structure the collected data, the author of this project used manual analysis. As all of the interviews were recorded, the author re-heard and thereafter transcribed the interviews. The interviews were transcribed as soon as possible after the interview, usually in the next days, when the author still remembered the interview with clarity.

The transcriptions of the interviews were done on a basic level, leaving out repetitions and concentrating on what was said instead of how it was said. After that, the researcher then categorized and structured the interview material under few initial themes such as the importance of digitalization for KN, current digital strategy, the challenges for digitalization and current digital initiatives. These sub-categories were considered the most relevant for the study. According to Saunders et al. (2009), categorizing data involves two activities: developing categories and then attaching these categories to meaningful chunks of data. This allows to understand the interviews better, develop propositions and subsequently answer the developed research questions.

Figure 10 represents the final data structure from raw data to themes:

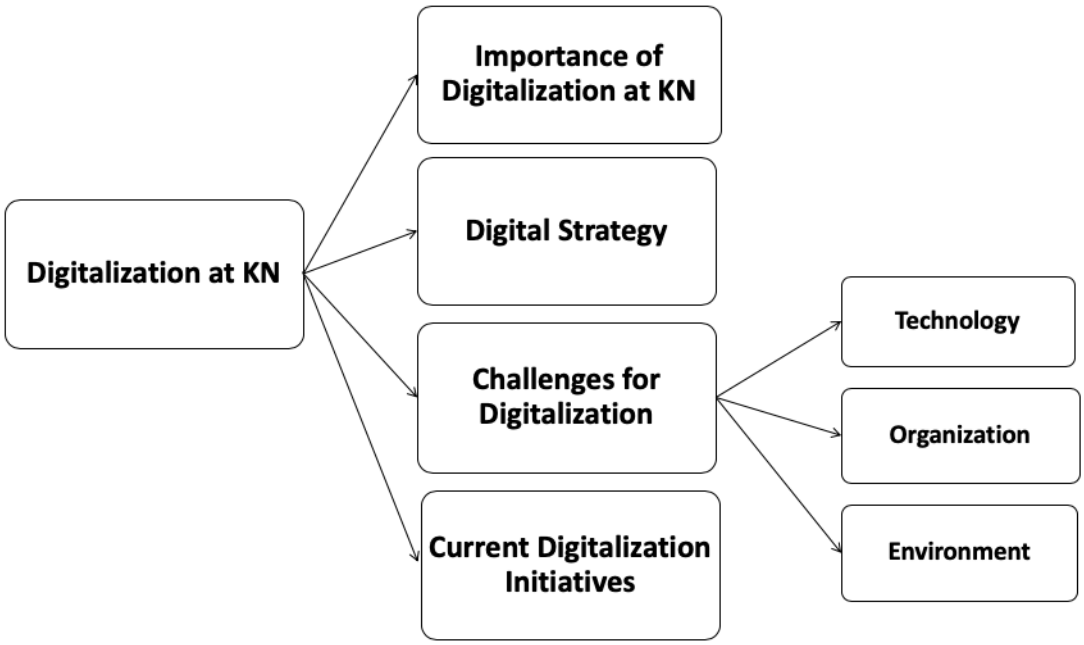

Figure 10. Data structure of the interviews

2.6 Quality of the research

The quality of a conducted research can be divided into two categories, the first one being the study's reliability and validity, and the second is the generalizability of the study. According to Saunders et al. (2009), reliability refers to the extent that the collected data delivers consistent and accurate findings. Reliability is used to answer the question whether another researcher would yield the same results if the research would be repeated (Eriksson et al., 2008).

Validity is another classic evaluation criterion which questions whether the research truly related to the problem or phenomena researched (Saunders et al., 2009). It is of great importance to make sure that the validity and reliability of the study is as high as possible in order to ensure that the research provides value and credibility. Further, generalizability refers to the extent that the results of the study could be applied to other cases and contexts (Saunders et al., 2009).

2.6.1 Reliability

In terms of reliability of this thesis, interviews were selected so that there was a great variety of points of views for the research questions as the respondents were from different units and positions at the company. In addition, the interviews were recorded, transcribed and analyzed to ensure that both the reliability but also the validity was high. Direct quotes from the interviews were used in order to make sure that the opinions of interviewees are reflected in the study.

However, it is important to note that qualitative research method findings are in general given lower credibility since different interviewees might interpret similar questions differently, thus making it harder to replicate the interviews (Saunders et al., 2016). If the data would have instead been collected through questionnaires, it would have been easier to interpret the answers.

Another reliability issue that could be worth mentioning is the language. The case organization is based in Lithuania and all the interviews were conducted and transcribed in Lithuanian language. There could be a possibility that some of the richness of the natural language was lost when translating.

Another possible threat to the reliability of the research is that the interviewees manipulated the truth because of their own interests. However, the researcher believes that using semi-structured interviews was the best option because it enabled to explore interesting areas and outlooks on digitalization, its challenges, company's culture and operations. In addition, semi-structured

interviews encouraged oppeness in the conversation and let the interviewees discuss the areas which they found the most interesting regarding the topic.

2.6.2 Validity

In order to ensure validity of the study, the literature has been carefully chosen to be aligned with the research questions. However, due to immaturity of the research, some reports from consultancy companies were used to get a broader and up-to-date understanding of the topics.

Also, according to Saunders et al. (2009) when conducting semi-structured interviews, validity is rarely an issue because the interviewer has the chance to ask probing questions and check the data with the participants. During the interviews the answers were checked with the interviewee to get as correct data as possible. Also, interviewees received the interview guide prior to the actual interviews, thus they could determine in advance if they were the right person for the research.

2.6.3 Generalizability

Generalizability refers to whether the findings of the study could be extended to a wider context. The essential problem with the case studies and qualitative interviews is that they usually are not widely applicable because the sample is not representative of a larger segment (Saunders et al., 2009). The study was conducted as a single case study, the sample size is just one company, the research was based on a small number of interviews offering only their organization specific information, thus there is likely to be a concern whether the findings could be generalized to all organizations and other industries considering digitalization.

However, it could be argued that the study provides an indication to what could be expected and could be used for future studies within the challenges of digitalization.

3. Theoretical Background

This chapter provides an overview of digitalization, its impact, strategies, capabilities and challenges. Industry 4.0 and its main technologies are also introduced. This is followed by the TOE framework.

Throughout the thesis writing process, various literature was continuosly studied in order to obtain suitable knowledge and create the theoretical background for the research. It was also of great importance to search for the most recent information when reviewing literature about digitalization, since it is evolving and changing fast. The research consists of various scientific papers, journals, articles, magazines, reports and other publication mostly collected through CBS library and Google Scholar databases.

However, it was found that there is a lack of scientific research and academic reports regarding digitalization. Even though digitalization covers quite a broad scope, most of the published academic work dealt with technological aspects (various analytics solutions and technological innovations). It appears that the research on digitalization at the organization still remains scattered and the ways how to adapt and fully comprehend digitalization are not thoroughly studied.

Based on the search for literature, digitalization is currently a hot topic in various non-scientific publications and reports from different consulting companies.

However, sources from consulting companies are usually based on the opinions, thus it is hard to know how reliable the information is for the company.

Keywords used for the literature review were: *digitalization, digital transformation, digital strategy, challenges for digitalization, digital capabilities, Industry 4.0*

3.1 Digitization

First of all, the distinction between digitization and digitalization should be explored since these two terms quite often occur interchangeably and there is a considerable value in understanding the difference between them. According to (Ross et al., 2017) in order to be successful in the digital economy, companies need to be both digitized and digital. Digitization has several definitions, however the most common is that digitization means encoding of analog information into a digital

format which has been enabled by the technological development (Brennen et al., 2014). *"Digitization makes physical products programmable, addressable, sensible, communicable, memorable, traceable and associable"* (Yoo, 2010). In other words, digitization means transition of all available non-digital data into a digital format, for example getting rid of paper documents and inputting them to a digital platform. Digitization does not replace the original document but stores it digitally for further access. The information and data are easily available and offers advantages over a tangible product.

3.2 Digitalization

Even though digitalization has been hyped for the past decade, it has no standard definition and various authors describe it differently (Kuusisto, 2017). It is interesting to note that the first time the term "digitalization" can be found mentioned in an essay that was published in 1971 by Robert Machal, where he talked about "digitalization of society" (Brennan and Kreiss, 2014). While digitization covers the technical side of converting data into a digital format, digitalization covers *"the changes associated with the application of digital technology in all aspects of human society*" (Stolterman et al., 2004).

Fitzgerald et al. (2013), define digitalization as, *"the use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements, such as enhancing customer experience, streaming operations or creating new business models".*

Warner et al. (2018) provide a definition where digitalization is driving changes in corporate strategies, transforming business models, organizational structures and processes in everyday organizational life: *"Digital transformation is an ongoing process of strategic renewal that used advances in digital technologies to build capabilities that refresh or replace an organization's business model, collaborative approach and culture".*

From an academic point of view, digitalization is rather a fragmented field (Ismail et al., 2017). Recent academic work has mostly focused on particular aspects of digitalization rather than providing an overall guidance on it (Urbach et al., 2019). When searching for academic literature based on the keyword *"digitalization"*, many articles are provided that have investigated the phenomenon from different angles, such as digitalization of societies, industries, economies and individuals, as shown in the Figure 11 below:

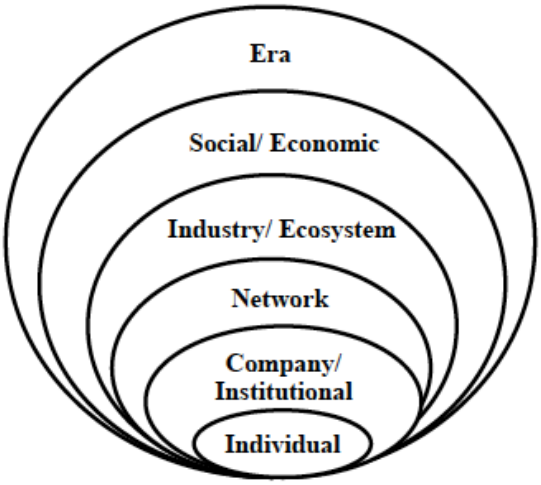

Figure 11. Digitalization perspectives in the literature (Ismail et al., 2017)

From the digital era perspective, mostly the fourth industrial revolution is being addressed, stressing the change in our world due to the digital technologies (Schwab, 2016). From the economic perspective, economy is characterized by dynamism, customization and intense competition, also the sharing and circular economy concept is highlighted, which is shifting the linear take-make-dispose model and promoting a more productive economic system (Schwab, 2016). The industry dimension explores how disruptive technologies such as smart factories, advanced manufacturing are revolutionizing industries (Ismail et al., 2017). Digitalization is also contributing to creation of digital ecosystem, where consumers and communities co-create value which results into networks or changing roles and value chains in ecosystems (Ismail et al., 2017). From the company and institutional perspective, today digitalization is a clear business reality in companies of all sizes and shapes (Basole, 2016). Last but not least, technological changes have a strong impact on individuals, allowing them to present themselves digitally (Belk, 2013).
This thesis focuses on the company/institutional level and and how can the organization tackle the challenges of change and take advantage from it.

It is argued that digitalization is not a new concept, nor will it ever reach the final evolutionary stage of information and communication technology (Porter et al., 2014). The Internet has been used since the 1990s, the e-commerce started in 2000, yet digitalization has experienced an additional stimulus with recent introduction of various smart devices and mobile applications (Urbach et al., 2019). Also, today users adopt various technologies more quickly. For example, it

took 38 years for the radio to reach 50 million people, when the iPod reached the same number in four years, Instagram platform reached 50 million users in less than six months (Chui et al., 2012). When it comes to organizations, before digitalization concerned IT departments only, now it affects all business units and has become an important part of the firm's value propositions and business strategies (Gimpel et al., 2018).

According to the literature, the most essential characteristics of digitalization are not the usage of data or technological adoption, but the speed of change and level of connectedness (Gimpel et al., 2018). Thus, digitalization shapes the world that is at once the cause and effect of its own features: volatility, uncertainty, complexity and ambiguity, also referred as a managerial acronym VUCA (Bennett & Lemoine, 2014). Based on the research done by Gimpel et al. (2018), there is no doubt that digitalization "came to stay", continuing to affect all facets of organizations: customer relationships, value propositions, company's operations, collaboration, data analytics, business models and digitalization management itself (Gimpel et al., 2018).

Henriette et al. (2015), states that digitalization is more than just a technological shift, it is a complex issue that affects many or all the segments of the firm, including the business model, operations and end-users experience. It is also argued that digitalization is not just about the technologies being adopted, but also a strategic and cultural change within the organization (Von Leipzig et al., 2017).

What is important to note is that digitalization is also sometimes referred as digital transformation, both terms are used to define the same phenomenon concerning the changes that digital technologies can bring to the organization (Hess et al., 2016). In this study the terms will be used interchangeably.

3.3 Impact of Digitalization

Based on the literature, there is a clear consensus on the significance of adapting digital technology (Fitzgeral et al., 2014; Kane et al., 2015; Westerman et al., 2014). A global survey, which was conducted in 2015 by MIT Sloan Management Review and Deloitte with more than 4800 managers, business executives and analysts from organizations all around the world, was investigating how digitalization is seen in the companies (Kane et al., 2015). The study found that 76% believed that digital technologies are important and 92% felt that digital technologies will be important for their organization within the next three years (Kane et al., 2015). Also, 60% of the respondents agreed that digital technologies have the potential to fundamentally transform the way employees worked

and 76% stated that digitalization will disrupt their industry to a great or moderate extent in the near future (Kane et al., 2015). The research further investigated how the respondents see their organization maturing for the digitalization. The results show that 26% of the participants found themselves in the early stages of maturity in digitalization, 45% stated that their company is developing and 29% of the respondents marked themselves to be matured companies when it comes to digitalization (Kane et al., 2015). This shows that most executives see the potential of emerging digital technologies, however a high percentage of the respondents are still uncertain how to achieve the digitalization goals.

According to Parviainen et al. (2017), the impact of digitalization can be identified from three different perspectives: internal efficiency, external opportunities and disruptive change. For the internal efficiency the advantages include improved business processes, their quality, accuracy, efficiency and consistency by enabling better views on organization data, automation of routine tasks (Parviainen et al., 2017). From the external opportunity's perspective, it includes possibilities for new ways of doing business and creating prospects for improved service offerings for company's clients (Parviainen et al., 2017). Disruptive change includes changes caused by digitalization, for instance manual scanning of the invoices replaced by electronic invoice or other new possibities in the operating environment (Parviainen et al., 2017). In fact, it is perceived that digitalization has the power to reschape every aspect of the organization (Olanrewaju et al., 2013).

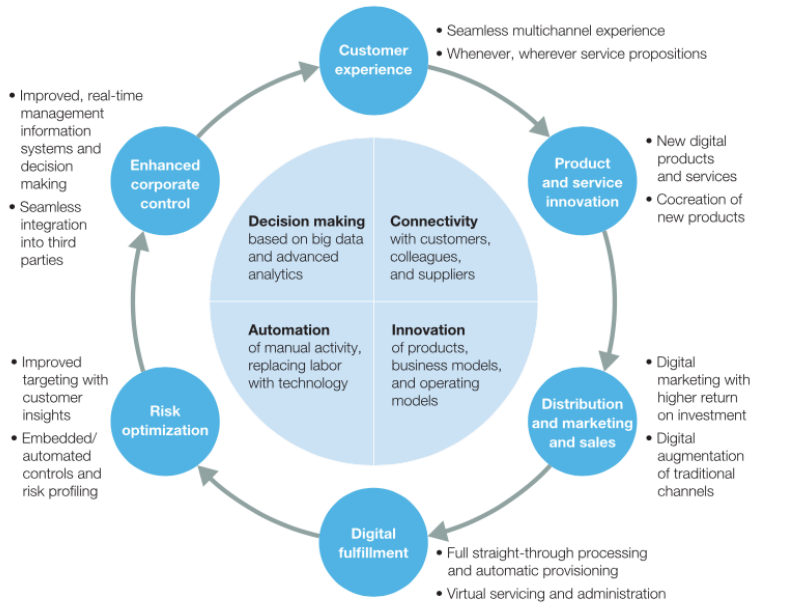

Figure 12. Digitalization's impact on every aspect of the firm (Olanrewaju et al., 2013).

As shown in the Figure 12, automation of manual tasks, improved decision making, innovation of products, increased connectivity are the aspects of digital technologies that drive value in businesses (Olanrewaju et al., 2013). Besides, the impact of digitalization on one part of the organization expands the improvements across the whole value chain of the organization, therefore companies need to implement management practises to govern these complex transformations (Matt et al., 2015). Digitalization strategy is seen as an important approach to integrate the entire coordination, prioritization and implementation of digitalization within a firm (Matt et al., 2015) and will be explored in the next section.

3.4 Strategy for digitalization

Recent studies show that successful digitalization does not only depend on the technologies adopted, but most importantly, on the digital strategies that the top management deploys (Ismail et al., 2017). According to Ismail et al., (2018) "*Digital transformation strategy is a company-spanning strategy that is formulated to enable a company to incorporate the opportunities of the digital economy by leveraging digital resources and capabilities, and digitally transforming along multiple business dimensions: operational, customer-focused and business models".* Thus, the scope of the digital strategy is broader compared to other functional strategies. In order to keep pace with the new digital reality, formulation and execution of a clear digitalization strategy which would guide the organization in its digitalization journey has been recognized (Matt et al., 2015).

For more than 50 years, the focus of IT was to enable business strategy: understand firm's employees, product, service, customer relationships, processes and then implement IT to make them more efficient and reliable (Urbach et al., 2019). Even though IT is still playing that role, that is not why emerging technologies are disrupting businesses, digitalization strategies take on a different perspective and goals (Matt et al., 2015). Digital strategy differentiates from IT strategy, because IT strategy is focused on the management of IT within a firm and does not necessarily account for transformation of products, processes and other structural aspects that are needed when integrating technologies (Matt et al., 2015). IT strategy has only a limited impact on driving innovations, meanwhile digitalization strategy has a business-centric perspective and goes beyond the process paradigm, including digital activities at the interface with customers, changes for products, services or even business model as a whole (Matt et al., 2015).

It has been acknowledged that it is important to have a good fit between IT strategy, business strategy and digitalization strategy (Matt et al., 2015). According to Bharadwaj et al. (2013), digital strategy can be seen as a combination of IT strategy and business strategy. The research found that 90% of the digitally maturing organizations, where the digital technology transformed the processes, are integrating their digital strategy with the overall company's strategy (Kane et al., 2015). This means that digital strategy should not be positioned below the corporate business strategy but should be collaborative (Kane et al., 2015).

Based on the literature, it is apparent that there is a concern with providing guidance for development of a company-wide digital transformation strategy and there are many questions to consider when formulating it (Hess et al., 2015).

Ismail et al., (2018) identified several key areas that have to be addressed in order to design appropriate digital transformation strategy, as shown in the Figure 13:

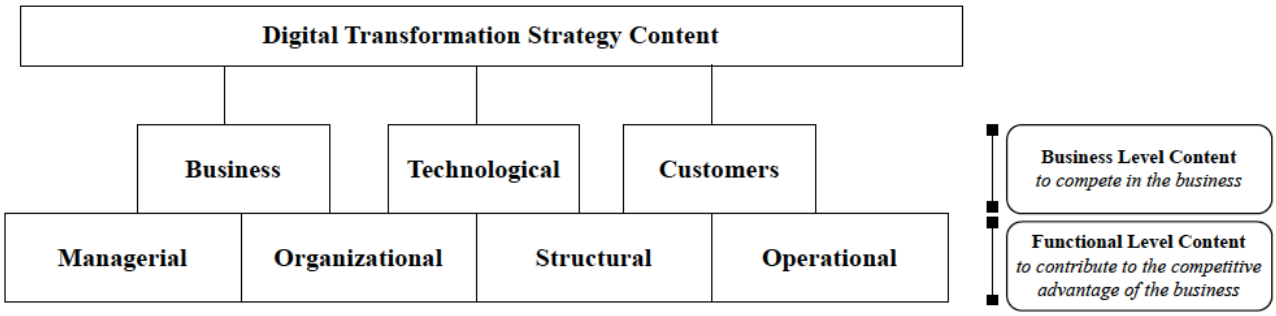

Figure 13. Digitalization strategy content (Ismail et al., 2018)

From a business perspective, the importance of establishing a clear vision and a common goal across the entire company to inform all the involved stakeholders is emphasized (Ismail et al., 2018). Technological decisions are of high importance and the company should conceptualize how digital technologies could impact their business and ensure that the firm is evolving with the technologies as well. Also, strategic decisions should be taken into consideration from a customer point of view (Ismail et al., 2018). These three perspectives construct business level content that allows the firm to compete in the business environment. Managerial, organizational, structural and operational decision areas also have to be incorporated into the strategy formulation process because they respresent the functional level content that contributes to the comptetitive advantage of the business (Ismail et al., 2018).

