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Open Innovation Opportunities of Open Banking and APIs in the Finnish Banking Industry

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ABSTRACT:
During the last decades, due to digitalization, the financial industry has undergone continuous transformation in service delivery. At the same time, regulation in the financial sector has increased and new players such as FinTechs have entered the industry. The latest advancement in the industry that can have the ability to greatly unlock the potential of these new players is open banking. In Europe and in Finland the catalyst for change and for open banking has been regulation driven and initiated by European Union's Revised Payment Services Directive also known as PSD2. The directive is forcing traditional banks to give third party providers access to banks customers' account and transaction information in secure digital form and with customers' consent. The information sharing is implemented through Application Programming Interfaces (APIs).

The objectives of this thesis are to examine the current state of the open banking in Finland and how PSD2 and open banking has impacted to innovation processes of traditional Finnish banks. In addition, objectives include the examination of the current state of utilizing open innovation practices and co-operation in Finnish banks and one goal is to gain better understanding the innovation and product development opportunities and challenges that open banking and utilization of APIs offers to traditional Finnish banks.

This research is based on literature review followed with empirical part. In literature review, the relevant literature from central topics and previous studies of these topics are introduced. Literature review is consisted of three parts which cover the main topics of the study. These main topics are retail banking industry, open banking, and open innovation. The empirical part of the study is implemented by conducting qualitative survey with open-end questions that has been sent to experts of open banking working in Finnish banking industry. The questionnaire of the survey has been built around theoretical framework that has been formed from central findings of the literature review.

The results of the study indicate that open banking and APIs can offer new innovation opportunities for Finnish banks as APIs can be used as facilitator of new innovation opportunities including open innovation activities, cooperative development and forming innovation platforms. However, as open banking and use of APIs may slowly change the way that Finnish banks innovate, the impact of open banking in Finland has been rather low and development of it has been slow so far. Also, the biggest constraint right now for Finnish banks that is limiting the utilization of open innovation and collaboration in development, is that banks are struggling to find suitable partners that are meeting banks' strict requirements.

Keywords: Open innovation, Innovation platform, Retail banking, Open banking, FinTech, API

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TIIVISTELMÄ:
Viime vuosikymmenten aikana finanssi- ja pankkiala on kokenut jatkuvaa muutosta digitalisaation vuoksi. Samanaikaisesti finanssialan sääntely on lisääntynyt ja toimialalle on tullut uusia toimijoita kuten finanssiteknologialan yrityksiä (engl. FinTech). Viimeisin muutos alalla, jonka myös uskotaan voivan merkittävästi avata näiden uusien toimijoiden mahdollisuuksia, on avoin pankkitoiminta (engl. open banking). Euroopassa ja Suomessa avoin pankkitoiminta on sääntelylähtöistä ja perustuu Euroopan Unionin tarkistettuun maksupalveludirektiiviin, joka tunnetaan myös nimellä PSD2. Direktiivi pakottaa perinteiset pankit avaamaan kolmannen osapuolen palveluntarjoajille pääsyn pankkien asiakkaiden tili- ja transaktiotietoihin, kuitenkin asiakkaiden suostumuksella. Tämä tietojen jakaminen toteutetaan ohjelmointirajapintojen (API) kautta.

Tämän tutkimuksen tavoitteena on tarkastella avoimen pankkitoiminnan nykytilaa Suomessa ja sitä, miten PSD2 ja avoin pankkitoiminta on vaikuttanut perinteisten suomalaisten pankkien innovaatioprosesseihin. Lisäksi tavoitteina on tarkastella avoimien innovaatiokäytäntöjen (engl. open innovation) ja kolmansien osapuolien kanssa tehtävän yhteistyön nykytilaa suomalaisissa pankeissa. Yhtenä tavoitteena on myös saada parempi ymmärrys uusista innovaatio- ja tuotekehitysmahdollisuuksista sekä haasteista, joita avoin pankkitoiminta ja ohjelmointirajapintojen hyödyntäminen voi tarjota suomalaisille pankeille.

Tutkimus rakentuu kirjallisuuskatsauksen ja empiirisen osan ympärille. Kirjallisuuskatsauksessa esitellään tutkimusaiheen olennaiset ja keskeiset asiat aiemmista tutkimuksista. Kirjallisuuskatsaus koostuu kolmesta pääosasta, jotka kattavat tutkimuksen pääaiheet. Nämä pääaiheet ovat vähittäispankkitoiminta, avoin pankkitoiminta ja avoimen innovaation teoria. Tutkimuksen empiirinen osa on toteutettu avoimia kysymyksiä sisältävän laadullisen kyselylomakkeen avulla, joka on lähetetty Suomen pankkialalla työskenteleville avoimen pankkitoiminnan asiantuntijoille. Kyselyn kysymykset on rakennettu teoreettisen viitekehyksen ympärille, joka on muodostettu kirjallisuuskatsauksen keskeisistä havainnoista.

Tutkimuksen tulokset osoittavat, että avoin pankkitoiminta ja ohjelmointirajapinnat voivat tarjota uusia innovaatiomahdollisuuksia pankeille. Avoimet ohjelmointirajapinnat voidaan nähdä uusien innovaatiomahdollisuuksien, kuten avoimen innovaatiotoiminnan, yhteistyön kehittämisen ja innovaatioalustojen muodostamisen mahdollistajana. Vaikka avoimen pankkitoiminnan ja ohjelmointirajapintojen käytön uskotaan muuttavan hiljalleen suomalaisten pankkien innovointitapaa, niin toistaiseksi avoimen pankkitoiminnan kehitys on ollut hyvin hidasta ja näin myös sen vaikutus on toistaiseksi ollut hyvin vähäistä. Suurin haaste tällä hetkellä, joka rajoittaa avoimen innovoinnin ja yhteistyön hyödyntämistä kehitystyössä suomalaisissa pankeissa on se, että pankkien on haastavaa löytää kumppaneita, jotka täyttävät pankkien tiukat vaatimukset.

AVAINSANAT: Avoin innovaatio, Innovaatioalusta, Vähittäispankkiala, Avoin pankkitoiminta, FinTech, Ohjelmointirajapinnat

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1 Introduction

1.1 Research background

For years, technological innovations have transformed industries and financial services industry is no exception in this regard (Nicholls, 2019). Over the last decades, financial sector has undergone continuous transformation in service delivery due to digitalization. While the financial sector has historically been an early adopter and an intensive user of modern technological innovations, the advent of disruptive business models and the growth of new competitors have had a significant effect on current industry dynamics (Gomber et al., 2017). There has been a rise of Financial technology (FinTech) companies which have attracted attention of not only investors but also governments and regulators (Nicholls, 2019). At the same time, the regulation and controlling in the industry has increased during the past years.

One particular development in the industry that can significantly unlock the potential of these new entrants like FinTech companies, for consumers of financial services is Open Banking (Nicholls, 2019). Open Banking can be described in multiple ways, however, Nicholls (2019, p. 122) offers moderately simple description of Open Banking:

> *Open Banking refers to regime in which banks, either voluntarily or in response to regulatory requirements, provide access to customer information in secure, digital form – with the customer's express consent – to third-party service providers (often FinTech companies).*

These third-party providers (TPPs) can then build new services using this data, often combined with data from other sources also (Nicholls, 2019).

The catalyst for change in European bank industry and in Finland has been the European Union's Revised Payment Services Directive (PSD2) (Petrović, 2020). One significant requirement that directive made mandatory for incumbent banks was implementing Open Banking practices by making their customers' account and transaction information

available for TPPs through Application Programming Interfaces (APIs). PSD2 came into force on January 2016, requiring all EU Member States and countries of the European Economic Area (EEA) to incorporate it by January 2018 in their national legislation.

Before PSD2, due to advantageous position of incumbent banks, there has not been many incentives for banks in Europe to open financial services to innovation through sharing account and transaction information with other market participants (Euro Banking Association, 2016; Petrović, 2020). However, now that it has been made mandatory, banks must at least do the minimum by opening specific APIs and give TPPs access to their customers' account information.

However, traditional banks can do more than just the minimum and see this regulatory requirement as more than just mandatory regulatory practice to comply with, or as a threat to lose valuable information to competitors (Petrović, 2020). Open banking and sharing information through APIs can offer a great opportunity for traditional banks to utilize open innovation practices by sharing knowledge and developing new products in co-operation with TPPs and external developers (Omarini, 2018).

1.2 Research gap, question, and objectives

Since PSD2 and open banking are rather new topics, there are not that many studies made yet in this field at all. Still, from the beginning, majority of the studies made about PSD2 and open banking in Europe have focused on how financial industry will be disrupted, how financial service offering will be fragmented or about the optimal open banking strategies for traditional banks to manage in the competition with FinTech companies and BigTech companies (Botta et al., 2018; Gomber et al., 2018; Omarini, 2018; Petrović, 2020). Also, majority of all reports and articles studying the impacts of Open Banking in Europe have been published by different consultancy companies or interest groups, especially the ones written from traditional banks' point of view with focus on different open banking strategies (Innopay, 2018; Pwc, 2018). These studies made by

consultancies and interest groups may give moderate picture of the phenomenon but at the same time, they cannot be handled as completely unbiased. It can be assumed that consultancies and different interest groups have their own incentives which may lead to creating unnecessarily speculative scenarios with boosted sense of urgency towards actions.

In addition, there really are not much research done that would study open banking phenomenon from open innovation point of view. However, many characteristics of open banking practices and requirements are also familiar topics in the field of open innovation. As the main point of open innovation is utilizing also external ideas and external paths to market, open banking offers just those opportunities (Chesbrough, 2003; Omarini, 2018). Still, there has not been academic studies about this. In addition, there has not been many studies focusing on APIs role in open innovation either. One exception is the research from Aitamurto and Lewis (2013) who studied the impact and opportunities that APIs could offer in open innovation manners in US-based news organisations.

So, although open banking has yet not been studied that much at all, there is also room for study made from innovation management point of view. With the focus on more collaborative aspects of open banking and how traditional banks could see open banking as a possibility to utilize open innovation practices and gain value by exploiting external knowledge and establishing strategic partnerships.

In order to fill this gap in current research, the aim of this work is to study from traditional Finnish Banks' perspective that what kind of open innovation opportunities open banking and APIs could offer to traditional Finnish banks. This research aims to answer the following research question:

RQ: What kind of open innovation opportunities are available for Finnish Banks by utilizing Open Banking and APIs?

Also, to support the process of answering to research question, following research objectives have been determined.

1. To examine how Open Banking has impacted innovation processes of traditional Finnish banks.
2. To examine current state of utilizing open innovation practices and co-operation in Finnish banks
3. To better understand the innovation and new product development (NPD) opportunities and challenges that Open Banking offers to traditional Finnish banks.

1.3 Definitions and limitations

Although, open banking is global phenomenon, this study is focusing on open banking at the European level with the main focus on Finnish banks. Open banking practices are principally shaped by country or region-specific legislation and regulation. Since the focus is to study open banking phenomena and its influence on Finnish banking industry, the study is being done on European level because EU's regulation (PSD2) is the one affecting to Finnish banks.

In this study, the banking industry stands for general landscape in which various traditional banks operate. Whereas financial services industry stands for more general ecosystem with all different players offering or assisting on financial services. FinTech companies, for example, are operating in financial services industry but not exclusively only in the banking industry. FinTech is an abbreviation for financial technology. FinTech has been a buzzword during last years which has also given it several slightly different meanings and explanations. However, one common and clear declaration of it has been stated by Kuszewski (2018).

> *Fintechs are entities that use new technologies to offer products that are either complementary or competitive to related products offered by regulated financial institutions.*

While there are FinTech companies operating on different fields of Financial services industry and offering different solutions, in this work the aim is to examine FinTech companies in wider perspective as a one player in the field of financial services industry and not regarding only in some specific financial service or technology offering.

Another limitation regarding Finnish bank industry in this work is that the focus will be in retail banking industry. Generally, retail banking, also called consumer or personal banking, means financial activities and services that banks provide to the public and to small business, excluding large corporations and organisations (Cambridge Dictionary, 2021).

Relating to the perspective of innovation management in this work, the delimitation and focus will be in the theory and practices of open innovation. The two important modes in open innovation theory are inbound and outbound open innovations. In some cases, there has also been discovered third option, coupled open innovation (Bogers et al., 2018; Chesbrough, 2006). Definitions of these different modes of open innovation will be provided later in literature review chapter. However, the theoretical framework of open innovation that will be used in analysis of Finnish banking industry regarding aspects of open banking and APIs will be built around these three modes.

In addition, the concept of innovation platforms will be discussed in this study. Eckhardt et. al. (2018) state in their article that *"The concept of a platform has a long-standing history in systems, innovation, and technology management literatures."* In addition, Eckhardt et. al. (2018) state that platforms work as core hubs in innovation ecosystem, where individual product offerings are aggregated into unified customer-facing solutions. Also, in order to platforms owners to become platform leaders, they may use different open innovation techniques (Eckhardt et al., 2018). In addition to this, in previous studies regarding different possible open banking strategies that traditional banks can utilize, one commonly proposed strategy is to build an open banking innovation platform (Nicholls, 2019; Omarini, 2018; Petrović, 2020).

Additionally, because open banking practices and sharing of customer data will be provided through APIs, also discussion about the opportunities and challenges of using APIs will be included in this work (Petrović, 2020). However, APIs will be studied only on a general level as a part of open banking, innovation platforms and open innovation practices. Subjects related to technical aspects of APIs or process of implementing them are not in the scope of this study.

