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Antonia Pekansaari

Market Research of Digital Tendering Platform for The Private Healthcare Sector

Metropolia University of Applied Sciences
Master of Health Care
Health Business Management
Master's Thesis
25th May 2020

Author Title	Antonia Pekansaari Market Research of Digital Tendering Platform for Private Health Care Sector
Number of Pages Date	38 pages + 7 appendices 25th May 2020
Degree	Master of Health Care
Degree Programme	Health Business Management
Instructor	Eija Metsälä, Docent, PhD, RT, Principal Lecturer

The purpose of this study was to find out the market possibilities of a digital tendering platform for the private health care sector. The aim was to produce more knowledge about the market possibilities by investigating the value of digitalization in medical device tendering and the means of optimizing the process.

The study was carried out by interviewing health care professionals with experience of procurements and sales professionals from medical device supplier companies. Interviews were implemented as theme interviews and analyzed with inductive content analysis.

The results showed that digitalization brings value to procurement and tender processes. Utilizing digitalization in a medical device tendering can increase efficiency, workflow and bring cost savings to both the health care company and the medical device supplier. The use of digital tools can improve communication and the flow of information between different actors, which can lead to better transparency and equality in the tender process. It was found out there is still room for improvement in the current tendering and product comparison process. Mixed practices between different actors, lack of expertise, or lack of necessary information makes the process time-consuming and require extra resources from the companies. Nevertheless, the digital tools which are now in use have not solved all the challenges yet.

The results lead to the conclusion that modern, improved tendering and sourcing e-platform with practical and user-driven features, could ease the work and bring more value to the procurement processes for both buyers and suppliers. The findings can be utilized in the business concept development of a modern e-tendering platform for medical devices.

Keywords	market research, medical device, tendering, digitalization

Contents

1 Introduction

Health care expenditures in Finland are growing every year. Expenses of care for the aging population have almost doubled in the past ten years. The medical technology industry is also growing year by year, on average by 4,3% annually over the past ten years in Europe. There are more than 500.000 medical technologies improving the quality of patient care, helping people to live longer and bringing efficiency to health care. (Terveyden ja hyvinvoinnin laitos 2019; Medtech Europe 2019.)

In Finland, medical technology purchases in the public health care sector are regulated by the law on “Act on Public Procurement and Concession Contracts”. The aim of the law is to create competition to optimize public funds use and to provide equal and transparent procurement procedures for all stakeholders. In the private health care sector, procurements are not regulated similarly; therefore, the private sector has more freedom and variety of practices on their procurement process. (Laki julkisista hankinnoista ja käyttöoikeussopimuksista 2016.) The public health care sector has procurement departments responsible for purchasing and tender management for hospital district areas, but usually, private health care clinics do not have their procurement departments or specialists. Previous studies showed that well-planned and implemented procurement processes and tender management could add quality, save time and reduce costs (Terio 2009; Graves 2016). With the means of digitalization, the process could be optimized even more (Raventós & Zolezzi 2015; Garnedal 2013).

This study is market research of digital tendering platform for the private health care sector. The purpose of this study is to find out the market possibilities of digital tendering platform. The aim is to produce more knowledge about the market possibilities by researching the value of digitalization in medical device tendering and the means of optimization of the process. The topic of the study is based on the business idea of service, which would offer modern, digital tendering platform and outsourced tender services for private health care and medical device suppliers aiming to deliver more quality, efficiency, transparency and sustainability to the procurement process and tendering. The study was carried out by interviewing the potential users of the e-platform: health care professionals with experience of procurements and sales professionals from medical device supplier companies. Interviews were implemented as theme interviews and analyzed with inductive content analysis. The theoretical background of the study is based

on previous studies and literature about the topic. The main concepts are medical technology, procurement and tendering process of medical devices and digitalization.

2 Theoretical background

The main concepts of the study are presented in the theoretical background. In the beginning, the healthcare system and medical device market in Finland are presented in brief. After that, the key areas of medical device procurement are presented with terminology, regulations, means of the successful procurement and tendering process and impact of digitalization and outsourcing. In the end, the current situation with procurement services in Finland is presented.

2.1 Healthcare in Finland

According to the Constitution of Finland 731/1999, everyone has the right to adequate social and health services. Foundation of health care in Finland is public healthcare, which is supported by the state. Finland's healthcare services are strictly monitored by many laws and regulations to ensure quality and availability of care for everyone. Municipalities have a responsibility to organize primary healthcare for their citizens. Specialized healthcare, like hospital care, is organized by 21 hospital districts. (Ministry of Social Affairs and Health 2020a.) The private healthcare sector complements public healthcare services. Private health care services produce more than a quarter of all health services in Finland. Hence, customers of private healthcare are not only private people or companies, but also municipalities. Healthcare services can be bought from a private healthcare provider, for example, when public resources are insufficient. (Ministry of Social Affairs and Health 2020b.)

Finlands' healthcare expenditure in 2017 was 20,6 billion euros with 2,4 % yearly increase in real terms. Expenditure per capita was 3742 euros. (Terveyden ja hyvinvoinnin laitos 2019.) The spending on medical technologies in Europe varies depending on the country, ranging from 5-10% of total healthcare expenditures. On a weighted average, expenditure on medical technology in Europe is around 213 euros per capita. (MedTech Europe 2019.) In Finland, if 5-10 % of total health expenditures are spent on medical technology, it means that expenditure on medical technology would be from 187,1€ (5% of total expenditure) to 374,2€ (10% of total expenditure) per capita.

2.2 Medical technology

World Health Organization describes medical technology (also called as health technology or health care technology) as the “The application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of life.” (World Health Organization 2007). Medical technology has three main categories: Medical Devices (MD), In vitro diagnostics (IVDs) and digital health. Medical devices mean any instrument, machine, apparatus, implant, or software used for medical purposes, for example, treatment, monitoring, diagnosis and prevention of illness or disease. In vitro diagnostics are non-invasive methods for diagnostics to test someone’s health. Digital health is digital services and tools improving diagnosis, prevention, treatment and monitoring. There is a great amount and variety of different kinds of medical devices, from wound care products to anesthesia machines. In IVDs sector variety is also broad, from pregnancy tests to clinical chemistry analyzers. All medical devices have to be classified following a risk-based classification system. Classification determines the potential risk of the fault of the device's functioning to the health of the individual and the public. (Medtech Europe 2019; World Health Organization 2020).

European legislation controls the medical technology market in Europe with regulations ensuring the safety of patients and the high quality of medical devices. All medical devices, other than investigational or custom-made devices, should meet the requirements of European Union’s regulation. Devices also need to have the CE marking of conformity before the device is placed on the market. There are new regulations on medical devices and in vitro devices that were adopted in spring 2017 and these two new regulations are gradually replacing the old directives. Previous directives of Medical Device sector will be replaced entirely with new Regulation 2017/745/EU starting on May 2020 and for IVD sector, new regulation Regulation 2017/746/EU will be entirely replaced on the end of May 2022. (European commission 2020; EUR-Lex 2017).

Medical technology is strongly based on research, development and innovations. According to the European Patent Office, medical technology has been the number one technology field in the number of patent applications already for years. The year 2019 is an exception for medical technology being second because of the significant growth of patent applications in the field of digital communications. Leading countries on European medical technology patent applications are the United States, Germany and Japan. In Finland, the share of medical technology’s patent application among all applications has

increased in recent years. In the year 2018, medical technology was fourth of all technologies based on the number of patent applications in Finland. (European Patent Office 2020; Finnish Patent and Registration Office 2019.)

2.2.1 Medical technology market in Finland

The exact number of medical technology companies is difficult to estimate because there is no list of companies operating in the field of medical technology. In Finland, there are several unions or organizations for health tech companies and startups. Sailab MedTech Finland, an advocacy organization for health technology companies, has more than a hundred member companies. Sailab estimates that their member companies represent about 80-90% of the market in Finland. (Uusitalo 2020). In addition to Sailab MedTech Finland, there is Upgraded, Health and Wellbeing Startup Association of Finland with around 60 members and also Healthtech Finland, the union of health technology (Upgraded 2020).

According to Business Finland (2020), Finland has more health startups and research & development professionals per capita than any other country. Finland has invested a lot of funds yearly in health-related education and research for decades, which has resulted in high-quality research and innovations (Business Finland 2020). Health technology is one of the fastest growing high technology field in export in Finland. Total revenue in health tech in Finland is less than 3 billion euros. Most of the revenue, around 2,4 billion euros, comes from export. USA is a leading destination country for health technology export with 38,5% share of total export. Export in health tech has constantly been growing for the past twenty years with average yearly raise 5,7%. The raise was the same, 5,7%, also in the last year 2019. (Healthtech Finland 2020.)

Most of health tech companies in Finland are producers or distributors. The majority of companies operate in the medical device industry (60%) or both in the medical device and in vitro device industry (20%). The main customers are specialized healthcare and primary healthcare in the public sector as well as the private healthcare sector. In the future, the growth of private healthcare as a customer is expected. Digitalization, artificial intelligence and robotics are believed to become even more significant in healthcare in the next five years. (Sailab MedTech Finland 2019.)

2.3 Medical device procurement

2.3.1 Terminology

E-procurement is use of electronic methods in every stage of the buying process. *E-sourcing* is part of the buying process. It can include supplier research, collaboration with suppliers, tender processes and contracts. E-sourcing process can include tools like *e-tendering. Tendering* is the process of inviting bids and choosing the most suitable company to supply goods. E-procurement and e-sourcing are both part of *e-purchasing* cycle. *Outsourcing* means using of external resources to implement activities that internal staff handles traditionally. (Baily – Farmer - Crocker - Jessop – Jones 2015: 508-509, 145.)