Elements of digital transformation

Sebastian et al. (2017) have identified two digitalization strategies that navigate digital transformation for big old organizations, namely customer engagement and digitized solutions. A customer engagement strategy aims to build customer loyalty and trust by providing superior, innovative, customized and intergated customer experiences, meanwhile digitized solutions strategy focuses on integrating products, services and data to re-construct company's value proposition (Sebastian et al., 2017). The authors state that there is a natural synergy between those two strategies, however it is important to commit to one strategy or the other because of better resource allocation and capital investments (Sebastian et al., 2017).

Besides, in order to ensure successful execution of these strategies, the firm needs two technology-enabled assets: an operational backbone and a digital services platform (Sebastian et al., 2017). According to the authors, an operational backbone enables operational excellence and efficiences of scale for critical decision-making capabilities, meanwhile digital services platform helps to achieve business agility and rapid innovation (Sebastian et al., 2017). The former is about process optimization, the latter one is about test and learn processes (Urbach et al., 2019).

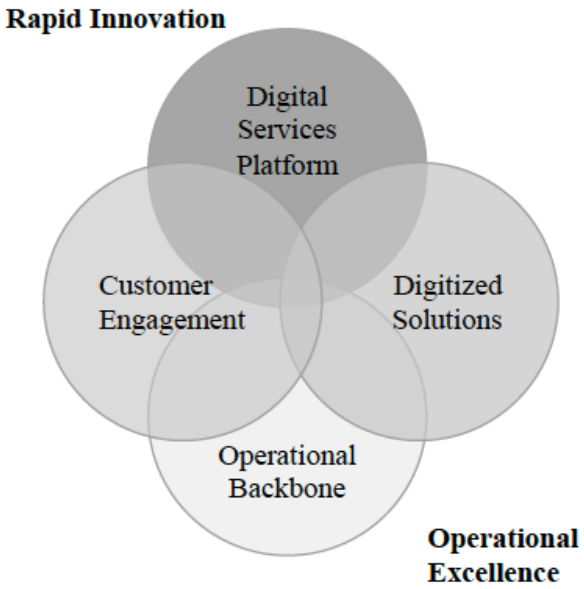

Figure 14. Elements of digital transformation (Sebastian et al., 2017)

Operational backbone and digital services platform allow to execute the chosen strategy and deliver digizited solutions and customer engagement (Sebastian et al., 2017). The authors conclude that in

order to succeed with digitalization, companies should embrace new organizational processes and structures, empower employees to collaboratively experiment with technologies and deliver integrated products and services to their clients (Sebastian et al., 2017).

The digital transformation framework

Matt et al. (2015) have introduced the digital transformation framework (Figure 15), explaining that independent of the industry or organization, digital transformation strategies consist of four cornerstones: use of technologies, changes in value creation, structural changes and financial aspects.

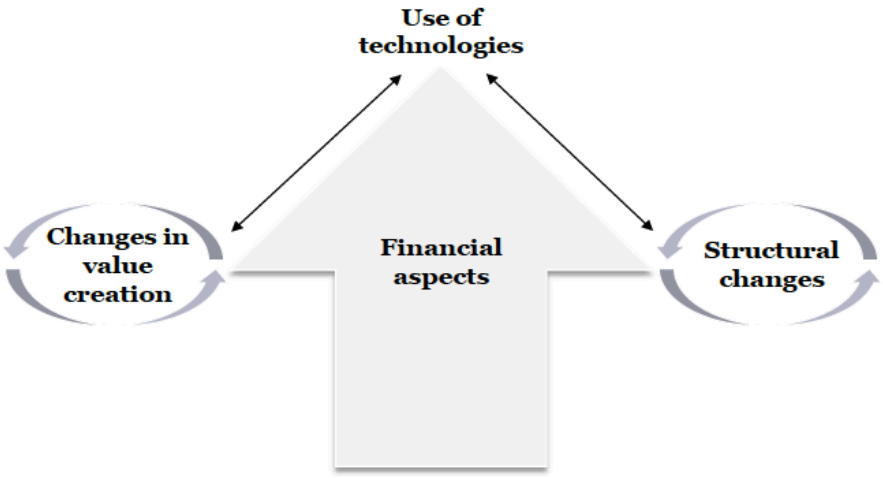

Figure 15. The digital transformation framework, Matt et al., (2015)

The use of technology addresses company's attitude towards technologies and its ability to exploit them. The organization should decide whether it wants to develop its own technological standards or prefers to use the already established standards as a mean to fulfill business operations (Matt et al., 2015). The choices of technology determine what kind of changes in value creation and which structural changes are important parts of digital transformation at the firm. Further, the use of technology, value creation, structural changes can only be transformed when financial aspects allow it (Matt et al., 2015). Financial aspect is at the core of the framework and is considered as a driver and a bounding force of the digitalization. Dependencies between the four different dimensions should be aligned to create the digital transformation (Matt et al., 2015).

Nonetheless, the authors state that these blocks might be too vague to provide clear guidance on how to structure digitalization, thus they also emphasize the importance of adequate and clear

responsibilities, top management support, transformation leadership skills and adequate staffing for the successful implementation of digital strategy (Matt et al., 2015). Also, clear procedures on the reassessment of digital transformation strategy are needed, in which both the underlying assumptions and the progress are evaluated (Matt et al., 2015).

3.5 Dynamic capabilities

In order to succeed with digitalization, organizations should also improve their internal resources such as leadership and other employee skills in order to adapt to digital challenges and changes. Investing into own talents and hiring new digital talent is needed to develop digital capabilities (Kane et al., 2016). Leaders need to create the right culture to support digital strategy and one of the most important traits for that is to be digitally capable (Kane et al., 2016). It has been suggested that it is not enough to adapt the business model and strategy, there is a need to improve the capabilities to flexibly adapt in unstable and turbulent environments (Gimpel et al., 2018).

One of the main theories for strategy adaption in fast-changing environment is dynamic capabilities theory that was introduced by Teece et al. back in 1997. Teece (2014) states that capabilities can be divided into ordinary and dynamic. Ordinary capabilities enable the firm to perform various operational tasks, they include carrying out administrative, operational, governance-related tasks that have to be acomplished (Teece, 2014). Whereas dynamic capabilites are innovation based and defined as "*the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments"* (Teece et al., 1997). The author states that dynamic capabilities are higher-level activities that govern the rate of change in firm's ordinary capabilities (Teece, 2014). Even though ordinary capabilities enable the organization to perform the needed operational tasks, they leave the firm vulnerable to the environmental change (Helfat et al., 2011). In order to reach the sustainable advantage, the firm should have dynamic capabilites that are unique and difficult to replicate (Teece, 2007). Dynamic capabilities should be used to constantly create, extend, upgrade, protect and keep the relevant assets that the firms possess (Teece, 2007). Dynamic capabilities should not be bought but built at the company because *"ordinary capabilities are about doing things right, dynamic capabilities are about doing the right things"* (Teece et al., 2017).

Teece (2007) states that dynamic capabilities consist of three broad clusters: the first one is *"to sense and shape opportunities and threats",* the second is *"to seize opportunities"* and the last one

is *"to maintain competitiveness through enhancing, combining, protecting and, when necessary, reconfiguring the business enterprise's intangible and tangible assets*" (Teece, 2007).

3.5.1 Sensing

Sensing is the first dynamic cluster of dynamic capabilities model created by Teece (2007). For the company to be able to react to the changing environment, it needs to have good sensing capabilities to scan the external environment for unexpected trends in competition, customer needs or technologies, in other words, the firm needs to know what is happening around it. To be able to adapt to these changes, the company first needs to sense and later shape them (Teece, 2007). Sensing new opportunities includes scanning, learning, creation and interpretitve actions and should take place in all levels of the organization and the insights should be shared with middle and top management (Teece, 2007). Sensing process could be challenging and requires both the ability to recognize, sense and shape the developments as well as access to information (Teece, 2007). Sensing new opportunities and threats will not result in a competitive advantage for the firm if the information is not used effectively. The company needs to have a good process to effectively evaluate the information from sensing, this involves gathering and filtering the information, making sense of it and preparing implications for action. Teece (2007) states that sensing is significant as the firms need ways to steer through the uncertainty and generate insights to the new possibilities. Besides, sensing is highly important in the digital strategy context since it is ongoing and there is a need to identify how the changes can be implemented and adjusted to the current strategic approach for further ations (Yeow et al., 2018).

3.5.2 Seizing

Seizing is the second dynamic cluster enacted by the firm that allows to act and capture value on the opportunities that had been identified. Once a new opportunity or threat is sensed, then it should be addressed through new products, processes or services which usually require investments in development and commercialization activity (Teece, 2007). However, the author emphasizes the fact than even though the firm senses an opportunity, it should not be surprising if the company fails to invest into it because the firms rely on routines, assets and strategies developed to cope with already existing technologies, thus are restricting itself to make or adopt a radical innovation (Teece, 2007). According to Warner et al. (2017), to overcome such inertia, companies in traditional industries are starting to experiment with agility to seize new opportunities, even though

its execution is harder and less addressable in practice. It is important to have a strong alignment between sensing and seizing capabilities, because the information that has been gathered from sensing only provides value if it is also seized. In seizing, investment priorities, commercialization strategy, choices when, where and how much to invest have to be selected (Teece, 2007). Seizing enables the company to decide which specific changes to make and involves actions including: designing, selecting among the options and committing (Teece, 2007).

3.5.3 Reconfiguring

The third component of dynamic capabilities theory is reconfiguration which includes continued renewal involving "asset alignment, co-alignment, realignment and redeployement", in other words it involves reconfiguring company's resources (Teece, 2007). Sensing and seizing capabilities enable to discover and create opportunities, but the key to sustaining a profitable growth is to reconfigure intangible and tangible assets. Reconfiguration helps to keep evolutionary capabilities and to avoid unfavorable path dependencies (Teece, 2007).

Changes in organization can often result in resistance to change and if company's culture is not used to internal change, it also leads to increased anxiety within the firm. If innovation is incremental, then it should be done gradually, in steps (Teece, 2007).

According to Teece (2007), building sensing, seizing and transforming capabilities empowers the company to create a future strategy that improves defensible business model, guides the transformation of the organization and provides a source for obtaining competitive advantage (Teece, 2007).

3.6 Dynamic digital capabilities

Warner et al. (2017) posit that new digital technologies are changing the nature of dynamic capabilities and state that firms must build a system of dynamic capabilities for digitalization: *"building dynamic capabilities is now a strategic imperative for incumbent to ensure survival in the digital age"*. The authors state that *digital sensing*, *digital seizing* and *digital transforming* are the new dynamic capabilities that are required for digital transformation according to the digital-based view (Warner et al., 2017).

3.6.1 Digital Sensing

Digital sensing consists of digital scouting, digital scenario planning and digital mindset crafting to determine new technological, customer and competitor-based trends (Warner et al., 2017). Digital scouting includes scanning for technological trends, screening of competitors and sensing customer-centered trends. Digital scenario planning involves analyzing the signals that have been scouted, interpreting the future scenarios and formulation of the digital strategy. Digital mindset crafting covers promoting digital and entrepreneurial mindset within the company and establishment of a long-term vision (Warner et al., 2017).

3.6.2 Digital Seizing

Digital seizing consists of these subcapabilities: strategic agility, rapid prototyping and balancing digital portfolios, that are needed to respond and exploit unexpected opportunities and threats in the market (Warner et al., 2017). Strategic agility is considered to be a critical dynamic subcapability for seizing new digital trends because it allows a rapid response to unexpected opportunities and threats (Warner et al., 2017). Rapid prototyping allows experimentation and balancing digital portfolios allow to scale up or down on business model innovations (Warner et al., 2017). The authors state that as soon as the pathway to digitalization is constructed, various new external factors arise, therefore the need for sensing and seizing should be constantly adjusted.

3.6.3 Digital reconfiguring

Digital transforming/reconfiguring cluster consists of navigation of innovation ecosystems, redesigning internal structures and improving digital maturity (Warner et al., 2017). The purpose of this microfoundation *is "to manage a wide range of tensions that relate to balancing internal and external collaboration, redesigning flexible and manageable governance structures, and improving digital maturity of an externally recruited and internally promoted workforce"* (Warner et al., 2017). It is important to note that the authors conceptualize that building dynamic capabilities is a process that is individual to each digitalization and involves updates of business models, collaborative approaches and company's culture (Warner et al., 2017).

3.7 Digitalization challenges

While digitalization brings many advantages, there is a great number of challenges that need to be tackled in order to unlock its full potential for business as well as society. In many companies

digital transformation did not succeed because the organization did not change their mindset or the company's culture was not fostering the change due to previous generation's management systems (Kane et al., 2015). This barrier is also referred as organizational inertia (Kuusisto, 2017). According to Urbach et al. (2019), given the turbulence of the business environments and the opportunities provided by the emerging technologies, the main challenge for the firm in the digital era is to be able separate sustainable opportunities in the long run, from the short-term hypes. When it comes to Oil and Gas companies, the digitalization challenges mostly include regulation, lack of standardization, ecosystem, culture and mindset, talent and cybersecurity (Dudley, 2017).

Based on the McKinsey's data survey of 2135 global executives, the most typical obstacles for digitalization include cultural and behavioral challenges, lack of understanding the digital trends, lack of IT infrastructure, not aligned organizational structure, lack of funding, lack of internal alignment, too rigid business processes, lack of data and lack of senior support (Goran et al., 2017).

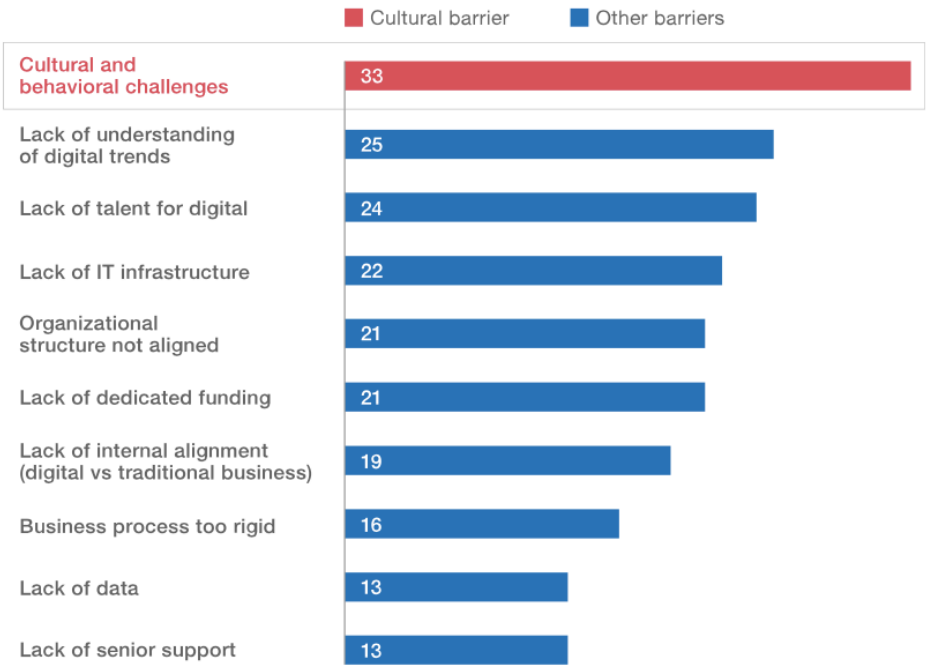

Figure 16. Most significant challenges for digitalization, (Goran et al., 2017)

Culture and behavioral challenges are the main barriers that hinder the potential of digital transformation. Based on Kane et al. (2015), an interesting finding from the survey was that digitally maturing organizations have organizational cultures that share common characteristics. The main features include: *"an expanded appetite for risk, rapid experimentation, heavy investment*

in talent, and recruiting and developing leaders who excel at "soft" skills" (Kane et al., 2016). Also, Kane et al. (2016) acknoweldge that digital congurence is needed in order to respond to the challenges in the changing digital landscape. Digital congruence involves culture, people, structure and aligned tasks and strategy. According to the authors, culture should embrace risks, digital skills should be deepend, structure should be agile, and workforce should be contingent (Kane et al., 2016). Westerman et al. (2015) indicate that traditional organizations are able to outcompete digital start-ups if the digital environment is embraced at the company and if business methods and new digital opportunities are constantly questioned.

Another challenge is to determine who will be responsible for guiding the organization through digitalization, the digital strategy and nurturing of the digital mindset. In order to succeed with digitalization Fitzgerald et al. (2013) explains that top management needs to first have a clear vision of the digitalization that must be shared with the whole organization, so everyone understands the purpose of it. Westerman et al. (2014) also support the statement and argue that digitalization must start from the top management and it is their responsibility to steer the employees towards the right direction. In the book called "Leading Digital" written by Westerman et al. (2014), digitally successful firms are called Digital Masters. The authors explain that in order for the firm to become a Digital Master, both the digital capabilities and the leadership capabilities are required in order to establish a vision and execute it. Westerman et al. (2014) regard digital leadership as a perequisite for successful digitalization because it implies the ability to involve all the firm's employees in the digitalization process, creation of a vision and the development of the skills and abilities that are needed. Combined together, digital capabilities and leadership capabilities result in a clear digitalization advantage over the competitors (Westerman et al., 2014).

It has also been been emphasized by Hess et al. (2016), that companies need to improve their internal resources such as developing leadership and employees and also if needed, hiring new resources to support digital competencies (Hess et al., 2016).

According to Urbach et al. (2019), in order to tackle the challenges and seize the possibilities of the digital era, it is important to align five layers at the firm: business model, business processes, people and application systems, data and information and technological infrastructure (Urbach et al., 2019). Business model is significantly important because it allows it exploit new market potentials, such as platform-based or innovative decentral models (Urbach et al., 2019). In order to turn the business model into reality, business processes are important as well. The processes should be both

operational as well as proactive, departamental but also across the organizational boundaries (Urbach et al., 2019). When it comes to employees, firms should foster agility by moving from hierarchical to networked-like structures, also by developing digital mindset and related competencies (Urbach et al., 2019). In order to make better decisions, forecast trends and perceive the needs of customers and employees, data and information should be considered as well. Finally, besides the traditional technology components such as personal computers, the technological infrastructure should also include novel technologies in order to bridge the gap between the physical and digital worlds (Urbach et al., 2019).

Model for tackling digital transformation

Parviainen et al. (2017), have introduced the model that provides an approach on how to tackle challenges and changes associated with digitalization. The model follows plan-do-check-act principles and describes four steps: firstly, the company should analyze the potential impact of digitalization and then decide its position with respect to digitalization, including the goals that the organization wants to achieve. This step is divided into four sub-steps, namely digitalization impacts, drivers, scenarios and goals. This analysis is used as a basis for position the company towards digitalization (Parviainen et al., 2017).

The second step is to identify the gap between the goals and the current state at the company. This stage is divided into two sub-steps: analyzing the impacted areas and analyzing the situation in respect to the goal and the wanted future. As a result, a detail description of the review of the current state should be described (Parviainen et al., 2017).

The third step is to plan a roadmap for digitalization success. In this step, the detailed action plan is defined. This step consists of four sub-steps, including identification of the gap between the current firm's state and the wanted future, planning the actions that are needed to close the gap, then analyzing the priorities and feasiblity and then creating a roadmap (Parviainen et al., 2017). The final step is to implement the roadmap into practise.