1.4 Structure of the thesis

This thesis is following the traditional structure of a research. In figure 1 is presented the structure and the progress of the research

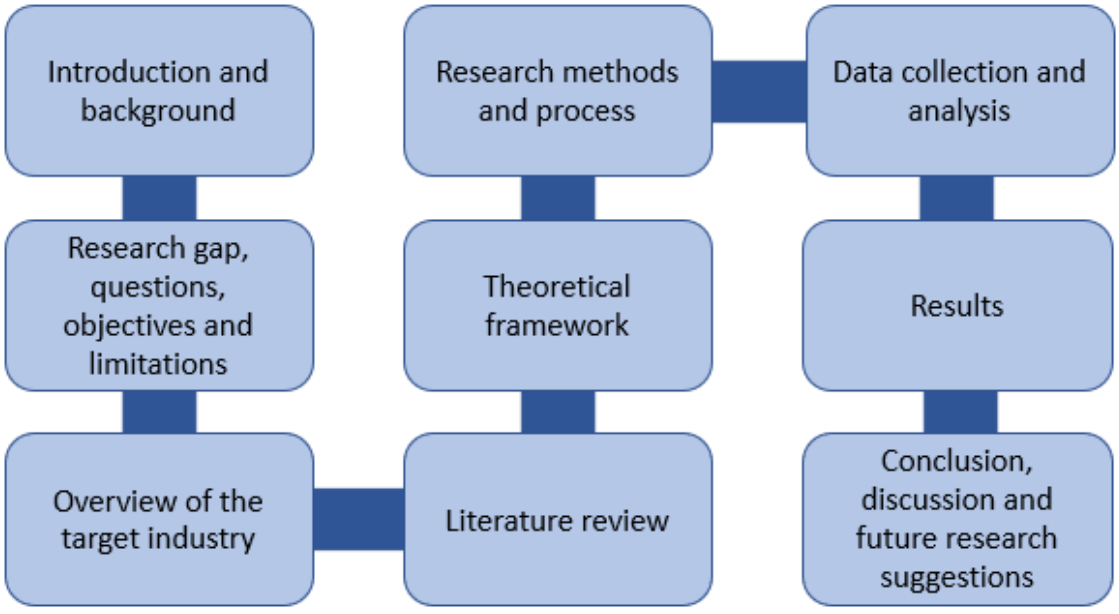

Figure 1. Structure of the thesis

The chapter one served as an introduction. In a chapter 2 is presented the overview of the target industry which is Finnish banking industry. This chapter includes the discussion of Finnish financial ecosystem and its different players. In a chapter 3, a literature review

of central topics and previous studies of these central topics will be presented. Chapter two is shared in two greater entities. The first part of chapter 3 covers the topics regarding banking industry, including the topics of current state of Finnish retail banking industry and different players of Finnish financial ecosystem. The Second part of chapter 3 will cover topics regarding open innovation, innovation platforms and APIs Also, literature and previous studies regarding open banking and PSD2 will be covered in this second part of chapter 3. At the end of chapter 3 is introduced the theoretical framework where the findings of literature review will be combined as comprehensive framework which will support the empirical part and analysis of the study and enable the answering to research questions.

Chapter 4 is a methodology part. This chapter will define the research methodologies, research process and design used in this research including a reasoning for using the selected research methods. In chapter 4, also data collection methods and data analysis including the results of the empirical part will be presented. This will be followed by chapter 5 which will contain discussion and conclusion of the study, also including the suggestions for future research.

2 Overview of Finnish retail banking industry

This chapter will provide an overview of Finnish retail banking industry and Finnis financial industry. The purpose of this section is to give a comprehensive picture of the current state of Finnish banking industry, introduce the different players in the ecosystem and to discuss about distribution of power in the market. In addition, the current state of implementing open banking practices in Finnish banks will be discussed briefly in this chapter.

2.1 Finnish financial ecosystem

Finnish financial ecosystem is composed of various players. The ecosystem and its players are illustrated in figure 2 which is adopted, and slightly revised version of the model originally provided by Lee and Shin (2018). In Lee's and Shin's (2018) version, the FinTech ecosystem was in the middle and it has now been replaced with financial ecosystem.

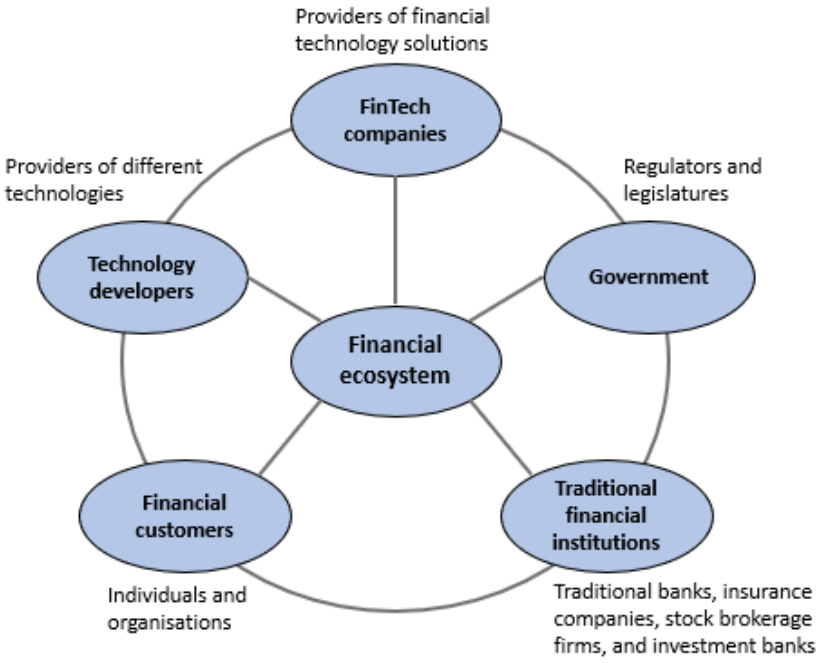

Figure 2. Financial ecosystem (adapted and modified from Lee & Shin 2018).

Lee and Shin (2018) state that these different actors work symbiotically to promote innovation, enhance collaboration and competition in the financial industry and to comprehensively improve the economy in order to benefit consumers of financial solutions. In this work, the focus will be on traditional banks' innovation processes and interactions between banks, FinTech companies and technology developers. In addition, since one of the primary aspects of this work is to study open banking and its affects to innovation processes, also regulators and legislatures' role will be analysed because open banking practices are principally shaped by country or region-specific legislation and regulation.

2.1.1 Traditional banks and financial institutions

There are currently multiple traditional banks operating in the Finnish Banking sector, however, the market share has been distributed in large respects to only a few bigger banks (Finance Finland (FFI), 2020). In figures 3 and 4 are presented the different Finnish credit institutions' market shares of non-MFI loans and non-MFI deposits in Finland. Non-MFI, meaning non-monetary financial institutions, means in this case that loans for and deposits from other financial institutions are excluded from these numbers. Credit institutions contain deposit banks but also other credit institutions that do not take deposits like mortgage credit banks (Hypo Group), finance houses and Municipality Finance plc (Finance Finland (FFI), 2020). In this work, the focus will lie particularly on these deposit banks and their retail banking activities and players like Municipality Finance and Hypo Group will be excluded from the analysis.

As it can be observed from the figures 3 and 4, OP Financial Group is the biggest banking group by market share operating in Finland. OP Financial Group has leading position in both categories by having market share of 34-39 percent in deposits, mortgages, and corporate loans. It is also noteworthy, how OP Financial Group, Nordea and Danske Bank, the three biggest banks in Finland by market share, are possessing around 70 percent market share in loans and almost 80 percent market share of deposits (Finance Finland (FFI), 2020).

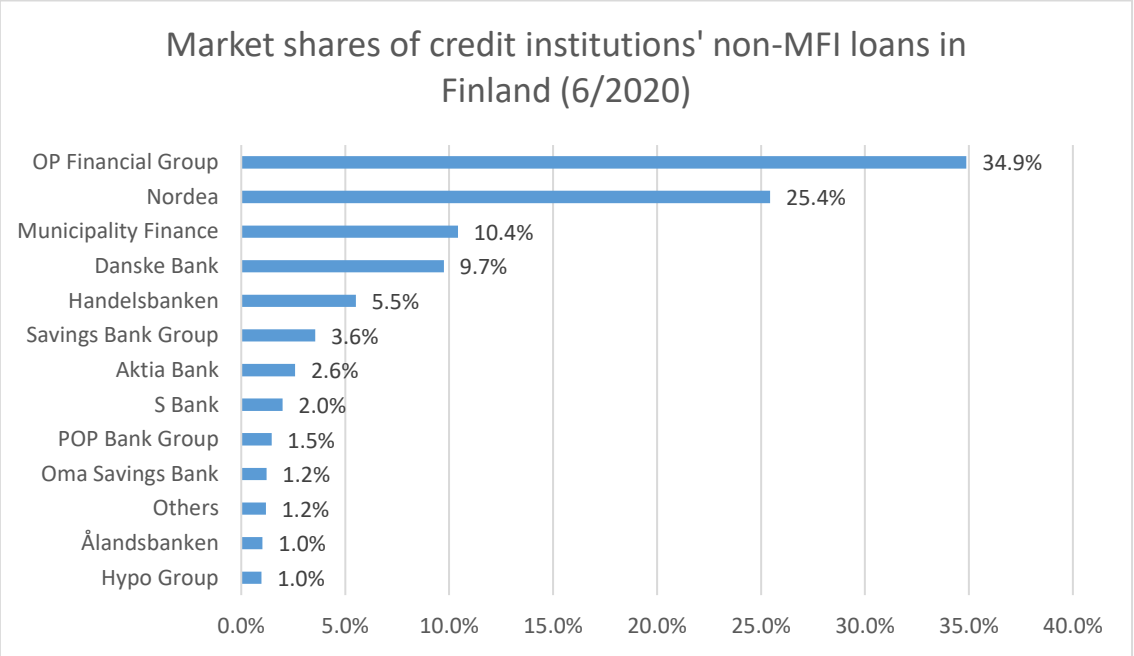

Figure 3. Market shares of credit institutions non-MFI loans in Finland 2020 (Finance Finland (FFI), 2020)

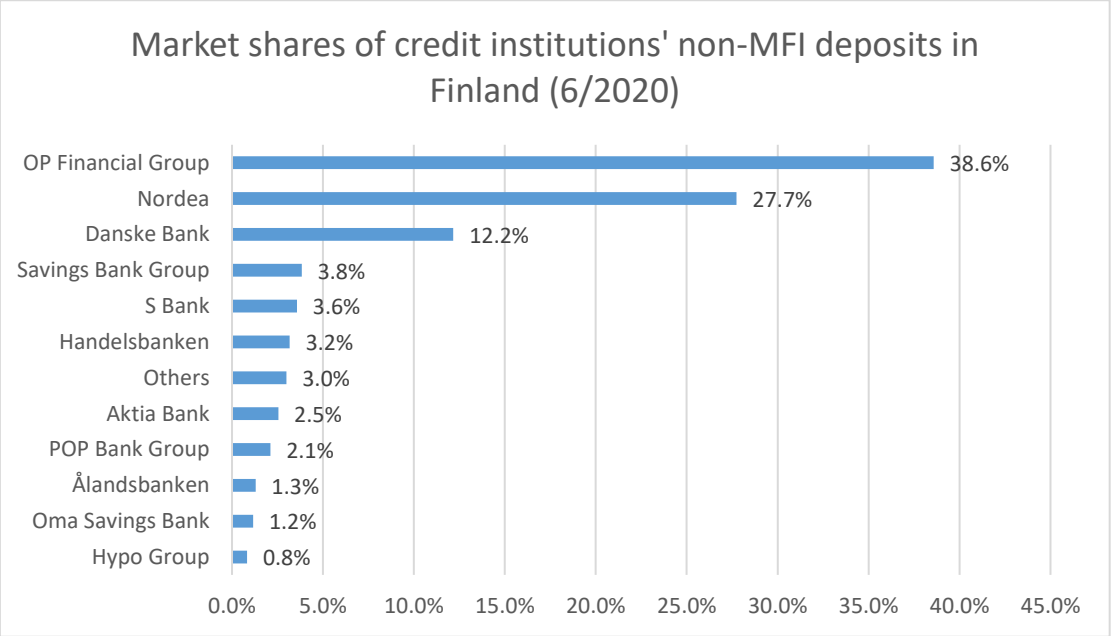

Figure 4. Market shares of credit institutions non-MFI deposits in Finland 2020 (Finance Finland (FFI), 2020)

In 2019, the Finnish banking sector's operating income totalled €3.4 billion (Finance Finland (FFI), 2020). The most important source of revenue for the Finnish banking industry in 2019 was the net interest income. The net interest income means the difference between interest income and interest expenses. It now accounts for more than half of all revenue in the Finnish industry. However, the formation of overall income differs significantly between banks. Net interest income is the main source of income in some banks, while commissions are the main source of income in others. Commissions are received, for instance, from the customer's fees for using payment and wealth management services.

Using digital services to manage personal finances has been on top level in Finland for years compared to other European countries (Finance Finland (FFI), 2019). Eurostat's (2018) data reveals that already in 2018 almost 90 percent of Finnish people were using online banking services for paying invoices and taking care of daily banking tasks. At the same time, the average of this number in whole Europe was around 54 percent. One reason behind this success has been the innovative collaboration between Finnish telecom operators, traditional Finnish banks, and other providers of financial services (Business Finland, 2021).

2.1.2 FinTech companies

In addition to these traditional banks, there are also many other players in the Finnish financial industry today. Most of these other players are being called Financial technology (FinTech) companies and start-ups that are providing financial services in different specific fields such as payments, wealth management, financial software, investing, data and analytics, APIs and platforms, financing, and cryptocurrencies (Helsinki Fintech Farm, 2021).

