Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Economics and Management
Department of International Business

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Barriers to Open Banking

Case Nordea Abp

Master's thesis in International Business and Marketing
Supervisor: Ainur Begim
Co-supervisor: Øivind Strand
June 2022

NTNU
Kunnskap for en bedre verden

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Abstract

During the last years, the banking industry has been going through continuous transformation. Digitalization, new regulations, and intensified competition are shaping the financial sector and new players, such as fintechs, have entered the industry. The latest change that has tremendously shaped the industry has been the European Union's Revised Payment Services Directive, which is also known as PSD2. The directive forces banks to give access to customer data to third parties providers in a secure digital form with customers' consent. The data consists of account and transaction information and is distributed through Application Programming Interfaces (APIs).

The purpose of this study is to gain knowledge of technical and organizational barriers to open banking and contribute to closing the research gap by asking: "*What are the technical and organizational barriers to open banking?*".

The research was conducted as an exploratory case study and the case company was selected from the Nordic retail banking industry. For the case company, Nordea Abp was selected being one of the biggest banks in the Nordics. The data collection consisted of semi-structured interviews with professionals working in the Open Banking department within the company. Analysis of the interview transcripts revealed several barriers that were categorized into two groups: technical barriers and organizational barriers. Within these two groups, in total nine different themes were identified as barriers.

The main findings of this research include that there are still many barriers to open banking. Some of the barriers were already identified in prior research, but the study also resulted in new discoveries. Based on the findings and previous literature, four new barriers were identified. The four barriers are communication of the technical requirements and troubleshooting, communication with stakeholders, knowledge of the service/product, and resources.

Sammendrag

I løpet av de siste årene har banknæringen vært gjennom kontinuerlig transformasjon. Digitalisering, nye reguleringer og skjerpet konkurranse preger finanssektoren og nye aktører, som fintechs, har kommet inn i bransjen. Den siste endringen som har formet bransjen enormt har vært EUs reviderte betalingstjenestedirektiv, som også er kjent som PSD2. Direktivet tvinger banker til å gi tilgang til kundedata til tredjepartsleverandører i en sikker digital form med kundenes samtykke. Dataene består av konto- og transaksjonsinformasjon og distribueres gjennom Application Programming Interfaces (API).

Formålet med denne studien er å få kunnskap om tekniske og organisatoriske barrierer for open banking og bidra til å tette forskningsgapet ved å spørre: "*Hva er de tekniske og organisatoriske barrierene for open banking?*".

Forskningen ble utført som en utforskende case-studie og case-selskapet ble valgt fra den nordiske detaljbankbransjen. For caseselskapet ble Nordea Abp valgt ut som en av de største bankene i Norden. Datainnsamlingen besto av semistrukturerte intervjuer med fagpersoner som arbeider i Open Banking-avdelingen i selskapet. Analyse av intervjuutskriftene avdekket flere barrierer som ble kategorisert i to grupper: tekniske barrierer og organisatoriske barrierer. Innenfor disse to gruppene ble til sammen ni ulike temaer identifisert som barrierer.

Hovedfunnene i denne forskningen inkluderer at det fortsatt er mange barrierer for open banking. Noen av barrierene var allerede identifisert i tidligere forskning, men studien resulterte også i nye funn. Basert på funnene og tidligere litteratur ble det identifisert fire nye barrierer. De fire barrierene er kommunikasjon av de tekniske kravene og feilsøking, kommunikasjon med interessenter, kunnskap om tjenesten/produktet og ressurser.

Acknowledgements

I as the author of this study, would like to dedicate this space to express my most sincere appreciation and gratitude to the people who have guided, advised, and helped me throughout the research and writing process. Altough their efforts might be invisible to the reader, they remain very important to me. First, I would like to thank my supervisors, Associate Professor Ainur Begim and professor Øivind Strand. Their knowledgeable and valuable guidance and constant feedback were essential for shaping this thesis. Without your commitments and dedications the completion of this thesis would have been impossible. I will always cherish your encouraging and passionate attitudes that inspired me to deliver my best.

Second, I would like to thank Nordea Abp and its employees who have contributed to this study and its data collection. I am grateful that you chose to give some of your time to me and this research. Your input allowed me to make a valuable contribution to the literature. Furthermore, I want express my sincere thanks to NTNU and the International Business and Marketing department. Finally, I would like to thank my family for supporting me in every step along the way.

Janina Haapanen

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List of Abbreviations

ABP	Publikt Aktiebolag (Public stock company)
AISP	Account Information Service Provider
API	Application Programming Interface
BigTech	Big Technology company
EU	The European Union
Fintech	Financial Technology company
GDPR	General Data Protection Regulation
UK	United Kingdom
PISP	Payment Initiation Service Provider
PSD1	Payment Service Directive
PSD2	Revised Payment Service Directive
R&D	Research and Development
TPP	Third Party Provider of Payment Services
UK	United Kingdom

1 Introduction

This chapter will provide background information for the thesis, present the existing research gap regarding barriers to open banking and argue why it is important to close this said research gap it. The following chapter will also define the research objectives and the research question. Lastly, the structure of the study is introduced.

1.1 Background for the thesis

Banks are often considered to be traditional and conservative organizations. Strict regulations and tight control have limited the innovativeness of banks. The changes within the industry have been rather evolutionary than disruptive (Gozman et al., 2018; Mansfield-Devine, 2016; Premchand & Choudhry, 2018).

However, for years, technological innovations have been changing industries and banking has been no exception (Nicholls, 2019). Over the last decades, the internet and mobilization has changed how the financial sector interacts with its customers (Premchand & Choudhry, 2018). Other factors creating constantly ongoing changes are, for example, regulation, trends, and technology (Deloitte, 2021).

In recent years, the biggest change in the financial industry within the EU (The European Union) has been triggered by the Payment Services Directive 2 (PSD2). It was first introduced by the European Commission in 2013 and executed in 2018. PSD2 was the trigger of the open banking era allowing customers to have control over their data by forcing banks to share customer data with Third-party Payment Providers (TPPs) (Leitner & Spohrer, 2020; Stiefmueller, 2020). The customer data is shared through Application Programming Interfaces (APIs) to TPPs (often fintech companies) with customer's consent (Nicholls, 2019; Premchand & Choudhry, 2018). APIs are basically software intermediaries that connect a website or app to a user by sending information back and forth (Apimetrics, n.d.). APIs can also be described as a messenger that delivers the request of information from the user to the provider, and ultimately brings the answer back to the user (Pearlman, 2016).

Open banking offers innovative new business models for the financial industry (Premchand & Choudhry, 2018). However, at the beginning of the open banking era, this change was feared to shift financial markets towards fintechs and weaken the position of banks that they had gained over the decades. This also discovered by Mattila (2021) during his research conducted with open banking experts in Finland.

So far, open banking has not received adequate attention in research. Most of the research has focused on the customer side of the barriers, and only a few have investigated them in a holistic way and considered also the perspectives of banks and fintechs. Previous research that has been focused on the organizational and technical side of the barriers has found challenges with the lack of API standardization, trust between actors in the ecosystem (Farrow, 2020), old legacy systems, governance, culture (Kokkinis & Miglionico,

2020), and different aspects with collaboration, such as security and different phases between banks and fintechs (Mattila, 2021; Zachariadis & Ozcan, 2017).

However, the field of open banking is still a very young field and most of the studies that has been conducted are from the beginning of the open banking era, which presents an interesting opportunity to look more in detail into why open banking has been adopted so slowly from the perspective of the organization (Gozman et al., 2018; Premchand & Choudhry, 2018). Recognizing the importance of innovation and its process to the performance and competitiveness of organizations, this study examines the relationship between open innovation and potential barriers identified by the research.

Open banking as a topic is still highly relevant, because it is still evolving and changing the financial industry (Woods, 2021). The current era of open banking can be viewed as a turning point for the industry. It has offered a great chance for banks to integrate into their customers' lives to meet their convenience needs (Capgemini Research Institute, 2019) and also the work with smaller innovative technology based companies gives banks an opportunity to combine traditional banking together with technology and innovations (Laplante & Kshetri, 2021).

1.2 Research Objectives and Research Question

1.2.1 Objectives

The main objective of this thesis is to examinate what kind of barriers there are to open banking from the perspective of the professionals working closely with it in a bank. This research will contribute to this field by exploring the existent literature with qualitative research. As a research design, a case study will be conducted and interviews with the professionals working with open banking will be held. The aim of this research is to contribute to literature by offering Nordic perspective to barriers to open banking, and how the perception of these barriers has developed during the years based on the experiences of the professionals compared to prior studies.

1.2.2 Question

In order to fill this gap in current research, the aim of this study is to investigate technical and organizational barriers to open banking. Thus, the following research question was formulated:

RQ: What are the technical and organizational barriers to open banking?

Open banking is a global phenomenon. However, for this research the focus has been narrowed down to the EU and focused on the Nordic scale. Overall, the Nordic countries are among the most digitalized countries in Europe (European Commission, 2021), and the Nordic banks are at the forefront of automated and digitalized banking systems (Banqsoft, 2021). This makes the Nordic countries a remarkably interesting area to conduct this study. Since the author wants to research this specific phenomenon, barriers to open banking, the decision was made to conduct a case study and focus on one company, Nordea Abp. The company was selected since it gives a good overview of the Nordic markets being the biggest bank in the Nordics (Nordea Bank Abp, 2021a; Yuen, 2022).

1.3 Structure of the study

The structure and the progress of the thesis is presented in Figure 1.

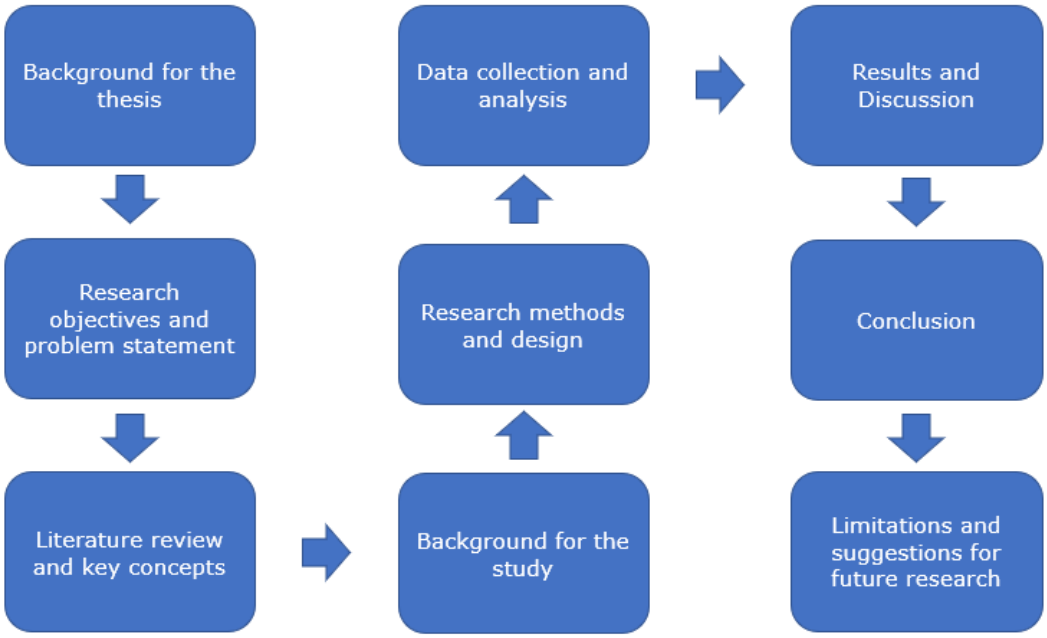

Figure 1. Structure of the study

The first chapter introduced the background, research objectives, and research question. In the second chapter, a literature review of central topics and key concepts will be presented, which is divided into two parts. The first part is focused on the background of the topic, covering what is open banking and what are the main terms related to it. This part also presents prior studies on barriers to open banking. The second part focuses on the open innovation paradigm and open innovation ecosystem.

The next part, chapter 3, will contain the background of this study. First, it will present an overview of the retail banking industry in the Nordics including traditional banks and fintech companies. Second, chapter 3 will introduce Nordea Abp as a company and include the current state of open banking and innovation in Nordea Abp. Chapter 4 presents the methodology, research design, data collection, data analysis, and research quality. This chapter will define the chosen methodologies and design, including the justification for the usage of these selected methods.

In chapter 5, the results will be presented and discussed. This will be followed by chapter 6, which will contain implications and conclusion of the study. In addition to this, limitations and suggestions for future research will also be included in this chapter.

2 Literature review and key concepts

This chapter will cover the main concepts of this thesis. It is separated into two main sections. "Background of the topic" will cover open banking and concepts relevant to it. Furthermore, this section will also introduce relevant previous research from the field. Second part, "Theoretical framework," focuses on relevant theories. It will offer insight on open innovation paradigm, which will be the theoretical viewpoint for this research.

2.1 Background of the topic

2.1.1 Open Banking

This section will provide an overview of open banking and prior studies on barriers to open banking. First, a definition and description to open banking will be presented. This will be followed by a more detailed introduction to components that are closely related to open banking, such as Payment Services Directive 2 (PSD2), General Data Protection Regulation (GDPR), third party providers, and the Application Programming Interfaces (APIs).