The model is shown in the Figure 17 below:

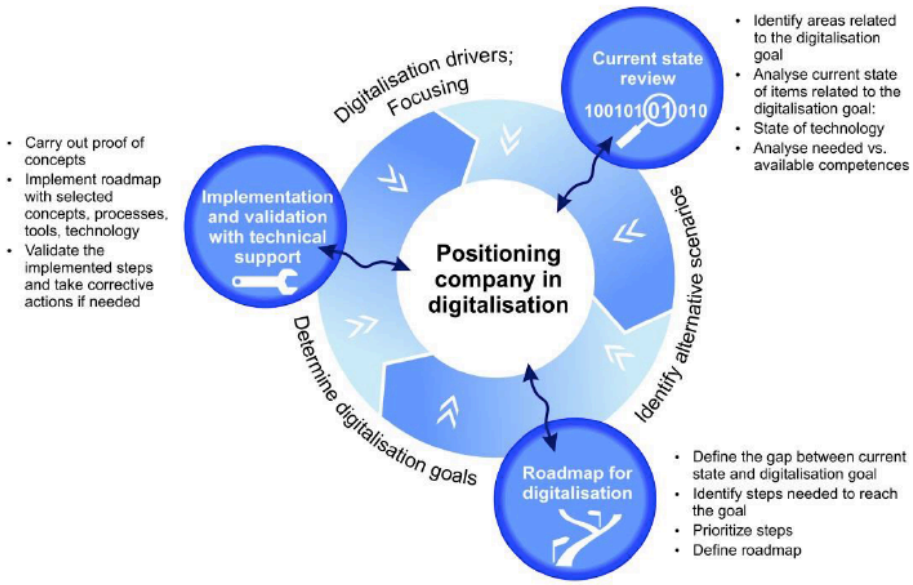

Figure 17. Model for tackling digital transformation (Parviainen et al., 2017).

According tho the authors, these steps are frequentative and can be repeated many times to build the solution. Even though the model is quite generic, it can be used to help companies to analyze the effect of digitalization and the needed steps for tackling the change (Parviainen et al., 2017).
The authors emphasize that all aspects of change management should be included, starting from managerial disputes ending with technical challenges that come with understanding of the adoption of a new technology (Parviainen et al., 2017).

3.8 Digital technologies

The term Industry 4.0 represents the so-called fourth industrial revolution which involves digital transformation of industrial markets. More than over the past 200 years, the world has seen several industrial revolutions and currently we are in the phase of the fourth one (Geissbauer et al., 2016). The first revolution happened in 1784 when the commercial steam engine and the mechanical loom were introduced. Later on, around the start of the 20th century the second one was sparked with introduction of electricity which allowed the use of conveyor belt and assembly line, enabling mass production (Geissbauer et al., 2016). Then, after the second World War, the third revolution was set in motion when the computer was invented, bringing massive use of electronics, communication and information technologies (Geissbauer et al., 2016). The evolvement of the cyber technologies

and their integration into digital ecosystems contributed to the emergency of the fourth industrial revolution (Barreto et al., 2017).

The term industry 4.0 was first mention in 2011 at the world's leading industrial fair – Hannover Messe in Germany, when Henning Kagermann, the head of the German National Academy of Science and Engineering, proposed a government-sponsored industrial initiave (Geissbauer et al., 2016).

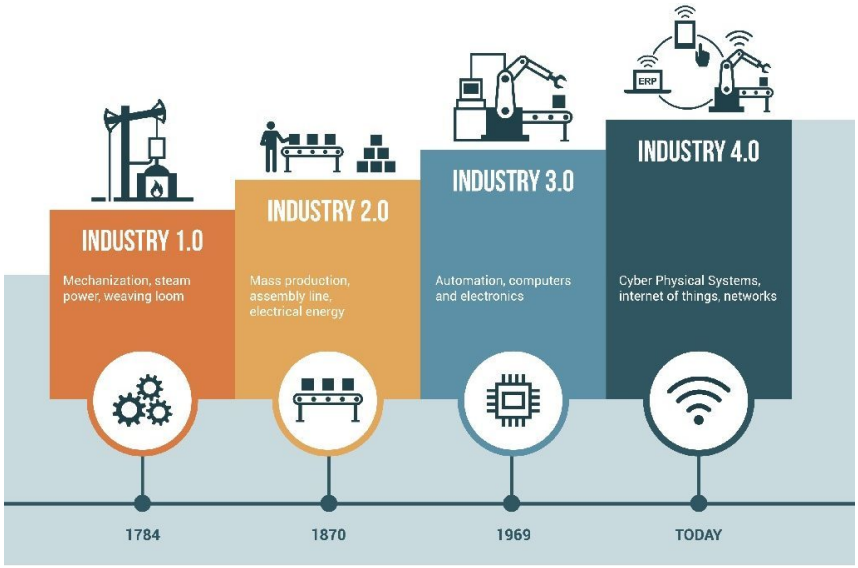

Figure 16. Industry phases (Hammel Scale, 2019)

Industry 4.0 has become one of the most used terms in industrial business concepts in the recent years. Industry 4.0 is also an emerging topic in management studies and a great number of contributions covering various aspects of it have been published (Piccarozzi et al., 2018). It has been acknowledged that the current technological advancements have a significant impact on the international industries and competition (Bär et al., 2018). Many countries started to develop solutions of the concept Industry 4.0, especially European governments, also United States, Japan and China (Barreto et al., 2017). Thus, this new industry era is viewed as strategic by the major industrial players.Today this concept is present in manufacturing, logistics and supply chain, chemical industry, energy, transportation, utilities, oil and gas, mining, pharma, healthcare and many other segments (I-scoop, 2019).

In general, the main purpose of Industry 4.0 is the emergence of digital manufacturing, which means smart networking, mobility, flexibility of industrial operations and their interoperability, integration and adoption of innovative business models (Barreto et al., 2017).

Humankind has greatly benefited from previous industrial revolutions, however the Fourth Industrial Revolution is expected to be fundamentally different. According to Schwab (2016), *"in its scale, scope and complexity the transformation will be unlike anything humankind has experienced before"* (Schwab, 2016). Industry 4.0 is characterized by a range of new technologies and not only changes the "what" and "how" of doing things but also challenges the ideas what it means to be human (Schwab, 2016). Indeed, when looking closely in the pace of digitalization, it does not sound hyperbolic at all.

As of today, there is still no consensus on the definition of Industry 4.0, since it has a very broad scope including production processes, efficiency, data management, competitiveness, buyer-supplier relationships and more. According to (Gilchrist, 2016) the four main characteristics of the fourth industrial revolution include: vertical integration of smart production systems, horizontal integration through global value chain networks, through-engineering across the entire value chain and acceleration of manufacturing.

What is important to note is that Industry 4.0 does not revolve around a single one technology which enables the industrial shift, but refers to the combination of several innovations in digital technology that are poised to transform the world and could be described as "umbrella term for a new industrial paradigm" (Pereira & Romero, 2017). These technologies are usually thought of separately, however if joined together, they become a new method to connect digital and physical worlds (Barreto et al., 2017).

According to Yoo et al. (2010), digital technologies differentiate from earlier technologies in three factors:

a) ***Re-programmability*****,** which allows to separate the functional logic of a device from its physical embodiment that execute in addition to a wide array of functions

b) ***Homogenization of data*****:** storing, transmitting, processing and displaying digital content using the same devices and networks

c) ***Self-referential nature****:* the requirement of using digital technology, leading to faster diffusion and yielding positive network externalities

Various technologies are on the market today, all the tehnological trends are summarized in figure 18 below:

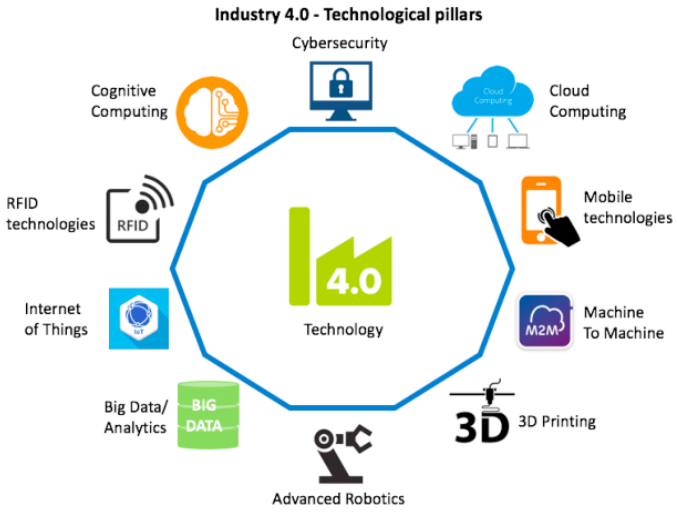

Figure 18. Technological trends (Saturno et al. 2018)

Gartner's hype cycle is known as one of the most common tools for mapping the expectations on the new technologies and can be a helpful tool for organizations that are evaluating the promise of a new technology (Gartner, 2018). The hype cycle consists of five different phases which new technologies go through. Below is the figure of the top trends in the Gartner Hype Cycle for Emerging Technologies in 2018 that are expected to have the most influence (Gartner, 2018).

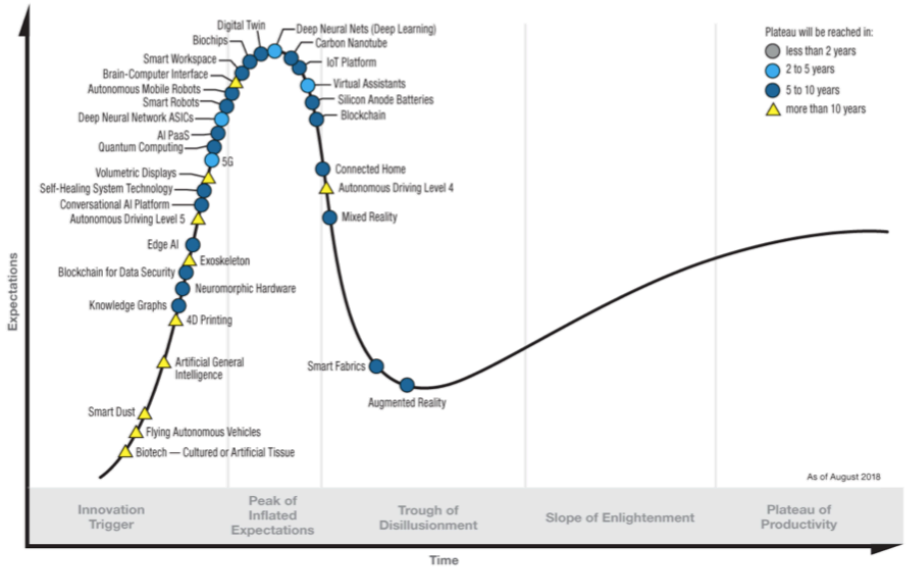

Figure 19. Hype Cycle for Emerging Technologies 2018 (Gartner, 2018)

Key technological pillars

In the next section they key technologies of industry 4.0 will be briefly introduced, particularly those that are refered as SMACIT (social, mobile, analytics, cloud and Internet of things), because these technologies are already in widespread use (Sebastian et al., 2017).

Internet of Things (IoT)

Internet of things is changing much of the world we live in today. IoT in the Supply Chain context can be defined as follows: *"The Internet of Things is a network of physical objects that are digitally connected to sense, monitor and interact within a company and between the company and its suppy chain, enabling agility, visibility, tracking and information sharing to facilitate timely planning, control and coordination of the supply chain processes"* (Ben-Daya et al., 2017). IoT is a network of connected devices and consists of different technologies: RFID, GPS chips, sensors, smart card. These devices gather and share the data on how they are used and the environment in which they are operated. It is all done using sensors that are embedded in the physical device, these sensors continuously emit data about the working state of the devices.

The total installed base of Internet of Things is projected to amount 75,44 billion devices worldwide by 2025 (Statista, 2019). IoT offers plenty of potential for companies since it provides so much data to analyze their operations which allow enhancing the decision making.

Nowadays there is also a new term called Industrial Internet of Things (IIoT), which is focused on improving industrial systems (Dudley, 2017). IIoT enables machine-to-machine communications and and machine-generated data can be analysed, which leads to a smarter decision-making. Downstream players in oil and gas companies using IIoT could identify new revenue opportunities, from expanding the supply chain visibility, which would enable targeting digital consumers with a new way of connectivity (Dudley, 2017).

Big Data

Data could be understood as a DNA of the Industry 4.0 and as the name suggests, it is about managing large amounts of information. Data is growing rapidly and has become one of the most important business assets. Because of new data sources such as social media usage, sensors, mobile devices, various digital transactions, about 90 percent of the data that is available today has been generated in the past two years (Marr, 2018). The processes of Industry 4.0 provide mountains of data about consumer demands, value chain and so on. What is important is to make sense of that

data and make it a valuable asset in order to boost efficiency, develop better products or services for the customer or reshape operations (OECD, 2017).

To put it is simply, because of big data, managers can measure and know more about their businesses. This directly translates into improved decision making (McAfee & Brynjolfsson, 2012). Big Data is often characterized by three V's: volume, variety and velocity. Volume refers to the existing large amounts of data, variety is based on the variation of the data that is available and velocity refers to the speed at which big data should be analyzed (McAfee & Brynjolfsson, 2012). The big data technologies are already available in the market and can help with innovation by analyzing large quantinities of data from various sources and generate real-time insights. Around 36% of Oil and Gas companies are already investing in Big Data and analytics, yet only 13% use the insights (Dudley, 2017).

Cloud

Cloud computing is defined as a computing paradigm, where many systems are connected in private or public networks, providing a scalable infrastructure for application, data and file storage (OpenText, 2019). It is an internet-based computing platform that allows to share a place for different computing resources and access them immediately. Some of the most known cloud computing platforms are Dropbox and Google Docs.

Mobility

Mobile technologies have changed the way people and companies communicate and made it possible to stay connected and reachable 24/7. Mobility allows to connect with anyone, anywhere and anytime. Besides, many organizations increasingly offer services through mobile applications. In oil and gas companies, use of mobile devices result in better communication, better recording of field data, it could also allow to have an improved employee safety by using smartphone application to track employees in dangerous situations, making their movements visible (Dudley, 2017).

Social

The term social comes from the word society. Social media is being used as source of sharing news, a source of learning and a tool for marketing. Social media platforms have also provided businesses with various new ways to reach and interact with customers.

Combined together all these technologies provide three important capabilities: unlimited connectivity, data and automation (Urbach et al., 2019). Together these five technology pillars enable to ensure that large amount of data can be shared and accessed through Big Data. By connecting processes with IoT, analysis of the data can help to forecast and enhance decision making. Usage of Mobility and Cloud allows the information to be accessible no matter the employees location. Social provides the possibility to easily share the information between different the parties or stakeholders involved.

3.9 The Technology-Organization-Environment Framework (TOE)

Tornatzky and Fleischer (1990) created technology-organization-environment (TOE) framework that is useful when assessing the adoption of innovations. The framework considers three contexts that influence the technological innovation: technological, organizational and environmental (Tornatzky & Fleischer, 1990). It is perceived that these elements present constraints and opportunities for innovation. This framework helps to understand how the factors influence each other and also allows to see which of the three contexts is the leading category that drives the changes in the other two (Baker, 2011).

3.9.1 Technological context

Technological context comprises all technologies that are relevant for the company, both that are already in use at the firm and also including those that are available in the market place but not used at the company yet (Baker, 2011). It is perceived that the existing technology in a firm plays an important role during the adoption of new innovations, it holds the variables influencing adoption of innovation and can be used as a measure of the pace at which the organiation can adapt to technological changes (Baker, 2011). The research takes into consideration technologies that the case company is interested to obtain.

3.9.2 Organizational context

Organizational context refers to the characteristics of the organization such as structures between the employees, internal communication processes, the size of the firm, degree of centralization (Baker, 2011). It is stated that managerial skills are of high importance of when it comes to implementation of new technology. Also, the author argues that the links between the different units of the firm influence adoption and implementation of the innovation. The studies identify several

important aspects of organizational context such as: *"degree of formalization, managerial structure, trust, human resources, organizational slack, innovation capacity, knowledge capability, linkages among employees, financial resources, firm structure, operational capability, strategic use of technology, technological resources, top management support, quality of human capital, organizational knowledge, accumulation, expertise and infra-structure and organizational readiness"* (Gangwar et al., 2014).

3.9.3 Environmental context

Environmental context refers to various external factors that influence the environment in which the organization is operating. This includes industry, business partners, competition and also the government regulations. For instance, Baker (2011) explains that intense rivarly has positive influence on the adoption of innovation. Important variables in the environmental context include : *"customer mandate, competitve pressure, external pressure, internal pressure, trading partner pressure, vendor support, commercial dependence, environmental uncertainty, information intensity and netwok intensity while government regulation is not identified as significant variable"* (Gangwar et al., 2014).

Conclusion of the theoretical background

In this theoretical background, the author has presented the research done on digitalization, its impact, strategies, capabilities and challenges. Also, Industry 4.0 and its main technological pillars have been briefly introduced as well. Theoretical background concludes with the TOE framework that is useful to assess the adoption of the new technologies.

4. Empirical Research Findings

The findings from the interviews are presented in this chapter. These findings include views of managers and directors on digitalization and KN Digital activities. Empirical data for this research is based on a case study, to allow analysis of real problems in a set context. The results are divided into four sub-categories: importance of digitalization at the company, digitalization strategy challenges for digitalization and current digital initiatives at the firm.

4.1 Importance of Digitalization at the company

The interviewees were asked to explain how they understand digitalization and its importance, both generally speaking as well as in the context of KN. In general, all of them have a good understanding of the term and the majority were able to argue about different areas that could be affected by digitalization as well as listed examples on how it will affect the company and its current operations. Majority of the interviewees identified the topic being strategically highly significant and mentioned that steps have been taken towards the right direction, all of them mentioned the KN digitalization initiative. Even though majority of the respondents agreed that digitalization is highly important for the company now, most of the interviewees stated that they think they are not where they need to be. The company still has a lot of manual, repetitive work, uses a lot of paper and the operational processes are not handled efficiently.

For the most cases, digitalization is seen from the positive perspective at the company: *"Digitalization is speed, time, comfort – that is what is needed for our business to move ahead"*. However, the Director of Oil Business believes that digitalization is too hyped today, according to him, it is a part of normal business and it is just basic cleaning up at the business: "*Nowadays, digitalization is simply a hygiene that is very much needed for business, it makes the company more competitive by bringing new technological progress that is used to increase business process efficiency."* Meanwhile, Head of IT sees it as an expensive and uncertain concept, but states that there is no choice anymore, it is a neccesity for the business: "*Digitalization is an expense, both time and money wise, plus add the risks that it will not be successful, but there is no other way, we need to move forward."* Chief Administrative Officer describes it as a reaction to the digital revolution going on in the world now and emphasizes the importance for KN to react to these trends. A slighlty different perspective was stated by the Head of Logistics Unit: *"I believe that digitalization has meaning only where it improves the process, not only doing something because of*

doing something". He expressed the views that digitalization is important for KN, however, he argued that digitalization could be discussed a lot, but the most important thing is action. Another interesting point was brought up by the Director of Business Processes, stating that digitalization can also turn into new business opportunities: *"digitalization is not only about increased efficiency and elimination of repetitive tasks, it is also about the new opportunities to offer some kind of new service or a technical solution that benefits the client as well"*.

4.2 Digitalization Strategy

The vision of the current digital strategy at the company is to have a more competitive organization with efficient processes and new value creation that is enabled by digitalization. The aim is to have a consistent, rational and coordinated digitalization of activities, switching from fragmented implementation of individual IT projects to an overall business process efficiency. The digital strategy has been prepared by the Chief Administrative Officer as well as the rest of the KN Digital team and the preparation took about 6 months in total. As the Oil Business Director stated: *"we needed quite a lot of time because in the beginning we went way too far with ideas such as exoskeletons replacing the workers at the terminal, I do think we have to be realistic."*

The whole KN Digital movement started internally, identifying people called Change Agents that wanted to create improvements at the company. The Chief Administrative Officer and the Head of the IT unit did presentations on how the world and the industry is changing, evolving and introduced various new technologies and their applicability at the company. Besides, a couple of companies were invited as guests to share their successful digitalization stories. Approximately 120 employees of KN attended the event and started brainstorming what could be done at KN. Then KN Digital club was created consisting of 34 people today, part of them have been assigned as coordinators of particular strategical direction.