2.3.2 Laws and regulations

Public procurements in public health care are regulated by the law 1397/2016 “Act on Public Procurement and Concession Contracts”. The law includes an obligation to tender, which means that contracts exceeding the threshold set by law must be tendered to an extent commensurate with the size of the contract. The purpose of procurement law is to increase the efficiency of public funds and promote transparency and equal opportunities for companies of all sizes to participate in tendering. The operational obligations are based on the principles of non-discrimination, transparency, equality and proportionality. Public actors must comply with the Public Procurement Act. However, the obligation to tender also applies to the private sector if more than half of the procurement value is received for public procurement. (Laki julkisista hankinnoista ja käyttöoikeussopimuksista 2016; Hankinnat 2016.)

There are three types of procurement, depending on the threshold: small procurement, national procurement and EU procurement. When a procurement falls below the threshold for national procurement, it is a small procurement. Tendering for small contracts is excluded from the law, in which case the tendering is carried out in accordance with the contracting authority's regulations but taking into account the principles of transparency and equality. (Hankinnat 2019.) EU procurement and national procurement comply with the principles of the Procurement Act and procurement is subject to the notification obligation. The main difference is that tendering for national procurement is more flexible and lighter than tendering above the EU threshold, and the contracting authority itself

has discretion in defining the procedure for national procurement. EU procurement procedures are further defined. Invitations to tender for both national and EU procurement must be published on the HILMA service of public procurements. For EU procurement, the notice will also be published in the Supplement to the Official Journal of the European Union and in the TED database. The notification shall use the CPV vocabulary Common Procurement Vocabulary following Regulation 2195/2002 / EC of the European Parliament and of the Council. (Laki julkisista hankinnoista ja käyttöoikeussopimuksista 2016; Hankinnat 2016.)

Procurement in the private health care sector is not regulated by similarly as in public, because procurement is done with private funds and not with public funds. However, in practice, similar principles apply in the private sector as well. For example, the European Union is addressing transparency and equal opportunities for suppliers (Hankinnat 2019). Essential things in procurements are good commercial practice, tendering and decent market knowledge.

Health care sector, especially procurements and connections to pharmaceutical companies, is often mentioned as one of the fields with risk of corruption. University of Vaasa (Salminen & Viinamäki 2017) researched hidden corruption in Finland. The results showed that health care with its procurements is in the top 10 of fields with suspicions of corruption, based on people's interviews. There are several guides to follow to illuminate corruption, and mostly, these are orientated for the pharmaceutical sector, but not much for medical devices at the moment. For example, the pharmaceutical industry has ethical guidance that has instructions for correct activity before and after procurement (marketing, cooperation with doctors, product presentations and bribes). (Lääketeollisuus ry 2019.)

2.3.3 Successful procurement and tendering process

All purchases of goods that the organization makes outside of the company are an act of procurement. Procurement is resource management in a way that the availability of all necessary products and services is secured. Successful procurement enhances the competitiveness of the company, which also means cost efficiency and added value for the customer. (Nieminen 2016.) Graves (2011) examinated best practices globally in medical device tendering in over ten different countries. Study states five main principles for successful tendering:

1. *evaluating total cost of care*
2. *ensuring clinical output*
3. *use of flexible contracts*
4. *encouraging supplier diversity*
5. *process transparency and fairness of administration.*

Procurers should evaluate procurement decisions based on the long-term total cost and not only on the product price. Different factors, such as product lifecycle, running cost of device, quality and cost of maintenance, monitoring, spare parts and disposals, affect the final price. (Graves 2011; Maniadakis 2018.) Multiprofessional involvement (of physicians, medical staff and administration) in product selection and use of health economics data can help with analyzing the total cost and benefits of product use. Physician's participation in the purchasing process from the very beginning helps to ensure that all clinical needs are met. Also, well-educated personnel implementing the procurement or tender process helps to avoid pitfalls maintaining the correct practices. A well-defined procurement process increases patient safety and ensures that patients have a sufficient amount of treatment options available. (Graves 2011; Maniadakis 2018; Terio 2009.)

Tendering should encourage supplier diversity to maintain a healthy market. Solutions to maintain the competition can be using flexible and short contracts, selecting multiple suppliers and avoiding whole-market tenders. Transparency and fairness are crucial in the tendering process. Clear definition of process, requirements and quality standards enhance transparency and efficiency. Communication with all the bidders about the process and final results improves fairness, transparency and trust between procurers and suppliers and discourage corruption. (Graves 2011; Maniadakis 2018.)

Cost-efficiency is essential, but it does not mean the lowest price. There are many ways to effect cost-efficiency. Costs can be reduced, for example, by concentrating procurement on fewer suppliers to receive better deals. (Nieminen 2016.) However, choosing multiple suppliers instead of one is recommended to avoid shortage and monopolies (Maniadakis 2018). Electronic tendering can be very effective because it is possible to reach a large number of potential bidders at the same time. With electronic bidding, it is possible to achieve cost savings of more than 20 percent. E-tendering suits the best for standard products and services that can be clearly defined and have several potential suppliers in the market. (Nieminen 2016.)

2.3.4 Impact of digitalization

There are many advantages of e-procurement and e-tendering, also disadvantages. Total costs can be reduced. High transaction costs, long-lasting negotiations with suppliers and non-contract compliance are usually causing a higher total price. With e-procurement, the process can be reduced and the price of goods can get 5 to 10% less. (Baily et al 2015: 514.) Raventós & Zolezzi (2015) find that transfer from traditional tenders to the e-tendering platform with medical device purchases reduced prices in the public healthcare sector. Direct price saving for medical device purchases was 9,1% (Raventós & Zolezzi 2015). The study found that also volume effect in e-tendering with bigger aggregation of purchases leads to volume discounts and 2,8% lower prices. Study of den Ambtman, Knoben, van den Hurk & van Houdenhoven (2020) also had similar results that purchasing volume is associated with lower prices paid.

The medical product market can easily have a lack of transparency, which leads to an opaque price market. E-procurement can improve the quality and availability of information, which leads to better transparency in the procurement process (Gardenal 2013). Research of Raventós & Zolezzi (2015) report that using the e-tendering platform caused less supplier collusion and less corruption in the tendering process. This improved overall transparency and led to a direct price effect with more than 8% reduction in purchasing prices (Raventós & Zolezzi 2015). Bandiera, Prat & Vallett (2009) found similar results in the effect of corruption on purchasing prices in public services: “active waste”, like corruption, can cause 11% additional cost to reference prices. They also find that public buyers pay very different prices for similar goods because of a lack of transparency. (Bandiera et al 2009) Another study also found out that local hospitals are paying very different prices for identical medical products. The variety of prices was enormous, with an average coefficient of variation of 71%. (den Ambtman et al 2020.)

E-procurement can increase supplier participation in tendering procedures and grow competitiveness (Gardenal 2013). Graves (2011) states that one vital sector in medical device procurement is encouraging supplier diversity and encourage market competition. In the study of Raventós & Zolezzi (2015), e-tendering in the medical device sector did not increase the number of supplier participants, but that improved supplier diversity by attracting new bidders from the market to join the competition.

Improved process efficiency and reduced lead time are desirable with e-procurement. The aim is that usage of resources is less than with traditional procedures. For example,

the time reduction of requisition processing can be 70-80% less than time-consuming manual processing. Long lead times can cause the purchase of large stocks for safety reasons. Improved efficiency can lead to reduced inventory and reduction of inventory expenses by 25-50%. (Gardenal 2013; Baily et al 2015: 514).

The effectiveness and quality of procurement can be increased. Electronic platform with advanced tools brings possibilities for better communication and negotiations between buyer and supplier. Relationships between supplier and buyer can improve. It can also be possible to access broader markets than before, which can lead to lower prices and better discounts. (Gardenal 2013.) Compliance in process can be improved, and off-contract spendings can be reduced by 50% (Baily et al 2015: 514). Dematerialization, like reduction in paper consumption and lower archiving costs, can be seen as a benefit as it brings financial and environmental value (Gardenal 2013). Less paperwork and less duplicated records are also benefits of e-procurements (Sitar 2011.)

There can also be many disadvantages with e-procurement. Firstly, the high setup cost of implementing the platform, integration to existing enterprise resource systems, information security and lack of technical expertise can be obstacles, especially in the business development stage. The maintenance cost of IT solutions can be high. Users may not be willing to use the system, or they may have limited IT skills. Poor relationships with suppliers or low interest of suppliers can have a negative impact on the platform's success. Organizational obstacles can be limited resources and a lack of support from management. Internationally, countries have different legal systems and different cultures, which can affect implementation. (Baily et al 2015, 517-518, Sitar 2011.)

2.3.5 Impact of outsourcing

It is common to outsource services by using contract service providers in the healthcare sector. The most common outsourced services are cleaning and facility maintenance, security and food services. (Karimi et al 2012, Moschuris & Kondylis 2006.) According to the study of Moschuris & Kondylis (2006), the main reasons for outsourcing services in private healthcare are cost reduction, customer satisfaction and service customization. Private healthcare organizations were more satisfied with the cooperation with external service providers than the public sector. Most private sector companies in the study believe the usage of outsourced service will increase in the future. (Moschuris & Kondylis 2006)

Karimi et al. (2012) stated that the highest disadvantage among hospital managers' viewpoint was that outsourcing could increase patient costs. Other difficulties and challenges with outsourced service can be a lack of integration and coordination between providers and healthcare organizations. To overcome these challenges, understanding of healthcare organizations' operations and flexibility with changes are important. (Moschuris & Kondylis 2006.)

2.3.6 Procurement services for health care in Finland

There are procurement services, webpages and electronic platforms for health technology procurements in Finland. All public national and EU procurements are always announced in the HILMA Public Procurement service, which is Finland's official notification service owned by the Ministry of Employment and the Economy (Julkiset hankinnat 2020.) There are e-procurement services for private sector enterprises and organizations. Provided services or tools are usually contract and supply chain management, e-tendering tools, reversed e-auctions and customer support. None of these e-procurement services are specialized in the healthcare sector. Internationally, for example in the America, there are plenty of e-tendering services specialized only in healthcare-related products and services.