2.1.1.1 Definition and introductory description

Open banking is an innovative new business model for the financial industry in which financial institutions, such as banks, will either voluntarily or in response to regulatory requirements share banking data with third parties (Nicholls, 2019; Premchand & Choudhry, 2018). Open banking initiatives are often either driven by regulations or markets.

Typically described as a business of trust, the financial sector is often required to follow "*higher standards of compliance and control than in other sectors*" (Bylykbashi et al., 2021, p.3). For this reason, open banking raised a lot of questions, including concerns about banks' role in the future and what challenges and opportunities open banking offers (Ramdani et al., 2020). Many banks at the time considered it as a threat, fearing to give up some of the control and the customer data to new, more agile competitors (Mansfield-Devine, 2016).

However, open banking has not led to a much feared change in the industry. It has developed slowly and many opportunities remain unreached. These opportunities include enhancing service innovations, improving service distribution, and overall using open banking and APIs as a facilitator for new innovation activities and platforms (Gozman et al., 2018; Mattila, 2021). Multiple studies have examined the barriers to open banking, which include security issues, loss of reputation, lack of standardization of APIs, loss of customer base, and the requirement to have a change in culture and mindset within the organization. These will be presented in more detail in section 2.1.2.

2.1.1.2 PSD2

Payment Services Directive 2 (PSD2) played a significant role in the development of open banking. It was proposed by the European Commission in 2013, passed by the Council of the European Union in 2015, and finally implemented in 2018 (Figure 2.) with the main motivation to make the banking industry more innovative (Mansfield-Devine, 2016). Other motivations for this directive include, for example, improving and standardizing payment

efficiency in the European Union, improving security, and making payment methods more transparent (Mansfield-Devine, 2016).

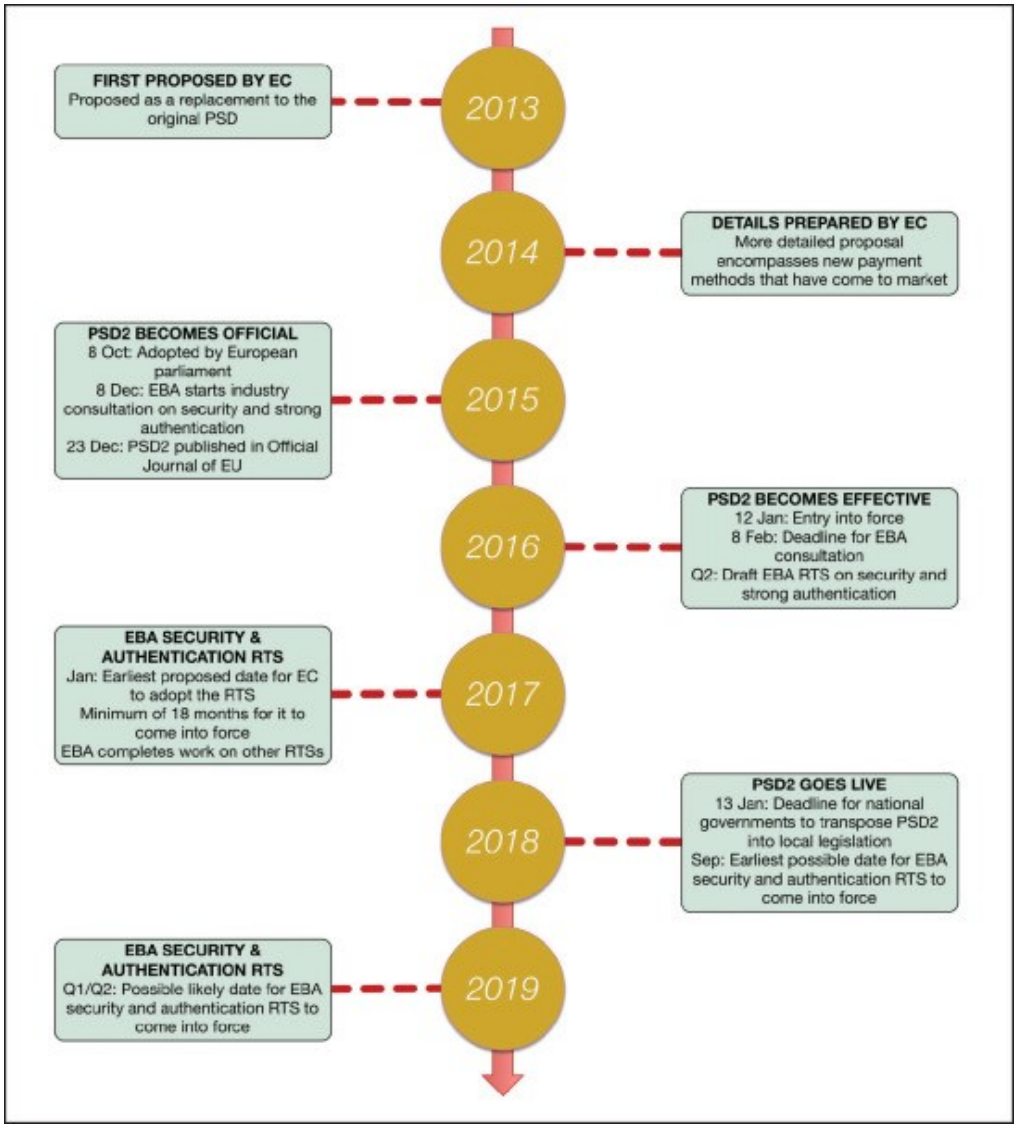

Figure 2. A timeline for PSD2 (Mansfield-Devine, 2016)

PSD2 is a refined and updated version of previous directive PSD1, which was repealed from 13th of January 2018 when PSD2 became effective (Council of the European Union, 2015). The main purpose of the new directive was to improve existing EU rules for electronic payments. The main goals were to increase transparency, tighten the security requirements, and set the rules for rights and obligations of users and providers (Council of the European Union, 2015).

With PSD2, the EU markets also became more integrated and open to new services and providers (Council of the European Union, 2015; Leitner & Spohrer, 2020). This unveiled more opportunities for users and providers, broke up the existing market structure, and reduced the dominance of vertically integrated incumbents, such as banks (Leitner & Spohrer, 2020).

The European Court of Justice found out that several leading banks and credit card companies were guilty of anticompetitive practices (Leitner & Spohrer, 2020). For this reason, PSD2 was meant to make a change to revive competition in markets for card and mobile payments (Leitner & Spohrer, 2020). Opening the industry for new players helped to make the banking industry more innovative (Mansfield-Devine, 2016). Since PSD2 was the start of the shift within the industry, it can be considered as one of the main forces to start the open banking era.

2.1.1.3 General Data Protection Regulation

Tightly connected to PSD2, General Data Protection Regulation (GDPR) aims to allow European Union (EU) citizens to control their personal data better (The European Parliament and the Council, 2016). This includes the right to know when customer data has been hacked, the right to delete personal data, easier access to data, and data portability (The European Parliament and the Council, 2016). GDPR extends data protection to any data collected or processed which is related to EU citizens by anyone or any organization, no matter where they are based or where the data is stored (Tankard, 2016).

GDPR also expands the definition of personal data. With this regulation, all information from which a person could be identified, either directly or indirectly, is considered as personal data, including identifiers such as IP addresses and cookies (Tankard, 2016; The European Parliament and the Council, 2016).

2.1.1.4 Third Party Providers

Open banking requires banks to grant third-party service providers (TPPs) access to customer data. These are often fintech companies. With the access to customer data, TPPs can offer useful new services to customers, which are often based on the combination of information from other sources (Nicholls, 2019).

Every TPP can be divided into two groups:

> Payment Initiation Service Provider (PISP): An organization that initiates the payment process on behalf of the customer using bank provided Application Programming Interfaces (APIs). Banks have to provide suitable data through the APIs if the customer has given permission to the PISP (Mansfield-Devine, 2016).
>
> Account Information Service Provider (AISP): Those organizations have permission to access customers' bank information. Organizations typically build services around the customer's bank information from multiple bank accounts and aggregate it into a single source hoping it will attract technology start-ups to create new innovative services (Mansfield-Devine, 2016).

In the beginning of the open banking era, TPPs, like fintechs and digital ecosystems, such as Apple, Google, and Facebook, were seen as a threat to banks (FinTech Futures, 2018; Harrison, 2021). Digital ecosystems, or bigtechs, have been creating pressure to the financial industry by expanding their capabilities with payment and loan systems (Harrison, 2021). Having huge amount of customer data already in their systems, the development towards financial services has been quite natural and an easy move (Meirion-Williams, n.d.). The advantage of having an all-in-one solution can be an interesting selling point to customers for these bigtechs. Over the years, they have also managed to master the

creation of user-friendly solutions with a good customer experience (Harrison, 2021). Banks are still quite new in this field creating more digital financial services, which increases the threat of bigtechs.

However, so far bigtechs, like Apple and Google, are working with banks rather than competing against them. This might be due to complex regulations and privacy obstacles (Harrison, 2021). Hiring competent people with right knowledge of the regulations and building up the teams is time consuming, which creates one challenge for bigtechs (Pattie, 2019). Banks are much more familiar with the regulations than fintechs and digital ecosystems, and have the necessary customer base and expertise. (Premchand & Choudhry, 2018).

Another challenge for bigtechs is gaining the trust of consumers. The financial industry is built on trust and reliability of software, which is a key success factor (Pattie, 2019). Banks have been building up trust through the years and customers may be cautious about switching to new providers, such as bigtechs and fintechs. This makes collaboration more appealing for both parties. To keep their competitive advantage towards bigtechs, banks and fintechs should focus on collaborating and creating their own ecosystem together (Meirion-Williams, n.d.).

2.1.1.5 The Application Programming Interface

At its simplest, APIs are "*a way for two computer applications to talk to each other over a network using a common language that they both understand*" (Jacobson et al., 2012, p.5). In other words, API can be described as a messenger between the user and provider (Pearlman, 2016). The user makes a request for information and the API delivers this request to the provider (Apimetrics, n.d.). After getting the answer, the API brings it back to the user (Apimetrics, n.d.). API is basically a software intermediary working in the background connecting the user and the provider in an efficient and straightforward way.

APIs are widely used by developers. When they start to code, they do not often start from scratch but utilize APIs in their work (Häger, 2019). If a developer wants to connect, for example, a map service on their app, they can simply use an API for an existing map service such as Google Maps (Apimetrics, n.d.). This way they will have the map service and its updates on their app as long as they want.

APIs help banks to fulfil their requirements of ongoing data transfers between outsiders, enabling third-party developers to come up with more innovative applications, create better customer experience, and deliver advanced solutions (Premchand & Choudhry, 2018). With APIs, banks can adapt their core systems for innovations and integrate them into internal systems or with external partners in a simpler, controlled, and safer way (Premchand & Choudhry, 2018).

APIs offer a lot of new innovative opportunities that benefit both customers and banks. Thanks to APIs provided by fintechs, customers are able to make purchases easier, receive their salaries, use mobile wallets, and pay their invoices online (Unsal et al., 2020). These solutions help banks to enhance the customer experience and meet their customers' needs. Banks also might get completely new revenue sources, such as selling the spending information to new companies (Unsal et al., 2020).

2.1.2 Prior studies on barriers to open banking

Open banking has received a lot of attention since it became official in 2015. A few of the prior studies have been focusing on the organizational and technical side of the barriers. These studies have found challenges with the lack of API stardardization, trust between different actors (Farrow, 2020), old legacy systems, governance, culture (Kokkinis & Miglionico, 2020), and various aspects with collaboration, such as security and different phases between banks and fintechs (Capgemini Efma, 2019; Mattila, 2021; Zachariadis & Ozcan, 2017).

In his article "*An application programming interface model for open banking ecosystems*" Farrow (2020) presents a model for an open banking application programming interface ecosystem that supports open banking APIs to expand beyond the regulatory demands. The paper introduces different banking scenarios and identifies specific examples of services that would increase the value of these scenarios. As a barrier for developing and realizing new services, Farrow (2020) identifies the lack of unified API standards over Europe, and trust between actors in the ecosystem. According to him, the lack of standardization can cause clusters which can limit the openness of the markets. The lack of TPPs regulatory demands creates challenges with the trust between partners, which requires additional actions from the banks to ensure that their partners are trustworthy and filling the requirements (Farrow, 2020).

Kokkinis & Miglionico (2020) examinate in their paper the new borders of open banking and cryptocurrencies as a payment system from the perspective of inclusive economic development. The article focused on studying the importance of alternative options to credit and payments, such as open banking. It also assessed the potential that financial innovations can have to financial inclusion policy agenda. As a part of their study, Kokkinis & Miglionico (2020) identified that old legacy systems, governance, and culture are creating constraints to new innovations and technologies of financial services. The old financial institutions, such as banks, are lacking transparency in their culture and governance which is slowing down their innovation processes. The legacy systems are not often compatible with new technologies which is decreasing the innovation pace.

Mattila (2021) conducted a literature review and an empirical study to examinate open innovation opportunities of open banking and APIs. The empirical study was done with qualitative survey with open-ended questions. The survey was sent to experts of open banking working in the Finnish banking industry. As a part of his study, he also identified challenges with collaborations that limit the utilization of open innovation and open banking. These challenges when banks and TPPs are trying to collaborate arise from the difficulties of finding suitable partners to work with. Often these partners fail to meet banks' strict requirements. Mattila (2021) argued that often smaller fintech companies seem to be too small to meet the banks requirements while the bigger fintechs might be too expensive to collaborate with.