The Chief Administrative Officer is the leader of the KN Digital club and is supervising the execution of the digital strategy. Other important issues are discussed in the KN Digital committee. The creation of KN Digital was founded based on the idea that full digitalization was too difficult to achieve in a regular corporate setting. The KN Digital team today is sharing information, organizing various incentives, engaging and supporting other units, attending various trainings and seminars regarding digitalization. They also have meetings where they question the coordinators of the directions, give feedback and encourage trying new things: *"For the success of this strategy, the goal is to track every month where we are at and during every meeting I will communicate why*

something is not happening, what are the reasons and find solutions and ways how to overcome the obstacles".

The strategy is currently being managed based on OKR (Objectives and Key results) and is being reviewed every quarter by the KN Digital committee. Today digitalization strategy is an important part of the overall business strategy: *"it is now embedded in our overall planned strategy for 2020-2024 and we believe that its execution is possible",* however it was also said that clearer roles, investments and directions still need to be defined. Besides, Oil Business Director also does not agree that there is a need for 34 people to work on it, he states: *"Sometimes I notice slightly too much fanaticism in this process, but I really do not want to stop this initiative".*

Chief Administrative Officer is rather pessimistic regarding execution of the initiatives *"The success rate I would say would be 1:10, we do not have that much capacity*", explaining the fact that this strategy was created with minimal resources and really high drive and enthusiasm:*"Today it is important to catch all the low hanging fruits, so we could create more success stories".*

4.3 Challenges for digitalization

During the data collection process, interviewees were asked for their opinion regarding most critical technological, organizational and environmental challenges that are faced when adopting digitalization at the company. These challenges will be analyzed in the following section based on the TOE framework.

4.3.1 Technological context

Costs

When it comes to technological context, many of the interviewees mentioned the cost of it being an issue. As stated by the Business Process Director: *"Of course, cost of those technologies is a challenge a well. But again, if we consider our smartphones today, 30 years ago it was a crazy expensive technology, until it gets cheaper and available to every user, it takes time."* The Chief Administrative Councel also mentioned a challenge that the top management does not really allocate any investments for the digitalization: *"Another challenge is that we do not really have the funds for that, because it is not allocated. I think it is crazy that we spent 100 million of investments on the infrastructure of some fire systems and metal contructions, but about smart or digital there was zero communication".*

Complexity and availability

Complexity and availability of technologies is another factor that has been mentioned by the respondents. It has been argued that even though the emerging new technologies are of high interest, there is still a lack of understanding and interest on how to deploy them. A couple of interviewees came up with example of a company that deployed robots for a certain task for the oil loading site and it actually turned out very unsuccessful. By explaining this example respondents concluded that it is often easier to achieve positive impact when the technologies are those that have been already widespread compared to emerging ones, mentioning the need of "proof of concept". Also, it was mentioned that because the current development has provided so many new technologies, it is difficult to decide which one would be the most relevant for the company. Thus, the conclusion for those was just that it is a matter of time until these technologies will become more mainstream and mature enough. However, Head of IT Unit highlighted the organizational context fact that *"Everything is fine with technology, we can always find the ways to apply it, but the biggest challenge is to work with limitations in people's minds".*

On the other hand, it was also stated that even though various technologies are becomind widespread today, their application also varies depending on the company. The general finding based on the answer for technological context was that many of the technologies are so new that there is actually hardly any actual usage of it and it seems to be still developing and in some cases far from reaching its mature stage, as Head of Logistics unit stated: *"I think the focus for us should be on the tried-and-true technologies that are already widespread in use across many companies such as the (ERP) enterprise resource planning systems or (CRM) customer relationship management platforms".*

4.3.2 Organizational context

Culture and organizational behavior

The most mentioned challenges during the interviews were within existing company's culture and organizational structure and processes that have been cemented in the organization over the years. The greatest challenge according to the Chief Administrative Officer is:*" I would say is not being able to collaborate, because there is no tradition",* what he elaborated later on, is that everyone mostly cares about their units, the most important is for their unit to deliver and what happens at the rest of the company, they do not really seem to care as long as their department delivers what is

needed and requested. The same was stated by the Business Process Analyst*: "I have an impression that everyone is too focused on their own unit, so the co-operation is minimal."*

What is more, there was a lot of emphasis placed on the challenge of working with different generations. The company employs people from three different generations, there are people who have been working at the company for more than 40 years, they are used to their working routines and are resistant to changes. Many of the interviewees mentioned that it is a great challenge because the older generation is mostly not open to novel ideas and new ways of working and see digital initiatives as a threat rather than an opportunity for the company. It was mentioned by several respondents that digitalization movement created emotions such as fear for the future of the business or risk of losing jobs. Oil Business Director stated that: *"The company is quite unique with the variety of generations that it has, naturally the older generation is more "allergic" towards technologies and have more fears when it comes to the job loss",* but he also continued that "*it is not easy to replace an experienced generation of people. Also, I think they are more conservative because they know the cyclical changes of our business".* The generation dilemma was also expressed by the Business Process Analyst: *"if we are talking about employees in manufacturing and production unit, they are really reluctant to change, they are very used to their stability, comfort zone and they usually get scared and resistant to changes".*

On the other hand, interviewees argued that this is just basic human psychology, it is in people's nature to live in the comfort zone and resist changes, as Business Process Director stated, *"We have to keep in mind that people in general are prone to status quo and to prove that changes are needed is hard"*. However, he also admitted that it really makes his job harder because he has to go around convincing some employees why the digital changes are necessary, and that status quo is not an option anymore. The interviewers involved in KN Digital state that it is difficult to communicate and manage these processes, however they did figure out that they simply need to communicate it better, showing the value of those changes, also allowing to ask questions and this challenge can be solved with education and training of the digital competencies.

In addition, Logistics Manager actually described her own experience when she changed one of her tasks that was very manual by making it completely digital, she actually encountered a lot of resistance from her colleagues and other involved departments. She placed a high importance for "soft" skills when implementing the change.

Another practical example was described by the Chief Administrative Officer with the attempt to digitalize the administrative process at the tanker site, after the discussion in Law and

Administration department it was identified that according to a law there was no need for certain documentation, however accounting team insisted on saying that it is of high importance to a client. It turned out in the end that there is no need for that procedure. This example once again illustrates the fact that there is a natural resistance for the change, however the positive side of it was also identified, pointing out that it is actually nice to see that resistance, because it means that the KN Digital movement actually has an effect on the employees in different departments. In general, Chief Administrative Officer stated that company's culture comes as a high importance for digitalization, he even concluded that *"If we will not manage to get the right culture attitude, I do no think that any of the KN initatives will ever be implemented*".

An interesting finding from the perspective of the respondent with IT background was introduced, he assumes that there is a need to clearly communicate that the *"The long-established attitude that IT department is the one that has to come up ideas and solutions for digitalization is not valid anymore".* He also proposed that there is a need for better co-operation across the organizational silos.The interesting finding here is that some of the interviewees stated that the role of the IT department should be more proactive in terms of digitalization. As Oil Business Director stated: *"To be honest, here I want to give some critics to our Head of IT who has been working at the company for so many years and did not manage to initiate that everything would be more concentrated in one database, one format, one cloud and then it could be better integrated with various modules within logistics, client management, technical maintenance and so on".*

Logistics Manager also believes that IT department is actually the unit that is not that open for changes and is used to work from inertia: "*What is quite annoying that we have some people who are dragging us down a bit, especially IT department. Maybe because more than half of their team have been working at the company for many years now and they do not see possibilities because they are just working their routine tasks".*

Findings from the interviews point out that it is believed that IT department should take on more responsibility when it comes to development of the new technologies, in contrast, from Head of IT point of view, he believes that IT team can serve as consultant on how to install various technologies, test them and do whatever it is necessary to ensure smooth implementation, however he also argues that the need has to sparkle from the business itself: *"the initiator for these changes should be business, not the IT team."*

Top management support

If looking looking at the challenges from the interviewees job position perspective, it is visible that middle management perceives there to be more challenges compared to the top management. As a matter of fact, middle management did state that they feel that there is a lack of motivation and initiative from the top management. Head of IT pointed out that actually all this digitalization movement seems to be more attractive to the middle management and he expressed the concern *"the companies I mentioned as digitalization examples before, they started their digitalization from the top management, in our case it is different, we are trying to initiate the movement and influence those at the top, which means that we are lacking leadership skills"*.

In addition, the Director of Busines Processes considers the top management to have the most influence on whether the digitalization has the possibility to be implementet, he stated that "*What is the most important is that top management, not technology, have to drive this change and this what makes the difference if it will be successful or not."*

Interestingly, from the perspective of the Oil Business Director, he did state himself that top management has the most influence when it comes to allowing all these initiatives to take place: *"the moral of the conference was that if the leaders do not understand the benefits of digitalization, it will probably never start at the company. And you know it is logical because these decisions are related to the allocation of human resources, financial resources and so on, so there is a need for support and initiative and it won't start at the bottom of the hierarchy"*.

Chief Administrative Officer, who started the digital innovation focus, also endorsed that even though the top management understands the need for digitalization, he is having a hard time convincing them to put more attention for the initiative: "*As a director myself, I feel there is also a lack of collaboration between other directors, they have also settled down to work as we worked before",* even though he was assigned the task to create the strategy and top management does admit that digitalization is of strategic importance to the company, there is still a lack of support and understanding of how much it is needed from their side: *"The top management has confirmed the digitalization strategy, it is official now, but when we are having meetings, the topic usually gets lost in translation",* he also stated that another reason is that the company's results are getting better and better every quarter, so the attitude of why change something is apparent, however he continued that that when the top management starts to question the foundation of KN Digital, it is a really demotivating factor:*"I see that there is a gap between what directors say about digitalization and what they actually do about it."*

Size and organizational structure

Some of interviewees mentioned the size of company to be a challenge for digitalization. Business Process Director comes with a background of many years working at SME's, he states that in regard to digitalization, compared to other SME's, KN is significantly behind. He communicated that the processes that KN is trying to digitalize now, at other SME's have been done 4-5 years ago, mainly because when the company is smaller, all these processes can be deployed faster. On the other hand, he argues that these smaller companies are forced to do so because of the competition. For the KN's case, because of its historical background and the sector that the company operates, the company is lagging behind because there is not that much pressure from the competitors.

On the positive side, the company has a lot more resources. Head of IT posits that of course, if taking an example of a company that is being run by 5 or 6 employees, it is significantly easier to move forward faster. Since KN is also more than 70% state-owned there are certain requirements that have to be met. Even so, the company still stands in a good position when it comes to opportunities for experimenting: *"I think we are in quite good position, not too large, not too small and also we can afford modern tools, also we do not have thousands of clients, so we have a good space for testing".* He proceeds stating that those companies in Lithuania that are really progressing with digitalization maturity such as Lithuanian Railways or Lithuanian Energy, they are facing greater challenges because they have a lot more customers and competitors involved, for KN's case it is easier because the company does not have that many clients involved. Oil Business Director in turn stated that the industry is not good for testing digital solutions:*"it is important to understand that the company has a very complex infrastructure and that the product we are loading is really risky, the cost of human error is highly costly in case of an incident"*.

Another issue that persists is that bureucrracy has to be eliminated as much as possible, because that is one of the drivers that is slowing the improvements. If taking for instance processes of easier documentation handling, it goes through so many departments and takes a really long time to get the final signature. This was especially the area of focus for the Business Process Analyst, she stated: *"we really needed standardization and better access to information. In some situations, we did not even know who is using what in which activities, so now when we describe the processes and analyse what is going on, what is the relation and responsibilities of certain employees".* Thus, it seems that the levels of bureaucracy are affecting the transperancy of the processes and must be reviewed. The Chief Administrative Officer also seconds that opinion, recently the company had to lay off around 20 employees and ended up facing challenges of how to do some tasks, because there

was limited information sharing. Besides, he was also of the opinion that if the company was smaller, these initiatives would be easier to implement: *"digitalization would be way faster and way more possible if we had employees of my age or yours or if the company was a start-up".* An aspect was mentioned regarding the organizational structure stating that there is a difference between digitalization of the Oil terminal and LNG sector activities because of historical background related to the KN Oil terminal, Logistics Manager stated:

"I also think that historical consequences of the oil terminal have an effect, if you take our LNG terminal for example, there they have newest technologies, and everything is being built on different attitudes, as much modern as possible".

Digitalization capabilities

Based on the respondents, the challenge of capabilities seems highly relevant at KN. As stated by the several interviewees, a great number of employees are against the new technologies and are worried that their jobs might disappear due to the increasing automation. This especially refers to the employees who work at the back-end, as stated by Director of Business Processes: "*at KN, we have over 400 employees here and if we compare front-end and back-end of the company, we recognize that there is quite a high separation when it comes to understanding of digitalization".* The Business Process Director also emphasized the fact that it is of vital importance to educate and teach the employees and the process of the digitalization has to first and foremost start from education, he continued saying: *"The situation can be described as such: A runner standing in front of the start lane, ready for running sprint and then noticing that actually the running track is not even there."* Also, according to the respondents, there is a need to break even with the understanding and knowledge of modern technologies. There is the difference inside the organization, part of the employees is highly familiar with emerging technologies and their implementation and the rest does not know how to use them and are resistant: *"We have people at the company who are complete technology geeks and also those who do not really know much about it at all."* However, another challenge arises here, since there are people with attitude and the way employees think about themselves, such as: *"I have been doing this for a hundred years now and you come here and tell me what I am supposed to do".*

Chief Administrative Officer mentioned that this also occurs in discussions with the top management, he is of the opinion that the human resources should focus on hiring more digital

talent to succeed with digitalization implemenations, he stated that *"There is a fear to let in, let's say a data analyst, because of the attitude "we know everything", which is really wrong."*

Based on the answers from the interviewees involved in the digital activities, the change agents face resistance before even trying to implement something, this mostly results from habits and the fact that changes are scary, and employees are used to work from inertia. As stated by the Business Process Director: *"A skill to change has to be incorporated in our company's culture and that is the biggest challenge organizational wise".*

On the other hand, based on the answers from employees involved in the KN Digital activities, the team is constantly attending many trainings, various lectures, events and visiting companies that have successfully achieved digitalization objectives. Besides, also started collaborating with other companies and local universities.

4.3.3 Environmental context

The environmental context includes business partners, customer, competitors, the government and other network externalities. According to the respondents, compared to the domestic competition, the company is slightly ahead, however if including international rivalrs, it is seen that the case organization is significantly behind, as stated by Oil Business Director:*"The processes are, unfortunately, still quite primitive, if we take a look at Germany for example, then there is really a lot to do".* Based on the empirical findings, case company does not consider the challenges of competitive pressure as that critical. However, the fact that the company is performing well in the market lowers the chances for digitalization, as stated by the Chief Administrative Officer: *"KN is an established company, we are the leaders in the market of Baltic region, things are going well and I think as long as we continue winning in the marketplace, our digitalization efforts will stay constrained".* Another environmental aspect according to Logistics Manager is that the company should follow other companies related to the company's industry: *"I think is wrong is that we are trying to follow examples of other digitalized companies in Lithuania, but the thing is that they do not really match our industry."* The interviewee also believes that external environment, such as other companies at the port of Klaipeda should show more improvements and even collaborate on some projects together.

When it comes to the clients, some of the interviewees stated that there is also a need for better collaboration, this was especially emphasized when talking about RFID initiative, since it involves other parties as well. Another point that was brought up by a Chief Administrative Officer is that

some external companies in Lithuania do say that they have digitalized, however it is still not clear to what point. He mentioned an example of the Port of Klaipeda and his director who said that the port has already digitalized. Although in practice KN is still receiving a lot paper and have to go through a lot of manual paper work when they need to fix some documentation.
When it comes to the clients, Commercial Project Director stated that there is a need for better communication, real-time information and new ways of collaborating should be required for better value creation and growth. Business Process Director also emphasized the need to engage more with firm's suppliers, business partners regarding changes of the processes that have been stagnating. Another suggestion from the environmental perspective was that company should aim to use some resources from the government, in order to ensure faster development of digitalization.

4.4 Current digital initiatives

KN has distinguished five dimensions that are expected to drive the company towards digitalization. They consist of technical innovations at the oil terminal and cross-cutting technical and organizational innovations.

4.4.1 E-processes

The vision of this initiative is to have transparent, understandable, manageable and constantly optimized business processes. According to Business Process Director: *"Many processes, at KN or generally in the world are not happening in the digital space yet, or if they are, then they are mostly used as an alternative for the use of paper, without any sophisticated decisions, without analyzing any results, not making any conclusions and not even trying to make something faster, change or fix something that could be done more efficiently and that is really wrong."*
Another aim of this initiative is that everyone at the company should be able to easily identify process owners and responsibilities of the process participants. There is also a need to clearly describe both existing and newly identified processes, to implement operational process management systems and to automate time-consuming processes, apply process measurement indicators to ensure the most efficient added-value creation within an organization.
As of today, the company does not have process mapping, not all the projects have owners, many of the processes are fragmented: *"Some of the processes do not have instructions, especially we see it within the older generation, now when we had to fire around 20 people, we noticed that we do not know how the process has to be done, so we have some challenges because the people who knew*

how to do it, did not share the information and kept it all in their heads and when they are not a part of the company anymore, we are facing issues". According to the Business Process Analyst, the goal is to have all business process instructions and automate 50% of those processes in 2019. This is expected to result in a faster access to information on the activities of each unit and employee, faster adoption and implementation of performance management solutions, wider business process analysis and development capabilities, decreased operational inefficiencies and improved risk management.

4.4.2 E-documentation

In the technology age, more and more processes related to document preparation and management are transferred to the electronic space. According to Business Proccess Analyst, the aim of this direction is not only to improve the quality and availability of documentation, but also to reduce costs and protect the environment. The aim of e-documentation direction is to become a paperless office and provide paper-free services. In order to do that the company aims to analyze, rethink and optimize all existing internal and external documentation management processes and convert them to electronic documents wherever possible and signing them with electronic signature. It would also result in optimized time, personnel and investment resources for document management. Head of IT unit compared the large amount of printing documents to a tip of an iceberg, stating that it just shows that the processes are not effective and converting the printing time results in a lot of hours of work that could be used on something more valuable instead. Another goal of the initiative is to be able to access the information anytime time and from anywhere, thus possibility to handle tasks and documents via mobile applications on mobile phones.

For this direction, strategical goal is to reduce the printing volume by 50% compared to 2018. The expected outcome is significantly reduced costs of printing and better management of paper documents, both time and money wise. This is also expected to result in a faster exchange and search of information. As stated by Business Process Director: *"Also, it is a mistake to think that we digitalized the process when we had a paper document and we placed it to Excel and then we digitalized. That's silly, because there is no value, instead of carrying that paper document, now we are just re-sending it by mail. No, the process, the whole chain has to be reviewed and checked if it is actually needed at all."*

4.4.3 E-communication

For this initiative, the goal is to introduce a new integrated Intranet, because technologies are also affecting people's communication habits, thus ability to access company's real-time information at any time and from anywhere creates the need for similar opportunities at work. KN currently employs over 400 people in 4 different locations, some of them do not have a computerized workplace. These circumstances lead to a need of increased accessibility of data by integrating corporate data into a readily available platform. This would increase accessibility to technology across all employess and would enable information sharing, e-communication and e-collaboration among the colleagues. Another goal within this initative is to create a better functioning CRM system, because according to Commercial Projects Director, as of today it is not very structured and there is a need to introduce digital pathways of collaboration with clients and business partners for better transparency and more efficient communication.

4.4.4 Business Intelligence

Based on the interviews, current data analysis at KN does not involve a large amount of data sources and prevents disclosure of the full potential of the insights, thus does not bring potential business benefits. It is believed that the data accumulated inside and outside the organization has a great potential, which can only be revealed by raising questions and finding answers, as stated by Chief Administrative Officer: *"these analytics would be very beneficial to have for better understanding the dependencies and their causes, analyzing causal relationships, modeling future scenarios and forecasting"*. KN also strives to create an environment and tools that enable management and staff portals or mobile applications to see the business situation in real time, understand what is happening and why. The goal is to implement digital tools for efficient data analytics through smart dashboards and mobile applications that would display business performance in real-time. This initiative is expected to improve understanding of data through systematic analysis and conversion to knowledge, also evaluate dependency of processes and inform decision making.