Finnish FinTech landscape has its origins in the fields of financial software and different back-end technologies and those are still some of the strongest areas in the landscape

(Helsinki Fintech Farm, 2021). However, during the last years, fields of payments and financing have had most remarkable growth. Currently Finnish FinTech landscape is consisted of over 200 start-ups, scaleups and companies. The totalled revenue of this market in 2019 was over 1300M€ and more than EUR 450 million has been invested in Finnish FinTech companies. Many of these Finnish FinTech companies are still in the early stages of their life cycle and almost one quarter of the companies in Finnish FinTech landscape have stated that they are aiming for over 200 percent annual growth (Deloitte, 2019).

Additionally, in Deloitte's (2019) study about Finnish FinTech landscape, it was founded that although FinTech industry in wider perspective have very international nature, the majority of Finnish Fintech start-ups are not going forward with born-global strategy but are rather looking for first securing their position in domestic market. Companies wanted to first have the position of local champion in Finland, then expand to Nordic market and after that to Europe. However, it is still arguable whether Finnish financial services market offers enough possibilities for these companies and if the focusing on domestic markets in the beginning is limiting their opportunity of international growth. In addition, although Finnish FinTech landscape has been growing over the past years, Finland has not been globally recognized having actual FinTech hubs like for example European cities like London, Stockholm and Amsterdam have. One reason for that may have been the fact that there has not been Finnish FinTech "unicorn" company which value would have been considered being over $1 billion.

2.2 Open Banking in Finland

As it was stated earlier, the market share in Finnish banking industry has been distributed in large respects to only a few bigger banks. The size differences of different traditional banks in Finnish banking sector are also visible in their open banking strategy. Smaller banks have all outsourced their open banking interfaces, developer portals and production of PSD2 APIs (Tink, 2020). Savings Bank Group, Oma Savings Bank and Bank of Åland have all outsourced API production to one Finnish FinTech company called Samlink,

whereas S Bank's and Bank of Åland's APIs are provided by a company called Crosskey, which is nowadays fully owned subsidiary of Bank of Åland (Crosskey, 2021; Samlink, 2021).

In addition for outsourcing, these smaller banks are providing only APIs that comply with PSD2 requirements (Tink, 2020). This means that they are with the consent of the customer only sharing the mandatory data which contains customers' account and transaction information. With such approach towards open banking, these smaller Finnish banks are implementing more of the wait-and-see strategy and are currently facing the PSD2 and open banking more as mandatory compliance issue to be taken care of, rather than strategic initiative that concerns the organisation more widely.

At the same time bigger banks such as OP financial group, Nordea and Danske Bank have made notable investments into open banking and are approaching the concept of open banking more openly (Tink, 2020). These three big banks have built their own open banking interfaces and developer portals for utilizing PSD2 APIs and also established or have planned to establish more advanced APIs also called premium APIs besides the required PSD2 APIs. This means that with customer's consent, these banks have initiatives for sharing even more data besides the mandatory PSD2 data through their APIs with third parties.

For instance, OP financial group has stated that they see open banking as a great opportunity to collaborate with third party developers and by that boost innovation and secure their place in the future's digital ecosystem (Hämeen-Anttila, 2019). OP financial group has already introduced their own Multi-bank service which utilizes the account aggregation that has been made possible by PSD2. This basically means that they are offering service to their customers where they can link their account from other banks and see the information of these other banks' accounts on this one OP's platform (OP Financial Group, 2021). Concurrent, Nordea has stated that they are planning and have already taken first steps for becoming a platform player within banking by providing premium

APIs and building comprehensive open banking ecosystem (Nordea, 2020). Nordea has already launched some premium APIs, for instance one providing beneficiary validation (Nordea, 2021). This API allows corporate customers to check the validity of a beneficiary's account number before sending the payment which for instance enables corporate customers to reduce risks of fraud when making cross-border payments.

Therefore, these bigger banks are approaching open banking with much different strategy by facing the PSD2 more as an opportunity rather than just mandatory regulatory matter and they might serve as an example for the rest of the Finnish market in the near future (Tink, 2020). The further discussion of different open banking strategies will be provided later in this thesis on the literature review part.

3 Literature review

3.1 Retail banking industry

The financial crisis that began in the summer of 2007 highlighted the importance of banks to the economy (Allen & Carletti, 2012). Also, for growth and general welfare, the efficiency of the mechanism by which savings are channelled into productive activities by banks is essentially important. Additionally, especially Euro area has been considered as bank-based economy when comparing financial structure to the US or Asia which can be seen more as market-based economies. However, in recent years, traditional banks have been becoming less central part of the customers life also in Euro area as financial services has been started to be provided by other players also (Omarini, 2018). The future of traditional retail banking lies in the customer needs, which have gone and are constantly going through major changes.

The retail banking sector has gone through dramatic changes over the past decades and large part of these changes are due to technological change which has driven financial innovations (Frame & White, 2012). Banks have been diversifying and redefining their markets as a result of recent developments (Nätti & Lähteenmäki, 2016). Simultaneously, the types of institutions and companies that have been providing different banking services have changed within last years. Numerous different newcomers have entered the field of retail banking and started offering complementary products such as saving accounts, transaction deposits and different loans.

Furthermore, Gomber et al. (2018) state that financial services innovations are based on three key forces which are technology innovation, process disruption and services transformation. The technology innovation refers to approaches and tools that are used in order to achieve these revolutionary new services and products. Process disruption means the process of determining new approaches to disrupt traditional processes like financial processes. FinTech companies has been determined as ones to exploit the

process disruption in financial services industry. However, these agile and adaptive companies and start-ups are still battling with one primary issue which is lack of trust. Customers are not that likely to trust their financial services into hands of smaller and unknown service providers.

Services transformation comes from coupling technology innovation and process disruption in such a way that it results in comprehensive services transformation. Gomber et al. (2018) state that services transformation in financial industry is not a new topic but that there have been multiple failed service transformations in past. However, authors argue that today the situation is different because there is much more data available and at the same time the technological tools for analysing that data have developed much further. In addition, Gomber et al. (2018) state that cooperation between traditional banks and FinTech companies has improved, accelerating financial innovation overall.

To summarize, the changing market conditions, new digital technologies, and emergence of new players combined with regulatory push are changing the retail banking industry completely but also has demanded traditional banks to reconsider their business models (Omarini, 2018). Not only because of possible threats that aforesaid factors may generate to traditional business models but also because of opportunities that these factors may create. Opportunities are created through new banking paradigms with higher level of openness to third parties such as via open banking and by bundling services together. These new business models can range from simple adherence to PSD2's requirements, to the addition of new services or opening more data to third parties and even aggregating all of these into a platform experience.

3.2 Open Banking

As it was stated earlier in the introduction part, Open banking refers to system where traditional banks by their own choice or forced by regulation, give third party providers' access to their customer information securely and in digital form (Nicholls, 2019).

Sharing customer information with third party requires customer's express consent and is usually done through APIs. Open banking initiatives are principally regulatory, or market driven. In addition, the standards, and rules for implementing open banking practices are usually shaped by country or region-specific legislation and regulation.

The open banking phenomenon is also changing the roles of these different players (Petrović, 2020). New roles for Third party service providers like FinTech companies to choose from that have emerged from PSD2 are Payment Initiation Service Provider (PISP) and Account Information Service Provider (AISP). In these roles FinTech companies do not provide bank account servicing by themselves. PISPs are typically the ones placed between the customer and merchant, offering the payment initiation service and interface, usually by utilizing some modern payment method like mobile payments or Apple Pay. The PISP creates a link between customer bank's online banking platform and merchant's services, making it easier and less expensive for individuals and businesses to make payments. In addition, PISPs offer instant merchant notification of payment initiation. In order for this to work, PISP has to have consent of customer to be authorized to make a payment on customer's behalf, however, customer's consent is enough and PISP does not has to have consent from customer's bank separately.

The other possible role, the Account Information Service Provider's (AISP) purpose is to offer customer one integrated service, where customer can see the information of all payment accounts from different banks that customer possess (Petrović, 2020). So, AISP's provide online platform and interface where with customer's consent all the customer's bank accounts are aggregated together in one place in order for customer to get comprehensive picture of financial situation and transaction history. Role of AISP is not only for FinTech companies but can also be implemented by traditional bank. The before mentioned OP Financial Group's Multi-Bank Service is an exact example from traditional bank's acting as AISP and providing possibility for aggregating other bank's accounts to their online banking services.

There has been notified multiple different benefits that open banking could bring to consumers, businesses and for the whole economy (Nicholls, 2019). The most common one has been the idea that open banking can enhance the competition and innovation which will create new businesses and unbundle the financial services that has been traditionally provided only by traditional banks. As a result, consumers will be offered wider spectrum of financial services with better quality thanks to competition. It is difficult to foresee the total spectrum of financial services that will potentially be developed and delivered to consumers as a consequence of open banking. Nevertheless, at least retail banking services regarding comparison of financial products, personal wealth management applications and different electronic payment applications are among the types of services that could be improved through open banking ecosystem.

3.2.1 Open banking in Europe

In European Union and in European Economic Area (EEA) the open banking initiative has been regulatory driven (Petrović, 2020). EU's Revised Payment Services Directive also known as PSD2 made it mandatory for banks to start implementing open banking practices by sharing their customer's account and transaction information with third party providers. However, for TPPs to be eligible to get access to this banks' customer information through APIs, TPP must be first registered by the responsible financial authority of its home country.

The directive entered into force in January 2016, requiring all EU Member States and countries of the European Economic Area (EEA) to incorporate it by January 2018 in their national legislation (Petrović, 2020). The deadline for Finnish banks to have their fully PSD2 compliant APIs established, and functioning was in September 2019.

The original intentions of PSD2 were to provide the legal basis for the progress of creating better integrated internal market for electronic payments within EU area (EUR-Lex, 2019). Also, the idea was to create comprehensive rules for payments services and

enable international payments inside EU area to be as efficient and secure that they currently are within a single country. Therefore, PSD2 can also be seen as an enabler for creating borderless banking in EEA area (Petrović, 2020). Another objective was to open payment markets for new players and enhance innovation which would create more competition, better service offerings and better prices for consumers (EUR-Lex, 2019).

In order to establish PSD2 compliant open banking practices and enable possibility for securely sharing customers' account and transaction data, banks must provide application programming interfaces (APIs) (Petrović, 2020). API technology is the agreed standard for the safe sharing of data in online environment.

APIs are interfaces that connect software applications, both within and between organisations. APIs allow software applications to communicate with one another by allowing one application to call on the functionality of another (Euro Banking Association, 2016). APIs are a type of software architecture that is based on the idea that interfaces should be reusable, secure, and scalable while also providing developers with self-service options. As a result, APIs have the potential to reduce the cost and time it takes to interface systems which allows faster, inexpensive, and better innovation on larger scale.

There are multiple different forms and classifications of APIs varying from private and internal APIs to partner APIs and completely public also known as "open" versions. In open banking and PSD2 framework, the APIs used, are open APIs which means that they are open to external third parties to digitally connect services (Euro Banking Association, 2017). However, like it was stated earlier, in PSD2 framework for TPPs to be eligible to use APIs and get access to actual customer information, TPPs must be registered by the responsible financial authority of its home country (Petrović, 2020).

APIs have their own technical specifications, testing capabilities and consistent legal and operational terms under which APIs can be used (Euro Banking Association, 2016; Petrović, 2020). For several years bigger technology companies like Facebook, Google,

Twitter, Salesforce and Uber have been providing APIs for third parties in order to share data, enrich their platform connectivity and to deliver more attractive services to their customers (Euro Banking Association, 2016).

In addition, open APIs have been identified being tool for value co-creation (Euro Banking Association, 2016). Open APIs allow TPPs to create their new applications "on top" of the platform. For developers, this means that they are able to reuse existing functionalities and use existing data sources to enrich their applications, which lowers costs and shorten time-to-market. For API owners, this means larger distribution network and minimized innovation costs, which are taken care of by TPPs. Also, providing open APIs offers opportunity to build comprehensive social network where it is easier and more efficient to build user communities, and increase brand awareness by social sharing.

3.2.2 Open Banking strategies

Apart from the mandatory requirements of the PSD2, banks have a wide range of options in terms of openness and services provided (Omarini, 2018). There are many dynamic changes to be prepared for in this emerging context of open banking. Choosing the right strategy is essential in order to manage in the competition and even gain competitive advantage from open banking. Choosing the right strategy and right degree of openness should be based on traditional banks' strengths, weaknesses, goals, and constraints, because not all strategies work for everyone.

Earlier studies of open banking have identified four possible strategies for banks to utilize when implementing open banking practices in PSD2 context . (Omarini, 2018; Petrović, 2020). One of the main points in these strategies is the degree of openness with which the traditional bank interacts with the ecosystem. Although, the content of these strategies is basically the same in different studies, the names of the strategies are varying

slightly in different studies. However, for example in Petrovic's (2020) study these strategies are called Resign, Distributor, Manufacturer and Open Banking Ecosystem.

Resign

This open banking strategy that has been called "Resign" or "Comply" means the procedure where banks perform only the minimum effort by opening specific APIs which fulfil the requirements of PSD2 in order to comply with the regulation (Omarini, 2018; Petrović, 2020). This is passive strategy where banks wait and see in which direction the situation with PSD2, and open banking will develop and then act reactively (Omarini, 2018). In this strategy, traditional revenue streams that were previously thought to be secure are being affected, and interfaces of third parties are disintermediating the bank. Traditional banks continue to serve as account service provider and as foundation of the system.

Distributor

This strategy option means that banks establish more advanced APIs also called premium APIs, which are produced for sharing voluntarily more advanced client information besides the mandatory account and transaction information (Omarini, 2018; Petrović, 2020). This strategy enables banks to collaborate more with TPPs. Sharing more different datasets enables the development of new specific services in broader scale which in the end benefits the consumer also. In this strategy, traditional banks act as gatekeepers, allowing third parties access to data and other services.