Some private health care clinics, like Terveystalo, have their own procurement department with procurement specialists (Terveystalo 2020). Mostly in private health care, especially in small clinics, it is healthcare staff, like nurse or doctor, who takes care of procurements beside their primary work.

3 Purpose and aim of the study

The purpose of this study is to find out the market possibilities of digital tendering platform for the private healthcare sector.

The aim of this study is to produce knowledge about market possibilities of the business idea of digital tendering platform for medical devices.

Objectives

1. What value digitalization brings to medical device tendering?
2. How to optimize the tender and procurement process?
3. Is there a demand for outsourced digital tendering service for the private healthcare sector?

This thesis is about a new business idea. Behind the idea are two business and health care professionals who are planning to start a company in this field. The business idea for digital tender and sourcing service has risen from the issues they have faced in the medical device sales industry and from professional experience in healthcare organizations. This idea was developed through the evaluation of general economic and business processes and the effect of digitalization on them.

The idea is to offer an online service and platform for medical device competition. The goal is that by modernizing the selling and buying process with digital service, all stakeholders would optimize their resources, including time and money, and being able to concentrate on their key activities. The service would offer fair competition and more ways to connect sellers and buyers. Online service would also provide human resource optimization for companies and sustainability to business compared to the traditional selling process, which includes traveling and multiple face-to-face meetings. We think it is important to do market research in the early stage to get data for validation of the concept, including its strengths and weaknesses.

4 Research work setting

The target environment for data collection is actors on both sides of the selling-and-buying process: healthcare clinics and medical device suppliers. There are more than 4000 private healthcare clinics (Tilastokeskus 2018) and more than 100 medical device companies, mostly producers or distributors, in Finland

Target customers would be especially those private health clinics that do not have a purchasing department, for example, small general healthcare clinics, occupational care clinics or dental care clinics. Companies that are supplying medical devices are also target customers because the online procurement service can be important for them by

reducing sales process costs, improving time management, and offering more market space for their products.

5 Materials and methods

5.1 Methodological approach

This study is market research, which aims to produce more knowledge about market possibilities. Market research, either quantitative or qualitative, is used when there is a need to examine the factors which affect the business, for example, when a company is heading to the new market area or launching a new product. The purpose of market research is to collect data, which can help the company to make decisions. (Westwood 2011, 16.) In this study, the main interest is to find out if there are market possibilities for the business idea by creating an understanding of the customers and markets with qualitative research methods. Because the qualitative market seeks quality and depth from a small sample of people (Hague – Harrison – Cupman – Truman 2016: 45), it was chosen as a method for this study to reach content-rich result material.

In addition, the idea of service design is also used in this study to create a better understanding of customers' real needs. Service design is an approach of designing and developing services that meet the needs of customers with the needs of an organization. (Stickdorn et al 2018). It provides a business development method and the process begins with a deep understanding of the user needs and problems. (Stickdorn et al 2018, Koivisto – Säynäjäkangas – Forsberg 2019: 48-51.) The idea of service design and customer-centric thinking fits well with the goals of this study. In a way, this study is the first step of the service design process and therefore, final results of customers' needs and challenges can be used later in the entire service designing process of the e-tendering platform.

5.2 Sampling

Purposive sampling is used in this research. Criteria for participants were the following: professionals working in healthcare with experience of procurements or sales professionals working in the medical device industry. Target professionals are sales managers from the medical device supplier companies and healthcare professionals responsible

for decision-making or processing purchases of medical devices from private healthcare clinics.

Potential participants who met the research criteria were selected through open sources in the internet from companies' own webpages. Interview requests were sent to 14 health care organizations in the private healthcare sector and 12 medical device supplier companies with altogether 26 requests. After a while, a second contact was made for some companies by a phone call to ask if they had received the e-mail and if they would like to participate. In the end, six interviews were performed. There were responses from several persons that normally they would be willing to help, but due to the COVID 19 pandemic causes, they were unable to participate and give the interview on that moment.

The researcher has worked in health care and the medical device industry and thereby has connections in the field, but the participants for this study were professionals outside of the researcher's network. This decision was made to improve the trustworthiness of the results and exclude the possibility that the researcher would unconsciously choose interviewees with a supporting attitude.

5.3 Data collection

The research task and research strategy conduct the choice of research method. An interview is a suitable choice for qualitative research by offering the opportunity to collect descriptive data about people's opinions, attitudes and behaviors. Open-ended questions allow the flexibility to probe the topic, encourage cooperation and information sharing, which can result in unexpected answers for the researcher. (Hague et al 2016: 89-92.) Interview suited well to purposes of this research because the researcher wanted to hear people's opinions and thoughts, also surprising ones. The chosen interview method was a theme interview because there was no need to set up strict frames for interview to keep the conversation flexible. Table 1 in Appendix 1 presents an interview guide of the interview themes.

The original plan was to perform theme interviews through face-to-face meetings and possibly through phone or video calls, but because of the Finnish Government's announcement about the state of emergency as a result of the COVID 19 outbreak, a face-to-face meeting was not an option anymore. Interviews were performed through a phone call in April-May 2020. All interviews happened in two weeks time period. Online survey

with open-ended questions was also considered as a data collection tool, but in the end, the conclusion was that a phone interview is more suitable for this research's purposes. According to Hirsjärvi et al (2015: 35-36), benefits for an interview compared to the survey are to mention few: flexibility, the possibility to specify and ask more questions to get more depth, changes to motivate people and get them to participate are higher with interview than online surveys. These were the main reasons for choosing the phone interview over an online survey.

Although the phone interview was initially the second option for the data collection method after the face-to-face interview, it has many advantages. A phone interview is a cost-effective method and it is a practical way to reach people who are busy or physically elsewhere. Disadvantages are lack of body language and the limited time, often 20-30 minutes is the maximum length for a phone interview. (Hirsjärvi et al 2015: 64; Hague et al 2016: 84.) In this research, the interview's main topics are designed to be comprehensive and cover the research objectives even in a short amount of time.

The aim was to keep the phone interviews brief enough to maintain the interest of interviewees but long enough to ensure that all interview topics are covered. Phone calls were recorded using a computer's dictation machine and stored on the researcher's computer. The amount of recorded data was 110 minutes and the average duration of an individual interview was around 18 minutes. Transcription of data was performed soon after the interview, on the same day or the following day. Writing the word-by-word transcription took about 200 minutes, and as a result, there were sixteen pages of transcription data from the interviews.

5.4 Analysis

The interview data was analyzed with inductive content analysis. Qualitative data processing is based on logical thinking and it has three stages: first reduction, second clustering, and third abstraction (Tuomi 2018, 90).

After data transcription, all data was read through several times to get an overall understanding of the collected material. First, the reduction of data was made by going through the transcription material and looking for phrases that answered the research questions. Phrases were highlighted and color-coded according to research questions. After that, condensed meanings were created from original expressions.

The second phase was clustering. All condensed meanings were listed to the separate document and closely related condensed meanings were grouped. These groups formed sub-categories that were named with the terms descriptive of the content. The main categories were created based on sub-categories that were related to each other. The main categories formed the three main themes, which were answering to each research question.

During the analysis process, the transcription material was often reviewed to secure the real connection to the original data. The research supervisor reviewed the draft of the analysis a few times. Based on the supervisor's feedback, changes were made to improve the clarity of analysis.

6 Results

6.1 Background information

A total of 6 people volunteered to participate in the interview. Participants are working in the health care sector or the medical device industry sector. Four of them were from the medical device sector, working in managerial positions in the medical device supplier company. Two participants work in private health care and are responsible for the buying of supplies in addition to their work.

All interviewees were experienced professionals in their respective fields. Participants from the medical device sector had work experience from medical device sales between 9 to 30 years. Health care professionals have experience of procurements from six months to 18 years.

In the health care sector, purchases were mostly made from previously identified and proved operators. Another interviewee said that they do not make actual product tenders due to low purchase volume. Usually, they use the online store of medical goods from a well-known supplier, where they make the necessary purchases. The other healthcare unit does tender when necessary but often relies on well-known companies with whom they have operated earlier. Both said if they do not get the desired product from a familiar supplier, for example, if the product has problems with delivery or is completely missing from the selection, then they use web search or their data files to find a new supplier.

I have this register where are our partners and they are the ones who have been recognized to be suitable suppliers for us for a long time.

On the suppliers' side, the ways of participating in tenders varied depending on the buyer company's tendering policies. Requests for participation for tender and product detail inquiries were received directly by e-mail or telephone. These requests happen when the tender is going to be launched or based on an earlier customer visit. Some companies had also used electronic platforms for tendering. However, mainly, the interviewees said that participation in tenders or product comparisons is made with more traditional methods, such as e-mails and excel templates.

Mainly from the private side it comes from them as requests, for example if they open a tender and in some way have done some pre-qualification or they send an inquiry about the interest to the certain well-known companies by e-mail.

6.2 Value of digitalization in medical device tendering

Utilizing digitalization in the product comparison was perceived as a positive thing, which can bring many advantages, but also disadvantages if the service is not implemented well. It was generally felt that digitalization is the direction where this modern world is heading.

I believe that digitalization is where we are heading in the future and we are going there at a fast pace.