4.4.5 Innovations

This stratetic goal aims to develop an organization that is capable of adapting and expanding various incremental and disruptive innovations to its oil transshipment business. This involves developing ideas for digitization, automation and robotization with partners, participating in various projects promoting and developing innovation activities as well as attracting external investments

for innovation projects. According to respondents, today the most focus is given to RFID, Induction heating and Digital Twin projects. Other highly discussed innovations at the company today are: robot locomotives, drones for tank and equipment inspection, smart pipeline cleaning system and blockchain.

RFID

Based on the interviews from the respondents working in the Logistics unit, the company is currently developing a new infrastructure, to be more specific, it is building a new terminal with the higher technical capacity which also results in increased oil and its product profile and their quantities. Today, railway wagon identification is done manually and holds a great potential for human error. With the increase of terminal's capacity and imported oil product profile, the company must find solutions to reduce manual human work, manage emerging risks and be able to offer faster and more efficient service for the company's client. The ultimate goal of the KN terminal is to optimize and deliver a high-quality service to the customer by managing data from an automated wagon identification and tracking system - RFID.

RFID will enable to automate the identification of railway wagons when they cross the gateways of the oil terminal, automate the inspection of wagons, help to distribute cargo flows in the tresles, add additional crossover control and enable to fully digitize cargo documentation. Besides, it will enable real-time data, thus various analysis can be performed which could result in more efficient planning of oil loading process at the terminal. This could also help to avoid certain unforeseen situations and manage the risks of different scenarios. Another advantage of this technology is that the investment for it is not that high compared to other technologies. It has been also predicted that with this technology some jobs will be eliminated.

According to the interviewees, this iniative is the most relevant to implement at the company now and it has been assigned to Logistics team, however the challenge is how to implement it while maintaining the focus on the core logistics process operations. However, Oil Business Director said that the main reason why RFID was not implemented before is the leaders who were not interested: *"From what I have heard, there has been a talk about RFID for the past 10 years and it has been always coming soon, but it has not come"*.

Besides, the challenge for this innovation is that it also depends on the wish of the clients.

Induction heating

Induction heating initiative would enable higher heating rates and improved unloading speeds of rail tank wagons by affixing radially shapped induction coils to the side of tank wagons to heat heavy crude oils at temperatures that are limited only by the metallurgy of the tank wagon containers.

Digital Twin

Digital twin is a digital model that reflects equipment and processes to plan activities and business decisions, it would be a fully digitized operational representation of KN's Oil terminal. The goal is to create a digital terminal twin for use in technology planning, preventive technical maintenance as well as investment planning. Technological processes and various equipment conditions are presented in digital twin and will help to plan activities and their changes before they are implemented. It also containts immediate availability of technical documentation to make the changes traceable. It is expected that efficient use of technological assets and energy resources will not only help to save, but also prolong the life cycle of the property, improve its maintenance, allow to avoid unnecessary repairs, help to plan operations without any errors, train new staff to simulate the process, reduce human error and reduce labor costs. Also, it will allow real-time environmental monitoring to address societal concerns about environmental polution.

5. Discussion

In this chapter, analysis based on the theoretical background and empirical results from the case study is presented. Also, a conceptual framework which was designed based on the literature review and the findings are introduced and explained.

5.1 Importance of digitalization at the company

Based on the empirical findings it is visible that company's employees are increasingly stressing the role of digitalization to enhance the business and its operations and create new value. The interviews also reveal that KN is beginning to comprehend the world-changing possibilities that emerging technologies offer. Even though there is no single definition in the literature that would be commonly accepted for the term digitalization, respondents expressed similar views that with digitalization organizations aim to create operational efficiency and new business opportunities. Also, the understanding that digitalization has an impact on internal efficiency, external opportunities and disruptive change is expressed in the answers of the interviewees. Some of the KN employees state that digitalization and changes created by it have happened already for a longer time in the industry, therefore there is a need to respond to those changes and study its business operations in more detail to achieve digital success. Some also stated that the company has already defined and set up transformation initiatives. Given these answers, the findings fuel the notion of digitalization being one of the most important priorities at the company today.

5.2 Digital Strategy

In general, it could be stated that KN has succeeded well in the initial steps of creation of digitalization strategy, since the company has created a vision and communicated it internally as well as externally, creating a movement at the company. KN Digital managed to create impetus for change and commitment for digitalization. The team identified several business areas that should be addressed in order to design KN digital strategy, the mentioned areas cover the strategy content that was introduced by Abdelaal et al. (2018). Besides, the digital strategy has been integrated with the overall business strategy, as recommended by Kane et al. (2015).

However, the company is still in quite an early stage of their digital transformation, but has articulated the strategy, defined the digital initiatives and set up the changemakers team. Yet, the digitalization process is not moving fast because of various challenges encountered at the company. In order to implement the digital strategy and the initiatives that are part of it, it seems that the company needs a good sense of change management as well as technological know-how. Also, based on the respondents, the strategy has been created with minimal resources, thus financial aspect should be considered further, since it is considered as a driver and a bounding force of the digitalization (Matt et al., 2015).

5.3 Challenges for digitalization

Based on the findings KN has noticed the need to change and adjust itself to become digitally more capable. However, it was also noted that digitalization comes with the challenges that are very diverse and could be split being people-centered and hardware-centered. The comparison of management literature and empirical findings showcases that the identified challenges are comparable to those that were found in the theoretical part of the study, but it also has some additional challenges of its own. In order to make a better sense of the challenges, TOE framework was used. The framework enabled to understand how different drivers from the different contexts affect each other when managing digitalization.

5.3.1 Technological context

KN is beginning to comprehend the world-changing possibilities that emerging technologies offer by considering RFID, Inductive heating and Digital Twin implementation, however, despite this, the interviewed company is not yet using the technologies on a broad scale. The interviewees also expressed interest in promising technologies that remain in early stages of development such as blockchain. However, the main reason behind this is the novelty of the technologies. The company is waiting for “proof of concept” and more successful examples before there is confidence for implementing it at KN as well. That assurance would make it easier to invest in a certain technology. Besides, what is clear from the theory as well as empirical findings, digitalization is not necessarily about the technology implementation (Von Leipzig et al., 2017).

5.3.2 Organizational context

Based on the analysis, organizational context has the most effect on digitalization at KN and many sociological and emotional barriers were identified. When it comes to organizational challenges, the aspect of top management should be stressed. In fact, it is a thought provoking finding that the company lacks the picture from above and top management support for digitalization because, according to the literature (Fitzgerald et al. 2013; Westerman et al. 2015), top management are the ones who should be responsible for communicating these initiatives for their employees, and it could be argued that if the top management does not see these changes happening, then the digitalization initiatives will never reach implementation stage, as it usually drips down the organizational ladder.

What is more, based on the interviews, company's culture is a challenge that is also in play and is a major obstacle to the adoption of new technologies. Some of the employees have a mindset that they have been doing things a certain way for many years and they do not need any new systems or approaches. Thus, there is a clear lack of digital mindset at the firm and what seems for KN's case is that it is also a generational issue, since there are many people who worked at the company for many years and simply do not like changes. It is the ingrained culture and inertia that provides resistance whenever any changes in the working practices are on the horizon (Kuusisto, 2017). Based on the literature, it was acknowledged that organizations should establish digital mindset as a core value of the firm's culture. As it was mentioned in the article by Gimpel et al (2018), success of digitalization does not depend on the company's age but on its mindset, more specific, on the mindset of the organization's employees. The founder of KN Digital initative also brought up the famous quote: "*culture eats strategy for breakfast*", emphasizing the need to develop the digital mindset at the company. Kane et al. (2015) convinces that there is a necessity for digital congruence which means the alignment of culture, employees, structure and tasks in order to succeed with digitalization. The results from the interviews did not highlight the alignment of these areas, however all these dimensions were present in the empirical findings.

The main conclusion that can be drawn from the organizational context issues is that lack of top management support, organizational culture and digital capabilities are at the heart of much of the confused picture for the reason why digitalization processes are struggling at the company.

5.3.3 Environmental context

Environmental context refers to various external factors that influence the environment in which the firm is operating. The environmental challenge at KN includes collaboration with the client for the implementation of digital initiatives, such as RFID implementation and there is a need for better communication and collaboration. Besides, the ideas for more engagement with suppliers and business partners were expressed.

5.4 Current digitalization initiatives

The researcher deep dived into understanding which areas KN Digital team focuses on to create the most digitalization impact. The presented current digital initiatives are focused on new possibilities of doing things more effectively within the core business operations, such as turning existing processes into digital versions as well as rethinking current operations fundamentally. However, firm's digitalization track records still suffer from a digital development process that is approached in a very conventional way and is not having a huge impact yet. Overall, the company has not too far progressed on their digital transformation journey. It appears that KN is still mostly focusing on earlier elements of digitalization, such as completing the transition from paper-based to fully digital business processes. The company is beginning to look at RFID and Digital Twin implementation, however there are still many building blocks to put in place for implementation of these initiatives.

5.5 Conceptual framework

Besides the emphasis given to digitalization today, it still remains an uncertain concept for both researchers and traditional companies that aim to achieve digital transformation. What is obvious is that digitalization is rapidly impacting the companies in a traditional industry sector, thus more thought needs to be given to changing the processes and operations that may be holding their businesses back (Ulbrecht et al., 2019).

For the successful digitalization, there is a need for guidance on how to structure and manage digitalization processes. According to Ulbrecht et al. (2019), *„what is missing are the success stories, good practises and lessons learned that make the benefits of digitalization tangible, help prioritize investments, choose among action possibilities, reveal „internal homework" that needs to be done before customer-facing initiatives make sense, and provide a plaftorm for exchanging thoughts on challenges and opportunities ahead".*

Therefore, based on the theoretical background and empirical findings, a conceptual framework was designed by the author of this case study. In order to understand which factors drive digitalization and where they take place at the company, a framework for better understanding and mapping of digital transformation has been integrated. The conceptual framework promotes an emergent view on digitalization and provides conceptual means that are needed in order to examine and better understand how to structure digitalization process. This framework reflects the results of the research process and provides insights from interviews and literature that were synthesized. It is important to note though that the model is quite generic and further studies shoud be conducted in order to bring more details into the model for its better use in practice.

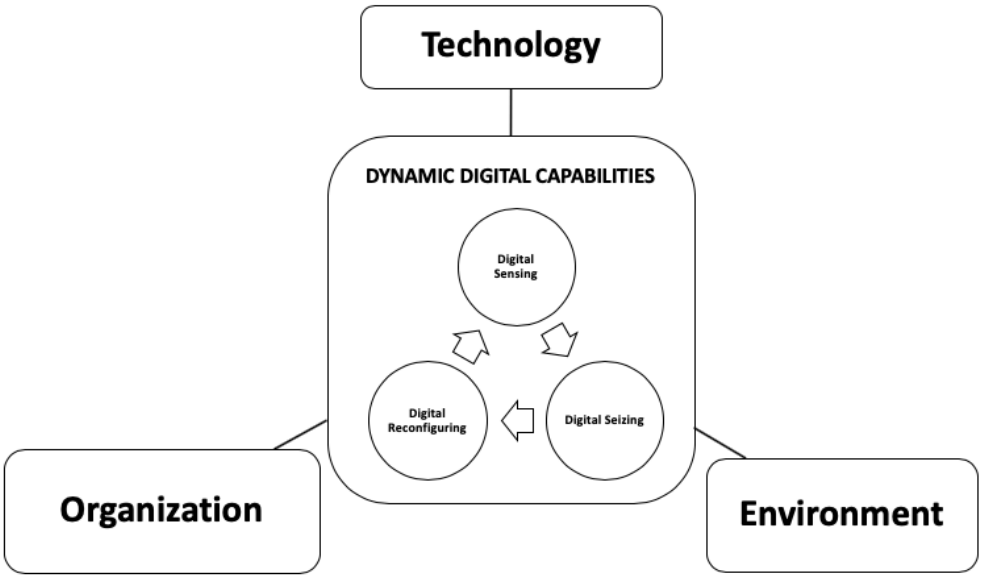

Figure 20. Conceptual framework for digitalization (source: own creation)

At the core of the framework dynamic digital capabilities: digital sensing, digital seizing and digital reconfiguring are placed. These microfoundations of dynamic digital capabilities are unpacked from the Teece (2007) and Warner et al., (2017) theories. In order to prepare for the digitalization, the firm has to develop digital capabilities which allow to align towards a set of firm's goals (Kane et al., 2016).

There are nine digital subcapabilities that support the building of digital dynamic capabilities and allow to get from as-is to a digitally enhanced to-be state (Warner et al., 2017). Digital sensing consists of three sub-categories: digital scouting, digital scenario planning and digital mindset

crafting. Based on those, the firm should continuously monitor their internal and external environment in order to recognize opportunities and avoid attacks from the competitors (Warner et al., 2017).

Digital seizing relates to strategic agility, rapid prototyping and balancing digital portfolios, that are needed to respond to unexpected opportunities and threats in the market (Warner et al., 2017). Finally, digital reconfiguring consists of navigation of innovation ecosystems, redesigning internal structures and improving digital maturity.

Building of these digital dynamic capabilities should be based on the contingency approach because constant redirection, strategic renewal, temporary advantages and ongoing business model innovation are common in the digital age (Warner et al., 2017).

By integrating TOE framework into the conceptual framework, the insights within three contexts that are recognized as potential triggers for digitalization are provided. This allows the company to understand where the main focus should be placed but also consider other factors that are important for structuring digitalization. Three contexts: Technology-Organization-Environment have to be considered when mastering digitalization. Each field includes different factors, either from internal or external perspective. For example, technology context includes availability, complexity, costs of the technology. Environmental context covers the external perspective such as customers, suppliers, competitors, business partners, government. Organizational includes tasks, structures, company's culture, strategy and other internal drivers.

What is clear is that it is not an easy task to prepare for the digital future. The research has shown that there is no one-size-fits-all approach to digitalization, however these are the factors that the company should go through when considering digitalization.The digital dynamic microfoundations should be carefully addressed and continuously reassessed. By considering these contexts when engaging in digitalization, the company can ensure to develop a holistic yet concrete perspective on digitalization and assess the barriers related to it.

6. Conclusion

This chapter will revisit the research objectives, summarize the findings of this research and offer managerial implications based on the empirical findings. Suggestions for the future research will be discussed in terms of how to progress in this case study. Thereby, this chapter provides the final marks to the study.

6.1 Main findings

It is almost impossible not to notice the ways in which digitalization is changing today‘s businesses. In the same way that advances in manufacturing has previously automated assembly lines, introduction of various intelligent technologies is improving the quality and efficiency of business operations. The concept of digitalization is gaining relevance in all industries and entails significant challenges and possibilities. Emerging technologies influence processes, products, services and business models. Various novel digital technologies force traditional existing actors to cope with this change (Ulbrecht et al., 2019).

This thesis discussed the phenomenon of digitalization and its challenges from the viewpoint of one company that is in its infancy in regards to digitalization. The topic is important due to the fast changes in business environment and various possible disruptions on the market.

The specific research objectives were to identify the forces driving digitalization and the barriers to the successful digitalization at the company, evaluate the implementation of the digitalization strategy and explore employee views and practises related to digitalization. To reach these objectives, the research question of the study was: *“What are the challenges for digitalization at KN and how to overcome them?”.* The research question also had several sub-questions concentrating on formulation of the digital strategy, new technologies and how can they improve the processes in oil and gas industry.

In general, the theory supported empirical findings well since the interviewees expressed similar views and barriers with the current digitalization situation at the company. The challenges were identified based on three contexts: technology, organization and environment. Based on the answers, it can be concluded that organizational context plays the most important role within digitalization challenges at KN.

When it comes to overcoming challenges for digitalization, based on the literature, company situations vary and there is no silver bullet for managing digitalization, however, there are various

factors that should be considered (Parviainen et al., 2017). The thesis contributes with a conceptual framework for companies pursuing digitalization where mapping digital dynamic capabilities in technological, organizational and environmental contexts offers a systematic way to approach digitalization and harness its true potential.

6.2 Managerial implications for KN

The opportunity for KN to leverage the impact of digitalization is becoming more and more evident, however the barriers faced will not disappear unless actions are taken. The aim of the study was to understand the challenges and the reasons behind them to figure out ways on how to tackle them. This section provides a set of recommendations on what the case company could do to combat the challenges occuring within digitalization to fully prepare for the changes ahead.

1) First of all, there is a clear need to **make digitalization a priority for the top management** of the firm. Digitalization requires effort for organizations to manage changes, engage with employees and improve their skills and mindset, thus the guidance needs to come from strong leadership. Top management should better communicate the vision, create the roadmap and rally the firm with goals and incentives to reach them (Westerman et al., 2015). Besides, what seems clear based on the interviews is that middle management has a lot of weight on their shoulders to execute the objectives of KN Digital, thus the reward and incentives for making digitalization a priority should also be considered.

2) **Drive the culture of innovation and technology adoption** – executing the digital strategy and managing the changing environment requires co-operation and engagement across the organization, therefore new ways of working should be discovered. The start-up like environment could be seen as an inspiration to evoke innovation culture, foster creativity, challenge the status-quo with experimentation and shift away from the hierarchical structure.

3) **Hire more digital talent and invest in human capital** - based on the findings, some managers have limited skills to execute the digital initiatives. Managing digitalization is a challenging process that requires new skills and knowledge, thus digital-savvy workforce should be considered for delivering the digital agenda. For example, hiring a Digital Data Analyst or Chief Digital Officer could be an option because a fresh digital talent with experience from outside the firm can enhance

company's creativity and innovation. Also, various development programmes that promote digital thinking could be designed for the employees to build dynamic digital capabilities, for example instructions on how to change current working methods with a thorough set of associated actions (Dudley, 2017).

4) **Leverage internal data and knowledge** – data is one of the most important business assets enabling digitalization today, thus data platforms should be optimized at KN. This would allow to have an improved insight on the organization and its operations, enabling better predictions and prescriptions as well as decision making.

5) **Identify opportunities to deepen digital collaboration with clients, business partners, suppliers and other stakeholders** – this will allow to unlock potential value and meet the ever-changing needs and develop digital capabilities quickly. An idea could be to develop collaborative partnerships with competitors or other port companies to innovate and invest in sharing-economy platforms to exchange resources among participating organizations. Also, an implication to open a dialogue with the government for fostering the ecosystem for innovation and driving future prosperity could be considered.

6.3 Suggestions for further research

There is plenty of future research topics regarding digitalization, because surprisingly little research from the organizational point of view was found. The first sugesstion would be to conduct a longitudinal study of digitalization at KN, as the general situation of digitalization progresses, thus the results could be different in a few years. Also, the study could include main clients or suppliers of KN, to get a broader understanding of the challenges from the client's perspective. Perphaps an interesting study could be to include other companies in oil and gas industry in the Baltic States in order to examine digitalization trends and find correlations between them. Also, an idea could be to investigate the start-up firms that have grown very fast and evaluate their digital dynamic capabilities, to see how they differ from the large organizations in traditional industry.

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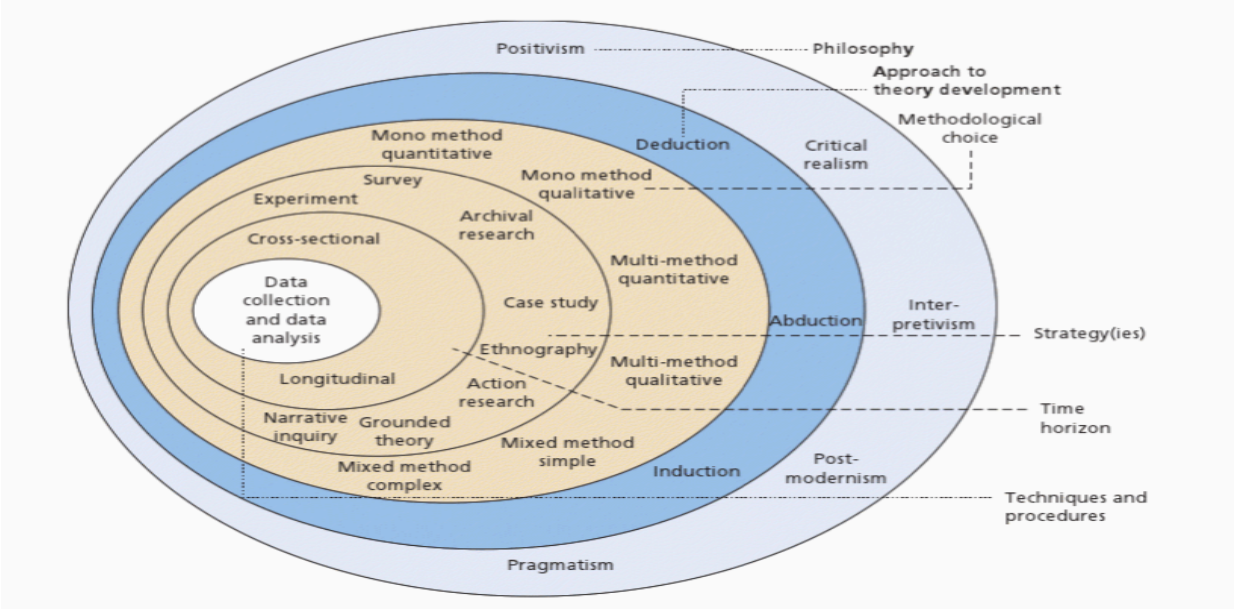
8. List of Appendices

8.1 Appendix 1 – The Research Onion



Source: (Saunders et al., 2016), page 45

8.2 Appendix 2 – Interview transcripts

Interview no. 1 - Director of Business Processes

- ***Could you please introduce yourself and your responsibilities at KN?***
  My name is Ramunas Makelis, I am a Director of Business Processes at KN. To be more specific, my goal is to help colleagues with processes and their optimization, so naturally one of the directions is digitalization. I have started working at KN in November, 2018.