In Zachariadis & Ozcan (2017) study "*The API Economy and Digital Transformation in Financial Services: The Case of Open Banking*" they conducted extensive field research and interviews. The research was done from July 2016 to February 2017. The study aimed to examinate what are the relevant theories that are lifting new organizational structures and business models, and to identify what are the key challenges and opportunities that open APIs have in the banking sector in the UK and the EU. They found that banks are not the

only ones concerned about the changes open banking is bringing about. Fintechs were also worried about the complexity of the banks that causes slow working pace of banks and how concerned they are with security. Fintechs often have a try-and-error mindset, and they are used to be concerned with security gaps only afterwards. On contrary, banks want and need to ensure that their services and products are secure before launch.

The report from Infosys Finacle & Efma (2018) examinated a decade of banking innovation. 300 banks participated in this research which showed that the legacy systems were in top three barriers for innovations and digital transformation for banks. This has already caused actions within the banking industry and banks have increased their investments to upgrade or even replace these legacy systems.

2.2 Theoretical framework

2.2.1 Open Innovation Paradigm

The concept of open innovation was first introduced in 2003 and ever since it has become essential for today's innovation process discussion and research. Open innovation is a paradigm, and its key idea is that companies can and should use external ideas and actors in their innovation process (Bogers et al., 2019; Chesbrough, 2006). With open innovation processes companies can combine external ideas with internal ones to create architectures, platforms, and systems (Chesbrough, 2012). It has become a basic principle, that knowledge and information is generally spread widely. The Open Innovation paradigm takes advantage of this belief and assumes that internal ideas can be taken through external channels to markets to create even more value for the company (Chesbrough, 2006).

Open innovation as a concept has evolved a lot over time and has received many arguments that this alternative model is developing innovation capabilities, which is going to replace the old, traditional closed innovation model (Battisti et al., 2015). Companies have realized that knowledge is generally spread widely and there is a lot of potential when collaborating with external partners. Chesbrough (2006) describes this shift from a closed innovation model to an open model as an innovation paradigm.

Figure 3 represents the innovation process under a closed innovation model. The R stands for research and the D for development. In this model, the projects are launched from the company's science and technology base. Some of the projects will be cancelled during the process but some of the projects will continue for further development. From these projects, a subset will continue all the way to the market as new products or services. This model is called closed, since projects can only enter in one way, starting from a science and technology base and ending when entering the market (Chesbrough, 2006).

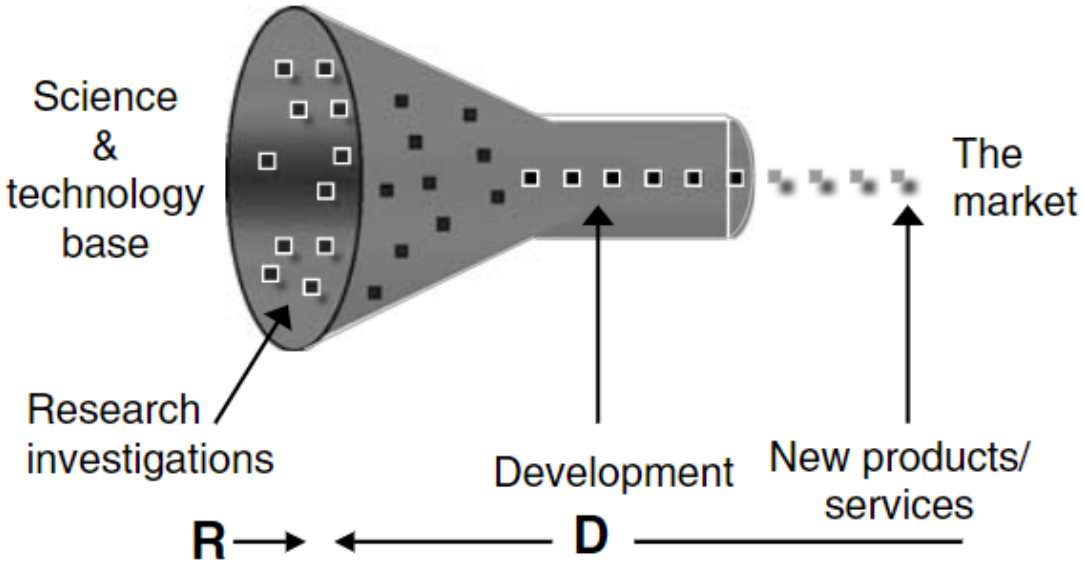

Figure 3. A closed innovation model. Adapted from (Chesbrough, 2006)

When using closed innovation and focusing only on internal knowledge and capabilities, companies might miss many good opportunities. However, studies have shown that open innovation offers increased innovation performance (Battisti et al., 2015). Figure 4 shows the innovation process of an open innovation model.

The process of this open innovation model is not linear where the knowledge is only coming from within the company (Fasnacht, 2018) but it rather suggests that R&D (Research and Development) is an open system (Chesbrough, 2006). With this model, the projects can be launched either from an internal technology base or from an external technology base. In addition to this, new technology can enter the process or go on the markets at any point. The model is seen as open since it combines internal ideas with innovations from other companies by opening organizational boundaries (Chesbrough, 2006; Fasnacht, 2018).

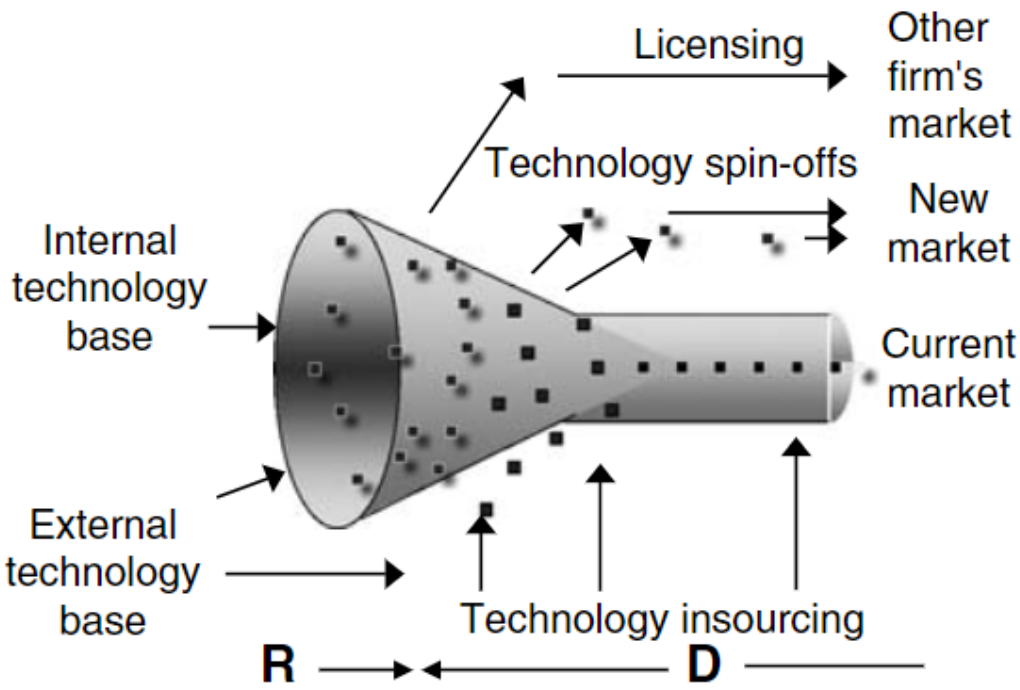

Figure 4. An open innovation paradigm. Adapted from (Chesbrough, 2006)

There are many ongoing debates about how companies should implement open innovation and how it is relevant to them (Trott, 2017). When implementing open innovation, companies have three options to choose from; inbound open innovation, outbound open innovation, or coupled open innovation (Bogers et al., 2019; Chesbrough & Bogers, 2014). These three processes are represented in Figure 5.

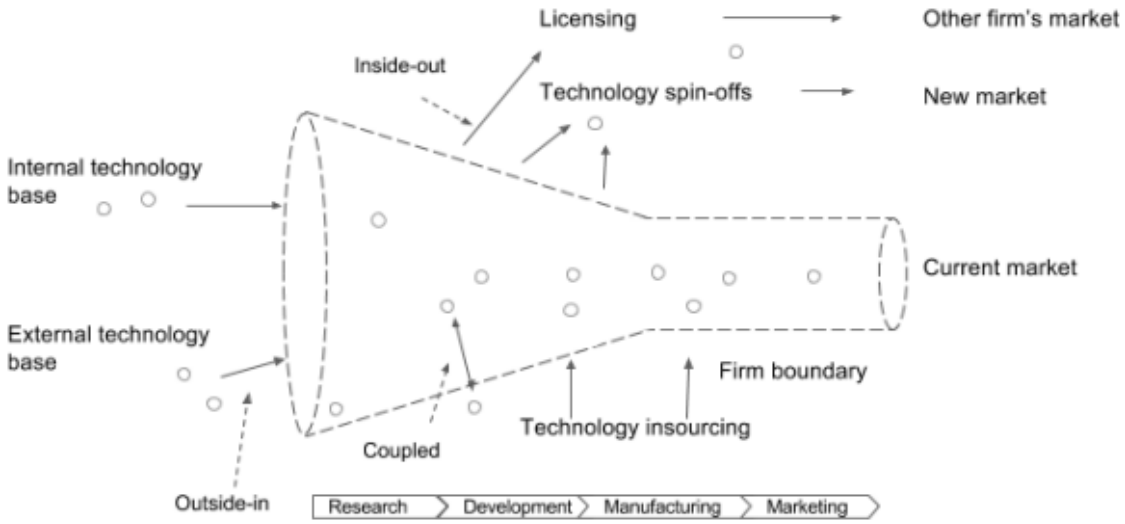

Figure 5. The open innovation process (Chesbrough & Bogers, 2014)

Inbound open innovation, also referred to as the Outside-In approach, suggests that a company does not just rely on their own research and ideas but rather collaborates with external sources (Bogers et al., 2019). This includes opening up the company's own innovation processes to external actors and their inputs

(Chesbrough & Bogers, 2014). Which of these inputs will be taken to the markets is up to the company's business model (Chesbrough & Bogers, 2014).

Outbound open innovation, or Inside-Out approach, a company lets others access their innovation and get revenue from it in return (Bogers et al., 2019). In other words, companies allow external actors to access their unused and under-utilized ideas to use them in their businesses (Chesbrough & Bogers, 2014). A good example of this type of approach is licensing.

Coupled open innovation is a combination of inbound and outbound open innovation processes. It implies combining knowledge inflows and outflows within the innovation process between its actors (Chesbrough & Bogers, 2014). These inflows and outflows of knowledge are combined to develop and/or commercialize an innovation (Chesbrough & Bogers, 2014; Fasnacht, 2018).

2.2.1.1 Open Innovation Ecosystem

Few studies have connected open banking to open innovation. Mattila (2021) found in his thesis that banks have already discovered the benefits different open innovation activities can offer, for example, using external knowledge to create new innovations. To take a little wider approach, looking into this topic using the open innovation ecosystem would be an interesting way to do so, since open banking can be treated as a financial ecosystem (Figure 6.) (Laplante & Kshetri, 2021).

"*The innovation ecosystem refers to various programs, projects and institutions that come together to deliver innovation*" (Sideways Thoughts, 2015). Open innovation is closely related to the financial ecosystem. It supports the convergence of finance and technology and nurtures the ecosystem (Fasnacht, 2018). The actors of the open innovation ecosystem in the banking industry include customers, start-ups, BigTechs, FinTechs, other banks etc.