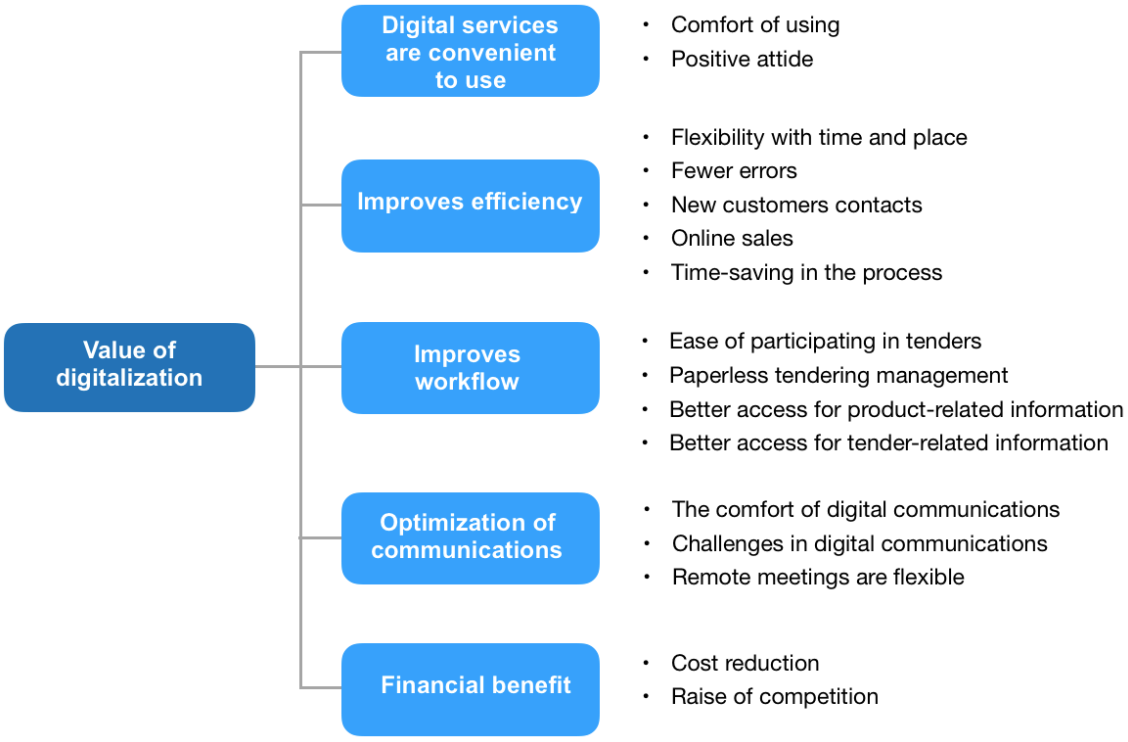

Figure 1. Value of digitalization in medical device tendering.

Figure 1 above shows the main themes related to the value of digitalization. These themes will be presented more precisely in the following chapters.

6.2.1 Digital tools and services are convenient to use

Both health professionals felt that centralizing services online is a good thing. They find that things are easy to take care of online, and thus they like to use digital tools with pleasure. In general, interviewees felt that digitalization is the future, and use of digital services and tools will grow. It was felt that digitalization would become a permanent part of the modern work-life, with remote working and remote meetings becoming more common than before.

> *I can't figure out any disadvantages, there are only advantages (with digitalization). Nowadays, when everything is online, it is only a good thing. It's easy to handle things from wherever. Difficult to find out any negative things.*

6.2.2 Digitalization can improve efficiency

Many interviewees name flexibility as a benefit, allowing them to do or participate in product comparisons or tenders regardless of time and place. The advantage was adaptation with their daily work, for example, the possibility of quitting and continuing later with tender-related tasks online.

> *…so, I can do it even during the evening shift, no need to do during office hours. I can leave it and continue later, it's not tied with time or place.*

Saving time and facilitation of work was an important issue for the interviewees. It was mentioned that a well-implemented e-tendering platform could bring time benefits to all parties; for example, product comparison or the whole tender process can get faster. Supplier's participating in tenders by e-platform can also be more time-effective than traditional ways if the platform is well-designed.

> *It could be faster for us if tenders are always in the same format, so we know what information is expected from us right away.*

A couple of interviewees mentioned that digitalization could potentially reach new customers or product suppliers. For example, in a situation where the customer is geographically distant, it is easier to reach the customer online. One mentioned that it could be possible to survey the customer's needs remotely and plan later actions based on that.

According to all interviewees, sales can be executed entirely online with basic and well-known products. Customers may want to see the product before ordering, but sending a small product sample by mail is an easy option.

A digital application can help to reduce errors. For example, when a supplier participates in a tender by entering the necessary information, the application can identify missing information or other errors that can be corrected immediately. One interviewee stated that a well-made platform also helps to ensure that the buyer manages the tender correctly and does not overlook critical issues.

Suppliers felt that digitization, such as e-tendering platform, could improve the flow of information related to tenders. Invitations to tender would be quickly and equally

available to all possible participants, not just to regular suppliers. Several respondents felt that it is sometimes very unclear in the private health sector to know details about tendering: what they tender and how often, how the tendering process is progressing, or the outcome of the tendering. Digitization can help bring clarity, transparency, and more diverse information about the tender.

6.2.3 Digitalization can improve workflow

The healthcare provider said it helps to manage the procurement process when going paperless, and all procurement-related functions are online. It makes work more manageable when one does not have to worry about filing documents when all the essential documents and order history is stored electronically. It also benefits that the information is updated automatically in the system.

> *And then there's all that order history and everything in the same place, no need to sort paper documents.*

Suppliers said a functional and easy-to-use digital system makes it easier to participate in the competition. The user-orientated system increases benefits. Digital tools make it easy to enter data and upload necessary documents for tender. One mentioned that the manageability of the invitation for tenders is better by the platform. Intelligent features such as processing entered data or converting files provide an additional benefit.

> *It will, surely, make it easier to participate in tenders using electronic tools, if there is for example a ready-made form on which to enter data and related documents.*

The healthcare side pointed out that with the ways of digitalization, for example, through suppliers' websites or e-tendering platform, it is possible to get additional information and updates about products, such as information of discontinued and replacement products. Also suppliers have better access for tender-related information. Sharing of information and communicating electronically between buyers and suppliers is easy.

> *Requests for tender are easier available if they are announced on the portal.*

6.2.4 Communication can be optimized with digital tools

All interviewees had a positive attitude towards using digital communications tools in interactions between seller and buyer. All interviewees found the digital tools convenient, which makes communication easy. For example, a video call that allows people to communicate and ask questions can be nearly as good as a face-to-face meeting. On the healthcare side, there was a desire that often tendering-related meetings could happen remotely, especially when the products are already familiar to the user. Product suppliers also believe that the sharing of information and providing training of basic products are very suitable to do remotely, even though it is still not a very popular way of providing services.

The interviewees brought up many benefits of digital communications. Remote meetings are flexible because they do not base on a specific location. There is no need to travel on-site for a remote meeting, and it also allows the seller to communicate flexibly with a customer who is far away. Product training is possible to arrange remotely and share it to several different locations simultaneously, so it increases work efficiency and productivity.

> *So yes, if it's just a basic product training, like some user guidance, doing it remotely is just a working system. Then you could reach them (the customers) faster and you don't have that transition to the place.*

In general, a remote meeting can be more comfortable and quicker to arrange than a face-to-face meeting. The benefit of remote communication emphasizes in exceptional situations, such as in a corona pandemic situation, when it would be otherwise impossible to meet the client. Every seller had of the opinion that, for basic products, the whole sales process could be carried out remotely if the customer was willing to do so.

> *If you don't ever have the opportunity to visit, but you would be able to communicate electronically, then, of course, that is always useful.*

However, digital communication has its challenges, and it does not fit every situation. On the side of healthcare, there may be a desire to see and try the product physically before making a purchase decision. In general, with slightly more complex products, it is felt essential to be on-site with the customer in order to go through the features together, allow the customer to try the product, and guarantee adequate user training for the

customer. With the medical machines, it is vital to ensure that it works correctly and can be used independently in the future. In other situations where digital communication is not suitable, and a face-to-face meeting is necessary, is the client's desire for a face-to-face meeting or training, or if the client does not have the appropriate tools for a remote meeting, such as a laptop or smartphone at work.

> *...And with more complex devices, it is really important to be on-site to ensure that device is working properly. If it is a surgery in question, sometimes it is really important to be present in certain situations.*

Attitudes towards remote meetings were quite positive among respondents, as long as the possibility of a face-to-face meeting is maintained if necessary. The general opinion was that remote meetings would inevitably increase in the future. The responses also reflected the current corona pandemic situation, as several participants speculated that pandemic might contribute to the day-to-day routine of sales and increase of remote meetings.

> *I don't know how this corona situation will affect whether it will make it more mundane. It will probably become more common and yes, it is utilized already, but not much. There would be potential.*

6.2.5 Digitalization can bring financial benefits

The e-tendering platform could lead to an increase in competition and the number of offers. Increased competition, on the other hand, can cause prices to fall. Generally, the increase in the competition was seen as a positive thing on the supplier's side, but there was also the view that a decrease in prices caused by competition is not a good thing for the supplier. The cost-effectiveness of the tendering process can increase due to digitalization. The e-tendering service can also help the buyer to take better account of the total acquisition costs or total cost of ownership, by taking actual price and other costs into account.

> *Probably the number of offers will increase, and then most likely prices will fall. Which, of course, is not so good for suppliers, but probably there is more pros than cons.*

6.3 Optimizing tendering and procurement process

Tendering has its challenges and there is still room for improvement in the current tendering and product comparison process. Figure 2 below presents main themes which will be presented in the following chapters.