- ***Could you please describe how do you understand digitalization processes at the company?***
  I see digitalization as process fixations, management of the processes using IT technologies. Many processes, at KN or generally in the world are not happening in the digital space yet, or if they are, then they are mostly used as an alternative for the use of paper, without any

sophisticated decisions, without analyzing any results, not making any conclusions and not even trying to make something faster, change or fix something that could be done more efficiently and that is really wrong.

- ***How is KN preparing for digitalization?***

  Yes, the company is preparing for it. As you might have heard, we have an initiative called KN Digital and I am one of the main coordinators. More specifically, I am coordinating e-processes and the main goal is to create and digitalize as many processes in the company as possible, in manufacturing, procurement, sales, even human resource management. It is the very beginning, primary stage, as we started formulating the strategy last year in June 2018 and only now we have finally purified the main strategic directions and we also grouped all the functional things and made sort of a system based on that and what and where could and should be done. Of course, if we have a look at the world or other Lithuanian companies for example, we have some companies that are really far ahead in the digitalization direction (for example Energy of Lithuania, Post of Lithuania, also many telecommunication companies). In general, what I can note here is that SMEs are way far ahead when it comes to digitalization. If we take KN, because of historical background, the conjecture of the market, in general in this oil and logistics sector, KN is far behind. My personal background is from SMEs and what we are currently solving here with the innovators club and what we are trying to implement here, it has been done in those companies 4-5 years ago. I have worked in automotive industry for many years and the progress there was huge, most of the business processes are being organized using those technologies, so it is not even an innovation but a necessity. SMEs have very limited resources if we compare with KN, so they cannot afford to do that many things, on the other hand, they are forced by the market to optimize their processes because of competition and the market is not staying in one place. I have one example of one SME that I worked at, in 1.5 years the firm managed to increase the productivity by 30% and to shorten the working hours needed for certain process by 40% and all because of digitalization. And you know they managed to do it so fast because of the size, so everything was deployed faster. And it is not even a limit, I mean those were just core processes, if we look into warehousing operations we can find even more processes to digitalize there. If we are coming back to the case of KN, we have over 400 employees here and if we compare front-end and back-end of the company, we recognize that there is quite a high separation when it comes to understanding of digitalization. If we take

employees in manufacturing, you know they are still using old Nokia phones and when you come there all excited to implement some applications they are asking you what an app is. You know everything is very nice and cool when we are talking with Millennials or Generation X. However, in this company, we have people who are older, thus there is a high need to educate. Teaching and educating them is vital for the implementation of digital solutions. The situation can be described as such: A runner standing in front of the start lane, ready for running sprint and then noticing that actually the running track is not even there. So overall, for KN, the digitalization process first and foremost has to start from the education for digitalization.

- ***How do you think employees of KN view the process of digitalization?***

  Well my impression is that of course there are fears that robots will replace some employees and that the number of employees will decrease, but these fears are natural, we need to digitalize without creating panic. You know these fears are natural in human history, for example, the first industrial revolution when the machinery began to replace hand production and the factory systems were implemented, so those rebels against the future have existed at all times and the protests against the new technology took place. Well, going back to the case of KN, of course there will be some technological misusage, I have experienced that in my previous workplaces. You know what we have to keep in mind that people in general are prone to status quo and to prove that changes are needed is hard. Of course, there are various methods to do that but for the human nature, laziness and resistance to change is inclined. Well, we all have it in us, just in different levels. Well thankfully, all these things can be trained, we can all leave our comfort zones, so it is just up to us if we want to change something. We just have to evaluate how much the person actually wants that change and of course a lot can be done when there is a high level of enthusiasm for the change. What is important to understand here is also that older generation is more risk averse and you know throughout their lives they have more experience and understand not only the good side but also the negative side of changes. But now I am also thinking that those who have experienced a lot might not be afraid of changes, so to conclude I would say it does depend on the perspective. But again, if a business is not digitalizing today, it is stagnating, it is not growing and thus not attracting talent and new customers. It is important to understand that change is vital. Of course, digital transformation is complex and is also different in different industries and companies. I believe that right mindset, strategy and resources are the most important. What is the most important is that top

management, not technology, have to drive this change and this what makes the difference if it will be successful or not.

- ***Are the enough skills and competences for the implementation?***

  Based on the conversations I had so far, there is a big part of people who are very excited and enthusiastic about the digitalization, they are very interested in all these emerging technologies and their implementation at KN. But you know what matters here now is that we are in the middle of the hierarchy, so we have to agree with the front end and help as much as possible in back-end. Managers simply should involve all their people in digitalization. And in this case, we have back-end that's used to working in their own old ways based on the experience. Front-end should always react to market, there are external factors that affect the business. Oil handling today does not add much value, the main service does not always have the meaning, sometimes sending a digital invoice can add more value and will affect to choose one supplier or client over the other based on that. What I am trying to say here is that digitalization is not only about increased efficiency and elimination of repetitive tasks, it is also about the new opportunities to offer some kind of new service or a technical solution the benefits the client as well.

- ***Which processes have the highest priority for digitalization today?***

  All the processes that have manual, repetitive tasks. I have only started working here since November, but I have already noticed that there is a real struggle with the copy paste processes, they all should be done faster and simpler. Also, it is a mistake to think that we digitalized the process when we had a paper document and we placed it to Excel and then we digitalized. That's silly, because there is no value, instead of carrying that paper document, now we are just re-sending it by mail. No, the process, the whole chain has to be reviewed and checked if it is actually needed at all. Well, I have started working here recently, have not covered all the specific sectors yet, it is important to know the business context in order to offer a technical solution, but to answer your question, form my current perspective it would be our accounting department as well as logistics processes. Both of those units are handling a lot of processes manually, but we will improve that I am sure.

- ***What would you say are the biggest technological, environmental and organizational challenges for digitalization at KN?***

I think our current development has provided us with so many opportunities that it is hard to use them all at once. IoT gives as a really big number of opportunities, I think in the near future using RFID we will be able to connect it to our fridge and know what we are missing to buy for our groceries. Of course, cost is a challenge a well. But again, if we consider our smartphones today, 30 years ago it was a crazy expensive technology, until it gets cheaper and available to every user, it takes time. The thing is that as of today, there is still no mass consumption of all these newest technologies, so that I would say is the technological challenge cause many of those technologies are still many of them are managed by people as well. Of course, it is a matter of time until it will be in use practically at the majority of companies, but that time is becoming shorter and shorter. In general, for technology a proof of the concept is needed. As of today, I do not think that technology will replace many people at our company, I think it is used as a tool that makes it possible to be more efficient. Electric bulb was not invented from a constant improvement of a candle light, right? If speaking about the environment, our industry in general, today I do not see an alternative for oil products, but in a long term definitely yes. The energy market is changing, KN has to also move forward. I think we should also engage more with our suppliers, business partners regarding changes of the processes that have been stagnating. From the organizational perspective, you know the saying goes that a decision not made to change equals to decision not to change at all, or the only wrong move for the management would be not making any move. A skill to change has to be incorporated in our company's culture and that is the biggest challenge organizational wise.

- ***Which decisions should be made in order to prepare for digitalization?*** That we are all going to change. Like the saying goes, the chain is a strong as the weakest part of it is. I think there is a need to break even with the understanding and knowledge of modern technologies. We have people at the company who are complete technology geeks and also those who do not really know much about it at all. Of course, we also need to raise a lot of internal questions regarding our operations, what do we want to improve, is it to make it communication with our clients more effective or handle the oil products faster or send an invoice faster. I am involved with our KN Digital, but I really feel the need to be even more precise with our goals. Is it to save 15%? Then let's fire 15% of the employees. You know it is like saying, let me know how you'll measure it, I'll let you know how I'll behave.

We have 40 economists, I think that is crazy. So, my first point where I'll go to and attack with digitalization is our Finance and Accounting team, they have very inefficient operations, there is no time for evolution there, weneed revolution in that department.

Interview no. 2 – Commercial Project Director

- ***Could you please introduce yourself and your responsibilities at KN?***

  My name is Gerda Korobka, I am a Commercial Project Director. I am responsible for various current and planned commercial projects at the company. In addition, I am also responsible for communication with our current and potential clients and partners; I also participate in negotiation and preparation of commercials offers and contracts. Besides, I also represent the company at various events, exhibitions and conferences and manage a team of three people in our commercial department.

- ***Could you please describe how do you understand digitalization?***

  Well, to be specific, I understand digitalization as a progress by improving processes at the company. When I hear a word digitalization I instantly think about progress, improvement, future, technologies, optimization and in my mind it's all from the positive perspective. Digitalization is speed, time, comfort – that is what is needed for our business to move ahead. It is very much talked about at KN at the moment, we have a group of people who created the movement called KN Digital who's main focus is on better process efficiency and innovative company, one of our main company's main values is progress, so we want to be open to innovations and improve our working processes. I am unfortunately not a part of the innovators club because I travel quite a lot and with my schedule would not really be able to contribute much there, but yes, I do follow their updates and ideas and also I think that systematic execution of the digitalization strategy seems possible, at least that's what I thought when it was presented to the whole company and I got a very good impression of digital strategy team. Personally, for my position, digitalization would mean connection to clients with digital channels and better transparency for communication.

- ***How is KN preparing for digitalization?***

  Last year the management started talking about it, what it is and why there is a need for it, also the development of digitalization strategy has started. This strategy includes many areas and departments of the company, starting with internal processes (for instance e-documentation) ending with external factors such as communication with the clients (e-communication). So basically, as of today we are still in a starting stage, trying to implement various steps how to improve our everyday tasks and the digitalization buzz is really in the air here and seems that the company is going forward. From my department's perspective, I am really hoping that we will manage to implement a proper digitalized client management system soon, because it is really messy to work the way we do with our client management.

- ***In your opinion, which technological, environmental or organizational factors are important for the KN in order to successfully digitalize?***

  Well, we actually discuss a lot about the emerging technologies that could be implement at KN. From what I know, Germany has started talking about industry 4.0 more than 8 years ago, in Lithuania, however I do not think that many companies are preparing for it yet. In general, I believe that businesses in Lithuania can be divided into those that already live industry 4.0, then business units that have a great interest in it and firms that haven't even reached industry 3.0. Of course, in order to stay competitive, companies should be prepared for it and to do that properly, from the organizational perspective there is a need for motivation, understanding and competencies to measure the potential of digitalization. Also, there is a need to be less risk averse and invest in order to receive gains from it. And investments should cover not only various manufacturing processes, but also employees. I think we have placed a lot of focus on those processes at the terminal, however I think that our internal operations should be aligned better as well. I personally work close with Logistics department, we sit right next door to each other, however we do not collaborate as much as we could, so I think a very important factor for the change is collaboration, we could really share more ideas and actions on how to improve the logistics processes for our clients. Or you know, as I am in touch with our current clients and potential clients directly, I think it would be also a good marketing for our company to say that we have taken these technologies and used them on our internal process efficiency, this way having appealing arguments to our external customers. From technological perspective, I can only comment from my position, I'd say we could use better communication tools, you know

something that would allow better mobility as well. From the environmental perspective, well government has high impact on our organization, so I think we could use some resources for faster development from there.

- ***In which processes you think it is the most relevant to implement digitalization at KN?***
  From my perspective, everywhere where it is possible. In our company it is possible to figure process optimization in all our activities, find ways how to use less resources and get better results. I think what is important for everyone to understand is that digitalization is supposed to make the jobs easier and more efficient. If I am looking from the commercial perspective, digitalization will guarantee a more optimal, efficient and higher quality communication and service. Thus, from commercial side, the highest efficiency would be timing wise, it will cut a lot of waste form the timing perspective.

- ***What are the factors that are stopping/slowing down the implementation of digitalization process at KN?***
  Well there can be many of them, but I think the fundamental one is the employee. The employee is a mean for a change, however if he/she does not believe it, then the employee can be considered as a problem that is stopping the progress. You know there are employees that are afraid of leaving the comfort zone, to think "out of the box" and look at the processes differently. People are used to doing things automatically, therefore changes are scary for them.

- ***In your perspective, how do employees of KN view the process of digitalization?*** Well, it is clear that there are many opinions and views towards it. I do hope that our company is international and open-minded, thus the majority of the employees are positive towards it and understand the need for it. But no doubt, that some of them are scared to lose the jobs because of automation, especially the older generation.

- ***Are the enough skills and competences for the implementation? Do you think there is a need for further training and education?***

  I suppose that for some process there must be additional information provided or even training, some less advanced ones do not require additional training.

- ***To sum up, in your opinion what are the positive and negative aspects of digitalization?***

In a long-run I am sure that digitalization will bring plenty of economic benefits, because of saving physical and timing resources.

Interview no 3. – Business Process Analyst

- ***Could you please introduce yourself and your responsibilities at KN?***

My name is Irina Motiejuniene, I am a Business Process Analyst, today my highest priority is on digitalization within document management process. When it comes to KN Digital club, I am responsible for e-documents and some part of e-process directions. I am also curating the platform called KN Ideas, it was also created for improvement and development of more efficient processes. I find the job very interesting, we started in September and have already received 43 ideas for business process enhancement, also given our employees I think it's quite a lot of ideas.

- ***Could you please describe how do you understand digitalization processes at the company?***

Well what is clear is that our company really needs to work more efficiently, thus digitalization is one of the ways to do that. As of today, we still have a lot of manual work, we use a lot of paper and we waste a lot of time and this really needs to be lowered if we want to be a modern, efficient and prosperous company.

- ***How is KN preparing for digitalization?***

Yes, the company is preparing for it; there is a lot of going on now. You know the issue is that there is so much bureaucracy and that really needs to be changed. For instance, if we take documentation adjustment, my biggest contribution is adjustment and arrangement of all the documentation and various regulated activities, instructions, political procedures, guidelines. Before all these documents were confirmed by the order. Today we have them electronic, digital process has been created that allows employees to work more convenient and waste less time, for example if there are any changes in the process, it becomes way easier for the employee to

update that documentation compared to how it used to be before. When we had to get the orders before, everything took way longer. We have also introduced digital signature, which turned out very beneficial, it significantly reduced the number of orders. I am so glad we did that because before there were so many orders that had to be confirmed with documents and those were only available to management or persons who were involved in these processes, so there was a lack of transparency. We really need standardization and better access to information. In some situations, we did not even know who is using what in which activities, so now when we describe the processes and analyze what is going on and what is the relation and responsibilities of certain employees. The goal is to have all business process instructions and automate 50% of those processes in 2019. This is expected to result in a faster access to information on the activities of each unit and employee, faster adoption and implementation of performance management solutions, wider business process analysis and development capabilities, decreased operational inefficiencies and improved risk management.

- ***How do employees of KN view the process of digitalization?***

Well if we are talking about employees in manufacturing/production, they are really reluctant to change, they are very used to their stability, comfort zone and they usually get scared and resistant to changes. And we cannot judge because it is a natural human reaction, it's all psychology, you know. What can we do from our side is to educate and encourage them to accept those changes. Today the world is turning very fast and the firm should and actually simply cannot stay behind. One of KN's characteristics is that the company was operating in the same routine for many many years and now we jumped onto the Digital train that allows implementation of various effective processes, of industry 4.0. Things are moving fast and some people, especially those working at the terminal, they are an older generation, that is another reason why they react quite negatively. For yours and mine generations, changes are natural, we need them, so in my job I have to fight with the psychological state of some people, well maybe not fight but just really thoroughly educate and explain what the meaning behind all these improvements is and why does the company really need them.

- ***What do you think about the current digital strategy?***

I am very positive about it and happy that we have competent and loyal employees who are looking ahead and created this movement. I am responsible for two directions of this strategy,

both related with documentation. My goal is to reduce the paper at the company, I checked some statistics and it is cruel how much we print here, so the goal is to reduce the paper by 50%. The idea is also to organize events where we all go plant trees, encourage people to participate in socially responsible environmental activities as well. Preparations for that strategy took months, we had so many meetings and from what I know, as of today the digital strategy is set in stone now, however during our meetings we always run through those directions again. Today this strategy is led by Rytis, who is the founder of the KN Digital initiative, we are approx. 30 people working on executing that strategy now. Rytis has experience with project management as well as good leadership skills I think. The responsibility of those directions has been spread now depending also on the business units, for instance Logistics have the RFID project, I have the documentation and so on.

- ***In your opinion, which technological, environmental or organizational factors are important for the KN in order to successfully digitalize?***

The attitude: *"I have been doing this for a hundred years now and you come here and tell me what I am supposed to do".* But when we start explaining the possible result, that the job will be done way more efficiently, the person understands it and the outlook and opinion usually changes. The thing is that we need to talk about changes and the mistake is that it has not been practiced here before. However, today I aim to approach everyone who works with a lot of documentation and try to help and find a way to improve the process. To be more precise, today the most problematic departments when it comes to documentation is administrative unit and accounting, they really lack transparency and clarity within their tasks.

- ***In your opinion, what does the company need to consider in order to better prepare for the digitalization?***

I think it all comes to the investment and determination. What we are doing today is done with minimal investments, so to be honest there is a lack of picture from above and some collaboration. But again, it also comes to firm's historical activities, I have an impression that everyone is too focused on their own unit, so the co-operation is minimal. Also, as I mentioned before, we are still fighting bureaucracy, so sometimes every step has to be proved to one person, then the other person, thus the process deployment takes way too long. Sometimes I even have to explain it five times. So, it also is a good challenge for me, but I am also educating

myself, learning patience and trying to find ways. Overall, I believe what is super important is to educate people, not just show some videos, but practically explain what is going on, to provide some forecasts and allow the person to ask all the questions.

Interview no 4. – Chief Administrative Officer, General Counsel, Founder of KN Digital

- ***Could you please introduce yourself and your responsibilities at KN?***

My name is Rytis Valunas, I am a Chief Administrative Officer, General Counsel and a founder of KN Digital.

- ***Could you please describe how do you understand digitalization?***

Digitalization for me means that I have to be agile and broaden my perspective on what is going on in the world. On the company level it is our reaction to the digital revolution. How do we make a company more digital, being up to date towards various technologies, processes, tools and how we react to these trends and strive not to fall behind.

- ***Could you please explain the KN Digital initiative?***

Ok, I think I will start with describing what we have done so far. So, to begin with, I'll explain RFID which stands for radio frequency identification, for KN it would identify wagons, tanks, which and how much of the oil product is arriving, it will allow to have digital information regarding the cargo, so there is no need for dispatcher, accounting. We had several discussions with Logistics department on how much we need it and that it could bring great value to our logistics processes. Ligita (the Logistics Manager) is responsible for the implementation of this, but you know I just spoke to her yesterday and she already doubts if it is possible to implement because some of the wagons are rented. You know I really identify this resistance before even we start doing something. All I see here is a technical challenge, maybe we will need to combine two or three technologies and we can have the solution. I believe that everything is possible; there is only a question of money and solutions. With RFID some jobs will be eliminated, the operations become cheaper, number of human error decreases, the speed increases as well because when it comes to accounting, the speed of it is very slow, we have constant disputes and so on. In the Western world, majority of the logistics companies have

RFID and the wagons are rented but they still implemented 10 years ago or so. This is nothing too advanced, just data reading and digitalization, the data gets generated conveniently.