Manufacturer

The "Manufacturer" strategy means that traditional banks start to compete with other TPPs by becoming one by themselves and actively seeking new opportunities of open banking and PSD2 (Petrović, 2020). This strategy allows banks to obtain better understanding of customers' data which can then be utilized in the production of more personal financial services.

Open banking ecosystem

Fourth strategy option which is called “Open banking ecosystem”, means the combination of previous three strategies (Euro Banking Association, 2016; Petrović, 2020). The focus of this strategy is on the concept of “banking as a platform” where banks act as intermediary and facilitator of businesses of TPPs. This allows banks to transform their open banking portals into data ecosystems, allowing them to establish partnerships across the TPP network. Banks are providing a core where other players can develop their offering as well as linking users across different groups and facilitating matchmaking (Omarini, 2018). These collaborations will enable banks to provide TPPs services via bank’s own online portal and give banks access to a portion of customer data stored on TPPs’ systems (Petrović, 2020).

In this strategy, banks may also attempt to monetize APIs, as well as compete and profit from their own improved value proposition to customers, in order to meet changing market demands (Petrović, 2020). This strategy model has been evaluated as most radical change, requiring complete rethinking of the business model.

Open banking strategies in PSD2 framework are indeed fostering the advantages of APIs. Omarini (2018) states that all four strategies seem to require some rethinking of overall banking business model as well as governance and internal organisation. Also, banks may utilize different strategies and roles for example between distinct product lines (Euro Banking Association, 2016). However, the common account relationship still forms the foundation for offering wider range of services. Petrović (2018) states that the most optimal strategy can certainly be combination of these four strategies. One possible combination is strategy where banks offer banking products and services through third party interfaces and their own interfaces which could also be platforms for offering third party services. In addition, it should be noted that for traditional banks, the process of adopting new roles and strategies involves different transformational challenges, which takes time to evaluate and execute (Euro Banking Association, 2016).

As it was stated earlier in the chapter 2, smaller Finnish banks have been utilizing the first open banking strategy called *Resign* or *Comply* by only providing mandatory PSD2 APIs. Also, these same banks have outsourced the production and distribution of these APIs to third party provider. In addition, as it was discussed earlier, bigger Finnish banks like OP Financial Group and Nordea have been providing these premium APIs and by doing that, approaching the open banking concept with much different strategy than smaller traditional banks in Finland. The approach of these bigger traditional banks could be now seen as a combination of strategies *Distributor* and *Manufacturer* because these banks are approaching open banking more openly and constantly looking for new opportunities to utilize from it. Furthermore, these bigger banks have discussed about building and implementing comprehensive open banking ecosystem. So, the final goal of these bigger Finnish banks such as OP Financial Group and Nordea might be treating the open banking concept with the lastly discussed strategy called *Open banking ecosystem*.

3.3 Open innovation paradigm

The open innovation concept was first introduced by Henry Chesbrough in 2003, when Chesbrough's book *"Open innovation: The new imperative for creating and profiting from technology"* was published (Chesbrough, 2003). After that, the open innovation concept has been widely distributed and studied in various industries (Bogers et al., 2018; Naqshbandi et al., 2019). Bogers et al. (2018) argue that variety of factors have contributed to the emergence of open innovation as philosophy, as well as a research area and culture.

The belief that information and knowledge is generally widely spread in the economy has become a basic principle. In more common words, companies have realized that most of the smart people work for someone else. Some factors that have strengthen the importance of open innovation practices are increased mobility of staff, more competent universities, increasing access of start-up companies to venture capital, and the growth

of the internet, social media, and supporting information and communication technologies.

In open innovation paradigm, it is assumed that in order to companies to manage in the competition and advance their technology, they should utilize external ideas and external paths to market as well as they are using the internal ideas and internal ways to market (Chesbrough, 2006; Piller & West, 2014). Value can be created by utilizing internal and external ideas, whilst internal mechanisms for claiming portion of that value are defined (Chesbrough, 2006). In addition, value can be created by taking internal ideas outside the present business areas of the company through external channels. The open innovation paradigm can be seen as the opposite of the more traditional closed innovation paradigm, where R&D actions are internally developing products and distributing these products to markets by companies themselves. In open innovation paradigm, R&D is seen more as open system.

Figure 5 represents the innovation process of closed innovation. In this paradigm the front-end of the innovation which contains the examination of possible ideas and research projects for new innovations, is launched with the internal knowledge and technology base of the company (Chesbrough, 2006). In this closed innovation funnel new ideas progress through the process which is closed and have only one possible entrance and one possible exit to certain market.

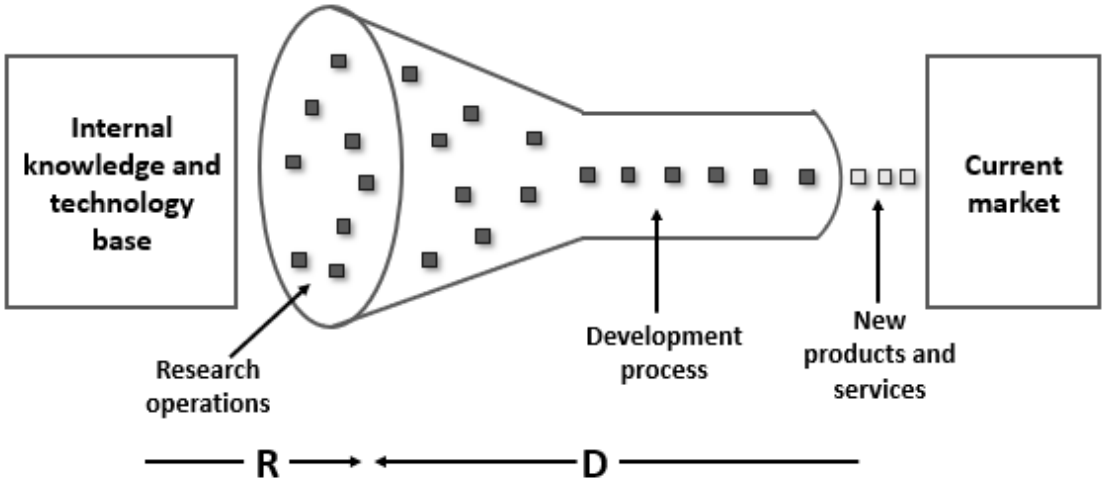

Figure 5. Closed innovation funnel. The R stands for research and D for development (adapted from Chesbrough 2006).

However, in figure 6 is presented the open innovation funnel. In this option, projects can be launched either from internal or external knowledge and technology base and new technology and knowledge can be applied to project on various stages during the project. Also, there are multiple options for exit (Chesbrough, 2003). Projects can enter to market in many ways besides through company's own sales and marketing channels, for example through licensing or spin-offs. As a result, new innovations may also enter to entirely new markets.

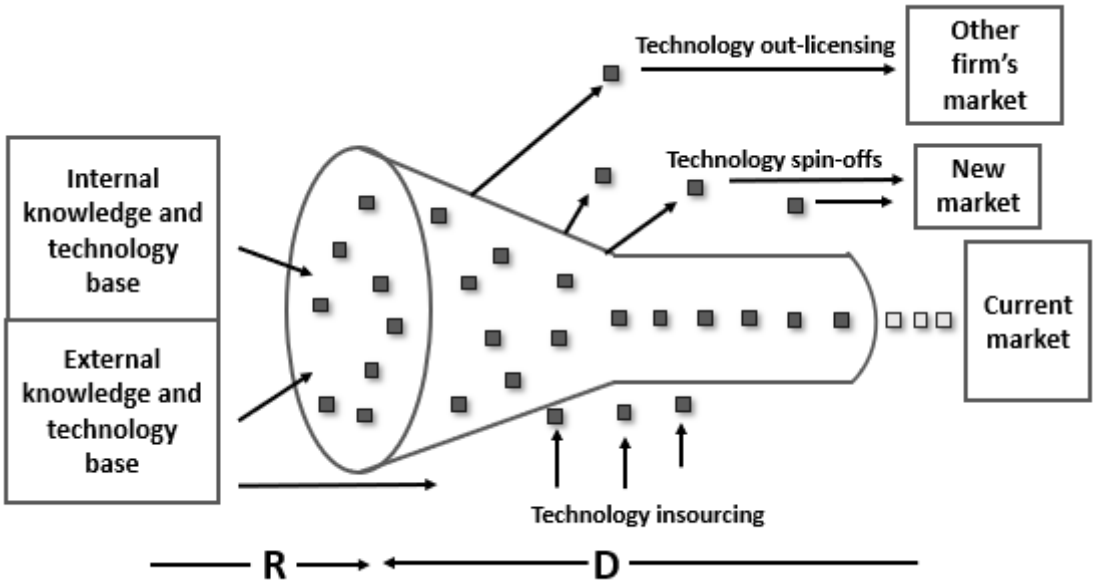

Figure 6. Open innovation funnel. The R stands for research and D for development (adapted from Chesbrough 2006).

Nevertheless, many businesses have adopted open innovation model and its popularity among scholars and practitioners as an alternative model of innovation has evolved exponentially in recent years (Naqshbandi et al., 2019). Companies have acknowledged the value of open innovation practices in order to keep up with dynamic and competitive market conditions. However, there are not many studies covering the utilization of open innovation practices in the banking industry.

3.3.1 Open innovation modes, platforms, and APIs

Inbound open innovation

The first mode of open innovation is called inbound open innovation also known as outside-in open innovation which practices are about bringing external technologies and ideas to company's own innovation process and integrating them into company's own knowledge (Chesbrough & Brunswicker, 2014). As a key idea in outside-in processes is that the locus of creating new knowledge is not always the same as the locus of innovation (Gassmann & Enkel, 2007). Results of Chesbrough's and Brunswicker's (2014) study

shows that inbound open innovation practices are used more usually than opposite outbound practises. Examples of these inbound open innovations are co-creation with customers and suppliers, informal networking, idea and start-up competitions, hackathons, and IP in-licensing. Chesbrough and Brunswicker (2014) studies also found that managers consider customer co-creation and informal networking being the most important inbound open innovation practices.

Gassmann and Enkel (2007) discuss in their article about some success factors and critical issues of involving suppliers and customers to company's product development processes. Benefits from involving suppliers are for example earlier identification of technical problems, better utilisation of internal knowledge and access to new or supplementary technologies which may improve product attributes or shorter time to market. Integrating customers in product development process can also create additional value, because customers are the ones with the valuable knowledge of real customer needs. Also, involving customers already on early phase of innovation process may enable company to deduce information about customers' needs that even customers are not aware of yet.

Gassmann and Enkel (2007) also introduce some characteristics of companies which prefer using outside-in open innovation process. Companies may be from low-tech industry which could expect overflows from high-tech industries. Some other characteristics are the possibility of high knowledge intensity in the industry, or the market is characterised by rapid change and fuelled by constant technology development. As a result, the company's need for knowledge cannot be satisfied by internal abilities and competencies only.

Outbound open innovation

The another mode of open innovation is called outbound open innovation also known as inside-out open innovation which practices serve as opposite for outside-in practices (Chesbrough & Brunswicker, 2014). The focus in inside-out approach is about

externalising existing unused internal ideas and knowledge to bring innovations to market more quickly than they could by internal development (Gassmann & Enkel, 2007). The key belief behind the inside-out process is that the locus of innovation does not inevitably have to be the same as the locus of exploitation. For example, joint ventures, spinoffs, IP-out licensing, and patent selling are so called outbound open innovation practices.

Gassmann and Enkel (2007) state that transferring ideas to other companies and commercialising ideas in different industries can bring companies new revenue streams and increase revenue vastly. In addition to commercializing ideas outside company's own industry or market, outsourcing can be used to channel knowledge and ideas to external environment. Outsourcing entails the obtaining knowledge from the open market and licensing of technology from a third party. Outsourcing can offer multiple benefits, containing the access to new complementary knowledge, more flexibility to manage problems, faster processes which may reduce time-to-market and possibility to concentrate to core competencies.

One characteristic of company that focuses mainly utilizing inside-out practices of open innovation is that they are research-driven companies (Gassmann & Enkel, 2007). Companies focusing on research, also aim at reducing fixed costs of R&D processes and sharing risks by outsourcing some parts of their development process. Other reason for outsourcing the commercialisation of company's innovation may be that company does not have suitable brand for the product in prospective market. Also, there might be possibility that company has innovated technology that can set a technological standard. This can lead to positive effects of spill over when this technology can be integrated to other industries through licensing. For example, innovations which are already old technology in IT industry, may be much later successfully integrated in other industries as well. These cross-industry developments are an excellent example of the inside-out open innovation processes.