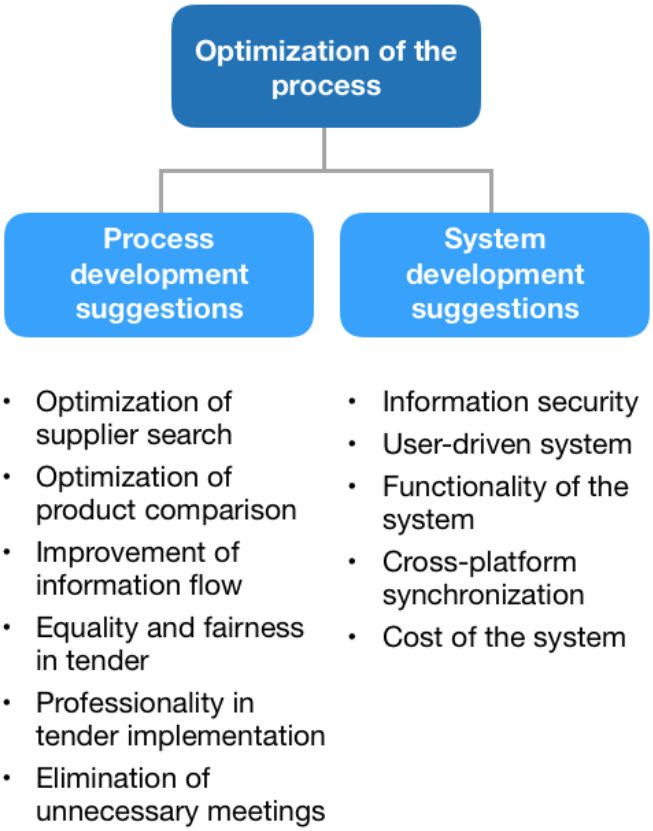

Figure 2. Optimization of tender process

6.3.1 Improvement of process creates efficiency

Healthcare professionals said that comparing products is currently challenging and very time-consuming. It is not easy to find the right suppliers when looking for a specific product or if they can not get a product from a familiar supplier. The comparison has its challenges when a buyer has to ask each operator for the price separately. It turned out that there would be a desire to support small Finnish companies, but it is sometimes difficult to find them, making it easier to make purchases from a large company. It can be challenging to keep up, for example, in acquisitions, and if the supplier company name changes, the buyer might lose track of where to get the product. The daily work related

to procurements would be easier if all the information about suppliers and their selections would be more accessible and found in one place.

> *It takes a huge amount of time to find such a supplier from where you can get it at a reasonable price, with relatively small quantities of a specific individual product when you don't get from the place where you usually order that stuff... At best, it takes one full working day when you search for those particular products.*

According to the interviews, there is room for improvement in the flow of information related to tendering and procurement. Suppliers said they would like information about future tenders and related matters are shared for them enough beforehand. It would help them to prepare for participation in tenders. Other important information for suppliers is: what products or product groups are involved in tender, annual consumption volumes, length of the procurement period, whether products are delivered to several different clinics (chain companies), and all other information that affects the tender participation. Clearly outlined requirements of the product or product group will help the seller. However, it is also important not to restrict alternatives too much so that there will be a possibility of offering new products with slightly different features, which could still suit the customer's needs. It is crucial to have a chance to present the product features for the customer, for example, in the form of text or video. In general, information must flow well between different actors.

> *If they (clinics) know that on what schedule they are tendering, would be good to be informed early enough through some channel, whatever it would be, about the future competitions and to which product groups it will apply and all the other information, like amounts of use and…*

Suppliers said that equality should take into account in the tendering process. For example, that invitation to tender does not define product requirements strictly based on one manufacturer's product but allows more suppliers to offer products from their selection. It is vital that the tender is implemented equitably and, for example, does not favor an existing supplier.

Several suppliers mentioned that total acquisitions costs (e.g. delivery, handling and consumables cost) must be taken into account in procurement and purchasing decisions.

One said digital tools might help the buyer see the big picture with the product's total costs and product features, not just the unit price, in the product comparison. In addition to that, other features to consider are the quality and availability of the product and service.

> *At the moment, you often find that it is quite difficult to tender through total costs.*

There was a wish on the suppliers' side that the entire tender process should be planned well and with expertise as inaccurate tenders take away additional resources from all parties if the tender has to be renewed. It was appreciated that the buyer has the vision to try new products and not just buying the same as always. The professionalism of the buyer with an understanding of the medical products was raised as an essential matter.

> *There is sometimes a lot of incompetence…when tendering is done poorly, it will be deleted, and you have to start all over again.*

The healthcare sector's responses emphasized the hectic nature of their work. They mentioned that taking care of some things remotely would make it easier to take care of their work. Especially when a product tender has begun, there are many visits from sales representatives, and these visits take up much time. One interviewee said many meetings beside one's primary work, can feel complicated and timeconsuming. In the case of an update of product prices, the meeting may not be necessary at all. Both thought that in numerous situations, the meetings could be easily handled remotely. However, there are situations when a meeting is necessary, such as the introduction of new or complicated products. Therefore, the wish from the healthcare's side is to have meetings with representatives only if needed.

> *To be honest, there are a bit too many unnecessary meetings. I offer that would it be possible to do somehow otherwise, for example, to send a picture to me. Anyway, that (meeting) is half an hour of working day.*

6.3.2 A well-functioning system makes work easier and saves time

Interviewees said that the systems involved in the procurement and tendering must be functional and easy to use. Clarity and efficiency of use make work more productive. The

platform must be designed well to be able to meet the needs of the users and be able to provide real benefit. One interviewee pointed out that the system they now have is difficult to use and requires learning, which means those who use it less do not want to use it. The technology must work properly, and it is crucial that training or technical support is available. Several interviewees expressed the wish that there would not be many separate systems or that it would be possible to synchronize them with each other. The challenge is if there is a need to write data to multiple systems and multiple times, making the process even more time-consuming. Also, it is easier to use just one, familiar system instead of many different systems.

> *Main thing is that platforms are as useful and easy to use as possible. That is perhaps the most important thing. Customer-driven.*

Interviewees mentioned several other useful user-friendly features of the tendering or procurement system. The platform could have intelligent features that detect errors and know how to process and select the input data. It is important to be able to utilize already existing data. For example, an existing excel file could be entered into the system that everything does not have to be written separately to prevent duplicate work. It is also an advantage that previously entered data remains in the system, so that it is not always necessary to start over with data entry, but simply updating the data is sufficient.

> *When making lots of bids, you always have to start from the very beginning. I mean, submitting the same documents even though the organization would remain the same... you just filled up everything and submitted all documents and still, next week you need to do everything again.*

Information security and the security of tendering through the platform is essential. Technical applications should be trusted. Few interviewees brought up the costs of using the system. Costs must be reasonable. One stated that the operating costs should not be paid only by one side, like the seller, but be divided for both the buyer and the seller.

> *Of course, the fact is that technology is always the technology, so you have to be sure it really works. Also, will there be additional costs and how much...and who maintains it and all things like that.*

6.4 Demand for outsourced e-tendering service

Based on the interviews, a well-designed platform for the buyer and seller to find each other would be beneficial for both parties. Interviews showed a need for a platform that assists with product comparison and sales, and buyers and sellers use it in their work. However, no great need is seen for a fully outsourced tendering service, where product comparison or tendering would be completely outsourced.

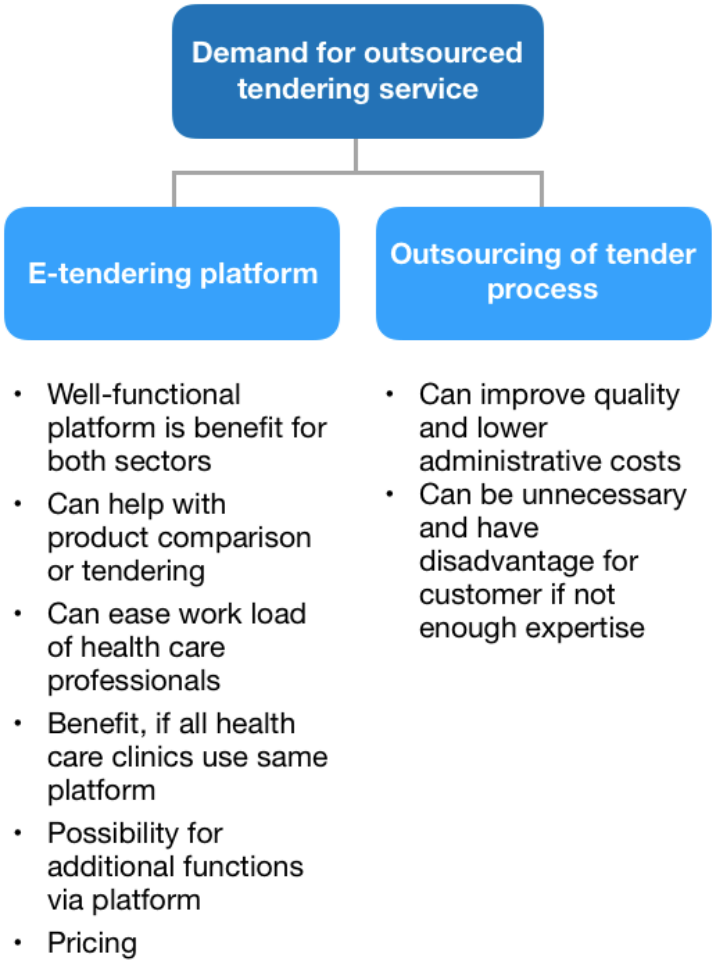

Figure 3. Demand for outsourced e-tendering service.

Figure 3 summaries the main topics of the demand. In the following chapters, the topics will be presented more in detail.

6.4.1 E-tendering platform has many benefits

Generally, it was felt that the platform could facilitate the work of both parties. It was seen that the platform would be a good additional help in work on the healthcare sector, especially with clinics that do not have a procurement department. It would save the time of the people in charge of procurement and free them up to do their original work. Both interviewees from the healthcare sector said that a platform for product comparison with product suppliers' information would be useful and would help them in product comparison or tendering. For example, platform which is something like marketplace, with information of all suppliers and their services and supplies might be helpful. One interviewee from healthcare mentioned that because buying of goods happens in addition to one's work, there is not always time to concentrate on procurement, and that brings extra concern. It was also mentioned that in small healthcare units where they do not do tendering, the platform could allow for better product comparison.