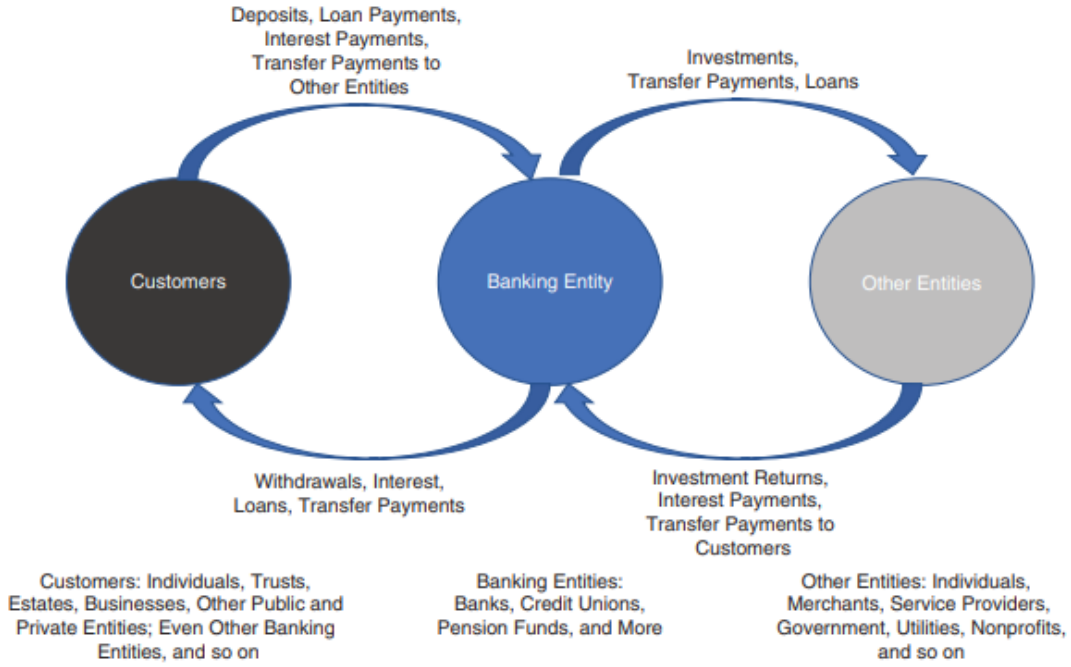

Figure 6. Typical interactions within the banking industry (Laplante & Kshetri, 2021)

More businesses are starting to be more like ecosystems. Innovation ecosystems are enhancing and changing the way we work, offering opportunities for incumbents to increase their effectiveness (Fasnacht, 2018). The open innovation ecosystem means that members open their boundaries, like platform and technology, to other actors in the ecosystem in order to create new innovations (Alam et al., 2022). This results in opportunities for fintechs to gain a more broad network of knowledge and information, which gives them a chance to create new business models, services, and products (Fasnacht, 2018). Heading towards being an ecosystem rather than a traditional bank, can result in a change in banking. Many roles can change or disappear completely, but also new roles will emerge that embrace technology, collaboration, and open innovation (Fasnacht, 2018).

3 Background

This chapter aims to create a background for this study. It is divided into two sections. The first section presents an overview of the banking industry in the Nordics. It is divided into two parts from which the first will focus on traditional banks, and the second on fintech companies. The second section will introduce the case company, Nordea Abp. It contains a brief elaboration of the current state of open banking and innovation in Nordea.

3.1 Overview to the Nordic retail banking industry

3.1.1 Traditional banks

Banks have a key role in the economy. Banks transfer risk, enable payments, and facilitates transactions by connecting savers and borrowers through a financial intermediation. Retail banking refers to the provision of banking services to consumers and companies (The Nordic Competition Authorities, 2006).

The Nordic retail banking market is being dominated by large domestic players (The Nordic Competition Authorities, 2006). The biggest banks in the Nordics are Nordea, SEB, DNB, and Danske Bank (Niemelä & Botnen, 2022). All the biggest banks in the Nordic countries are offering services that together define them as retail banks (The Nordic Competition Authorities, 2006). Additionally, to retail banking products, banks often have a large spectrum of other products, such as insurance, savings, and investment advice.

With continuous digitalization, banks have been moving away from traditional service channels towards self-service solutions (Deloitte & EVRY, 2014). The Nordic banks have been investing a lot of money in their business development and emphasizing innovation as a key aspect of improving their competitiveness (Niemelä & Botnen, 2022). Despite that going digital is still one of the top trends in the Nordic banking sector (Niemelä & Botnen, 2022), banks have to be able to move quicker with continuous disruption within the industry and new competition entering the markets (Deloitte & EVRY, 2014).

3.1.2 Fintech companies

As one of the biggest reasons for disruption in the banking industry are fintech companies (Accenture, n.d.). Fintech is an abbreviation of the words "financial technology", and it refers to the development of an IT-induced transformation (Puschmann, 2017). As an umbrella term, it also includes start-up companies that develop innovative financial IT solutions (Puschmann, 2017). Overall, this technological revolution is beneficial for the customers with an increased variety of products and services for them to choose from (King & Nesbitt, 2020).

Digital banking solutions have increased tremendously within the banking industry in Europe and Nordics during recent years. In fact, investment in fintechs has grown by 215% in Europe, Nordics being the second biggest area for investment activity (Accenture, n.d.). The number of fintechs is constantly growing in the Nordic markets and they are receiving substantial international attention underlining the strong value proposition of these companies (Accenture, n.d.). Nordics have tech-savvy and trusting consumers that are open to using rapidly deployed, highly agile, open finance fintech services, it is a perfect

environment for fintech companies (Cruickshank, 2021). However, fintechs are still willing to collaborate with banks. The main reasons for partnering up are ownership of customer channels and interactions, customer data, customer trust, and regulatory monitoring and reporting (Hannestad, n.d.). For now, collaboration is a beneficial option for both parties, incumbent companies and fintechs (Deloitte, 2017).

3.2 Case company – Nordea Abp

Nordea is the largest bank in the Nordics (Nordea Bank Abp, 2021a) having presence in 22 countries including home markets in the Nordics: Denmark, Finland, Norway, and Sweden (Nordea Bank Abp, 2021b). Nordea is also one of the ten largest financial operators in Europe in 2020 based on the market capitalization (Nordea Bank Abp, 2021b).

Nordea possesses a strong market position in their four business areas. These are

> **Personal Banking**, operating only in the Nordic markets, aims to create customer experiences to household customers including both physical and digital channels for everyday banking (Nordea Bank Abp, 2021b).
>
> **Business Banking**, operating only in the Nordic markets, offers advisory and banking services to small and medium-sized corporate customers, including payment and transaction services (Nordea Bank Abp, 2021b).
>
> **Large Corporates**, which include financial services to larger corporate and institutional customers (Nordea Bank Abp, 2021b). Operates in the Nordics, and in New York, London, Shanghai, and Singapore (Nordea Bank Abp, 2021b).
>
> **Institutions and Asset and Wealth Management**, which offers savings products through internal and partners' distribution channels, and offers advisory services to high-net-worth customers and investors (Nordea Bank Abp, 2021b). Additionally, to the Nordics, Institutions and Asset and Wealth Management operates in Austria, Chile, France, Germany, Italy, Luxembourg, Portugal, Singapore, Spain, Switzerland, the UK, and the US (Nordea Bank Abp, 2021b).

3.2.1 Open banking in Nordea

At the beginning of open banking era, financial companies had two options. To see these new changes and regulations as an opportunity or as a threat. Nordea chose the first option and wanted to collaborate with partners to offer new services for customers beyond their home region (Open Insights by Nordea, 2017a). The benefit of this choice included reduced costs for innovations and product development, and new revenue streams as well as business models that would benefit all parties of the ecosystem (Open Insights by Nordea, 2017b).

At the beginning of 2017 Nordea launched the Open Banking platform, which gave third parties access to their APIs and allowed them to interact with all business areas in Nordea (Open Insights by Nordea, 2017a). Within the first 72 hours, there were already 300 applications to access their APIs and start collaboration with them (Open Insights by Nordea, 2017a). In the end, Nordea received 700 applications from all over the world (Open Insights by Nordea, 2017a). In 2020, Nordea continued developing their Open

Banking platform further to ensure secure and safe access to third-parties for their customers' payment accounts (Nordea Bank Abp, 2021a).

The aim of the Open Banking platform was to find partners to co-create new products and solutions, like mutual funds and card solutions from the other side of the world, without having their own employees in those markets (Open Insights by Nordea, 2017a). The experience that banks have in compliance and regulation, and their customer base combined with creativity and agility of fintechs can lead to interesting and customer-satisfying outcomes (Open Insights by Nordea, 2017b). Through open banking, many new innovative services and products have been developed. These are at Nordea, for example, real-time account information, automated foreign exchange in different areas, and consumer finance services for their corporate consumers (Open Insights by Nordea, 2020).

Open banking in Nordea is organized in a "line organization" called Open Banking. Line organization is method to organize a company where the authority flows from top to bottom (Juneja, n.d.). This is most simplest and oldert method to use in administrative organizations (Juneja, n.d.). Line organization in Nordea includes three teams; Open Banking Platform, Open Banking Solutions, and Open Banking Community. These teams have Nordic responsibilities, meaning that there are no country-specific teams.

3.2.1.1 Premium APIs

APIs in Nordea can be divided into two groups: compliance APIs and Premium APIs. Compliance APIs make sure that Nordea is PSD2 compliant and are required from every bank. These APIs are created more through collaboration with fintechs and other external software developers (Nordea Bank Abp, 2017).

Premium APIs are products and services that allow Nordea to move beyond PSD2 compliance. These are offered to corporate customers to enhance their customer experience and are mostly made completely in-house. Offering different premium APIs, Nordea has headed towards embedded finance. Nordea defines embedded finance as "*financial services that make up part of an offering from a non-financial service provider, but are provided in the background by a bank or another kind of financial service provider*" (Nordea, 2021b). With embedded finance, the user can, instead of connecting with Nordea, access the service directly on their own system or process.

There are already a few examples of these kinds of new business opportunities. The case of Wärtsilä is one of these. In this case, Nordea created an API based on feedback from Wärtsilä. This API-based solution is called '*Beneficiary Account Validation*' and it provides a quick way for companies to "*validate the bank account information of their international suppliers before changing payment instructions or adding a new supplier*" (Open Insights by Nordea, 2021). Through this embedded API, companies do not have to contact Nordea to check the reliability of bank account information, instead, they are able to do it directly in their own system. This collaboration produced a great way of reducing the risk of fraud and increasing the security of companies (Open Insights by Nordea, 2021).

3.2.2 Innovation in Nordea

To take full advantage of open banking, Nordea has multiple innovation initiatives ongoing. However, they do not have dedicated department for innovations, rather than the function is distributed throughout the organization. To gain an idea about how innovation processes

and initiatives are organized, Figure 7 below will elaborate on it. Later, they will be presented in more detail.

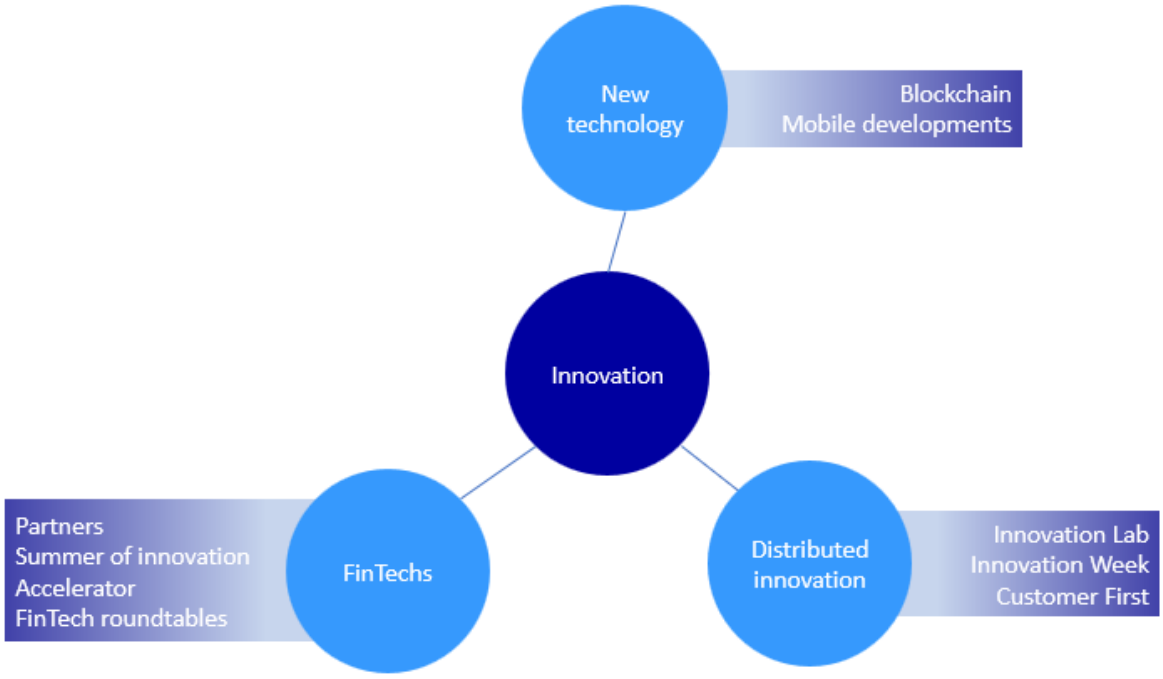

Figure 7. Innovation at Nordea (Nordea, 2021a)

First innovation channel is "*new technology*". For this, Nordea uses blockchain and mobile development. Blockchain is still in the early stages of development, but the aim is to develop blockchain in collaboration with others with multiple ongoing initiatives (Nordea, 2021a). Mobile developments include digital authentication application (Bank-ID and Nordea Codes), real-time payment solutions (Swish), and mobile payments (Nordea Pay) (Nordea, 2021a).

Second main group for innovation initiatives is "*distributed innovation*". This includes innovation lab, innovation week, and customer first. With all these initiatives, the goal is to find and develop some new solutions through collaborations (Nordea, 2021a). innovation lab collaborates with customers, innovation week aims to create a common vision of future customer behaviour and enable corporate solutions in a sustainable way, and lastly, customer first, which aims to create new innovative approaches to old challenges by having the customer at the centre of their thinking (Nordea, 2021a).