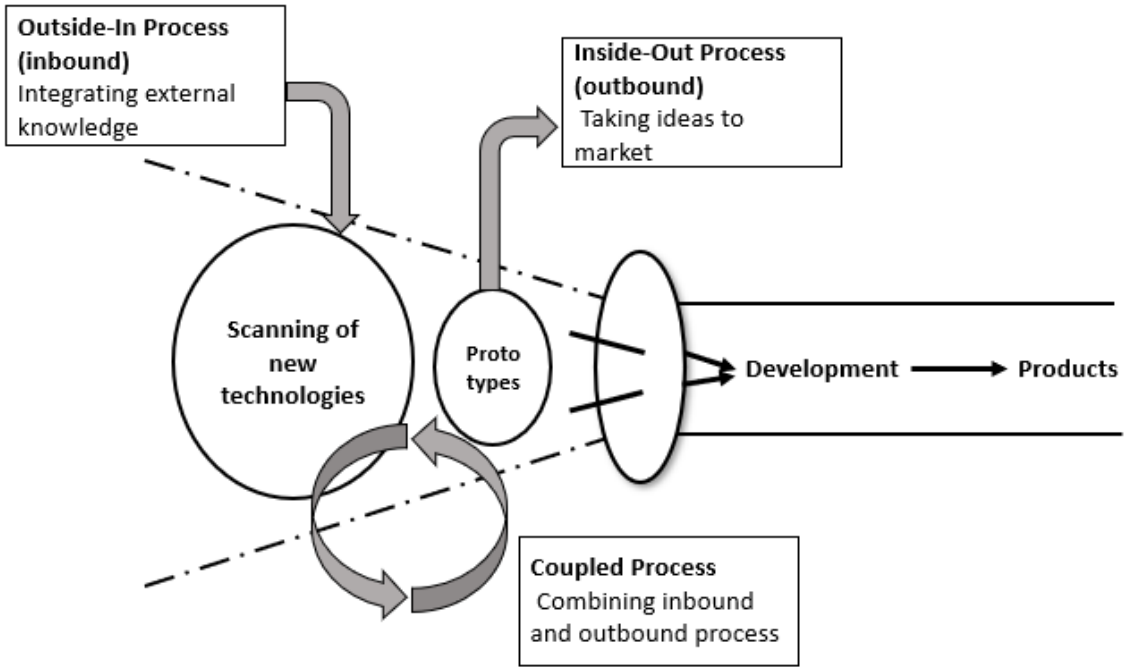

Figure 7. Three modes of open innovation processes (adapted from Gassmann and Enkel 2007).

Coupled open innovation

A coupled mode of open innovation, which represents a combination of inbound and outbound open innovation practices or another form of co-creation, is a third type of open innovation that has been described in literature (Gassmann & Enkel, 2007). In coupled open innovation companies combine the gaining of external knowledge (inbound open innovation) and taking ideas to external markets (outbound open innovation). To succeed in this, companies collaborate with other participants in strategic innovation networks. In order to cooperate effectively, balancing the give-and-take of information is needed and that is why combining outbound and inbound practices of open innovation is crucial. Cooperation relates to shared creation of expertise through partnerships with specific partners like suppliers, competitors, customers, joint ventures, or universities. Gassmann and Enkel (2007) state that cooperative partnerships can help companies to succeed better in competition and reduce risks but cannot shorten the time of development.

Balancing the give-and-take of the information is crucial especially for companies which have formed strategic alliances and joint ventures (Gassmann & Enkel, 2007). Company must have competency to integrate foreign knowledge effectively into company's own knowledge and processes but also to have ability to externalise competencies and knowledge to enable partner to learn. Also, one prerequisite to succeed and gain competitive advantage with coupled open innovation processes is built on finding and integrating right partners which can provide the right knowledge and competencies. Companies that are concentrating to coupling outbound and inbound processes of open innovation are commonly looking for creating a standard process.

Platforms and APIs in open innovation

The concept of platforms has long history in academic literature especially under topics related to innovation and technology management (Eckhardt et al., 2018). Platform as a term itself is rather broad and there are multiple variants of it such as product platform, technology platform, process platform, industry platform, multi-sided platform, and platform ecosystems (Thomas et al., 2014). However, in this work, the main focus lies on platform ecosystem but also on technology platform which can be observed as a subterm under platform ecosystem.

Eckhardt et al. (2018) state that platforms act as central hubs within an innovation ecosystem and are dependent on so called complementors in order to increase the success of the platform. Complementors are other players who are using the platform as foundation in order to build their own complementary services and products.

Eckhardt et al. (2018) also argue that there are multiple open innovation strategies to platform providers to choose from in order to become platform leaders or to improve their current platform leadership. APIs also have role in these strategies, for example Google increased the value of its Google Workspace (formerly known as G suite) business software ecosystem by granting developers API access (Eckhardt et al., 2018). In addition, Deutsche Telekom opened its API services and allowed software developers to

integrate their own applications. Aitamurto and Lewis (2013) state that in their studies open APIs have helped the companies' innovation processes and accelerated R&D by sharing expertise with developers, expanded company's product portfolio, and formed external R&D departments in the form of innovation networks.

In other words, APIs have become critical component of platform economy especially considering the aspect of openness and in the process of utilizing open innovation practices in these platforms (Huang et al., 2019). That is why big technology companies which are basing their business models to platforms and technology and are operating in multi-sided markets are offering open APIs and giving access to data resources for different users. To let them construct more application scenarios on top of their products.

3.3.2 Challenges and opportunities of open innovation

There are multiple challenges in open innovation that companies may face, and which may limit especially large companies' ability to utilize open innovation practices (Chesbrough & Brunswicker, 2014). Some of the most common challenges are organisational change and managing external innovation partners. In the context of open innovation, there has also been discussion regarding a challenge about inclination of employees to disregard external knowledge. This issue has also been called "not invented here" syndrome. Although, Chesbrough and Brunswicker (2014) state in their studies findings that this issue is no longer perceived as so significant in the companies practicing open innovation, it is still prevalent issue and might complicate companies' efforts in bringing external knowledge to it innovation processes effectively (Chesbrough, 2017).

One challenge that has also been discussed on implementation of open innovation practices is about the degree of openness that company chooses (Stanko et al., 2017). Stanko et al. (2017) argue that open innovation studies have a tendency to be excessively optimistic about its performance implications and there has been inadequately studies about potential drawbacks in results of utilizing open innovation practices. Stanko et al.

(2017) also states that there is a point of optimal openness after which additional openness harms the performance. Analyses of different approaches used to gain external information from a broad variety of sources have continuously indicated a point of diminishing returns on innovation.

Other challenges that have been identified in open innovation practices are the management of external ideas and the process of transferring open innovation outcomes to particular business unit that take care of the process to bring the product to market (Chesbrough, 2017). If the flow of external ideas grows large and the process is not managed effectively, it might create bottlenecks which are slowing the entire innovation process. In addition, if the company does not have ability to bring outputs of the open innovation to the market, the actual benefits are not claimed.

Opportunities and benefits that utilization of open innovation practices can provide to companies have also been identified broadly. The father of open innovation, Henry Chesbrough (2017) states that in multiple studies it has been found that companies in various industries that have been using open innovation practices and cooperating in their development process have created new revenue streams and achieved better financial return (Chesbrough & Brunswicker, 2014; Du et al., 2014; Laursen & Salter, 2006). In addition, companies that have been having more external sources of knowledge have achieved better innovation performance and better innovation results.

Additionally, Chesbrough and Brunswicker (2014) state that in their studies, managers of companies that have utilized open innovation practises are seeing more opportunities in inbound open innovation practices than outbound open innovation practices. Especially informal networking which means networking with other organisations without formal relationship has been seen as great opportunity to gain external knowledge. Although, outbound open innovation practises have not been as popular, Chesbrough and Brunswicker's studies show growing interest also towards them. Their studies have indicated

that most popular outbound practice are joint ventures which mean investing to strategic independent joint ventures together with external partners.

Chesbrough (2017) also appraise that in the future companies that are only relying to their internal and private R&D lab, cannot be successful against competitors who are also utilizing inflows of external knowledge and seeking paths to new markets for outflows of internal knowledge. The future of open innovation will be more extensive and contain more collaboration with wider perspective of different parties and it will go beyond the technology to include entire business models, as well as product and service innovations.

3.4 Theoretical framework of the study

In this sub-chapter, the final theoretical framework of the study is presented. The framework is built around the main topics that have emerged from the concepts of open innovation, open banking, and APIs during the literature review. This framework will serve as conceptual foundation of empirical part. The framework is utilized to support the process of developing the questions for online survey as well as in analysis part for assessing the results of the survey and finally to help to give answers to research question and objectives. There have not been exact studies of open banking made from the open innovation perspective although many characteristics of open banking practices and aspects are also familiar in the field of open innovation (Chesbrough, 2003; Omarini, 2018). Due to this, there was not any previous ready-made framework models that could have been exploited.

The following framework that is introduced in figure 8 is serving as a base module for combining the open innovation with open banking and APIs. The framework is built around the modes of open innovation and main information flows between banks and TPPs. The whole open innovation concept is built around these two flows of information, inbound and outbound flows (Chesbrough, 2006, 2017; Piller & West, 2014). This

information in this case means ideas, knowledge, and technology for instance. In addition, in the middle of the framework is presented the solution for combining the use of outbound and inbound information flows. In open innovation literature this concept is known as coupled open innovation and the implementation process of it is based on building strategic innovation networks, which can also be called platforms. Platforms have been identified being central factor in both open innovation studies as well as in the discussions of potential open banking strategies (Eckhardt et al., 2018; Euro Banking Association, 2016; Petrović, 2020).

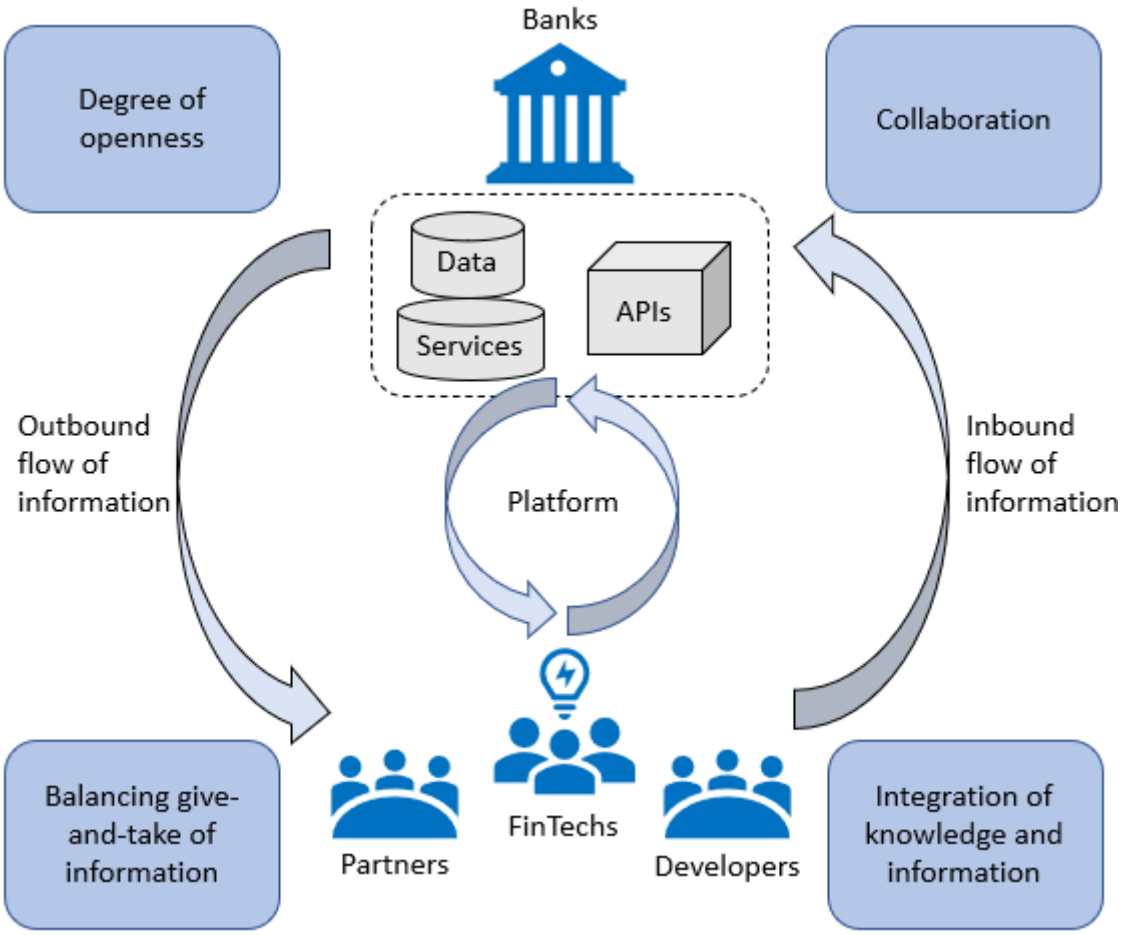

Figure 8. Theoretical framework of the study.

As it has been stated earlier, open banking in Europe has been regulatory driven and the whole PSD2 framework for banks opening up has been built around APIs. In addition,

the observed potential open banking strategies have also been grounded on APIs and their advantages (Euro Banking Association, 2016; Omarini, 2018). As a result, APIs can be seen as facilitator of open banking in Europe as they are the agreed standards for sharing data securely and they act as base for traditional banks' open banking portals. Additionally, open APIs have central role in platform business models that BigTechs such as Facebook, Google, Twitter and Salesforce are utilizing (Aitamurto & Lewis, 2013; Eckhardt et al., 2018). Due to this, open APIs can be observed as facilitator in the concept of open banking also regarding the possibilities for banks to build comprehensive open banking ecosystem where platform business model could be utilized.

In every corner of this framework has been stated an element that has been highlighted in both open innovation and open banking studies as central factor. The first element is the degree of openness. It is central part of current open banking strategies that has been introduced in earlier studies (Euro Banking Association, 2016; Stanko et al., 2017). Also, for instance Stanko et. al (2017) have stated that degree of openness is challenge of open innovation that has not been discussed enough. They also argue that there is certain level of openness that after crossing it, the openness becomes harmful for the company. As a result, degree of openness can be observed as factor that may offer more opportunities but may also reveal new challenges (Euro Banking Association, 2016; Stanko et al., 2017).

The second element is collaboration. It is central part of open innovation because utilizing all information flows including the utilization of external knowledge as well as searching for new external paths to new markets through new distribution networks or by building platform, requires collaboration with different external parties (Chesbrough, 2017; Gassmann & Enkel, 2007). In addition, in the open banking concept, collaboration is frequently repeated factor. Open banking has been particularly stated being the great opportunity to enhance collaboration and co-operation in innovation (Omarini, 2018; Petrović, 2020). Especially, banks collaborating with FinTech companies and start-ups is

topic that has been widely discussed not only studies regarding open banking but also in studies relating to a future of banking industry in general (Lee & Shin, 2018).