> *Some while ago there was something like that, but it wasn't that modern. I've been waiting for something like this for a while.*

> *It (a platform with supplier information) would certainly be useful. I think that would be a big advantage...It would make this product comparison much faster and easier.*

Suppliers also felt that the platform would be useful to them. A functional, modern platform would make it easier to enter the competition and save time. The user-orientated system was emphasized in the many responses, especially as there are already several systems existing; therefore, better usability would create the benefit. It was mentioned a couple of times that great benefit for e-tendering platform would be if all actors would use the same platform. In addition to the above, the benefits of the service are an improvement in the flow of information and the possibility of using the portal for other important issues, such as market dialogue, online training, meetings, and company marketing.

> *It would be very nice if there would be such a clear electronic platform where one could really do a comparison or tender. That it would be a win-win for everyone.*

Proper pricing is essential, whether it is a platform to help with product comparison or a fully outsourced tender. Extra, unnecessary additional costs are not desirable and value

for money has to be considered. As one interviewee said, if the platform is executed well and the price is right, this service would be pretty good.

6.4.2 Outsourcing of tendering is not necessarily needed

According to the interviews, a fully outsourced tendering can be an advantage if the specialists implementing the tendering have good knowledge and professionalism. Outsourced service can improve quality, for example, in the healthcare units that do not have resources in procurement. It might also reduce administrative costs. In large healthcare units with high order volumes, outsourcing of tendering or entire procurement can reduce staff workload.

> *It depends on how it is implemented. Of course, it can be beneficial to get the administrative costs down if there is a skillful person who does it and surely then you can benefit from it. But I have also seen when it has clearly been harmful to the customer when they have used an outside operator.*

Some interviewees said that fully outsourced tendering is also a disadvantage. For example, one interviewee said that in the case of a small healthcare unit with low order volumes, outsourcing is more a disadvantage. Especially when product selection happens according to doctors' wishes, an outside actor can be more harm. It is also a disadvantage if the outsourced tendering lacks competence and is performed poorly and incorrectly.

> *Well, perhaps for us as a small clinic, outsourcing is more a disadvantage. It still works the best doing things by yourself without a third party.*

6.5 Summary of results

Results showed that digitalization can bring lots of value to procurement and tender processes (Figure 4).

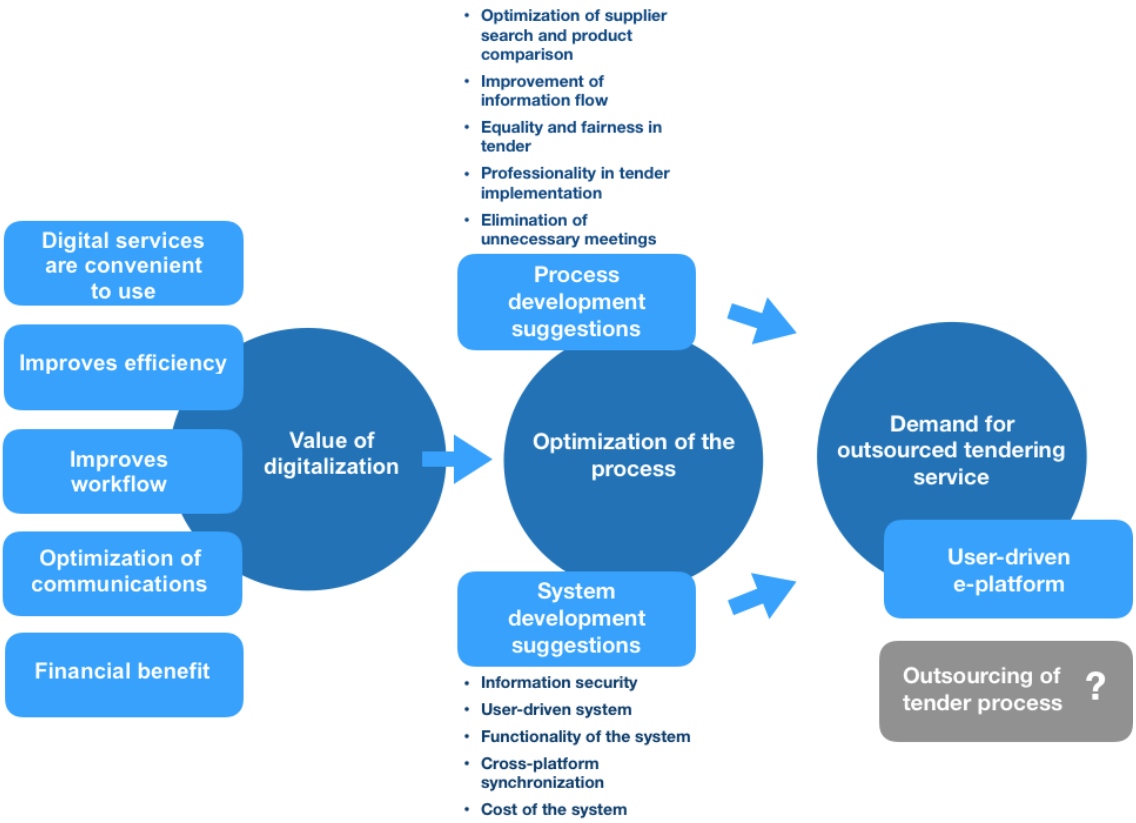

Figure 4. Summary of study results.

Digitization can bring time savings and efficiency to the medical device procurement process. Based on interviewees' opinions, digital services and tools are convenient to use. Electronic platforms and services can improve workflow with better access for information and easier tendering procedure. Competition can raise, which can bring financial benefits for the buyer. Communication between buyer and supplier can be optimized with digital communication tools.

There is still room for improvement in the current tendering and product comparison process. Mixed practices between different actors, lack of expertise or lack of necessary information are time-consuming and require extra resources from companies. Equality and fairness in the tender are important for suppliers. Electronic systems for procurement

and tendering have to be functional, safe and user-driven. Cross-platform synchronization eases work reducing double work when there are many different systems in use. The cost of the system has to be reasonable.

The digital tools which are now in use have not solved all the challenges yet. In many situations, a modern, competitive and user-driven digital solutions could help with these issues. Findings showed that there might not be the need for totally outsourced tendering, but improved tendering and sourcing platform with useful, practical features, could ease the work and bring more value to procurement processes for both buyers and suppliers.

7 Discussion

7.1 Reviewing the results

E-procurement can improve process efficiency and use of less time and resources than the traditional procedure. In this study, the findings also stated e-tools could improve the efficiency, which can have an indirect effect on costs, as Gardenal (2013) and Baily et al. (2015) stated. Time reduction in many stages of tender, such as in product comparison or taking part in the competition, was a prevalent view in the side of healthcare and medical device suppliers.

Study findings showed that digital solutions for tendering could optimize communication between buyer and supplier, like better possibilities for a market dialogue. In general, digitalization offers practical ways for communication, for example, remote meetings, and by that, the possibility to reach more customers. Gardenal (2013) had similar findings with better communication via e-platform and broader market access for suppliers. Also, e-tendering can increase competition (Raventós & Zolezzi 2015, Graves 2011, Gardenal 2013). Raise of competition can be seen in the results of the study as well.

Baily et al. (2015), Raventós & Zolezzi (2015) and den Ambtman (2020) stated that total costs can be decreased with e-procurement, including direct price effect and indirect effect. The results of this study also showed that digitalization in tendering could cause cost reduction with lower product prices or with cost savings in the whole process. Study findings also showed that the total costs of medical products are crucial to consider in

tendering. Graves (2010) classifies total cost evaluation as one main principle in successful tendering. Also, ensuring the clinical output in tendering, such as medical staff involvement, is essential to ensure that clinical needs are met. This same topic is mentioned in the study results about the demand for totally outsourced tendering service. According to the results, clinical needs might be difficult to reach with totally outsourced tendering.

Previous studies stated that e-procurement or e-tendering could improve the availability of information and better transparency in the process, which can lead to equality and also lower prices. (Raventós & Zolezzi 2015, Gardenal 2013, Bandiera et al. 2009, den Ambtman et al 2020). Graves (2011) stated that a clear definition of process and requirements enhance transparency and efficiency. Findings of this study support previous results regarding better information flow, transparency and equality between suppliers via e-platform. Suppliers needed more specific information about the tendering process and requirements of the products. Baily at al. (2015) mentioned that compliance in the process and off-contracts spendings could be reduced. This study did not support much of these results, except one interviewee brought up that there could be better insurance of implementing tender correctly from the buyer's side with e-tendering.

E-procurement or e-tendering can decrease corruption in the procurement process. (Raventós & Zolezzi 2015, Gardenal 2013, Bandiera et al. 2009, den Ambtman et al 2020). Corruption was not mentioned in the results of this study. That might be because corruption may not be considered as a problem in Finland. Previous studies were international and concentrating on countries where corruption might be a bigger issue. For example, the European Union is stating in their report about public procurements that public procurement in Finland is "virtually unaffected by corruption" (EC Europa). However, according to Salminen and Viinamäki (2017), procurements in healthcare were one area with suspicions of hidden corruption in Finland.

Gardenal (2013) stated that dematerialization could be improved by e-procurement, causing financial and environmental value. In this study, one interviewee mentioned how paperless procurement facilitates work. Might be dematerialization was not mentioned in the interviews more because different technologies are so widely used already in Finland and paperless processes are the norm.

Baily et al 2015 mentioned that integration to existing enterprise systems can be a challenge with the new e-tendering platform. This similar thought came up many times in

results. Interviewees wished that platform would be synchronized with existing platforms. Other platform-related issues were information security, the functionality of the system and technical support. Baily et al. (2015) also refer to information security and technical expertise, but also to relationships and interest of suppliers to use the platform. Study findings showed there seems to be an interest in the platform from both suppliers and the buyers' side.