The first two initiatives are focusing more on internal innovativeness or collaborating with customers and hearing their voice. The last initiative is "*fintechs*", which brings third parties into the equation, which is very important from the open banking perspective. Nordea has four different approaches for collaborating with fintechs to create new innovations. They are partners, summer of innovation, accelerator, and fintech roundtables. By partnering up, Nordea wants to get rid of the traditional approach of developing big projects, slow time to markets, and delivery risk (Nordea, 2021a). Instead, they aim to have a collaborative approach which includes leveraging the core banking platform, introducing new solutions to go fast to markets, and opening the bank to third-party developers (Nordea, 2021a). This also includes the Open Banking platform.

Summer of innovation is targeted at students, that form a group of five to solve six different cases and create a tested prototype for each case (Nordea, 2021a). The aim is to get instant customer feedback through rapid prototyping, which would accelerate product and service design (Nordea, 2021a). With start-up accelerator Nordea wants to reach start-ups with a 12-week Nordic program (Nordea, 2021a). It includes tight collaboration, and the goal is to find opportunities for new radical business innovations, identifying potential corporate innovation partners, and stimulate the growth of an innovative culture in Nordea. Lastly, there are fintech roundtables, which bring together Nordea's management and 8-10 fintech companies as equals, to discuss market trends and different collaboration structures (Nordea, 2021a).

4 Methodology

This section aims to provide an overview of the chosen methodological approach and research method. This chapter is divided into four parts. The first part describes the research design. In the second part, the author explains how the data collection was conducted and introduces respondents from the interviews. This will be followed by the part which introduces the data analysis process. The section ends with the chapter that evaluates the validity and reliability of the research.

4.1 Research Design

According to Saunders, Lewis, P., & Thornhill, A. (2016) a research design is the general plan of how to answer the research question. It includes specified sources for data collection, how data collection will be done and analysed, and discusses constraints such as time, location, and access to data, related to research (Saunders et al., 2016). For this study, a qualitative research design was selected. A qualitative method is suitable when the goal is to make sense of the subjective meanings expressed about the phenomenon being studied (Saunders et al., 2016).

To demonstrate the chosen research design, the research onion is used and presented in Figure 8.

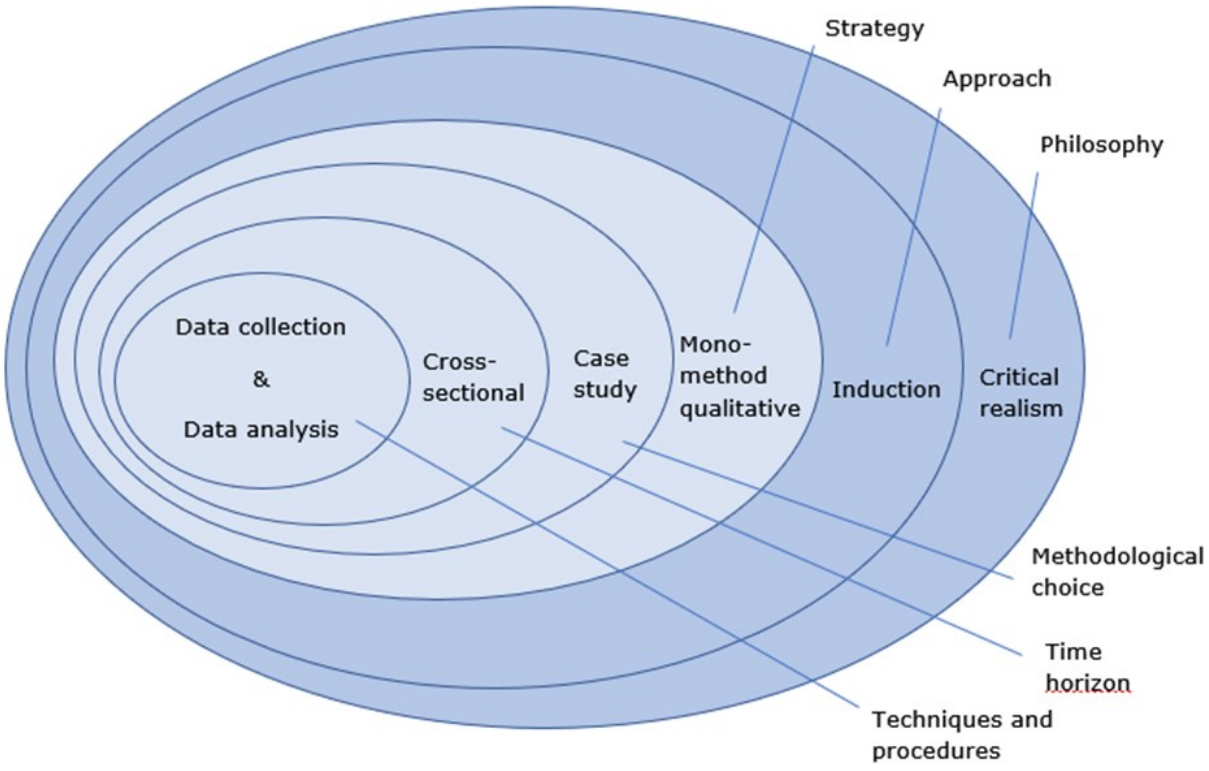

Figure 8. The research onion. Adapted from (Saunders et al., 2016)

4.1.1 Philosophical position

The philosophy of this study is critical realism. It has originally emerged as a critique within the philosophy of science of the dominant empiricist account (Zsolnai & Thompson, 2020). By philosophical standards, critical realism is relatively new approach to ontological, axiological, and epistemological issues (Easton, 2010).

According to critical realists, we should not only see a small part of something but rather focus on a bigger picture (Saunders et al., 2016). One important part of critical realism, that will also be considered as a Nordea employee, is to be aware that our sociocultural background and experiences can have an impact on the research, but the aim is to minimize such biases and try to be objective (Saunders et al., 2016).

4.1.2 Research approach

Case studies often might use both deductive and inductive approaches for data collection. Deduction helps researchers "*to identify the phenomenon of interest, suggests what mechanism may be at play, and provide links with previous research and literature*" (Easton, 2010, p.124). With induction approach, data collection is used to explore a phenomenon to create a conceptual framework and to identify themes (Saunders et al., 2016).

In this study, the inductive approach was chosen with an explanatory nature. Explanatory research is mostly used to gain insights about the topic of interest and the problem statement usually starts with "what" or "how" (Saunders et al., 2016). Explanatory study is very useful when wanting to clarify the understanding of a problem or phenomenon (Saunders et al., 2016).

4.1.3 Research strategy and time horizon

Study is a mono method qualitative study and uses semi-structured interviews as a data collection technique. As a research strategy for this thesis, the case study was chosen. Case studies contribute to our knowledge, for example, of individuals, groups, and organizations, with the focus on phenomena within the context of real-life, or if the research question requires more in-depth description of some social phenomenon (Brewerton & Millward, 2001; Yin, 2009).

Since the data collection will be done over a short period of time given to write a thesis, the time horizon will be cross-sectional. The definition of cross-sectional study includes that the focus for a study will be on a certain time on certain phenomena (Brewerton & Millward, 2001; Saunders et al., 2016). With this thesis, the focus will be on open banking in Nordea and its barriers.

4.2 Data collection

The data collection was done through semi-structured interviews conducted online. The sample includes bank specialists from Denmark, Finland, and Sweden, that are working with open banking at Nordea. To validate the interviews and clarify findings, triangulation of data was used. It is a process of using multiple perspectives to refine and clarify the findings of the research, i.e. the interviews are used to cross-check information (Eriksson

& Kovalainen, 2008). For this reason, the goal was to get at least six interviews, which was accomplished.

Semi-structured interviews include some key questions, still allowing additional follow-up questions or conversation (Saunders et al., 2016). This helps to receive in-depth answers from respondents and get their experiences and reflections about possible technical and organizational barriers to open banking.

The interviews were, due to the Covid-19 situation and the fact that respondents were located in different countries, conducted through Microsoft Teams meetings. The interview guide (Appendix A) was sent to the first respondent (I1) to get feedback. However, it did not lead to adjustments in questions. Interviews lasted 25-55 minutes per interview, and they were recorded with the consent of the respondents. Later, interviews were transcribed manually based on the recordings using intelligent verbatim transcription guidelines.

The interviews were conducted in English and Finnish. Having interviews in a proficient language for both parties, the author and the respondent, adds to the reliability of this study. The purpose of the study was explained to the respondents beforehand through email, and at the beginning of the interview, respondents had the opportunity to ask questions. Interviews followed the interview guide, but some questions might have been left out if the respondent had already answered them. Also, additional questions were asked if the author saw a need for it. The interview guide can be found in Appendix A: Interview Guide. The interview guide was built to gain some insight of the background of the respondent and the Open Banking department of Nordea, the current state of open banking at Nordea, the innovation process, collaborations with TPPs, and future insights of open banking.

4.2.1 Respondents

All the respondents had between 6 months to 5 years working experience with APIs and open banking-related tasks at Nordea. Three of the respondents are currently working in a position that is more technically orientated. Short descriptions of the respondents are presented in Table 1 below.

Tag	Position in "line organization"	Responsibilities
I1	Open Banking Solutions	Looking after the provider side of the APIs in Nordea and in the Open Banking platform. Enable different units in Nordea to use the Open Banking platform and publish their products, features, and services as open APIs.
I2	Open Banking Solutions	Working with corporate APIs with the focus on payments on premium and compliance perspectives.
I3	Working outside of Open Banking "line organization"	Head of software development team in Nordea. Working with foreign exchange, where the customers can either exchange currency, get prices or trades, or any other related information through APIs.

I4	Open Banking Platform	Product Owner of the API management platform. Exposing compliance APIs to external TPPs.
I5	Open Banking Platform	Working as a Scrum Master (facilitator of scrum, which is a software development method (Rehkopf, n.d.). Scrum Masters act as couches to the rest of the team.) Responsibilities include everything that is related to the work of the team that is handling the Open Banking platform, such as making sure that the team is feeling well and the work is done.
I6	Working outside of Open Banking "line organization"	Developing premium APIs for corporate customers.

Table 1. Interview respondents

4.3 Data analysis

Qualitative data is often subjective and socially constructed. To understand and analyze this kind of data, it is highly dependent on people's interpretation (Saunders et al., 2016). To describe the complexity of this process, Saunders et al (2016) compares it with a jigsaw puzzle. Like a jigsaw, the pieces of data and relationships between them help researchers to create a bigger picture and see what it is telling (Saunders et al., 2016).

To group these pieces of information, thematic analysis is quite common. It can be described as a foundational method for qualitative data (Saunders et al., 2016). Thematic analysis involves researchers coding their findings in order to find themes and patterns within the data (Saunders et al., 2016). This way, the data will be grouped in a more compact and meaningful way to allow a more deep understanding of the topic (Walliman, 2006).

For the data analysis, MaxQDA software was used. The process started by categorizing and summarizing answers into meaningful themes. These themes emerged from the theoretical framework and were guided by the goals and research questions of this study. By grouping the data, the bigger picture became clearer, and it advanced the analysis process.

4.4 Research quality

In this chapter the validity and reliability of this study will be discussed. Validity refers to "*the appropriateness of the measures used, accuracy of the analysis of the results, and generalisability of the findings*" (Saunders et al., 2016, p.202). This is related to which extent the researcher has managed to gain access to a respondent's experience and knowledge. Along semi-structured interviews, the scope to explore meanings can help to enhance the validity of data (Saunders et al., 2016).

However, this can be affected by cultural differences and forms of bias. People from different cultures might interpret and describe situations differently. Luckily, this concern is quite small in this study, since all the respondents and the author are from similar

cultures within the Nordics. Also, to ensure a certain level of validity, the author used clarifying questions and follow-up questions when the respondents did not understand something.

Reliability refers to consistency and replication (Saunders et al., 2016). Often, the lack of standardization in semi-structured interviews can raise concerns about reliability. The concerns are based on whether the results would be the same if some other researcher would investigate the same topic (Saunders et al., 2016). However, since this study is a cross-sectional case study done at a set point in time, it is not meant to be repeated. Also, everyone has their own unique experiences and perceptions which cannot be generalized to a wider extent.

To ensure the quality of this study, a continuous process of crosschecking and triangulation of the data was performed. The interviews were compared with each other and with the existing literature to ensure that they are valid explanations and that there are no inconsistencies. This type of comparison between established theory and new findings contribute to substantiate this research and increase the generalizability of the results.

5 Results and discussion

In this section the results are presented and discussed based on the specific themes that were found through the analysis of collected data. This research identified nine different themes that were grouped under two categories, technical and organizational barriers. These are presented in Table 2 with the tags of respondents next to each theme, if they mentioned or talked about it in their interview.

Possible Barriers	**Theme**	**Respondents**
Technical	Technical requirements	I3, I4, I5, I6
	Old systems	I2, I4, I5
	Communication of technical requirements and troubleshooting	I4, I5
Organizational	Organizational complexity	I1, I2, I3, I6
	Compliance with regulation	I1, I2
	Knowledge of the service/product	I1, I3
	Communication between stakeholders	I4, I5
	Resources	I3, I5
	Trust between partners	I3

Table 2. Main themes

The discussion will be anchored to the theoretical framework that has been presented earlier. This chapter is divided into three main parts: technical barriers, organizational barriers, and additional findings. First two parts provide a more detailed overview of the themes within these two parts with citations from the respondents. Different themes came up during the interviews depending on the respondents' background and current position. Others were more focused on organizational issues and others on technical barriers.