Third and fourth element are closely related factors that have also been highlighted especially in open innovation studies but are also relating to aspects of open banking. Balancing give-and-take of the information is vital for co-operating effectively and forming partnerships because there should always be some information or resources for both parties of the partnership. Balancing the give-and-take comes crucial especially in the coupled open innovation form and in platform business models (Gassmann & Enkel, 2007). The ability to integrate knowledge and information is also related to this balancing and is fundamental in order to practice open innovation activities effectively. Without ability of effectively integrating external knowledge to your own development processes and ability of integrating your internal ideas to others development processes, the company really cannot get the benefits of open innovation (Chesbrough & Brunswicker, 2014; Gassmann & Enkel, 2007).

In the following empirical part, the focus will be primarily only on the Finnish retail banking industry. In order to answer to research question and to achieve objectives, it will be analysed that how open banking have affected to development process of Finnish banks in general and how Finnish banks can utilise and facilitate these different information flows of open innovation. Also, these four elements of the framework will be considered, including the evaluation of potential opportunities of them as well as potential challenges that banks might be facing because of them.

4 Research methodology, analysis, and results

In this chapter is introduced research methodology and factors how it has been synthesized with research process, data collection methods and analysis methods. In addition, the actual data collection is walked through following with the data analysis and presenting the results. This chapter is concluded with the evaluation of research validity and reliability.

This research is an exploratory study where preliminary information is gathered to help the process of defining the research problems and objectives and to suggest hypotheses (Sachdeva, 2009, pp. 14-15). Exploratory studies are useful in terms of clarifying and creating better understanding of issues and phenomena (Saunders et al., 2007, pp. 133-134). In addition, it is useful to gain new perspectives, ask questions and evaluate phenomena in new light. Exploratory way of doing research has been considered especially helpful if there is a need to explain your understanding of an issue even though you are not sure what the problem is (Saunders et al., 2007, pp. 133-134).

Common techniques and procedures for conducting exploratory research are search of literature, interviewing experts in the field, in-depth interviews and focus group interviews (Saunders et al., 2007, p. 133). Exploratory research is rarely useful for decision-making on its own, but it can assist and offer insight into a situation. Qualitative analysis, on the other hand, may provide clues as to "why," "how," and "when" something happens (Sachdeva, 2009, pp. 14-15).

This research's methodology is closely based on Saunders et al. (2007) research onion framework. The structure of this onion framework is divided into six layers, starting from outer layer with generalities, and progressing to more specific techniques and procedures. The six layers of this framework from outer layer to inner are *Research philosophy, Research approach, Research strategy, Research choice, Research time horizon and Research techniques and procedures.* The onion framework for this research is presented in figure 9.

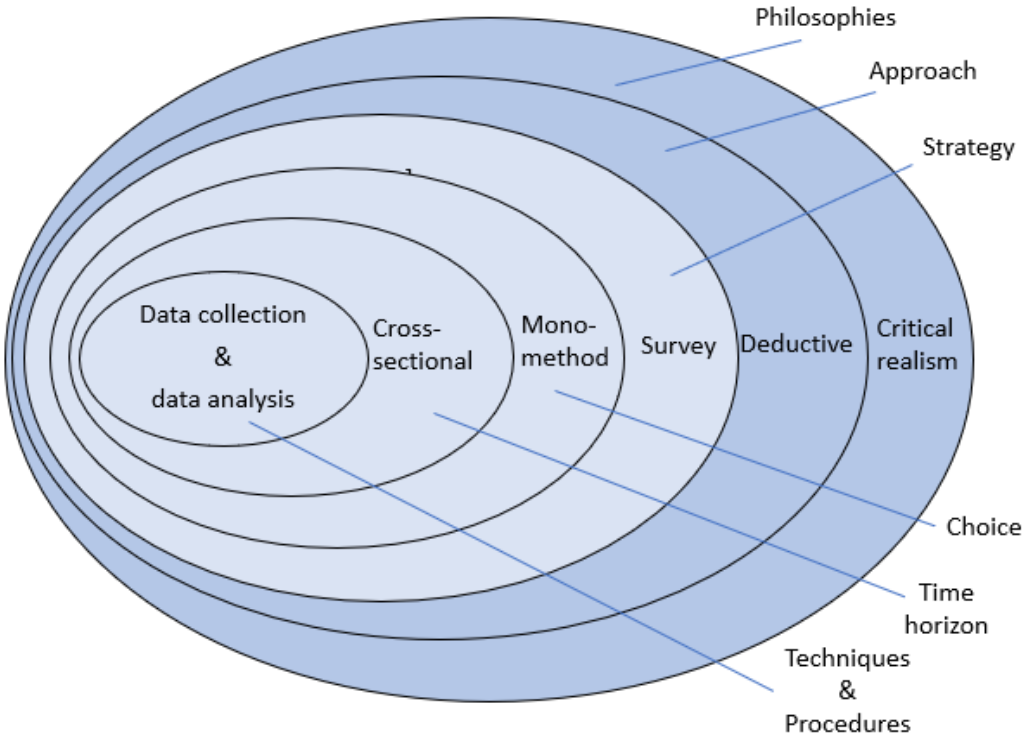

Figure 9. The research onion framework (adapted from Saunders et al., (2007). p. 102).

Starting from outer layers, the philosophy of this research is critical realism and research approach is deductive. The core of a realism is the belief that what our senses present us as fact is the truth and that there is truth that exists outside of human's mind (Saunders et al., 2007, pp. 104-106). In addition, according to critical realists, what we perceive are sensations, or images of objects in the real world rather than the exact things directly. Meaning that things that we see might not be the absolute truth but more part of a bigger picture.

So, although there are some common factors in practices of open banking and open innovation, the findings are analysed with such criticality that even though there exist similarities, this does not have to automatically mean that open banking offers open innovation opportunities to banks. The approach of this research is deductive, meaning that prior to data collection, theoretical position is developed by conducting comprehensive

literature review which helps to identify theories and ideas that can be then tested using data (Saunders et al., 2007, pp. 38, 57).

Research strategies of this study are a survey strategy and a narrative inquiry. The survey strategy is commonly associated with the deductive method, and it has been popularly used for exploratory research (Saunders et al., 2007 p. 138). Survey strategy is common because it allows collection of large amounts of data from a large number of people at a low cost. The common way of conducting survey strategy is by using questionnaires which allow collecting standardized data which is easy to be compared. Using questionnaires is often used as data collection method for quantitative data.

Narrative inquiry is a qualitative method for describing the meaning or result in general. This research strategy focuses on gathering perspectives of participants and evaluating them as full stories. It aims to maintain chronological links and event ordering in order to increase comprehension of relevant topics (Saunders, et al., 2019 pp. 209–211). In this strategy, the participator is the narrator of narrative investigation, which can be organized in multiple ways and usually with small number of participants. Usually in this strategy, small and purposively chosen samples are used because this technique has intense and time-consuming nature. However, because of the purposeful selection process, small and in-depth narrative interviews can be beneficial.

The time horizon for this study is cross-sectional, meaning that study is focusing on certain phenomenon at a certain time. In this case, research focuses on investigating the open banking phenomenon and how it is currently perceived to have affected the bank's innovation processes and how it is currently perceived to have an impact in the future. Saunders et al. (2007) state that common research strategy for studies with cross-sectional time horizon is a survey strategy. As a research choice, the mono method is used. Saunders et al. (2007, p. 145) state that using mono method means that data collection is done by using one either quantitative or qualitative technique and data analysis is

done by using one corresponding analysis technique. In this research, the collected data will be qualitative as the analysing technique will be too.

The process of this research with exploratory elements is presented in the Figure 10. The first step of this research has been to identify research objectives, questions, and limitations of the study. The second step has been conducting comprehensive literature review which main purpose has been to present the issues, theories and phenomena that are relevant to the work, considering research objective and research question. In this research, the literature review was built around three main themes including retail banking industry, open banking and open innovation. As a conclusion of the literature review, a theoretical framework has been compiled from these relevant themes.

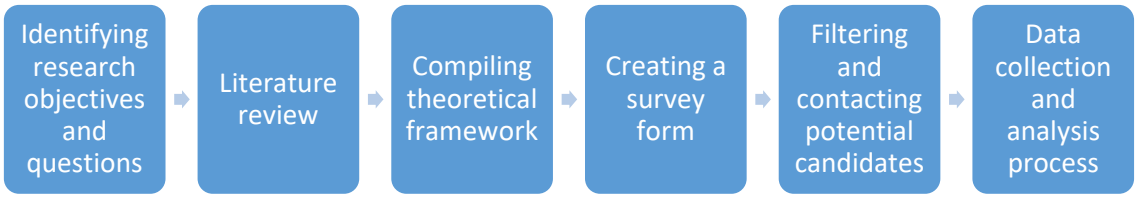

Figure 10. Research process of the study.

This theoretical framework alongside with research objectives and research question was then utilized in the empirical part of this work for conducting data collection of qualitative data by using it in the process of forming the relevant questionnaire for online survey. In this work, the collection of qualitative data is done by using online questionnaire which is sent to experts in the field of open banking. At first, the plan was to conduct semi-structured interviews with experts in the field. However, due to time constraints and challenges of scheduling the interviews with possible interviewees, the plan had to be changed, and data collection was decided to be done by online survey. However, the plan was still to collect qualitative data with survey by using mostly open-end questions and to try to get experts in the field to answer the survey.

Having survey with mostly open-end questions is not the most recommended way to conduct qualitative research and it has its own risks. Open-end questions are more often used in in-depth and semi-structured interviews (Saunders et al., 2007 p. 369). However, open-end questions can be also useful in questionnaires, for example in cases where the research is unsure of the response, such as in exploratory research or when more detailed answer is required and when researcher is trying to figure out what is the upmost in the respondent's mind.

Also, as the plan from the beginning was to conduct research with qualitative data and qualitative analysis, the research questions and objectives were also determined to their current form in which they can be answered best by using methods of qualitative research. Due to this, the questionnaire that was originally designed to be used in semi-structured interviews, was modified to be used in online questionnaire. As a result, the number of questions had to be reduced and some questions were combined, in order to ensure that potential respondents do not opt out because the questionnaire is too heavy.

The data collection process and contents of the survey are explained thoroughly in chapter 4.2. After the data has been collected it will be analysed by using qualitative analysis methods. Analysis is conducted by using conceptualization. First the answers of the survey are grouped in different categories which are then combined into themes and these themes are presented in cohesive manner. The more detailed walkthrough of analysis is presented in chapter 4.3. After the analysis, the final part of the research process of this study is to present the results, conclusion, and discussion around the future of this topic.

4.1 Data collection

As it has been stated earlier, the collection of qualitative data is conducted with online survey, the target sample being experts of open banking that has work experience in Finnish banking industry. Sample for participating the survey was chosen from the population of people who are currently working in Finnish banking industry or have been

working in the industry during the recent years and are currently still working in Finnish financial services industry as a consultant for instance. In addition, respondents had to have experience from working with open banking.

To find these experts, the chosen sampling technique is purposive sampling. This sampling technique allows the author to use own judgement and select cases that will best enable to answer research questions and achieve the research goals (Saunders, 2007, p. 231). Purposive sampling is useful for dealing with small samples or when author wishes to select cases that are particularly informative.

As a result, the survey strategy is combined with the narrative inquiry by sending the questionnaire for smaller purposively chosen sample of open banking experts working in Finnish banking industry. With this sampling technique and smaller sample, the results are not representing the whole population. However, this technique and strategies were chosen due to exploratory elements of the research where the goal is to gain better understanding and new insights from certain phenomenon rather than searching for the absolute truth. Secondly, because of the exploratory character of the research, the sample wanted to contain true experts in the field who are as informative as possible.

In order to implement chosen data collection and sampling technique, the preparation process for data collection included tasks of determining that who is considered as an expert, where these experts may be found and how they can be contacted. Potential respondents were found and contacted through online community service LinkedIn, where contacting specific people regarding their working career and professionality is rather easy. Search function of LinkedIn has multiple filtering options, and it allows to find people through keywords appearing in their profile.

Attributes of being expert in this case meant that this person has at least 3 years of experience working in Finnish banking industry in general and in their LinkedIn profile were mentioned knowledge or skills regarding open banking, or PSD2 and API development

or in their profile were mentioned about participating in projects regarding open banking or PSD2 and API development. Also, people who were in the position where it could be assumed that they have knowledge from the field even though there would not be exact descriptions about projects relating open banking were handle as experts, for instance job title being "head of open banking".

The first searches have been done by using open banking as main keyword and filtering the results by choosing Finland as location and banking and financial services as industry. After this, in following searches there have been added filtering with different Finnish banks as person's current employer or past employer. The final searches have been done by using same filtering options but using API and PSD2 as keyword. From the search results, the potential individuals were chosen and every expert's profile that was chosen to be on the mailing list for participating the survey was gone through one at a time and in detail.

Searching could not be done by using certain occupational titles as keywords because titles of experts in the field of open banking are varying a lot and there really is not standardized titles for experts in the field. For example, search parameter "open banking manager" does not provide almost any sufficient results. However, since the requirements for being expert and possible respondent were quite demanding, it was not surprising that almost all candidates worked currently at manager or senior level position. Titles of potential candidates included titles such as product manager, product owner, senior manager, head of development and senior business developer for instance.

Eventually, 40 experts were founded and contacted through LinkedIn in relation to their interest in taking part in the survey. Messages included the proposal cover letter and link to online survey. LinkedIn in-mail messages have been sent during three days on March 31 and 1st and 2nd of April and due to time constraints, the survey has been given a response time until April 11.