Another direction that we have is e-process and e-analytics, we want to have a proper process mapping, when everyone fully knows who is responsible for what, digitalized map that will clearly allow to see the processes because today it is a slightly chaotic, especially in logistics and accounting teams. And e-analytics that would allow getting the data that will be useful to make decisions. For example, for logistics which data is needed and how they plan the loading because today we still have quite a lot of manual work, thus these analytics would be very beneficial to for better understanding the dependencies and their causes, analyzing causal relationships, modeling future scenarios and forecasting. Another direction in our digital strategy is Digital Twin, having that would allow to test our decisions. It would be especially useful for exploitation, planning of operations, which pipe should be used for oil, how to mix and do things from the operational perspective, help to plan operations without any errors. In general, all these innovations that we are talking about are applicable to all the companies, not only firms within oil business. Also, blockchain, we find that particularly interesting and the goal of this year is to provide training for KN Innovators about it. We have a Blockchain center in Vilnius, it would be very relevant for us to learn and apply smart contracts. However, this year will not be too generous for us in terms of training because of saving, we can only start attending various trainings in autumn, so now we are trying to figure out how to use it because there is a great variety of theoretical possibilities at least. Also, robot locomotives, drones for tank and equipment inspection, smart pipeline cleaning system are taken into consideration, however at this point, two the most considerable innovations are Digital Twin and RFID implementation.

KN is a great company to work for, with good resources and of strategic importance to Lithuania. However, I do see in my job that we really need to make our processes better, there is a huge potential for us to strive even better in this industry, however for digitalization there is a need for everyone's participation, wish and will to do it. If we take the models, stages of digitalization, KN could be placed in the frame, we have in our own way created the needed elements. We are motivated to be innovative, to have that funnel we have generated a lot of ideas, today we are choosing what do we need most and what could be implemented the most successfully. The success rate I would say would be 1:10, we do not have that much capacity.

At the moment the plan is to filter what has been brainstormed so far and move forward, because we have the strategy that has quite a big scope.

- ***What are the biggest environmental, technological, organizational challenges of fulfilling the digitalization goals?***

If we speak about the challenges, the biggest one within the organization I would say is not being able to collaborate, because there is no tradition. I am a head of these strategical digitalization directions and I am responsible to make sure that they are happening, and something is being done about it. Additionally, we have the leaders or coordinators of these directions that report to me. The goal is to filter out the final goal for this year, create OKR's (objectives and key results) for the next quarters and then coordinate and calibrate with other units and make sure that there is involvement and contribution and to make sure that everyone is informed and knows what to do in order to reach those goals. To answer the question if it is easy to convince the others, absolutely not. You know we all have these habits, the ways we do things, so changes are scary, and we work from inertia. I think our problem lies in the company's culture, for me it is really about how to get people to think about the same things with different view, culture is really important in digitalization too, if we will not manage to get the right cultural attitude, I do not think any of the KN initiatives will ever be implemented. You know, there is this saying, "culture eats strategy for breakfast", and it is absolutely true. In general, at the company we have employees who work here for many years, I would say they have quite a good opinion about their professionalism and digitalization would of course make an impact on the job places, as we know it is the consequence of successful digitalization. This reason is the hardest to communicate and manage. As an example, one initiative that we had before, not as a part of the strategy, but just independent, just to save paper on the tanker administration site, it turned completely unsuccessful. In our law and administrative department, we have analyzed the opportunity to become paperless and save some time on one procedure, we have informed our accounting team and got a reply that no you cannot do it because the client needs it, then we started digging deeper what is it that clients want and what is needed according to the law. Then we found out that according to the law we surely can do it and the clients can also live without those papers. So, there is a proof that everything is possible, but then again, we got a reply that no, let's not change the procedure, because that way we found it more effective. So yeah, there is a natural resistance, because people do not know, and they are

scared or simply do not feel that it is needed. As a director myself, I feel there is also a lack of collaboration between other directors, they have also settled down to work as we worked before. I sense that there is a fear to let in, let's say a data analyst, because of the attitude "we know everything", which is really wrong. You know there are all these change management theories, so I could say our experience simply confirms those theories and there is nothing new here. In our company we have people from three different generations with different outlooks and views. Of course, digitalization would be way faster and way more possible if we had employees of my age or yours or if the company was a start-up. Today it is challenging to educate, cooperate, develop and collaborate in such environment. The top management has confirmed the digitalization strategy, it is official now, but when we are having meetings, the topic usually gets lost in translation. I actually think that many directors are simply not willing to risk and put the efforts that might also affect their status at KN. I see that there is a gap between what directors say about digitalization and what they actually do about it. Everyone knows that I am a founder of the strategy and I do spend many hours working on it now, but then I hear things like "oh Rytis took Darius' idea of RFID " and then Darius goes around spreading that this is his idea, but you know it really pisses me off, alright it is your idea but it needs to be implemented, and then he answers don't worry, logistics department is working on it, but when I invite them for the meeting and ask how is it going, then they answer 'we are working on our part, but our client Orlen does not see the value in it and in general, this does not matter for logistics', but then I say it does matter for us as an organization, the commercial department sits right next door, go and have a discussion and collaborate better on it. So, if the attitude was going there and coordinating, then we would not have such questions, but then you know, business as usual. Then the Head of Logistics Unit comes and asks oh, are we doing it for free only because of enthusiasm or it will be better for accounting team or what. But then when we start looking objectively, it is also a great help for logistics processes. I must admit the other projects seem to run smoothly, only RFID is a struggle because in my opinion it has little collaboration and I do not know what is planned, with other projects we have clear plans and goals, but RFID and it is quite strange because they do know that we will have a new infrastructure soon and the number of oil products is also increasing rapidly, the department will have challenges to face and it is quite strange that they do not really place that much attention on it. So, my task now is to neutralize all the obstacles, communicate as much as possible and really put a lot of effort changing culture to more innovative and to fight these stagnated habits

and if there is a need, I will speak with directors or even with the general director. For the success of this strategy, the goal is to track every month where we are at and during every meeting I will communicate why something is not happening, what are the reasons and find solutions and ways how to overcome the obstacles. Another challenge is that we do not really have the funds for that, because it is not allocated. I think it is crazy that we spent 100 million of investments on the infrastructure, but about smart or digital there was zero communication. It is a great challenge and I feel very sorry because a couple of millions can change a lot, but we invested to some metal construction and fire systems. I am not doubting the need for those, but I honestly do feel very sorry and sad that there is very little understanding how much we need it. I already started talking about it in 2016, but the reply was that everything is fine, there is no need, also I must admit that I also understood everything differently than today and I have no doubt that I will perceive it different in a year because everything changes and evolves very fast when it comes to digitalization. But there are positive sides as well, last week I spoke with our German consultants regarding this strategy and the model that we have today, conceptually it matches other companies, the same consultancy advised Siemens and it really does meet the requirements and I could actually discuss it with any other company. Of course, when it comes to the resources and people, then it is unfortunately different. On the other hand, I think it is quite amazing that we are doing this without separate responsibilities, units, duplicating with our work, so it can be said that with minimal resources we created it and that really a lot can be done with a really high drive and enthusiasm. Of course, digitalization will become necessity and it sort of is already. We can already see that accounting is working differently already, they have received a strict order to reduce the amounts of paper. The goal would be to have such managers that one could trust they will make it happen, we already have some good examples, in general I believe we should really focus more on better managerial skills. Another challenge is also the city of Klaipeda, not long ago I attended one conference and presented our digitalization strategy, there we had also our Port Director Arvydas Vaitkus who after my presentation commented that the port was digitalized long time ago, well I don’t know how because we are still receiving tons of paper from them. It is true though that there are companies in Lithuania that has been digitalized already, a good example is Lithuanian Energy, but they are really being affected by the competition, so otherwise the company would really leave the market. For us it is slightly different because we do perform very well, our results are getting better and better so naturally the question is oh why we need any changes then. KN is an

established company, we are the leaders in the market of Baltic region, things are going well and I think as long as we continue winning in the marketplace, our digitalization efforts will stay slightly constrained. So yeah, what else, I think for us it is also necessary to hire more digital talent, this should really be a priority task for our human resource management team, so we could be able to grasp those opportunities even better. Looking at our environmental context, I think we should follow other advanced port companies, I do know that some of our unit managers went to a conference where port of directors of port of Antwerp were presenting their innovative solutions, I think there is a lot to learn from them.
But in general, port of Klaipeda and other port companies could collaborate more on technological developments as well.

- ***How was the strategy created and how do you manage its execution today?***

I think the story is quite interesting and I am quite proud of it. It has been created to achieve business goals, including the core directions of the digitalization and innovation of KN's activities. The whole process started internally, finding these so-called Change Agents, that is identifying people who want to make the improvements at the company by introducing various technologies. So everything started in June, 2018, we organized a meeting and invited everyone, then I showed a movie from 1967 about the future how the life will be in 1999 and then a lot of that actually came true, then I did this presentation showing how things changed in the past 15-20 years, starting with music, games, phones and computers, with this presentation I wanted to send the message that everything is changing and that we also need to adapt to these changes and follow. Then the Head of our IT unit was attending this CEBIT exhibition on Industry 4.0 in Germany, so he did a presentation on technology for port companies, energy sector, he showed us ports of Antwerp and Rotterdam and how they developed and introduced various technologies. Then we had a couple of companies as guests who showed us the benefits of their digitalization. Approx. 120 people attended that event which is really quite a high number of attendees, then we divided into groups and started brainstorming what could be done at KN, we made these hashtags KN Digital, KN Industry, KN office, KN people, discussed what kind of environment would inspire people to work, which competencies should we improve, how to develop them, which processes really need to be changed and adapted to the modern technology world. Then out of this we created KN Innovators Club and the team of 34 people, so we continue to work in these groups. I am not going to lie we had a lot of discussions, even some

serious conflicts trying to figure out what we need. It was not easy for me to coordinate all of this, but now I can say it really gave me a good understanding of three things. First one is that we have very fragmented processes and there is a need to digitalize them asap, especially in the management of documentation. Some of the processes do not have instructions, especially we see it within the older generation, now when we had to fire around 20 people, we noticed that we do not know how the process has to be done, so we have some challenges because the people who knew how to do it, did not share the information and kept it all in their heads and when they are not a part of the company anymore, we are facing issues. Second thing that I realized is that there is a lack of competencies related to digitalization, so now we are attending as many trainings, lectures, events, visiting companies and during the meetings we share the information, also we had a meeting with our Human Resource department regarding the need for hunting for digital talent. I try to educate my team as much as possible. At the moment I am also involved with "Lighthouse Co-working", there is a high focus on innovation there, we actually are having weekly meetings with the senior managers of many companies that are undergoing innovation processes and brainstorm together and learn from each other. We have also started collaborating with universities, providing them our case and allowing them to provide solutions for us. Recently I have also organized a training that was adjusted for us accordingly, called "Plotting innovation to practice", we had a professor from Italy visiting us. During the discussion afterwards, some people admitted that it was a shock for them to realize that digitalization is actually a very long and methodical task, not just a simple dream that becomes true fast. It is a hard work requiring planning, conceptualization, business case and action plan. We often organize these sorts of roadshows, where we question the coordinators of the directions, we ask explorative questions on value proposition, core product and how to improve it. We also try to give a lot of feedback, to encourage trying things. It makes me happy that this process allowed to find so many motivated enthusiasts, there is a lot of trust and we are quite many, so I am not alone and it having this team allows me to push the top management even more. It is a bit sad that we did not manage to do it faster and sooner, but I blame our company's culture. Today it is important to catch all the low hanging fruits, so we could create more success stories. Also, increase qualifications and fight the excuses of why something cannot be done. For me the most demotivating this is the top management who comes and says why do we need this, but I am convinced that it is just basic biological things, that are coded in human genes. On the positive note, I also think it is nice to see this resistance, because it means

that the KN movement has an effect. I am sure there will be many challenges to fight, but the most important is to fight the limits in our minds.

Interview no. 5 – Oil Business Director

- ***Could you please introduce yourself and your responsibilities at KN?***

Sure, my name is Darius Silenskis and I am Oil Business Director. I am responsible for the oil business including both terminals in Klaipeda and Subacius, one of the terminals is oriented to the storage and the other is handling of the oil products.

- ***How do you understand digitalization processes at the company?***

I see digitalization as hygiene. Frankly, everyone is trying to present digitalization as something very special, but the truth is that it has been going on for a long time. It is a part of a normal business today, removing manual work. Both digitalization or industry 4.0 is a cut-off term in Germany that has been introduced in one summit. This is a government-approved strategy that has turned into a few interpretations, also in USA, China and Japan. I do attend many trainings and I am very interested in it, it is a great topic, but I also think that actions speak louder than words. Nowadays, digitalization is simply a hygiene that is very much needed for business, it makes the company more competitive by bringing new technological progress that is used to increase business process efficiency. You know, it is about being aware and bringing new ideas on how to think and act in order to be equipped for the digital age. The outcome of it should be simplification of the tasks and standardization and improved processes.

- ***Is KN preparing for digitalization?***

Yes of course. If you had the interview with Rytis, then you know more about it in further detail. We are one of the most effective and active participants in this process now, but for logistics I would not praise us too much, because there are other logistics companies in Lithuania that are even more digitized and robotized. So, we are definitely embarrassed and now putting a lot of energy to it. Everything started with a struggle for strategic purposes, but then we figured that the goal is actually attainable. Today, digitalization is an important part of our business strategy, we have a lot of soft and hard tools in handling, but there is no single

system to manage them. The processes are, unfortunately, still quite primitive, if we take a look at Germany for example, then there is really a lot to do.

- ***What would you say is the top priority for digitalization at KN?***

First of all, it is important to understand that the company has a very complex infrastructure and that the product we are loading is really risky, the cost of human error is highly costly in case of an incident. So, having a digital twin, that is a virtual space that would allow us to test and reflect on our decisions would be really great. All the other tools, including the same RFID, which is technology that is available for 20 years already, that's simply a business hygiene. However, KN does not have it yet, today this process is carried out visually and wagons are being identified manually. The reason is that the leaders who were in charge before were not interested. From what I have heard, there has been a talk about RFID for the past 10 years and it has been always coming soon, but it has not come. I remember I was attending one conference in Germany, with the University of Technology and visiting some digitalized companies, the moral of the conference was that if the leaders do not understand the benefits of digitalization, it will probably never start at the company. And you know it is logical because these decisions are related to the allocation of human resources, financial resources and so on, so there is a need for support and initiative and it won't start at the bottom of the hierarchy. We do not have the system today because the previous management team did not understand or even bothered about the integration of customers through RFID that would result in reducing human error and cost, because a person doing manual work today has little value. So that's just the basics. RFID is my idea that I brought to our Bank of Ideas and actually it is the simplest thing that we could implement and that will allow us to even better understand and grasp the benefits of digitalization. The challenge of RFID project is that it also depends on the will and wish of our clients. RFID is a way to track stuff, in a manufacturing pipeline it allows to see where the certain components are, the data enables the employees to see and control the process. RFID can be found in the majority of various factories, consumer goods or any electrical thing that contains many components. Each of the components can be identified and falls into a certain group, then there are these RFID marks where all the details have their own code and then all the needed components fall into one or other group, depending on the codes. And all of this happens automatically with the use of AI, so there are no mistakes or blockage of the components. I really want to implement it at KN, so there would not be a need for employees to

sit and mark the wagons manually, but everything would work automatically. Also, the system would provide the data for us and our clients, so we would know exactly how many wagons arrived, which oil products are there and how much. I do know that the railway company has it and is very satisfied because it enables better planning. Another advantage is that RFID investment would be really low compared to other investments that we make.

- ***How do employees of KN view the process of digitalization?***

The company is quite unique with the variety of generations that it has, naturally the older generation is more allergic towards technologies and have more fears when it comes to the job loss. The younger generation is open and understands that without digitalization, the business will not stay competitive, but you know, it is not easy to replace an experienced generation of people. Also, I think they are more conservative because they know the cyclical changes of our industry. Also, oil and gas is a highly costs and profit conscious business, so quite often there is a factor of conforming to what works. But it also depends on the education level and the job position of the person of course. If we take a simple worker, probably it is not very relevant or interesting for him, but actually if we take a look at the forecasted employee structures for Industry 4.0, it actually mostly affects the middle employees, such as accountants, lawyers – these actually hold a higher risk for being replaced. There are examples of workers who use Virtual Reality, the requirement is to be healthy, then they receive training for learning the software, they put VR glasses on and become warehouse workers. And these glasses show them everything and navigate their work, this is especially popular in the container business now. VR dictates the work to them and the worker just follows the steps, drives the truck as needed. The employee is easy to train, AI makes the decisions and the employee lifts and turns everything as required. Of course, this is happening now and if to predict to a long-term future, the robots that can do that work will be invented, but it works as such now. So, the prediction is that the need for directors will increase, because there is still a need for human decision making and for the management for digitalization. But we already have so many examples, you know there is this robot that does the updates for the market shares. The robot is able to do it in 20 seconds, while it takes 1,5 hours for the employee. Today at KN we have 40 directors, 200 specialists and around 160 workers, so middle is the highest range, they have a higher education and certain competencies, but according to the theory, they also have the highest risk for being replaced. And in my opinion it is very logic, if we take accounting as an example, we integrate a certain

software and then the number of these accountants will decrease greatly, or if we take lawyers as another instance, we take a certain situation, enter it into algorithms, there are certain rules and laws, the system will automatically create a scenario of what are the actions one should take. Such tools exist already today. In general, I think all this digitalization if very hyped today, it is just a basic clean-up of the business. KN is quite digital as of today already, I have seen terminals that compared to them we are even very digital. ***(Are you comparing with other Baltic states or worldwide?)*** Well ok let's stick to Europe and you know I saw Antwerp, Rotterdam, Hamburg ports, so I saw better and worse looking ones. I recommend going to the terminal, you will see how high the level of electric dampers is, automatic fire extinguishing systems and so on. They are highly intelligent and operate completely autonomously. Some parts of our business activities are very digitalized, and others are really primitive, if we take our specialists, we have some processes that are really level zero, just a basic Excel or another basic software. To be honest, here I want to give some critics to our Head of IT who has been working at the company for so many years and did not manage to initiate that everything would be more concentrated in one database, one format, one cloud and then it could be better integrated with various modules within logistics, client management, technical maintenance and so on. I see a lot of potential within digitalization, everyone wants effective processes, but the thing is that not everyone is willing to pay more money, our investors want higher returns – how to do that? The answer is – make it digital, make it cheap and more effective.

- ***What are your thoughts on the digital strategy?***

  We have it confirmed, but we are still improving it, we needed quite a lot of time because in the beginning we went way too far with ideas such as exoskeletons replacing the workers at the terminal, I do think we have to be realistic. I know a good example from Neste, the Finnish company that is known for their innovations and are leading in this industry. They tried to replace the need for worker who drops the petroleum products in the wagon or takes care of connecting the pipe to open the cover, so Neste came up with the idea to create a robot, invested a lot of money into that and the result was that it took 2,5 hours for the robot to do the same what the person does in 15-20 minutes. Technology is developing exponentially, the prices are going down allowing to improve processes, but where the process contains a lot of variable parts, then here is inaccuracy and AI takes a long time to dig and eventually the person has to

step in and correct it again, so it is not always more efficient. The terminal workers will definitely need to be provided with innovative solutions, such as the VR glasses that provide security-related information and their work will be much more efficient. Or we will be dealing with less security issues such as knowing exactly what that wagon temperature is. Also, number of employees will also possibly decrease there, maybe we won't need 8 of them but 4. You know one thing is to speak about digitalization, such as the Lithuanian Railways do, but the truth is that not much is really going on inside. In general, leaders change naturally, new generations enter with new knowledge, everyone has their own advantages. For example, the old generation may be better at working with people and the next generation understands technology better. But yeah regarding the digitalization strategy, it is now embedded in our overall strategy for 2020-2024 and we believe that its execution is possible.