5.1 Technical barriers

5.1.1 Technical requirements

As a main concern from the technical barriers most frequently mentioned was "*technical requirements*". This was brought up by four respondents that included all three persons working in more technical execution positions. With technical requirements the respondents referred that when collaborating with TPPs, their solutions have to be as good as other solutions that Nordea is offering. All the services and products that Nordea is offering must be equally good or otherwise this can cause some troubles with financial regulators, such as the Finnish Financial Supervisory Authority. Also, the lack of standardization was seen as an issue. Without standardizing the APIs, banks and TPPs have to create completely their own solutions and interpret the requirements from the regulators, which causes irregular outcomes and more work, if those solutions have to be refined or in the worst case redone.

Requirements for new solutions affect both parties, Nordea and fintechs. As a type of Outside-In approach, Nordea's Open Banking platform has created a good space to meet third parties and engage with them. With this approach, Nordea can determine which external contributions they will proceed with (Chesbrough & Bogers, 2014). However, it can be difficult to find a suitable partner for collaboration that would fulfil the technical requirements needed:

> *"I would say that the partners need to have plenty of very good characteristics in order to be reliable partners. Their technical solution must be good enough, the user experience provided must be good enough […]."* (I3)

For both parties, it is important to find a partner that can collaborate and work according to the same standards. Finding a partner, who can meet the requirements set by the bank can be a struggle. Fintechs are not used to work with such a wide variety of regulations. To fulfil compliance requirements, banks offer their guidance and support to fintechs, but this can be very time-consuming and expensive for banks. The same challenges were found by Mattila (2021) in his research. According to his findings, banks should not collaborate with too small fintechs since they tend to struggle too much with being compliant with all the regulations (Mattila, 2021).

On contrast, banks also must be able to make sure that all their own solutions are equally good enough within the bank. Some programs have been developed over the years and even decades:

> *"[…] we are obligated to have as good uptime or as good service as we have in all other online channels in the bank. Meaning that it is our net bank, that is our corporate net bank, it is all our online platforms. If just one of these platforms is performing better than our open banking platform is, then we could be in trouble with the financial institutes. […] we need to ensure that this new platform performs at least as well as the legacy systems that we have in the bank. Many of these systems were built about 30 years ago or have evolved in the last 30 years. So, coming in and trying to do a similar service within maybe a few months, it always has to have some technical issues."* (I4)

This causes pressure when developing new products or services since they have to be on the same technical level as existing ones. Rooted in compliance requirements coming from law, this can also create barriers to technical requirements such as the requirement to create a product/service that offers a good customer experience. Filling all the compliance requirements, the bank and developers must keep in mind to ensure that customer has a good usability and experience.

However, increased standardization could be seen as a solution for all barriers related to technical requirements:

> *"The other thing is standardized open banking, as they did in the UK, where everyone did not come up with their own solution. […] That would obviously take this whole thing forward more steadily and maybe even faster. That would eliminate this slow and stiff conversation between legislators, and the need of every bank to make their own solutions which might not please someone."* (I5)

This way financial institutions would not have to invent solutions by themselves, which could make open banking-related products and services more in line and compatible with each other. The lack of standardization as a barrier was also found by Farrow (2020). His findings pointed out that the lack of single unified API standards is one reason for the remaining barriers to open banking in the EU (Farrow, 2020).

5.1.2 Old systems

"*Old systems*" was mentioned by half of the respondents as a possible barrier. They specifically referred to the legacy systems working in the background that has been developed over the decades. The challenges that these old systems have, are related to how compatible they are with other systems and APIs, and their effectiveness, meaning how fast the legacy systems work and how much pressure they can handle from multiple other systems and APIs.

Being created over decades, adapting legacy systems to new technologies, such as APIs, is adding barriers and extra work for developers:

> *"A lot of the data that we want to provide to our customers, a lot of the sales material, a lot of our customer data, it is running in our, you can say legacy systems, […] that are not easy to share with other teams with other areas of the bank. […] Not all these systems can talk to each other."* (I4)

> *"First of all, there is an incompatibility between old and new technology, or they are difficult to reconcile. However, it does not matter if it is related to open banking or some other new technology. When two centuries of technology meet and trying to integrate them together, it may not be pretty or easy."* (I5)

APIs offer many opportunities to gain faster services and flow of information, but the legacy systems that were created years ago are setting limits to it. It is not easy to combine new and old technology. The same challenges were also found by Kokkinis & Miglionico (2020), who discussed how legacy systems are creating constraints to new innovations in the financial industry. Kokkinis & Miglionico (2020) found that the old legacy systems are harming the data strategy and slowing the information flow. This also raises concerns concerning the effectiveness of these old legacy systems when developing new open banking solutions:

> *"But we still are dependent on the legacy systems. We are not able to be faster than our legacy systems."* (I2)

In the report conducted by Infosys Finacle & Efma (2018) the legacy systems were identified as the third biggest barrier for innovations and digital transformation for banks. The legacy systems can be stiff but on the other hand they are secure. To overcome these restrictions that legacy systems cause to data access and information flow, it would require an upgrade or even replacement of old systems (Infosys Finacle & Efma, 2018; Kokkinis & Miglionico, 2020). Many banks are already putting more effort to face these challenges by investing heavily in technology modernisation (Infosys Finacle & Efma, 2018). However, this is a very costly investment and a large upgrade affecting the whole organization, which is also discouraged by the short-term profitability (Kokkinis & Miglionico, 2020).

5.1.3 Communication of technical requirements and troubleshooting

Some respondents also felt that "*communication of technical requirements and troubleshooting*" can cause barriers. The communication between banks and TPPs has been perceived as challenging, leaving a lot up for interpretation. For example, troubleshooting and the communication of technical issues have been problematic. This is due to the difference in systems and language used within companies.

In fact, there are several layers of translation, where first a fintech company has to interpret some vague instruction and translate it into a specific process. Often, a bank has to take that translation into consideration and ensure that they understand it, agree with it and can implement it with the constraints of their systems. The translation is on multiple levels – at the level of actual words (what does this piece of regulation mean?) to the technical language used by different IT specialists working for different entities:

> *"[…] a lot of the requirements set from the third parties or the fintech areas are based on some kind of vague instructions from the financial institutes or the ECB (European Central Bank), because it is seldom very technically defined. So, what are the real requirements? It is up for interpretation. […] That sometimes can be a little tricky when we are designing the processes, our technologies, and we are doing it based on what we guess is the real requirement. Sometimes we need to change, sometimes we can simply just adopt our way of thinking."* (I4)

> *"Also, despite that, both parties are working with IT, we still might not talk the same language. […] Like with all communication between humans, it is always not easy to understand, especially in IT. When something is not working, how you would know where it is when both are representing different organizations and cannot see each other's systems. Troubleshooting can be very difficult."* (I5)

There are many factors to be considered and often, for example, troubleshooting is not easy without seeing what the other party is seeing and struggling with. Technical requirements are usually closely tied to regulations and come from a higher party that has not set those requirements in a very technical way. This leaves a lot to interpret, and people can understand these requirements differ depending on whether they are working in sales or IT. Additionally, the working cultures tend to shape how different people perceive and interpret things. Prior research done to examinate openness of public governments in smart cities and the removal of barriers to innovation and entrepreneurship have found that different work cultures can also cause conflicts between participants (Ferraris et al., 2020). However, previous studies done within the open banking field have not identified these barriers.

5.2 Organizational barriers

5.2.1 Organizational complexity

From the perspective of organizational barriers, the most mentioned barrier by the respondents was "*organizational complexity*". This theme was mentioned by the respondents working a little further away from technical execution tasks. Respondents felt that there was a substantial difference between fintechs and banks in terms of the working pace.

Perceived as slow and heavily regulated, banks are perceived as not as agile as small fintech companies are. This is in turn due to greater requirements and regulations imposed on banks that make it difficult for them to match the pace of small and more flexible fintech companies. To ensure the security of their products and services, banks must go through many control mechanisms and procedures:

> "*I think that the large incumbents have been to a big extent trying to partner with these very small fintechs and should probably be more selective in the future […]. As large banks we are agile, we're trying to move, but we are not and will never be as small and nimble as a small start-up. […] We have a lot of different processes that […] are perceived to be quite heavy, and there are a lot of control mechanisms here, and we should have that because we're a bank.*" (I1)

> "*We have a lot of people, and we are not so fast in adapting and changing. We should spend a lot of time on communicating the change, outlining that not on the country level, but on all four country levels. […] When we are talking about lead time to the product and delivery, it's longer compared to a fintech company. […] fintech companies or third parties are very often driven by venture capital. They have requirements to be faster and deliver in half of a year something.*" (I2)

Nordea, as a big company, has multiple departments and operates in several countries. It thus has a quite complex organizational structure. When implementing new changes, it is not only about introducing them in one country, but also in all countries where Nordea is present. This requires time and resources. Operating in Norway presents an especially challenging case as Norway is not part of the EU and thus has slightly different regulations for financial institutions than other countries where Nordea is present.

Fintechs are operating on a completely different level of complexity than big banks. Being small and agile, they do not have to worry about risk frameworks and communication across departments and countries. However, they are often driven by venture capitalists, who impose certain time constraints on them. For instance, fintechs might have expected to show results within a six-month frame. This time constraint may not match the pace of banks which may be less agile and are burdened with greater reporting requirements, but which do not face any time constraints. Also, Mattila (2021) identified similar challenges during his research on open innovation opportunities of open banking and APIs in the Finnish banking industry. He found that banks struggled to find good partners to collaborate with since banks are heavily regulated and fintechs are more agile. Finding a suitable partner was also a challenge since if the fintech is too small, it might not be able to reach standards set by the law and the bank, and if the fintech is too big, collaboration might end up being too expensive to be worth it (Mattila, 2021).

The most time-consuming part for banks when developing a new product or service, is all the surrounding processes, such as different risk frameworks and heavy contracting proceedings. All these processes are increasing organizational complexity:

> "*Then on top of that, the agreement negotiations with all the kind of legal details, ID security details, they tend to be quite heavy and that leads to the last point, which is that you need to be able to trust a partner.*" (I3)

> "*What I have been developing APIs, in the end, the coding and the technological part is a relatively small piece of it. More work requires how we can make the*

surrounding processes work. How we will manage contracts, what kind of contract do we need, how we process that contract in our customer service organization, how on onboard the customer, how we manage the certificates, how we create the connection between us and a customer, and if a customer has some problems, how we will organize the support system. So, these surrounding processes have required a lot of effort and still do." (I6)

Operating in a heavily regulated industry, banks are more likely to increase their control systems and frameworks to ensure that everything is going the way it should without any unnecessary risks. Having multiple control systems increases organizational complexity (Richardson, 2005). Big banks that have a heavy contracting process and on top of that must fill different control systems and risk frameworks, are not able to keep up with small fintechs.

As a solution for organizational complexity, Fasnacht (2018) argues that bringing the legislators closer to financial innovations within the open innovation ecosystem could be beneficial. This way legislators could be easier aligned with the procedures allowing them to quickly balance between openness of solutions and the privacy of individuals (Fasnacht, 2018).

5.2.2 Compliance with regulations

Another regulation-related barrier is "*compliance with regulations*". To ensure compliance and security of their products and services, banks must create and maintain different processes. While verifying compliance is prolonging banks' time to market, it is also creating barriers when collaborating with TPPs:

"[…] there is a huge gap in the perspective of when you were a large bank towards when you are a perhaps say VC (venture capital) driven start-up with a very "test and fail" and "lets pivot to something else" like a mentality, where the bank is all about compliance, brand, and risk minimization." (I1)

"When we are talking about collaboration with the third parties, we have a different level of their regulatory requirements. That is when we as a bank are strictly regulated to provide services to our customers. […] The processes and aligning on our side take longer, and we have reasons for that. We are strictly regulated, and the level of regulation is not comparable. […] From the obstacle perspective, it is that they are faster, and we have a longer time to market, and we are more regulated." (I2)

The challenges are highlighted when collaborating with third parties, such as fintechs. The problems are similar when talking about organizational complexity. However, this barrier has also been worrying fintechs. Zachariadis & Ozcan (2017) found that fintechs were concerned about working with the banks when it comes to speed versus security. Fintechs have a more trial-and-error approach and banks are concerned with ensuring the security of all their services and products before the launch (Zachariadis & Ozcan, 2017).

The trial-and-error approach is something that banks cannot afford. They must be compliant and fulfil all the regulatory requirements. Otherwise, they can end up having trouble with financial supervisory authorities. Third parties are not subject to the same set of requirements and thus often do not have experience with these regulations. This puts barriers to collaborations between banks and third parties since it is not easy to find a

common ground between time-to-market and compliance with the regulation. Inevitably this will have an impact on the speed with which fintech-bank collaborations can move forward.

5.2.3 Communication with stakeholders

The respondents that work more closely with technical execution, brought up "*communication between stakeholders*" as a barrier. Respondents felt that communication between the bank and stakeholders, such as customers and regulators, can be challenging. The distance between developers and customers, and stiff and slow conversation with legislators were seen as problematic.