Online survey includes total of 14 questions. First three questions are related to background information of the respondent and following 11 questions are mostly opinion-based open-end questions. As it was stated earlier in the end of the chapter 3, the questionnaire has been built around the research framework that was presented in chapter 3.4. For survey form, questions after the background part have been divided into three different categories relating the impact of open banking, innovation opportunities and collaboration with third parties. The full list and template of questionnaire can be found attached to appendices as Appendix 1. The online survey has been built on Google Forms platform and respondents were provided with link to the form. The respondents answered to survey completely anonymously and there were not collected any personal information about the respondent or any specific information about respondent's employers.

Eventually, 7 responses were collected. The total response rate for this survey can be calculated by dividing total number of responses with total number of samples minus ineligible responses. In this case, there is not ineligible responses, so 7 is being divided with 40 which means that total response rate is ~0.175, in other words 17.15%.

4.2 Data analysis and results

Saunders et al. (2007) state that there are not that much standardized approaches to analyse qualitative data as there is for analysing quantitative data. However, Saunders et al. (2007) compares the process of analysing qualitative data for constructing a jigsaw. First, qualitative data can usually be quite complex, so it will first need to be grouped, or classified into categories, before it can be meaningfully analysed. After that, in the analysis part, categorisation helps to find relationships between distinct categories. By finding these relationships, the bigger and conclusive picture can be finally formed (Saunders et al., 2007, pp. 470-472).

Different approaches to analyse qualitative data can be divided to more structured ones and less structured strategies (Saunders et al. 2007, pp. 478-480). More structured ones are usually following deductive approach, where there have been defined categories or codes for analysis in advance and usually derived from the theoretical framework. This will be the type of analysis to be used in this work.

This analysis is started by categorising and summarizing answers into meaningful categories or themes which are derived from theoretical framework and guided by objectives and research questions of this study. By categorizing the survey answers in such manner, the analysis process is also quickened because each theme will be analysed one by one and by doing that the direct answers for some research objectives can be found directly from there.

These main themes are presented in the table 1 with more detailed explanation of the content that is included in the theme as well as the actual questions which answers are grouped under this theme. The results of the survey are presented under these main themes which are presented in the first column of the table. The content of the answers will be analysed with the support of theoretical framework and literature review which concepts will be reflected during the analysis of answers. After this, the final conclusions for answering the research question and objectives can be collected from these categories and summarized into coherent conclusion.

Main theme	Detailed content	Questions of the survey answering the theme
Current state of PSD2 open banking and utilization of APIs in Finnish banking industry	• Traditional banks' attitude towards open banking • Effects of open banking to banks' innovation processes • Utilization and opportunities of APIs	• Q4 • Q5 • Q6
Open innovation opportunities and cooperation in the Finnish banking industry	• Inbound flows • Outbound flows • Coupled flow (networks and platforms) • Collaboration and cooperation with TPPs	• Q7 • Q8 • Q9 • Q13
Challenges of open banking and open innovation in the Finnish banking industry	• Challenges of open banking • Challenges of collaboration • Degree of openness	• Q10 • Q11 • Q12
Future of Finnish banking industry	• Traditional banks' role in the Financial ecosystem in future • Effect of open banking to banks' role in the future	• Q14

Table 1. Main themes for analysing the survey answers.

First, is shortly introduced the background information of the respondents on the Table 2. As it was stated earlier, the potential candidates searched for participating this survey

were the experts in the field of open banking but who also have at least 3 years of work experience from banking sector in general. As it can be observed from the table 2, all respondents have at least 4 years of work experience in the banking sector in general and three of them have over 10 years of experience. In addition, 6 out of 7 stated being very familiar with the open banking and PSD2 while one respondent stated being still familiar with the topic.

Respondent's occupational title(s)	**Experience of working in banking sector**	**Familiarity with open banking and PSD2 (From 1 to 5, 1 = Not very familiar, 5 = Very familiar**
Platform business partner, Open Banking lead and Program director	5 years	5 = Very familiar
Open Banking Program Manager	7 years	5 = Very familiar
Service manager, Open banking support	4 years	5 = Very familiar
Senior Business Developer	Over 10 years	5 = Very familiar
Management consultant, Head of Data and Analytics	Over 10 years	5 = Very familiar
Product Owner	6 years	5 = Very familiar
Execution leader	Over 10 years	4 = Familiar

Table 2. Background information of survey respondents.

Current state of PSD2 open banking and utilization of APIs in Finnish banking industry

In the first theme is discussed about the current state of open banking, PSD2 and APIs in Finnish banking industry. The survey questions which answers are related to this theme are questions number 4, 5 and 6. These questions searched answers for matters of what is the experts' opinion that what is traditional Finnish banks current attitude towards open banking, how these experts believe that open banking and PSD2 have affected to traditional banks innovation processes and how they think that APIs are being or could be utilized by traditional banks in the product development and innovation.

Almost all of the respondents stated that traditional Finnish banks' attitudes towards open banking is highly depending on the size of the bank. Bigger ones are facing the open banking more as an opportunity rather than threat while smaller ones might be seeing it purely as a threat. In addition, some respondents stated that open banking is being seen only as an opportunity and one respondent stated that traditional banks are seeing open banking rather neutral matter which has been driven by regulator. However, the common tone of the answers can be summarized by one respondent's answer to question whether open banking is seen more as a threat or an opportunity:

> *"Both. I believe the smaller banks see it purely as a threat, bigger banks with the right development resources can draw opportunities as well as."*

This same finding was also discussed about in the chapter 2 regarding the current state of the open banking in Finland (Tink, 2020). While the size of the bank and the amount of development resources have been discovered being a contributing factor regarding the attitudes towards PSD2 and open banking initiatives, it is also contributing to the process of choosing the open banking strategy for the bank and by that bank is choosing the degree of openness.

Regarding the effects of open banking to banks innovation processes, it has been emphasized in answers that open banking might be slowly changing the way that traditional banks are innovating but so far, the impact has been rather low in Finland and there has not been ground-breaking open banking innovations from the Finnish banks. It is also

believed that after banks in Finland have comprehensively completed the building of the so-called mandatory interfaces for APIs, there will be even more room for different innovation opportunities. As one respondent states:

> *"It's slowly changing. As people and companies embrace it more. I would say the year 2022 is when the Nordic Open Banking scene is more mature. Currently it's still young and developing."*

In addition, for change being such minor because the open banking is still rather new topic in banking, one reason that was also stated for open banking having such minor impact so far in Finland was the current nature of Finnish banking sector in general. As one expert have stated:

> *"The Finnish banking market is rather small and concentrated. Banks are in good shape; they have in general good reputation and customers trust their banks. Hence competitive pressure is not as strong as in some bigger and perhaps more attractive banking markets. However, banks' customers are constantly demanding better digital / omni-channel customer experience from their banks. In that sense the banks see open banking more as an opportunity to improve their existing service experience."*

However, some respondents state that although open banking has not yet greatly changed in practice the way traditional banks innovate and develop products and development of open banking in Nordic industry has been rather slow, it has still of course forced traditional banks to rethink their future role, processes, and policies. As it has been stated by one expert:

> *"For sure PSD2 and Open Banking has made the banks think if we should invest more heavily in APIs and what is our role in the emerging platform economy. Will we become a bitpipes similarly to the telecom operators only taking care of the expensive backend and more nimble players will charge a premium for the customer interface and value-add services."*

About current situation of utilizing APIs in the product development and opportunities that lie on them, experts emphasized that APIs can be observed more as facilitator for different innovation and product development opportunities and for open banking. This same finding was presented also in theoretical framework. The open banking initiative in Europe which is based on PSD2 has been built around APIs and also all current open

banking strategies that were presented in literature review also, are basically based on APIs and their advantages (Euro Banking Association, 2016; Omarini, 2018). APIs have also seen fundamental facilitator and having central role in platform business models that BigTechs have been using (Aitamurto & Lewis, 2013).

In addition, it has been stated by some experts that APIs have become business-as-usual for banks and the focus should be now shifted in bigger strategic questions regarding the business models such as platform model and monetization of these models and APIs. As one expert have stated in the survey:

> *"The bigger strategic question is for banks to consider their role in the platform economy. What is the value add of banks' platform (digital customer channels) to the customer? How to ensure that they will return? How to create new services and value add for customers by bringing partners to the bank's platform. What products could be integrated into third party services? What is the revenue share model with partners and with third parties? APIs are only the technical enabler behind the aforementioned questions which go into the core of banks existence."*

Additionally, the development and offering of more value-added APIs in other words premium APIs by banks has been emphasized by respondents as great opportunity. Also, the possibility to utilize other financial institutions APIs has been seen as great opportunity to enhance the customer experience and in banks services. It was stated that account and transaction data that is offered through so called PSD2 APIs is still very basic data and does not provide that many opportunities only by itself.

It has also been emphasized by experts that some old products can be replaced through modern APIs and these new products can be used to create new even more innovative solutions. As a result, banks can bring old and new products to markets that has not been made available or open to outside of the bank before and search for new revenue streams to replace the ones that can be lost from the services that are becoming obsolete because of open banking. As one example from a product that might become obsolete over time in Europe is relating to the current payment norms of online payments in the field of eCommerce such as card payments. PSD2 requires banks to offer API-based

payments without any cost, making them a very appealing business alternative to current card payment in eCommerce.

However, from the responses, it can be observed that many experts are still seeing many unexploited opportunities and untapped potential of open banking and APIs for banks to be utilized. As one expert have declared:

> *"I am still looking forward the emerge of true embedded banking where banking services will be seamlessly integrated into consumers everyday life. Also, true leveraging of customers' data (with customers' consent of course) for intelligent financial advisors is still to come. Due to the data banks have deeper understanding of their customers than many other companies. That is still an untapped opportunity."*

Open innovation opportunities and cooperation in the Finnish banking industry

In this second theme for analysing and presenting the results of survey answers is discussed the different open innovation opportunities in the Finnish banking sector. The survey questions which answers relate to this theme are questions number 7, 8, 9 and 13. These questions searched the answers to cover different open innovation topics in banking industry such as inbound and outbound flows of information and coupled flow of information including the matters of strategic networks and platform models. Also, the aspect of collaboration and cooperation with third parties is highly focused on under this theme since those are such vital aspects in open innovation.

Firstly, the inbound flows of information will be analysed through the answers for question 7. This question is used to gain information that how traditional banks are currently utilizing external knowledge and partnerships of third parties and what are the most valuable competencies that third parties have to offer. This utilization of external knowledge is the inbound flow of information in open innovation manner. In addition, as it has been stated earlier, partnerships and collaboration are also vital part of utilizing inbound flows of information.

The common tone in the experts' answers is that there certainly are many opportunities and benefits that third parties have to offer for traditional Finnish banks. However, it is also stated multiple times that banks are not utilizing the external knowledge and cooperation enough. So far, banks have done it on very limited scale and by collaborating more, there would be great synergy benefits.

Respondents also offer multiple examples that how traditional banks especially bigger ones have tried to arrange cooperation and partnerships with third parties such as FinTech companies. Banks have for example tried to arrange start-up programs in order to find the most valuable start-up innovations for certain needs. However, for now most of the cooperation and partnership have been mainly focusing of integrating different technical capabilities of third parties to bank's own service offering. Although, one expert also emphasized believing that third parties could also offer new delivery channels to bank's own products and services. So, FinTech companies could offer external paths to market for traditional banks which is perfect example of new open innovation opportunity for banks to consider (Chesbrough, 2006; Gassmann & Enkel, 2007).

About cooperation with third parties, there were given multiple examples about banks collaborating with FinTech companies such as Minna Technologies, Tink and Nordic API Gateway. Minna Technologies is a Swedish FinTech company that is offering and developing subscription management tools which can be directly integrated to bank's mobile banking solutions for instance. They have been partnering for example with Danske Bank and OP financial Group. Tink is also a Swedish FinTech company which is offering comprehensive open banking and API solution for big banks and other FinTechs to utilize for. They are currently partnering for example with Nordea through license agreement. Lastly, Nordic API Gateway which is headquartered in Copenhagen, Denmark, provides also comprehensive open banking platform and different services related to that. They are also partnering with OP Financial Group and Danske Bank currently.

Only one expert stated in the answers that he/she does not believe that third parties have much knowledge or competencies to offer that would go beyond traditional banks' own and already existing knowledge and capabilities. However, other respondents stated multiple competencies of third parties that could be utilized by banks. About most valuable competencies that third parties have to offer for traditional banks in Finland, experts emphasized that third parties such as FinTech companies are usually very innovative, more agile and might possess technological expertise that banks might not have which enables faster development processes and possibilities to utilize latest technologies in earlier phase already. In addition, it was stated that third parties usually have good competence in user design and usability journeys. As a result, third parties have numerous advanced innovative products and solutions to offer that can be utilized by traditional banks. As one of the respondents have stated:

> *"The partnerships can provide value by offering: a production ready service that the bank might not have interest or know-how to build, speed in development competence in building PSD2 APIs or a ready integration to other banks' APIs."*

Another important flow of information in open innovation manner is the outbound flow. Meaning that banks would externalise some of their internal already existing ideas and knowledge in order to bring innovations to market more quickly than they could by internal development. Transferring ideas to other companies and commercialising ideas in new markets can bring companies new revenue streams and increase revenue.

The possible outbound flows of information in traditional banks will be analysed through the answers for question 8. This question is used to gain information about experts' opinion that do they think that traditional banks in Finland could sell their internal knowledge, technologies and competencies to external parties and what would be the most valuable competencies that banks could offer to third parties.