- ***Do you think there are enough competencies for strategy implementation?***

  No, I do not think I could ever say that, I am a firm believer that there is no limit for improvement and development of competencies. I could add that when it comes to KN, the company does provide a lot of time for that. We allowed the creation of KN Innovators club, there are 34 members who use their working hours on that activity, so if we sum up, it results in quite a big investment. Sometimes I notice slightly too much fanaticism in this process, but I really do not want to stop this initiative. What I really want is that the strategy would really fall into even more clear roles, required investments and directions.

  I also do not see the need for all 34 members to work on it, there has to be head of every direction and the rest is just the hygiene, economist will calculate the pay off, the accountant will pay the bill, data analyst will analyze the data and the procurement team will choose the optimal technology.

Interview no 6. - Logistics Manager

- **Could you please introduce yourself and your responsibilities at KN?**

  My name is Ligita Motiejauskaite and I work as a Logistics Manager at KN. In our department we have two senior Logistics Managers and me, our position differs in a way that senior managers work with operational process, and my responsibilities include one side

of commercial processes, also everything from the manufacturing to delivery for the client. My tasks are to review and improve logistics processes.

- ***How do you perceive digitalization at the company?***

  I can give my own experience as an example, when I started working at KN a couple of years ago, I worked as a specialist of logistics processes and my main responsibility was to work with railways and their documentation. I used to receive around 3000 documents each month that I had to sign manually. This seemed like a real tragedy to me, I could not cope with it, so I decided to change it. Today, because I managed to make it digital, I only spend around 20% of my time on it. I reviewed the process, legislation, contracts, I checked the possibilities not to sign these documents and I also realized that a large part of these documents were not available electronically. I fixed that process, I do not know why nobody paid attention to that process before, it actually played an important role in the department, included downtime and railway costs and nobody has ever questioned it for some unknown reasons. After fixing this process, we got way more control in our hands and the budget is also easier to follow and see where we can save and improve further. We signed internal instructions, rules and it took around 6 months to improve that process, it took so long because both are government institutions, so it took longer time to receive the answers. We also identified other trends in the process where we can continue to improve it such as accounting, transshipment departments. In general, our logistics department covers the whole supply chain, so actually without our coordination and initiation there is not much that could be done. We also have a change management group that work with various regulations and instructions, however they work more with theoretical, not that much from the practical side. It could be said that I destroyed my position, but I simply refused to work such tedious and pointless tasks. Maybe I took the risk but also at the time a new manager stepped in, we identified some other problematic gaps, so I got other tasks and I am glad this documentation checking with railways takes only a small part of my working hours and I can focus on something way more interesting.

- ***How was the reaction of other employees?***

  Well to be honest it was not pleasant, I received a lot of resistance which made me realize that is not technology but people that is the biggest challenge when it comes to changes.

You know there was so much resistance that even made consider why am I doing it. At KN we have many generations working, some employees have been working here for 40 years, they have their own routine and habits and changes are not something that they would like to have. I personally love changes and improvements, I need them, otherwise I am bored. So, when I come with all my wishes and suggestions, then it is natural that they will say no. But I learned now to show and explain the value, the outcome of that activity, then it is easier for them to accept it. There was also a high level of resistance in my department, my colleagues were very skeptical and saying that it is not possible. I think having this attitude and expectations could also lead to losing talented workforce. But yes, I admit that when I implemented those changes, it did give a lot of satisfaction and proving them wrong was also quite an achievement to me, in fact I even won the nomination for the employee of the month. In general, now I think when making changes it is highly important to use your soft skills. The railway project included a lot of people and affected quite many departments, it gave me a really good experience and lessons in terms of learning how to communicate. I also wish that the change management group would put way more effort in educating and teaching employees, after all it is their main responsibility. In general, when we started the Innovators club, it feels quite chaotic at the company now, with all these different attitudes and perspectives but on the other hand it is also very interesting to follow and see where we are going to end up. Another thing is our working hours that we devote to those activities, I personally managed to incorporate the RFID project into my working hours. I spoke to some other colleagues who also participate in KN Digital activities, some of them are really struggling to combine their work tasks and this Innovators movement, so the motivation is decreasing. But I am very positive, and I see that the leaders of the club are highly competent, motivated and enthusiastic, so that is contagious, and I am a firm believer that everything can be done, especially now when I have a proof. What is quite annoying that we have some people who are dragging us down a bit, especially IT department in my opinion. Maybe because more than half of their team have been working at the company for many years now and they do not see possibilities because they are just working their routine tasks. My previous responsibilities is a good example of that, because there were people manually signing those 3000 pages and not changing anything, just accepting it as it is, which in my opinion is absolutely crazy. Therefore, I think for us it is important to change the way we

organize our work today, otherwise we will never be able to take advantage of the new possibilities that technology brings.

- ***What are your thoughts on the digital strategy?***
  I really appreciate it, we have put a lot of hard work into it, and today when we have divided the group by directions. We have the digital representative meetings regularly, however I do feel that there is a lack of collaboration meetings, to hear how we are progressing and what is happening, and share experienced around the organization. I have a meeting with Rytis today, I'll make sure to tell him this. Overall, I think the strategy is very realistic and all the goals can be reached, of course we will face many struggles because our company's processes are somewhat skewed, so that strategy is also referred as a transformation program. I think the problem is that the LEAN model has never been introduced so actually in every area we need to review the processes first and then digitalize them, so actually it is a double work. But in general, the components of the digital strategy are focused on the process efficiency with digital tools, digitizing many documentation processes and having a better knowledge. Also, we are actually considering co-operation with universities, you know creating some kind of hackathon that could allow generating ideas for execution, I think that will be very cool.

- ***Which departments in the company would you make more digital as a priority?***
  Good question, in my personal opinion that would be our finance/accounting team. When I go there it seems they are doing Sisyphean tasks there you know. They have massive amounts of documentation, invoices, wagon alignments and etc. It is a really big trouble there and everyone knows it that it needs to be fixed as soon as possible because it is a mess. Another painful unit is our auto refueling site, they also have to deal with insane amount of documentation. If it was up to me, I would really go crazy there. Anyways, I also feel that the directors should care more and would make sure to pay more attention there. I also think that historical consequences of the oil terminal here have an effect, if you take our LNG terminal for example, there they have newest technologies, and everything is being built on different attitudes, as much modern as possible. Another thing is that we are above 70% state-owned and the level of bureaucracy really has to go down. Another aspect that I think is wrong is that we are trying to follow examples of other digitalized companies in

Lithuania, but the thing is that they do not really match our industry. I believe we should learn from other Oil and Gas companies or port companies, follow examples of port of Antwerp, collaborate with other companies located at the port, in general the whole port of Klaipeda should show more initiative for improvements.

- ***What do you think are the biggest environmental, technological, organizational challenges of fulfilling the digitalization goals?*** Yeah so for the organizational, as I said before, that is really our culture, we need foster a better change management and more intention from the top of the hierarchy. From the technological perspective, well I doubt that we can have some advanced new technology here, but RFID can really be implemented, the challenge is just to finally agree on how we are doing it. From the environmental perspective, as I just said I think we should better co-operate with our business partners better and maybe also other port companies because we could really use similar innovations.

- ***Could you please tell me more about the RFID project plans?***

The idea for RFID is that as soon as the wagons leave the factory site, we can track them all along their route to our client. The purpose is to have all the information and replace the employees who do the wagon tracking manually. The desire is to have everything done automatically, to keep the track of the product, know its temperature and how to handle it. It would result in better risk management and would eliminate physical work. However, today for the implementation of it we are facing some challenges that our clients from Belarus, Russia and other countries have a lot rented wagons and that complicates the idea because the clients are not the owners, so we need to look further and get the permission to place the tags. We are analyzing the idea, trying to find ways to incorporate it. Today we actually have the camera that does the tracking, but it is not 100% accurate, so the idea is to use RFID as a supplement in order to receive accurate data. The best idea is just to start out with our regular client Orlen, I am sure RFID would provide great value from the data perspective. Also, it is not that expensive and if Orlen also agrees to do it, then we could even split the cost because the benefits would be useful for both sides. Oh, I also want to add another thing that we are working on now, it is called Induction heating that could

enable higher heating rates and improved unloading speeds of rail tank wagons, that is also something that would turn very beneficial for KN.

Interview no 7. – Head of IT Unit

- ***Could you please introduce yourself and your responsibilities at KN?***
  My name is Aidas Smaizys and I work as a Head of IT. I am leading a team of 9 people.

- ***How do you understand digitalization?***
  Well that is a broad term, but I would say that digitalization is a fundamental agent of transition to a better functioning company. The world of technologies is developing fast, new possibilities are available and the question is whether we will make the best use out of them. On the other hand, even though technologies are becoming widespread today, their application is not the same in every company. What I also want to point out is that the long-established attitude that IT department is the one that has to come up ideas and solutions is not valid anymore. With the number of technologies available today, IT cannot decide for everyone. Yes, I do play an important role in our Innovators club, but still, I am a strong believer that the initiator for these changes should be business, not the IT team. Of course, IT team can serve as consultants and helpers on how to install the technologies, but the need has to sparkle from the business itself. To answer why there should be the need of digitalization, I'd say that business is solving various tasks and decisions, digitalization serves as a benefit for the client and effective business processes that results in increased competition. Nobody needs it otherwise, because it is an expense, both from time and money wise, plus add the risks that it won't be successful, but there is no other way, we need to move forward.

- ***Which technologies are the most realistic to implement at KN?***
  I'd say e-signature, we do have it already but the goal is to make it as much applicable widely as possible. Another would be e-documentation, because we really need to decrease the paper use. Also, virtual collaboration, to have access to various systems from any place in the world, to have the content in our mobile devices as well. I am currently also working on another version of our Intranet, because KN currently employs over 400 people in 4

different locations, some of which do not have a computerized workplace, there was an agreement that we need to create a better access to company's information at any time and from anywhere. Actually, I just realized that since we started the KN Digital movement, I actually spent half of my work hours on it, I do experiment and test a lot and bring the technologies to other units. You know today there is no chance to stay inside and so something for yourself. All the ideas come from our group sessions, talks, brainstorming activities, seminars, even coffee breaks.

- ***What are the biggest environmental, technological, organizational challenges of fulfilling the digitalization goals?***

  From the environmental perspective I would say it is our clients, I think to manage digitalization means to understand the own company as a part of network in which different stakeholders are related to each other. Then, from technological perspective I would that the technology that we use today is not particularly sophisticated or unique. I think an important thing for us is to find out what is already out there and take advantage of it. For our processes, we do not need expensive or some kind of tailor-made systems. We can just use proof of concepts, first test the technologies in smaller scale, before we place it in a larger use, as for example with RFID, we can just start using it with one client. Organizational perspective, I'd say we really need stronger top management support and more innovative culture.

- ***How do employees of KN view the process of digitalization?***

  It varies, depending on the person. There are people who are very driven, when we first introduced the idea, more than 30 people decided to join. I think that is a lot. In general, there is a great interest at the company towards technology and that makes me happy. The most important is to apply that interest and generate good outcomes. Of course, we have challenges, such as time, investments, attitudes and fears. The company is of strategical importance to Lithuania, thus we also have certain requirements to meet. If we take business of 5-6 people, it could be done way simpler and faster. But still I think we are in quite good position, not too large, not too small and also we can afford modern tools, also we do not have thousands of clients, so we have a good space for testing. If we take companies such as Lithuanian Energy or Railways, it is more complicated for them, because they have a lot of

people involved, so from that perspective we are flexible. Employees who are resistant to change and have a negative attitude towards digitalization, I think they should just simply take it as granted, because it has to become a norm. Also, I think there should be more initiative from our top management, there is a lack of motivation. The companies I mentioned before, they started their digitalization from the top management, in our case it is different, we are trying to initiate the movement and influence those at the top, which means that we are lacking leadership skills. But I do not want to be all negative, they are also realizing and approving it more and more and the interest is growing, it just would be nice to have even more of it.

- ***What are your thoughts on the digital strategy?***

  Very positive, our KN Digital club has put a lot of efforts in creating it. Today the strategy and its objectives are fully defined and have been communicated for the whole organization. I am glad that we finally agreed what we should prioritize and how to act in order to achieve those set targets. Just one question still hangs regarding the budget for it, because of course we need investments for the technology as well as for our capability development.

- ***In your opinion, which project will be the most challenging to implement?***

  I would say RFID project, because it does depend on many factors outside our hands. In order to get started, we depend on the data from the Lithuanian Railways, because mostly they are the owners of those wagons on which we want to place the tags. We can initiate, push them, but if the owner of those wagons will say no, won't have any interest, then this project will never start. From the technical side, everything is clear and not that complicated, it also does not require huge investments. We just really need to go there, communicate, spark the interest, find ways to show the value and then also find investments. Those tags do not cost that much, but there is a really high number of wagons in use. Today we have this camera that allows tracking, however, it only has 95% accuracy, meaning that from every handling, 2-3 wagons are not being recognized, meaning that there is no point to have this system, because a person has to go and do the tracking again, manually. Same with RFID, if there appears a wagon without the tag, then it is pointless because we cannot have a trustworthy data then. In general, RFID is not a brand new technology, but it is not that

widely applicable, with every technology it is important to break that critical point. For instance, with the reduction of paper, okay that is true we really use very high amounts of paper for documentation and etc, but it is not really a big cost, okay a few thousands of euro per year, but it is nothing for a company like us. But the point is to see that this is indication like with the tip of an iceberg you know, meaning that the processes are not effective if we have to use so much paper, there is actually a larger possibility. Converting all this printing time to working hours, then it all accumulates to a massive waste of time and the invisible costs. These hours could be used to develop something valuable. Overall, everything is fine with technology, we can always find the ways to apply it, but the biggest challenge is work to with limitations in people's minds. Today RFID would be the most realistic and visible innovation. I think the problem is that we are very concentrated and focused on improvement of these routine business improvements for now. Of course, that is very needed, but they don't really generate big changes, yes, they allow to do something faster, better, cheaper but it is not a disruptive innovation. RFID would be something bigger, but I still would not say disruptive, yes it would affect the operating model though. But if we take autonomous ships, you know that's something disruptive. Think about what's the primary motivation for a self-driving car? Safety, safety first. Imagine the world without any car accidents, better traffic flow, without any congestion, that is amazing. I am sure sooner or later we will not even have petroleum anymore, so no need for oil. But it is a well-known fact globally that we have it for now and reducing it is a major goal of self-driving cars. Overall, digitalization is seriously changing the business. If we read the books written some years ago, we would see that many things are the reality now, speaking of decreasing number work places or the processes that are being managed using AI. Also, the challenges for our competencies, take economists as an example, before they had to calculate various formulas, various calculations, today we have robots who are able to do such tasks. In general, majority of specialists are actually becoming programmers, they have tools, they do not necessarily need to know how to code, but they already have it available. Today IT is everywhere, and I actually dare to forecast that in some years, such thing as IT will not be as a separate field. If we take KN, the company has around 400 employees and I bet that with existing technologies, around half of employees could be replaced by the robots already and a quarter of employees would be in charge of controlling them. I worry that in the future we are going to face a lot of social challenges, because the thing when you get the job and stay

employed at the company for 40 years or even until pension, that is not how is it going to be anymore. A person needs to change, learn, be flexible, change the profession if needed.

Interview no 8. - Head of Logistics Unit

- ***Could you please introduce yourself and your responsibilities at KN?***
  My name is Giedrius Situtis and I am the Head of Logistics Unit, together with my team I am responsible for logistics processes at KN's Oil terminal.

- ***How do you understand digitalization and its impact on KN?***
  For me digitalization is an improvement of some product or process that brings value and saves my time. I actually know some examples of really unsuccessful digitalization and automation, so after hearing all these stories, I only believe that digitalization has meaning only where it improves the process, not only doing something because of doing something, you know what I mean. Yes, I am of course positive towards which benefits digitalization can bring, but in my personal opinion, for KN these digital solutions will only be applicable when they become more cheap and common on the marketplace.

- ***Which technologies are the most realistic to implement at KN logistics processes in your opinion?***
  I really want to see RFID being realized in our logistics process and I can explain in detail why it makes sense. I just really wish I had more time to spend on its implementation strategy. I know it would be very relevant for us, because we would have the real-time data on the journey of the wagons and not only about that. The main logistic chain at the KN terminal consists of: Tank wagon → storage tank → tanker, and accounts for about 90% of all logistic schemes at the company. This stevedoring scheme is the most common at the company and has to ensure high quality and efficient handling of the oil products. The logistic chain starts with servicing the rail and is considered as one of the most complex processes at the company, from both technological and documentation perspective. There are many technological nuances, including the risks that have to be managed as well as cargo documentation such as waybills, quality passports resulting in a great deal of manual work to ensure continuous process of the railroad service. At the moment, KN terminal has

two access roads, each containing two tresles that can service from 30 to 32 tank wagons, thus when looking at the overall technical capacity approx 124 wagons can be serviced at the same time at the terminal. Current process of servicing rail tankers at the KN terminal amounts to 320 wagons per day, which is up to 115 thousand per year, resulting in about 7 million tons of transshipment annually. My department is responsible for planning the cargo flows ensuring to provide the best service and at the best cost. Therefore, the deployment of a RFID system in a company would be very useful and even necessary. It would be very cool to know what is happening, to foresee is some wagon is going to break-down soon, so we could have effective solutions and would lower the downtime for our client or similar as that. It could help us also inform our clients if they need some specific information about the performance of loading for example.

In general, from what I know, RFID is not a very new technology, but only recently have been started to be implemented into supply chain management and also has developed to a point where those tags can show really smart information, you know like temperature and other important parameters of the product. As of today, we have 4 ladies working shifts there and typing that data manually, it works today unless we have some technical problem with the wagon. But also, it is a bit embarrassing that in this digital age we still use manual typing with hand and identification based on the sight. It has been calculated that all of these procedures take up to 30 minutes to complete per each route. This system would really provide great information and also would save time for the accountant. We have like 320 wagons in 24 hours, when I think about it, if I was that accountant I would never do that job you know, it is just stupid manual typing, they are really good at it, we have not had that many problems with their identification so far. However, not sure if you have heard already, KN's terminal is currently developing a new infrastructure, to be more precise, the company is building additional railway with two gangways which could serve 16 railway wagons each, also after these expansion plans, the technical capacity of the terminal will increase, which also results in the increase of human workforce. Another factor for RFID is that that our product portfolio is increasing. All of this results in a greater flow of different wagons with different products moving through the terminal. If the rail service process does not change and remain the same as today, the risks of mixing the product and human error will increase, therefore, changes in this process are necessary. So actually, it is obvious that we would need more accountant manually typing the wagons, but RFID is the most rational

solution for this. Today in the logistics field we have these emerging logistics trends such as cloud logistics, internet of things, 3D printing, blockchain, smart energy logistics, self-driving cars, robotics and automation and I think I could continue naming them here for you for a long time, but at the current state, at least in my mind, I really doubt their implementation at KN now. Maybe I am a bad manager, maybe I should really try to spend more time investigating how should we implement blockchain in our operations, but I really think we need to wait until it becomes more mainstream in the market, like RFID is today. I do know that in some countries is mainstream already, was it not Mærsk and IBM implementing it. It is of course super interesting to read about it and dream about its implementation at KN, however I have to be realistic. It is indeed interesting to discuss how the world will look like in the future, we are living in a very exciting times now, however we should admit that future is beyond our comprehension. You know we could also address the challenge of oil and its products here, because we do not know for how long the market will be there. I think the focus should for us should be on the tried-and-true technologies that are already widespread in use across many companies such as the same RFID, ERP (enterprise resource planning systems) or CRM (customer relationship management platforms).

- ***What are your thoughts on the digital strategy?***

  Well the digitalization strategy has been introduced to us recently. They asked the right questions and touched the parts of the organization that really should improve. All I can say is let's see how that comes true, one thing is to create that strategy, another thing is to actually execute it. You know I agree that digitalization is a source of a positive change but there will be many challenges to face, I can already see that with our RFID initiative.

- ***What do you think will be the biggest digitalization challenges, from environmental, organizational and technological perspective?***

  Well okay, I think organizational challenge will be the biggest one, you know cultural transformation, working routines, skill shortage just to name a few here, I think this is not really the industry where you can experiment that much, at least for our operations. Also, I can already see that some jobs will be replaced with RFID implementation. Environmentally, as I said, new energy sources, the perspective and the impact of the

changes on the broader energy system in general. Technology wise, it is about the growing technical sophistication, like being more connected to multiple technologies. I think it will be the challenge in itself to unlock the full potential of these new technologies.