When working in the IT department the distance to customers can be far. Customers might not define what they want in a technical way, which leaves a lot for developers to interpret:

> "*First thing is that it depends on where you are in Nordea, how hidden away you are from the customer exposure. I mean, sitting in the technology area, limits the way of communicating with the customers, for natural reasons. […] The distance can sometimes be quite far. So, for us to fully understand what is it that the customer wanted, the fintech area wants, it needs some kind of mediators in between the ones that actually are contacting fintech areas and the ones that are setting the requirements to the technology area.*" (I4)

Having the mediators in the middle handling the communication with customers can lead to miscommunication, and some of the information can be lost in between. Also, if those mediators are not used to working with software, they might not know or realize to ask about the technical requirements the customer wants. Later this can require developers to fix and change something with the outcome or that communication must go back and forth to clarify the requirements.

The challenging conversation was also experienced with legislators. This was seen as a very heavy and lengthy process that puts difficulties in developing IT services/products:

> "*Firstly, always when working in an environment which is strictly regulated, legislators rarely give specific descriptions of what they actually mean and want. When they say that they want something, and we try to interpret that, we often must go back and ask what they mean by this and that. It is difficult to get answers to these questions since often they do not know what they actually want. […] Also, the communication with these kinds of legislators is very stiff. We are sending formal letters back and forth. Building IT services with this kind of limitation is more demanding. We can easily interpret something wrong, and then we must make expensive corrections or refactoring.*" (I5)

The communication between banks and regulators has been perceived as stiff and challenging leaving a lot for interpretation. When interpreting messages from stakeholders, it has a different if one is working in IT, sales, or legal services. These long and stiff back and forth conversations can create barriers to the development of open banking products by delaying the process and further extending the time to market.

Some literature, like research conducted by Vrgovic et al (2012) to study open innovation for SMEs in developing countries, has identified barriers to innovation when communicating

with partners and other stakeholders. However, this did not come up as a barrier during this study or in other studies related to open banking. Especially communication between banks and the regulators has not been mentioned in prior research.

5.2.4 Knowledge of the service/product

One other possible barrier that came up is "*knowledge of the service/product*". Respondents were concerned that the lack of knowledge might lead to difficulties when selling the service/product to consumers:

> "*I mean obviously one obstacle is that this is new in relative terms and to some extent technical. If you have been used to selling consumer cards (credit/debit payment cards) for 20 years, I guess there is an obstacle if you want to be able to talk about API's from now on. […] I mean if we are doing another new product, that is something that is new, it takes time too to master knowledge to be able to talk about this broader.*" (I1)

> "*Then also it is challenging to start commercializing the APIs because the salespeople in Nordea and other banks, they are not very used to selling software solutions that actually the APIs also are.*" (I3)

When commercializing the APIs, it can be difficult for employees in sales to suddenly start to speak about software, which is more complex to explain and sell. In open innovation ecosystem, the ability to network is an important skill to spread information and accumulate knowledge (Fasnacht, 2018). It might be beneficial to the sales department to be in more contact with the Open Banking department within Nordea. The frequent contact between teams and departments within the network forms a bond that allows them more easily and accurately to diffuse information and knowledge (Fasnacht, 2018).

The previous literature has not recognized the lack of knowledge within the organization as a barrier, unlike found in this study. Lack of knowledge was found by Nyström (2020) in her thesis. However, her findings referred to it within consumers and identified the need to educate consumers more about open banking.

5.2.5 Resources

"*Resources*" were also considered as a barrier to API development. More specifically, the lack of programmers and internal resources were mentioned as a challenge by two of the respondents.

In general, the lack of programmers in the Nordics is a big issue:

> *"[…] it always takes resources to build APIs and usually, the resources you need the most are programmers. Programmers are very short in supply in the Nordics, which means that there is quite a limited scope of APIs that we are able to build."* (I3)

According to a report from Manpower Group (2020), the shortages of experts are increasing all over the world, with the greatest year-over-year increases in Finland, Hungary, Slovenia, Sweden, and the United States. However, this barrier is something that Nordea cannot really influence.

The limited number of internal resources can inevitably lead to competition between teams and departments within an organization:

> *"Within the bank there might be teams with different priorities, and we need the same resources and databases. For example, customers are using online banks that use the same resources within the bank as open banking APIs. That might lead to some kind of competition. How the systems are able to receive all that load that is coming from all these different systems. When APIs started to use batch request mechanisms, no one thought about how that might affect to the performance of these old background systems, so they would not choke when they get bombarded by multiple systems. Basically, we are competing from the same system resources."* (I5)

The performance of old legacy systems is limited compared to the demand that is coming from systems, like APIs, that need customer data or other information. In worst cases, this can lead to internal competition, which can clash with organizational priorities. If the teams are not aligned properly with a clear strategy, it can create competition for resources, and in the worst-case makes the teams and departments work against each other (Pisano, 2015).

According to the interviews conducted, seems that Nordea does not have a specific innovation strategy. The respondents feel that open banking is a very important part of Nordea's innovation strategy and for sure it is one of the focus points. The lack of a clear and well-communicated innovation process also concurs to some extent as a barrier with previously made research on how Nordea can become a leading player in the open banking era through the use of open innovation by Kvist, H. & Monkvik, M.T. (2018).

Ultimately, the lack of a clear innovation strategy can cause different parts of the company to end up of pursuing conflicting priorities (Pisano, 2015). With a good strategy companies can clarify objectives, promote alignment within different teams, and help focus efforts around goals (Pisano, 2015). This way, the competition could be avoided, and Nordea could ensure resources to departments, that are ranked high in their priorities.

However, since the beginning of open banking, it seems that Nordea has changed its focus towards more innovation, collaborations, and partnerships. The change is also partly caused by the need of the customers. They are now more aware than ever of APIs, and they are also expecting more innovative and secure solutions from banks. Taking this into consideration, it can be argued that Nordea actually has at least an innovation strategy at some level. Pisano (2015) argues that in the end, the strategy is where the money, time, and effort are spent.

5.2.6 Trust between partners

The last possible barrier found in this study is "*trust between partners*". Only one respondent mentioned the trust issue that could be found between the bank and TPPs.

Ultimately, the lack of trust between partners can lead to heavier contract negotiations. Both parties want to ensure their position and right during collaboration:

> "*If you do not trust the partner, even the best and heaviest agreement package can do very limited help to you. But if you are able to trust your partner and what they say really holds, then actually the agreements would not maybe even be needed. It is*

more or less just about agreeing with them, with very little changes, and first, we need to have an agreement as a backstop." (I3)

The respondent mentioned that the lack of trust can prolong the contracting process since it must be covering all the steps. Farrow (2020) pointed out similar issues within the ecosystem. Since TPPs do not have to be regulated, it is necessary to implement a trust model to help identify business partners that fulfil banks' requirements (Farrow, 2020).

Fasnacht (2018) argues that to achieve a successful innovation ecosystem, a company needs to have open communication and great transparency. These actions can potentially increase trust when both parties are working openly and have effective communication between them.

5.3 Additional findings

Unlike the previous research, such as Kokkinis & Miglionico (2020) and Mattila (2021), respondents did not see any barriers coming from attitudes, culture, or governance of the company. On the contrary, they felt that the attitudes towards open banking might have been previously more skeptical, but now they have improved a lot and are overall positive. The employees felt that the shift in attitudes could be a result of moving more towards premium APIs and focusing more on the revenue side and collaborations with TPPs.

Additionally, this study did not raise any concerns that fintechs would overtake the market from banks which have been the case in some of the prior research, such as Mattila (2021). On contrary, respondents felt that in the future collaboration is the key to the future of the banking industry, and it will be increasing tremendously.

6 Implications and Conclusions

This chapter provides a conclusion for this research. In addition, the chapter recognizes the limitations of the study and offers suggestions for future research.

6.1 Conclusion

The aim of this study was to gain a better insight into the possible barriers to open banking which era begin with the implementation of PSD2 regulation back in 2018. This study contributes to the literature by focusing on technical and organizational barriers from the perspective of Nordea Abp.

This qualitative study identified several possible barriers to open banking and discussed how open innovation and open innovation ecosystem are impacting these barriers. The barriers were divided into two groups: technical barriers and organizational barriers.

The findings of the technical barriers indicate that "*technical requirements*" and "*old systems*" were equivalent to the prior research with one exception. As a new finding related to "*technical requirements*", this study discovered that banks have requirements to keep all their platforms at the same level of performance. If there are some irregularities between platforms, it can lead to issues with regulators. Additionally, "*communication of technical requirements and troubleshooting*" was mentioned as a challenge when communicating with TPPs. The requirements that are set for fintech companies by their investors are not very technical. This leaves a lot for interpretation which might lead to refinements and long back-and-forth conversations. Additionally, troubleshooting is creating its own struggles for collaborations. Different companies might have differences in the language of how they talk about issues and technical aspects of their IT services and products.

For the organizational barriers, the findings indicate that "*organizational complexity*", "*compliance with regulation*", and "*trust between partners*" have been identified in previous research. However, this study also identified new organizational barriers that has not been mentioned in previous studies. First, "*communication between stakeholders*" suggest that communication between a bank, its customers, and regulators can be challenging. Customers do not always specify enough the product or service they want, and developers who do not have direct contact with them have to interpret vague instructions from customers. This can lead to lengthy discussions and possible corrections to the products/services developed. Same issues can be caused by communication with regulators. They often lack clear instructions on what they want, and banks must clarify and interpret the given guidelines.

Secondly, although "*knowledge of the service/product*" has been mentioned in previous studies, it has been only acknowledged as a lack knowledge within customers. However, this study highlighted the perspective of a lack of internal knowledge in the bank. Employees working in sales have been selling products and services, such as cards and loans, for years. However, now they are facing new types of solutions to sell. Selling software requires a whole new kind of expertise that is more complex than selling other products/services to customers.

Lastly, this study found two different aspects of barriers related to "*resources*": lack of programmers and limited performance of the legacy systems. The shortage of programmers affects the whole of the Nordic countries and the chances for companies to make a change to it are limited. However, Nordea can make a change to the performance of its legacy systems. Currently, the pressure from many systems and APIs puts a strain on those legacy systems, and different departments may have to even compete for this resource. If a company's priorities are not set and communicated properly, different departments may end up prioritizing their needs over others, even if it may not be in the company's best interests.

6.2 Limitations and suggestions for further research

Although this study offers important insight into how employees in Nordea Abp view barriers to open banking, it has several limitations that should be acknowledged. When interpreting the findings of this study, the following reasons should be considered:

First, the sample size is relatively small, but due to limitations in time, more interviews were not possible to conduct. A larger sample would have provided more in-depth and generalizable results. Nevertheless, the study is limited to Nordea Abp and to the view of a few people, which limits its generalization to the international context and external validity.

Second, often researchers face obstacles coming from the surrounding environment. Also, the Covid-19 situation caused different conditions for this study. Because of this reason, there were some delays with the interviews. This also caused that the interviews were conducted only online which can have an impact on how comfortable respondents feel in the interview situation.

Third, there is the scope of the research. The findings of this study are only related to the Nordic context since the respondents are from Finland, Sweden, and Denmark. Hence, it is possible that in other countries the barriers might look a lot different. However, this can serve as a foundation for further research. It could lead to more generalizable findings of the barriers to open banking in the financial sector.

Another way for future research to gain more generalizable findings from this topic could be that research use a larger sample. This could be done through a broader quantitative study, either on a Nordic scale, also including other banks, or to go even further and research other countries, for example in Europe. This would provide deeper insight and generalizable results.

In addition to this, researching more into this topic from the perspective of fintech company would also be very interesting. Overall, they are sitting on the other side of the table, and not many studies have been focusing on them and especially what they think are the possible barriers. They are the newcomers to the financial industry and are not as experienced in regulations and legislations around the financial services and products as banks are. Research also could be done by combining both parties and conducting a larger study around banks and fintechs. To gain even wider insight, the research could be done adding legislators' perspectives to it. Banks, fintechs, and legislators are after all the main parties working with open banking that can identify technical and organizational barriers.

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Appendices

Appendix A: Interview Guide

The topic of my thesis is "Barriers to Open Banking – Case Nordea Abp" and it is focused on technical and organizational barriers.

So far, most of the research has focused on the customer side of the barriers and only few have investigated them in general. The thesis aims to look more in detail into why open banking has been adopted so slowly from the perspective of the organization.

Background information

1. How does your current work relate to open banking?
2. How long have you been working with open banking?
3. How is Open Banking department organized in Nordea?
    a. Is there difference between responsibilities between countries?

Current state of open banking

4. How would you describe the current attitudes towards open banking in Nordea?
    a. Are they positive or negative? Why is it so?
5. In your opinion, are there obstacles when integrating open banking features with Nordea's own services?
    a. If yes, what?
6. Is Nordea's experience with open banking similar to other banks?

Innovation Process

7. How important is open banking to Nordea's innovation strategy and overall strategic priorities?
8. Do you think that open banking has changed greatly the innovation strategy of Nordea?
    a. If yes, how?

Collaboration with third parties (Fintech and such companies)

9. How is Nordea currently utilizing external knowledge and partnerships of third parties? Can you give specific examples?
10. Do you think that the way Nordea collaborates with third parties has changed due to open banking?
    a. If yes, how?
11. What are the major challenges for you as a Nordea employee when collaborating with third parties?