7.2 Limitations

This study should be considered in the light of some limitations. These limitations are the small sample size, timing of the study and the time constrains. These all are connected to each other. The researcher was not able to get ten participants to the study as was planned. The reasons for this were the timing of the study and time limitations. During the thesis process in spring 2020, there was COVID 19 outbreak and the timing for data collection was not the most suitable, which affected the sample size. Many companies did not have resources or willingness to participate in the study on that exceptional moment. Although the sample size seemed to remain modest, the researcher did not want to extend the research process further because, at the moment, it was not known how long the COVID 19 pandemic would last. Therefore, this study settled with six interviews. With the use of a qualitative research method, it was after all possible to reach enough rich data to answer the research questions. However, because of the small sample size, these findings can not be generalized.

7.3 Trustworthiness

Trustworthiness of qualitative research can be evaluated with many ways depending of research theory. In general, things to pay attention in the assessment of trustworthiness are subject and purpose of research, data collection, research participants and relationship between them and researcher, timetable of research, analyze and report of research. Concept of credibility, transferability, dependability and confirmability are often used in the assessment of the trustworthiness of the qualitative study. (Tuomi & Sarajärvi, 118-121.) Trustworthiness of this study is evaluated according these concepts.

Study setting, participant and interview procedure with interview topics were described in the study. Clear descriptions of study participants and process helps the reader to

assess if study findings are transferable (Korstjensa & Moser 2018). To enhance credibility, study participant were chosen with purpose sampling to make sure that they are the best informant for the study. When searching for study participants, the managers of the companies were contacted, or alternatively general customer service, if no contact information of manager was available, and asked would they be willing to participate the research and who would be the best person from the company to answer to interview questions. Using of triangulation, a combination of different methods, can improve the credibility of the study (Tuomi, 124). In this study, triangulation was used in data collection by having two informant groups, health care professionals and medical device sales professionals, to increase the comprehensiveness of the phenomena. However, a small sample of interview participants can decrease credibility. Because of small sample, results may not be generalized to a larger perspective.

Before the interviews, one pilot interview was implemented to practice the interviewing skills and to test the functionality of the interview body. The themes of the interview seemed competent and no significant changes were made after the pilot interview. However, during the interview, there might have been slightly misunderstanding between some terms, like e-tendering, e-procurement or purchasing. All interviews were recorded and data transcription was made word by word, therefore precise documentation of interviews helped to identify situations when possible misunderstanding had happened and making it not affect the results. Hirsjärvi et al (2015: 35) mentioned that people's tendency to give socially acceptable answer can decrease reliability of the interview. As mentioned earlier in the chapter "5.2 Sampling", the researcher has worked in the health care and medical device industry and has gained connections from the field. Due to that, all the participants for interviews were chosen outside researcher's own network to prevent socially acceptable answering because of earlier relations to improve the trustworthiness of the results.

Dependability and confirmability can be improved with transparent description of research process and information of decisions (Korstjensa & Moser 2018). Chosen research methods with argumentations are presented. Also, the analysis method and different stages of analysis are described step by step. Research supervisor reviewed drafts of the analysis few times and changes of analysis were made based on feedback to improve the clarity and trustworthiness of the results. In analysis stage, transcription material and interview recording were reviewed many times to ensure that interperation is directly grounded in the collected data. Results of the study are presented clearly with

the help of figures, which are based directly on analysis. Also, direct sitations from the interview are presented with the results to enhance the trustworthiness.

7.4 Ethical considerations

According to ARENE publication Ethical Recommendations for Thesis Writing at Universities of Applied Sciences (Arene Ry 2018, 7), it is necessary to pay attention to that principles of GDPR and Data Protection Act are adhered by confidential way of handling personal information and application of data protection in the thesis process. In this study, anonymity and confidentiality of data collection was ensured in many ways. Research participants read and signed the consent form of GDPR. Permission for recordings was asked before the interview. Participants had the right to cancel their participation to the study at any time. All collected data was be handled confidentially and it was available only for researcher when conducting the study. Register of participants and all data of interviews, including recordings, was demolished immediately after the study was finalized. The researcher had delved into the guidelines for the responsible conduct of research established by The Finnish Advisory Board on Research Integrity (TENK 2012) and is very committed to following the responsible conduct of research.

8 Conclusion

This study aimed to produce knowledge about market possibilities of the business idea of outsourced digital tendering platform. Based on the qualitative data of the study, it can be concluded that there are market possibilities for customer-driven e-platforms for the medical device tendering and sourcing process. The results indicate that there is a place for improvement in the procurement and tendering process in the private healthcare sector and many of these issues could be improved with means of digitalization.

Findings showed that utilizing digitalization in a medical device tendering can increase efficiency and bring cost savings to both the health care company and the medical device supplier. The use of digital tools makes the tendering process smoother and facilitates the flow of information between different actors, which can improve transparency and equality in the process. A user-oriented platform, where it is possible to reach actors in the industry, can facilitate product comparisons and increase the competition in the medical device market.

Study findings can be used in the development of procurement and tender platforms or services. This study offers a good starting point for developing the business concept of a modern e-tendering platform for medical devices. With the research findings, it is possible to clarify the needs and wishes of the customers, which can be used as first phase in the service design process. An important point that emerged from the results concerning the business concept was that there was seen many benefits in an e-tendering platform, but the need for fully outsourced tendering was not so unambiguous. Therefore, based on the results, the main focus could be on implementing an e-tendering platform instead of implementing a fully outsourced tender service at this stage. Outsourced tenders could be more as an additional service on the platform in the future if needed.

Based on the results, the attitude towards digitalization is positive. Because in this research, resources were limited and focus was mostly on the medical device competition, it would be interesting to explore what other processes in the medical device sales or the healthcare sector could be improved by digitalization. Also, findings showed that medical device market might be challenging for small enterprises, if customers prefer larger, perhaps international companies. Further research related to that could be “how small SMEs could become more competitive in the medical device market?”.

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Appendix 1.

Table 1. Interview guide

Interview topics	Argumentation
Background information - Working in private health care or in medical device industry? - How long has worked with purchasing or selling of medical goods?	
Digitalization (e.g. electronical platform) in tendering - pros and cons	Objective 1 & 3 *Raventós & Zolezzi (2015): e-tendering reduced prices (8%), new bidders (supplier diversity)* *Bandiera et al. (2009): decreases prices & corruption*
Outsourcing of medical device tendering - pros and cons	Objective 1 *Moschuris & Kondylis (2006): main reasons for outsourcing of services in private health care are cost reduction, customer satisfaction and service customization*
Remote online services - Product presentation, product training - In what situations	Objective 1, 2 & 3
Optimizing/improving tendering process - In general - By digitalization	Objective 2 *Graves (2011): successful tendering improves patient safety, transparency and efficiency*

Appendix 2.
A participant consent form

Tutkimuksen nimi: Market research of digital tendering platform for private health care sector in Finland
Tutkimuksen toteuttaja: Metropolia Ammattikorkeakoulu Oy, Antonia Pekansaari puh. xxx, sähköposti xxx. Opinnäytetyön ohjaaja yliopettaja Eija Metsälä, puh. xxx, sähköposti xxx.

Minua _____ on pyydetty osallistumaan yllämainittuun tutkimukseen, jonka tarkoituksena on **selvittää sairaalatarvikkeiden digitaalisen kilpailutuspalvelun tarvetta terveydenhuollon yksityisellä sektorilla.**

Olen saanut tutkimustiedotteen ja ymmärtänyt sen. Tiedotteesta olen saanut riittävän selvityksen tutkimuksesta, sen tarkoituksesta ja toteutuksesta, oikeuksistani sekä tutkimuksen mahdollisesti liittyvistä hyödyistä ja riskeistä. Minulla on ollut mahdollisuus esittää kysymyksiä ja olen saanut riittävän vastauksen kaikkiin tutkimusta koskeviin kysymyksiini.

Olen saanut tiedot tutkimukseen mahdollisesti liittyvästä henkilötietojen keräämisestä, käsittelystä ja luovuttamisesta ja minun on ollut mahdollista tutustua tutkimukseen liittyvään tietosuojaselosteeseen.

Minua ei ole painostettu eikä houkuteltu osallistumaan tutkimukseen.

Minulla on ollut riittävästi aikaa harkita osallistumistani tutkimukseen.

Ymmärrän, että osallistumiseni on vapaaehtoista ja että voin peruuttaa tämän suostumukseni koska tahansa syytä ilmoittamatta. Olen tietoinen siitä, että mikäli keskeytän tutkimuksen tai peruutan suostumuksen, minusta keskeyttämiseen ja suostumuksen peruuttamiseen mennessä kerättyjä tietoja ja näytteitä voidaan käyttää osana tutkimusaineistoa.

Allekirjoituksellani vahvistan osallistumiseni tähän tutkimukseen.

Jos tutkimukseen liittyvien henkilötietojen käsittelyperusteena on suostumus, vahvistan allekirjoituksellani suostumukseni myös henkilötietojeni käsittelyyn. Minulla on oikeus peruuttaa suostumukseni tietosuojaselosteessa kuvatulla tavalla.

_____, _____ . _____. _____

Allekirjoitus: _____

Nimenselvennys: _____

Alkuperäinen allekirjoitettu tutkittavan suostumus sekä kopio tutkimustiedotteesta liitteineen jäävät tutkijan arkistoon. Tutkimustiedote liitteineen ja kopio allekirjoitetusta suostumuksesta annetaan tutkittavalle.