Future of banking

12. What future developments do you see anticipate/expect in open banking?

a. For reaching those developments, would there be need for new innovation processes?
   If yes, which one(s)?

13. Is there anything that I did not ask you, but you think is relevant to the topic of open banking and innovation?

Appendix B: Information letter

Are you interested in taking part in the research project

"Barriers to Open Banking – Case Nordea Abp"?

This is an inquiry about participation in a research project where the main purpose is to investigate technical and organizational barriers to open banking. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

So far, most of the research has focused on the customer side of the barriers and only few have investigated them in general. However, these studies have been conducted in the beginning of the open banking era, which presents an interesting opportunity to look more in detail into why open banking has been adopted so slowly from the perspective of the organization. Open banking as a topic is still highly relevant because it is still evolving and changing the financial industry.

In order to fill this gap in current research, this master's thesis aims to investigate technical and organizational barriers to open banking. Thus, the following research question was formulated:

Research question: What are the technical and organizational barriers to open banking?

Who is responsible for the research project?

The Norwegian University of Science and Technology is the institution responsible for the project.

Why are you being asked to participate?

People working with Open Banking in Nordea has been asked to participate in this study. Yet the number of participants is not clear. The goal is to get at least six interviews.

What does participation involve for you?

If you choose to take part in the project, this will involve an interview conducted. It will take approx. 60 minutes. The interview includes questions about open banking, innovation process, collaboration with third parties, and future insights of open banking. The interview will be recorded for transcribing purposes.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

The personal data can be accessed by the student conducting the study and supervisors. Master student is Janina Haapanen, and the supervisors of this thesis are Ainur Begim and Øivind Strand. Supervisor from Nordea is Kristiina Pallonen.

To ensure that unauthorized persons are not able to access the personal data, your name and contact details will be replaced with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data. Data also will be stored on school's secured server behind password.

In published thesis, the personal data will consist how your work is related to open banking.

What will happen to your personal data at the end of the research project?

The project is scheduled to end beginning of June. Recorded interviews will be deleted after they have been transcribed. All other data will be anonymised.

Your rights

So long as you can be identified in the collected data, you have the right to:

access the personal data that is being processed about you

request that your personal data is deleted

request that incorrect personal data about you is corrected/rectified

receive a copy of your personal data (data portability), and

send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent. Based on an agreement with The Norwegian University of Science and Technology, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

The Norwegian University of Science and Technology via Janina Haapanen, by email: (janinah@stud.ntnu.no) or supervisor Ainur Begim, by email: (ainur.begim@ntnu.no)

Our Data Protection Officer: Thomas Helgesen, by email: (thomas.helgesen@ntnu.no)

NSD – The Norwegian Centre for Research Data AS, by email:
(personverntjenester@nsd.no) or by telephone: +47 55 58 21 17.

Yours sincerely,

Janina Haapanen

Student

Appendix C. Consent form

Consent form

Consent can be given in writing (including electronically) or orally. NB! You must be able to document/demonstrate that you have given information and gained consent from project participants i.e. from the people whose personal data you will be processing (data subjects). As a rule, we recommend written information and written consent.

- For written consent on paper you can use this template
- For written consent which is collected electronically, you must chose a procedure that will allow you to demonstrate that you have gained explicit consent (read more on our website)
- If the context dictates that you should give oral information and gain oral consent (e.g. for research in oral cultures or with people who are illiterate) we recommend that you make a sound recording of the information and consent.

If a parent/guardian will give consent on behalf of their child or someone without the capacity to consent, you must adjust this information accordingly. Remember that the name of the participant must be included.

Adjust the checkboxes in accordance with participation in your project. It is possible to use bullet points instead of checkboxes. However, if you intend to process special categories of personal data (sensitive personal data) and/or one of the last four points in the list below is applicable to your project, we recommend that you use checkboxes. This because of the requirement of explicit consent.

I have received and understood information about the project Barriers to Open Banking – Case Nordea Abp and have been given the opportunity to ask questions. I give consent:

- ☐ to participate in interview

I give consent for my personal data to be processed until the end date of the project, approx. 12.6.

(Signed by participant, date)

Appendix D: Themes from data analysis

D1: Organizational barriers

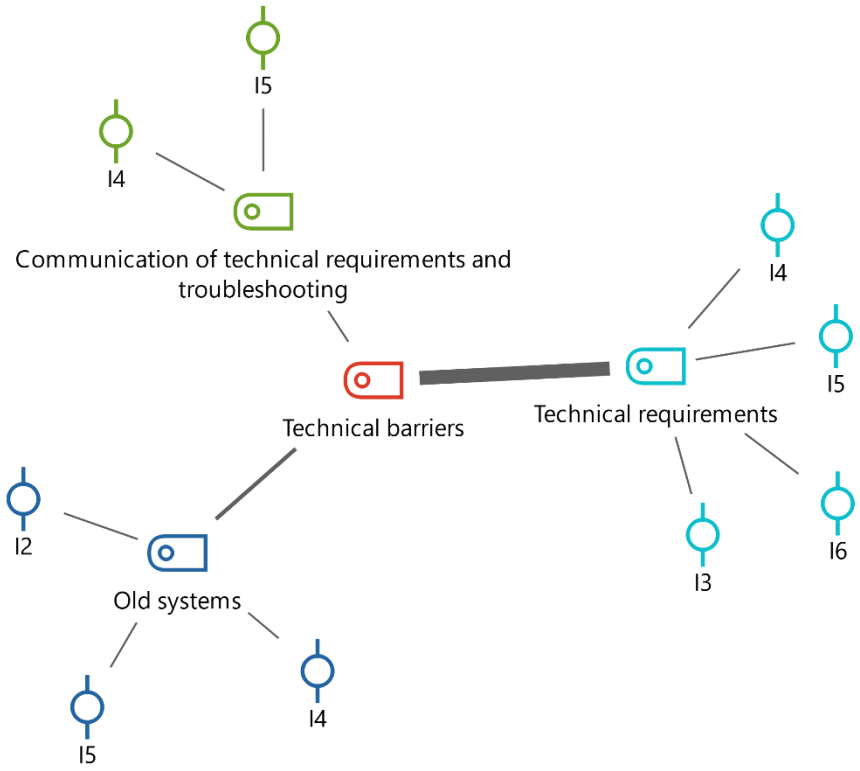


Figure D1: Technical barriers

D2: Technical Barriers

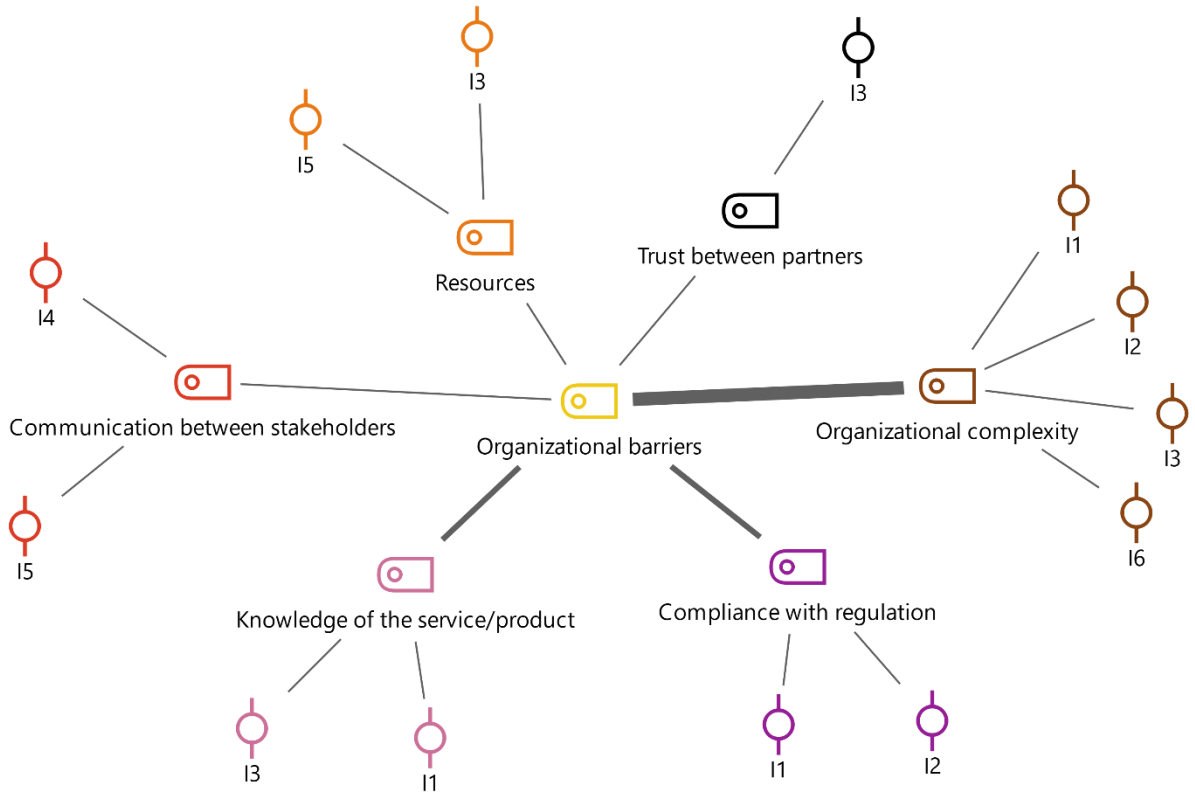
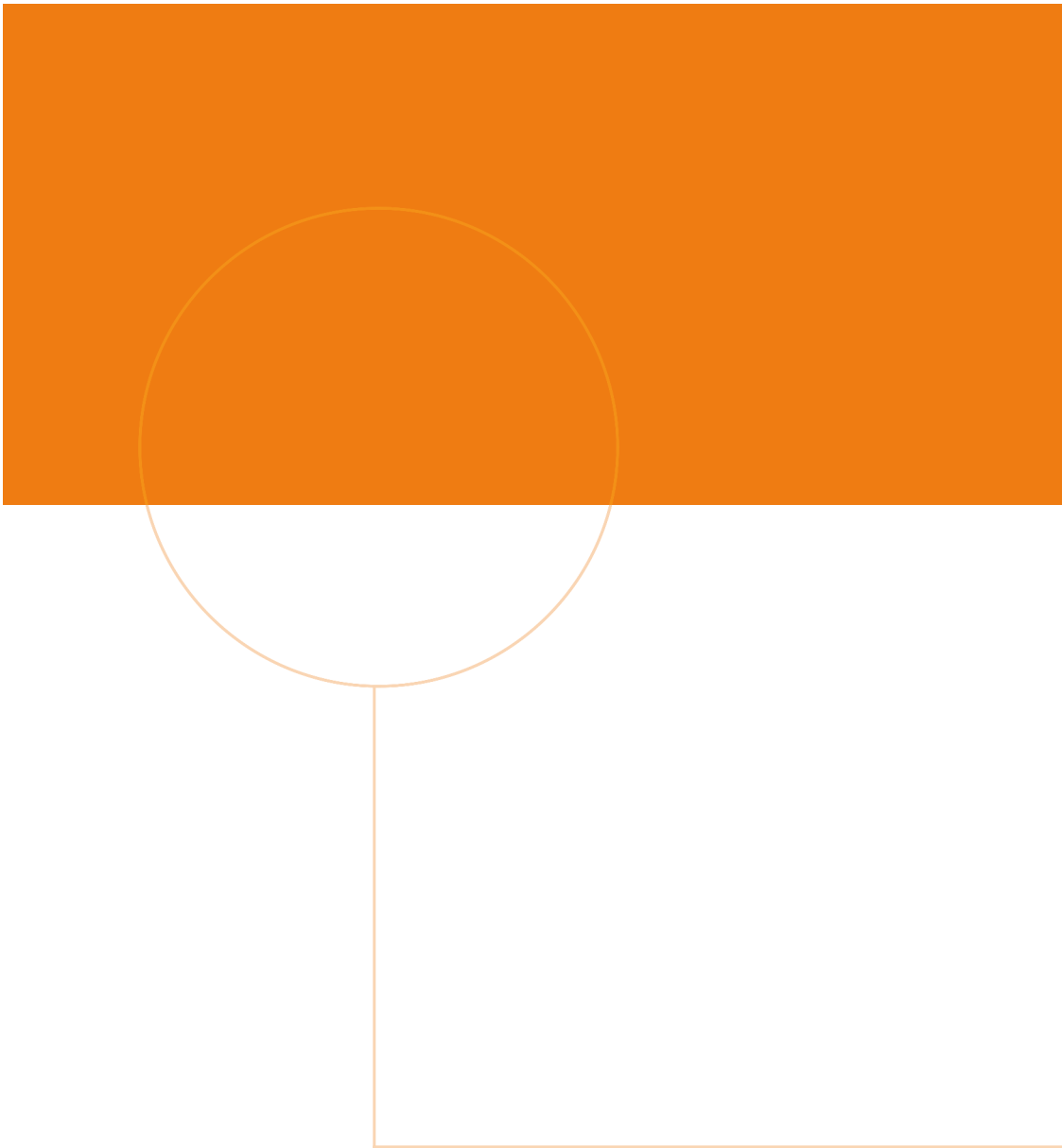


Figure D2: Organizational barriers



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