Appendix 3.
Information about the research

TIEDOTE TUTKIMUKSESTA

Market research of digital tendering platform for private health care sector in Finland

Pyyntö osallistua tutkimukseen

Teitä pyydetään mukaan tutkimukseen, jossa tutkitaan **yksityisen terveydenhuollon toimijoille tarkoitetun sähköisen sairaalatarvikkeiden kilpailutuspalvelun tarvetta.**
Olemme arvioineet, että sovellutte tutkimukseen, koska työskentelette sairaalatarvikkeiden hankintojen parissa tai työskentelette sairaalatarvikkeiden myynnin parissa. Tämä tiedote kuvaa tutkimusta ja teidän osuuttanne siinä. Perehdyttyänne tähän tiedotteeseen teille järjestetään mahdollisuus esittää kysymyksiä tutkimuksesta, jonka jälkeen teiltä pyydetään suostumus tutkimukseen osallistumisesta.

Vapaaehtoisuus

Tutkimukseen osallistuminen on täysin vapaaehtoista. Voitte myös keskeyttää tutkimuksen koska tahansa syytä ilmoittamatta. Mikäli keskeytätte tutkimuksen tai peruutatte suostumuksen, teistä keskeyttämiseen ja suostumuksen peruuttamiseen mennessä kerättyjä tietoja ja näytteitä voidaan käyttää osana tutkimusaineistoa.

Tutkimuksen tarkoitus

Tämän tutkimuksen tarkoituksena on tehdä selvittää markkinatutkimuksen avulla **yksityisen terveydenhuollon toimijoille tarkoitetun sähköisen sairaalatarvikkeiden kilpailutuspalvelun tarvetta.**

Tutkimuksen toteuttajat

Tutkimuksen toteuttajana toimii Metropolian YAMK-opiskelija Antonia Pekansaari, joka opiskelee Health Business Management-koulutusohjelmassa. Markkinatutkimus tehdään toimeksiantona aloittavalle yritykselle, joka haluaa selvittää liikeidean markkinamahdollisuuksia.

Tutkimusmenetelmät ja toimenpiteet

Tutkimukseen osallistuminen eli tutkimushaastattelu kestää noin 15 minuuttia.

Tutkimus toteutetaan siten, että tutkimuksen toteuttaja esittelee tutkimuksen aiheen, jonka jälkeen hän haastattelee teitä puhelimitse.

Kustannukset ja niiden korvaaminen

Tutkimukseen osallistuminen ei maksa teille mitään. Osallistumisesta ei myöskään makseta erillistä korvausta.

Tutkimustuloksista tiedottaminen

Kyseessä on opinnäytetyö, joka julkaistaan avoimesti Theseus-tietokannassa.

Tutkimuksen päättyminen

Tutkimus voidaan keskeyttää myös tutkijan taholta erityisen painavista syistä, joista tiedotetaan tällaisessa tapauksessa erikseen.

Lisätiedot

Pyydämme teitä tarvittaessa esittämään tutkimukseen liittyviä kysymyksiä tutkijalle/tutkimuksesta vastaavalle henkilölle.

Tutkijoiden yhteystiedot

Tutkija / Opinnäytetyötekijä
Nimi: Antonia Pekansaari
Puh. xxx
Sähköposti: xxx

Tutkimuksesta vastaa / opinnäytetyön ohjaaja
Titteli: Yliopettaja
Nimi: Eija Metsälä
Metropolia Ammattikorkeakoulu Oy
Puh. xxx
Sähköposti: xxx

Tutkimuksen tietosuojaseloste: Henkilötietojen käsittely tutkimuksessa

Tässä tutkimuksessa käsitellään teitä koskevia henkilötietoja voimassa olevan
tietosuojalainsäädännön (EU:n yleinen tietosuoja-astus, 679/2016, ja voimassa oleva kansallinen lainsäädäntö) mukaisesti. Seuraavassa kuvataan henkilötietojen käsittelyyn liittyvät asiat.

Tutkimuksen rekisterinpitäjä
Rekisterinpitäjällä tarkoitetaan tahoa, joka yksin tai yhdessä toisten kanssa määrittelee henkilötietojen käsittelyn tarkoitukset ja keinot. Rekisterinpitäjä voi olla Metropolia
Ammattikorkeakoulu, toimeksiantaja, muu yhteistyötaho, opinnäytetyöntekijä tai jotkut edellä mainituista yhdessä (esim. Metropolia Ammattikorkeakoulu ja opinnäytetyöntekijä yhdessä).

Tässä tutkimuksessa henkilötietojen rekisterinpitäjä on:

Metropolia Ammattikorkeakoulu	☐
Toimeksiantaja	☐
Muu yhteistyötaho	☐
Opinnäytetyöntekijä	☒

Tutkimuksessa teistä kerätään seuraavia henkilötietoja
Henkilötietojen käsittely on oikeutettua ainoastaan silloin, kun se on tutkimukselle välttämätöntä.
Kerättävät henkilötiedot on minimoitava, niitä ei saa kerätä tarpeettomasti tai varmuuden vuoksi.

Kerättävät tiedot: Nimi ja sähköposti tai puhelinnumero, työtehtävä.

Teillä ei ole sopimukseen tai lakisääteiseen tehtävään perustuvaa velvollisuutta toimittaa henkilötietoja vaan osallistuminen on täysin vapaaehtoista.

Tutkimuksessa kerätään henkilötietojanne myös seuraavista lähteistä

Tutkimuksessa ei kerätä henkilötietojanne muista lähteistä.

Henkilötietojenne suojausperiaatteet

Käytössä olevat työvälineet henkilötietojen keräykseen ovat sähköposti (Metropolian
sähköpostijärjestelmä), Metropolian verkkolevyasema, jonne vastaukset tallennetaan tutkimuksen teon ajaksi ja Excel-taulukko-ohjelma, jota käytetään apuna vastausten analysoinnissa.

Henkilötiedot ovat suojattu seuraavilla tavoilla: tietokoneen ja sähköpostin käyttäjätunnus ja salasana, jotka ovat vain tutkimuksen tekijän tiedossa. Lisäksi tietokone sijaitsee lukitussa tilassa, jonne ulkopuolisilla ei ole pääsyä.

Henkilötietojenne käsittelyn tarkoitus
Henkilötietojenne käsittelyn tarkoituksena on tuottaa markkinatutkimus, jolla selvitetään sairaalatarvikkeiden sähköisen kilpailutuspalvelun tarvetta terveydenhuollon yksityissektorille.

Henkilötietojenne käsittelyperuste
Suostumus

Tutkimuksen kestoaika (henkilötietojenne käsittelyaika)

Maksimissaan 6 kuukautta

Mitä henkilötiedoillenne tapahtuu tutkimuksen päätyttyä?
Henkilötiedot hävitetään tutkimuksen valmistumisen jälkeen.

Tietojen luovuttaminen tutkimusrekisteristä
Henkilötietoja ei luovuteta eteenpäin. Erikseen sovittaessa ja haastateltavan näin halutessa, henkilötiedot voidaan luovuttaa toimeksiantajayritykselle siinä tapauksessa, jos yritys aloittaa liiketoiminnan ja tarjoaa palvelua, josta tutkimus tehtiin.

Henkilötietojenne mahdollinen siirto EU:n tai ETA-alueen ulkopuolelle
Tietojanne ei siirretä/siirretään EU:n tai ETA-alueen ulkopuolelle.

Rekisteröitynä teillä on oikeus
Koska henkilötietojanne käsitellään tässä tutkimuksessa, niin olette rekisteröity tutkimuksen aikana muodostuvassa henkilörekisterissä. Rekisteröitynä teillä on oikeus:

- saada informaatiota henkilötietojen käsittelystä
- tarkastaa itseänne koskevat tiedot
- oikaista tietojanne
- poistaa tietonne (esim. jos peruutatte antamanne suostumuksen)
- peruuttaa antamanne henkilötietojen käsittelyä koskeva suostumus
- rajoittaa tietojenne käsittelyä
- rekisterinpitäjän ilmoitusvelvollisuus henkilötietojen oikaisusta, poistosta tai käsittelyn rajoittamisesta
- siirtää tietonne järjestelmästä toiseen
- sallia automaattinen päätöksenteko nimenomaisella suostumuksellanne
- tehdä valitus tietosuojavaltuutetun toimistoon, jos katsotte, että henkilötietojanne on käsitelty tietosuojalainsäädännön vastaisesti

Jos henkilötietojen käsittely tutkimuksessa ei edellytä rekisteröidyn tunnistamista ilman lisätietoja eikä rekisterinpitäjä pysty tunnistamaan rekisteröityä, niin oikeutta tietojen tarkastamiseen, oikaisuun, poistoon, käsittelyn rajoittamiseen, ilmoitusvelvollisuuteen ja siirtämiseen ei sovelleta.

Voitte käyttää oikeuksianne ottamalla yhteyttä rekisterinpitäjään.

Tutkimuksessa kerättyjä henkilötietoja ei käytetä profilointiin tai automaattiseen päätöksentekoon

Henkilötietojen käsittely aineistoa analysoitaessa ja tutkimuksen tuloksia raportoitaessa

Teistä kerättyä tietoa ja tutkimusaineistoa käsitellään luottamuksellisesti lainsäädännön edellyttämällä tavalla. Yksittäisille tutkittavalle annetaan tunnuskoodi ja häntä koskevat tiedot säilytetään koodattuina tutkimusaineistossa. Aineisto analysoidaan koodattuna ja tulokset raportoidaan ryhmätasolla, jolloin yksittäinen henkilö ei ole tunnistettavissa ilman koodiavainta. Koodiavainta, jonka avulla yksittäisen tutkittavan tiedot ja tulokset voidaan tunnistaa, säilyttää tutkija tutkimuksen ajan eikä tietoja anneta tutkimuksen ulkopuolisille henkilöille. Lopulliset tutkimustulokset raportoidaan ryhmätasolla eikä yksittäisten tutkittavien tunnistaminen ole mahdollista.

Tutkimusaineistoa säilytetään tutkimuksen teon ajan, jonka jälkeen ne hävitetään.