One expert respondent state that traditional banks in Finland do not possess anything such unique knowledge or competency which could be used to directly compete in new markets for example with FinTech companies. However, other respondents have

emphasized that especially customer data that banks possess is one the most valuable competencies and knowledge that banks could externalise to third parties. In addition, traditional banks knowledge about different compliance practices such as fraud prevention or anti-money laundering practises have been stated as one of the key competencies. Also, customer trust has been highlighted as one key competence of traditional banks, compared to third parties such as FinTech companies.

However, it is much more complex questions whether it is possible for banks to externalise these key competencies and should banks do it even if it would be possible. The common tone in answers is that respondents do not think that it is reasonable for banks to start externalising or selling their core competencies to external parties. Many experts also state that banks should stay as banks and focus on their core competencies, rather than trying to get too much into technology or consultancy business. As it has been declared by one expert in the survey:

> *"Banking has become a tech-play and banks should be extremely careful in what IPR [intellectual property rights] to license if it's linked to their core competence. What banks can offer to third parties is access to their customers by bringing them into their platform."*

However, among the respondents, the customer data and customer base has been raised as an asset that could be externalised and monetised. Of course, because of PSD2, some data has already required to be available for third parties through open APIs. Still by offering premium APIs, banks can offer even more valuable data from their customers with customer's consent, of course. Also, these premium APIs can be made chargeable. However, it has been also highlighted in answers that banks will need to think carefully that how they will monetise the customer data, in order to maintain the customer trust. As one expert has raised his/her concern in the survey:

> *"In order to maintain the trust, I believe banks will think carefully how to monetise the data. But what the banks can for sure offer for the third parties, is access to their customer base. Banks can have a role as trusted ecosystem facilitators who curate digital financial services for their customers. In that way banks can be a remarkable sales channel for third parties."*

The aspect of collaboration is being analysed more through the answers for questions 9. This question has been used to gain information about experts' opinion regarding that how crucial collaboration with third parties is considered to be and also gain information whether PSD2 and open banking has changed or increased the collaboration.

It has been highlighted in the experts' answers that it is crucial for banks to collaborate with third parties in order to ensure competitiveness. In addition, it is stated that banks have realised how it is more beneficial to utilize third parties' products in their businesses rather than trying to develop everything by yourself. As it has been stated in the answers of the survey:

> *"Collaboration is crucial for the banks in order to ensure competitiveness. As the industry opens up it will transform towards ecosystem business. In the ecosystem, production and distribution of banking services will segregate and banks need to decide which role(s) to play and when."*

The publication of Euro banking association (EBA) (2016) discusses about the same division of roles that banks will need to consider when they are choosing their open banking strategy. The roles are based in two questions, *who creates the products that will be distributed to my customer base?* And *who is distributing my products, that are made accessible via API to existing and new customers?* It is also stated that banks can play multiple roles for example differing between different product lines. Banks can act as distributor of others' products in one product line and as producer of products that are distributed by others in other product line. In addition, EBA (2016) is stating that one possible role for banks is to act as facilitator by providing a platform where third parties and customers are brought together.

The aspect of two-way deal is also mentioned by experts. Meaning that collaboration deals have to be beneficial for all parties and that should always be the base in collaboration. This aspect is related to the aspect of balancing the give-and-take of the information that was discussed earlier as a part of the theoretical framework. It is vital for collaboration and partnerships to be effective that there is always some information and resources offered for both parties (Gassmann & Enkel, 2007). So, it always needs to be

evaluated that are we receiving as much as we are giving through collaboration with another party. This comes especially crucial in coupled open innovation and in the platform business model.

To answer the question whether PSD2 and open banking has changed or increased the collaboration, it is highlighted that collaboration has been driven and slightly increased due to PSD2. One reasoning offered for that has been the establishment of open APIs which brings more service providers into financial industry and causes more traffic. As a result, there are more interesting players in the field and more opportunities to collaborate.

However, also some issues are point out in survey answers regarding the collaboration with third parties, especially with FinTech companies and start-ups. It has been stated in the answers that banks are not able to collaborate effectively because there are difficulties to find suitable third parties to work with. Small third parties are too small and young and have hard time to reach the banks requirements while bigger ones may be too expensive or does not want to collaborate with banks as they see it more beneficial to compete against banks. In addition, the issue is also raised again whether FinTech companies have much to offer for traditional banks and whether the hype around FinTech has been just hype. As one expert declares in the answers:

> *"Finnish Banks have tried it years [collaboration], but with very little success. Fintech doesn't have much to provide to banks and I predict that in the general, the hype about fintech startups are mainly already gone and all kind of collaboration between banks and startups is diminishing comparing to previous years of rather intensive collaboration."*

Gassmann and Enkel (2007) mention that one essential precondition for open innovation practices, especially in coupled open innovation, is to find right partners with good fit and which are able to provide the right knowledge and competencies. Since traditional banks in Finland may be struggling in finding good partners to collaborate with, it is one factor that may be essentially limiting banks possibilities to utilize different open innovation and cooperation practices effectively.

In addition to analysing the possibilities of utilising inbound and outbound open innovation opportunities and aspects of collaboration, also possibility of banks practising coupled open innovation activities and exploiting platform business model by building its own comprehensive platform and acting as platform leader has been chosen to be analysed. Platforms and their possibilities have been already discussed widely during this work but with question 13 of the survey, the intention was to get direct answer from experts whether they believe that banks can build these kinds of innovation platforms and exploit platform business model, including the aspect whether it would be beneficial although it would be possible.

Among respondents it is believed that it would be technically possible for banks to create such platform and it would offer multiple opportunities for bank. Still, it is stated that it would require scale and sufficient capabilities from bank, so it is not very likely that smaller banks would have capabilities to execute it. However, also issues regarding rationality for bank to implement such platform strategy have been pointed out. As the expert has stated in survey:

> *"Banks have chosen to be in business of trust. Technology is tool for banks operate. For platform ecosystems, the technology is the core of the business. We will see total new players coming with aim to conquer this new emerging area of platform banking - mainly coming from technology industry, like giants: facebook, google or other global startups. There is no reason why Finnish bank should start change their core business mission and strategy to become global platform ecosystem player."*

Additionally, one good option for implementing own platform that has been stated in survey answers is that bank joins platform ecosystems that are facilitated by others. This is likely option especially for smaller banks, but it can be good option for bigger banks as well. Every bank must choose their own open banking strategy and role in this new ecosystem and decision should be based on strengths, weaknesses, and constraints, because not all strategies work for everyone.

Challenges of open banking and open innovation practices in the Finnish banking industry

The third theme of presenting and analysing the survey results contains the discussion of different challenges that open banking and open innovation practices may cause. The survey questions relating to this theme are questions number 10, 11, and 12. With these questions, the intention is to gain information regarding challenges and threats of open banking in general, challenges with the degree of openness and challenges regarding the collaboration with third parties such as FinTech companies.

First the challenges and threats regarding open banking in general are discussed. Multiple challenges were highlighted by experts. Regarding for example change in mindset and culture, banks losing the customer interface and increased competition which may lead to loss of business at least in some product lines. The respondents state that challenge of open banking being the cultural change or changing the mindset is mainly related to fact that PSD2 and open banking forces banks to open up to the world and by doing that, give up some control on their value chain that has traditionally been fully controlled by them.

Banks losing the customer interface means that as different new players with the great experience on designing user interfaces are entering the field and establishing their financial services with the help of APIs. It is seen as possible threat that traditional banks end up being just the provider of core banking systems and become invisible infrastructure that is not visible directly to customer anymore. However, this threat has also been discussed as a potential strategic option that some banks may rely to by establishing business model based on Banking-as-a-Service type of revenue streams. Increased competition which may lead to banks losing their business in some product lines has already changed the markets of some products.

Experts state that for example the market of short-term loans and customer credits as well as payment industry has already been disrupted due to new players. The revenue

losses from these product lines may still be very marginally compared to overall revenues but experts believe that the competition is expected to increase in other product lines too in the future. In addition, one expert raises a concern regarding the corporate customers of the banks because the competition has increased, and new service providers are entering the field. This customer group is the one paying the most service fees from their banking services currently and because of that they are most likely to switch to new service provider if price is right.

Additionally, some experts emphasized that it may not be the current form of PSD2 open banking that is creating actual threats or challenges, but the real challenges are yet to come, and they are relating to overall increase of platform economy, BigTech companies and open finance. The term "Open Finance" refers to the expansion of Open Banking data-sharing standards to allow third-party providers access to wider spectrum of customers' data such as data relating to savings and investments (KPMG, 2020). Also, the challenge regarding the banks' relevancy for future's generations is being pointed out as well as the regulator's role in shaping the future of banking is emphasized. As it has been stated by the experts:

> *"Another challenge for banks is how to maintain relevant also for the new generations. Traditional (Finnish) banks are trusted by their existing customers, but the new generations may trust more on Big Techs than banks - also in banking. Therefore, the banks must learn to know their customers and decide their open banking strategy in the ecosystem play in order to maximise their future revenues."*

> *"I don't see open banking as a big threat to banks. Just forcing the banks to change and evolve a little. I see the big techs as a much bigger threat to banks. Perhaps the biggest issue is with the regulator, are they neutral or more Pro TPP or Pro Bank in their interpretation, which varies between countries."*

BigTechs like Facebook, Google and Amazon challenging traditional banks and looking for ways to conquer financial services industry as well is a risk that has been also discussed widely especially in open banking literature (Omarini, 2018). BigTechs have the advantage since they already have the technology, data, and access to customers. With these advantages, they can enter the world of finance and try to out-compete the

traditional banks and FinTech companies. BigTechs can for instance use their platform as portal where their customers can get access to financial services offered by others or they develop a different strategy by offering financial services by themselves.

Degree of openness is central aspect in different open banking strategies. Banks have to decide that how open they want to be in the manners of sharing customer data through APIs. European and Finnish banks can just comply with the PSD2 and establish the mandatory PSD2 APIs (Euro Banking Association, 2016; Petrović, 2020). However, many banks have also decided to share more value-added APIs, premium APIs. Degree of openness is also discussed as possible threat or challenge in some open innovation studies (Stanko et al., 2017). It has been discussed that after certain degree, the openness becomes harmful for the company, meaning that company can be too open with its innovation and development activities.

The common tone in experts' answers is that the current form of open banking in Finland which is based on PSD2 is not causing such issues with the degree of openness or banks becoming too open. However, the retention of customer trust by taking good care of their customer data and its sharing been emphasized in responses. As one expert have raised the concern:

> *"Banks need to maintain the earned trust. The banks must therefore take care that their customers' data will be kept in safe. However, as the value chain opens, banks ability to control e.g. data security diminish as the customers can decide what to do with their data and where to expose it. That's the reason why also third parties need to be regulated in somehow."*

Again, the regulator's role is also being emphasized in the answers and how much regulator have power on deciding the next direction of the future. The issue is being pointed out that how much more products and customer information banks will need to share for free with the third parties in future in the same way that PSD2 required to share account and transaction information. It is stated that as long as there remains business value for traditional banks also, the open banking and open finance are being seen as great opportunity to just develop the industry in the better direction. In addition, it is

being stated in the survey answers that there are some core business areas and products in banks that will never be shares opened for third parties but the parts that can be sold to third parties or areas where it is believed that third parties can add more value on them by getting access to them, will be shared. The whole aspect of degree of openness and possible challenges related to it is well summarized by one expert who is stating that *"If there is no business case behind openness, then what's the point of being open?".*

Third part of different challenges relating to open banking and open innovation possibilities in banking industry is about challenges in collaboration with third parties. The common challenge that is stated by the experts to cause friction in collaboration between banks and FinTech companies and start-ups is the cultural differences and differences in way of working between parties. As it has been stated in the survey by one expert:

> *"General Cultural divergence - Banks are traditional, large, trust-based institutions and startups almost total opposite. Gap in way of working and thinking is rather big, which hinder the collaboration."*

From open innovation point-of-view these kinds of differences may also cause troubles for banks in integrating this external knowledge of FinTech companies to their own development processes. As it has been mentioned earlier in theoretical framework part, the ability to integrate external knowledge is crucial in order to practice open innovation activities effectively and really gain benefits from this information (H. Chesbrough & Brunswicker, 2014; Gassmann & Enkel, 2007).

Another common challenge that is being stated is regarding the maturity level of third-party companies such as FinTech companies. Especially, the low maturity level of their IT security is raised as concern by the experts. As a result, banks are struggling to find good partners to collaborate with. As it was already stated earlier, small third parties are too small and young to reach banks' requirements while bigger ones may be too big and too expensive or too developed that they choose to compete with banks instead. It has also been raised again by the expert that the hype around FinTech of the last few years has

been seen fading away and only few of these innovative FinTech start-ups will really survive.

Future of the Finnish banking industry

The last theme is about the future of the Finnish banking industry. The survey question relating to this theme is question number 14. With this question the goal is to gain information about experts' opinion regarding the traditional banks place and role in Finnish financial ecosystem in the future as well as what is the role of open banking and how it is affecting in shaping this banks' role in the future.

Experts agree in their answers that traditional banks will still have role in the financial ecosystem, but it will surely evolve and change in future. It is emphasized that core banking principles have not changed much during last centuries although the product and service offering has developed enormously. Banks's master a risk management, compliance and know how to play the game under regulation. Also, they are seen as trustworthy partners and it is stated by the experts that especially corporate and smaller business customer are looking for reliable partners. So, banks still have role as the customers' financial trust and backbone. Banks have traditionally been the provider of bank accounts and they have built their other services around it. Many experts believe that this role will stay as the same and banks will remain as actor who provides the account and takes care of the deposits.

However, it is also being emphasized that banks cannot take it for granted that newer generations would automatically come to traditional bank for banking services because there will be multiple other providers of financial services also. Traditional banks have to figure out how to bring their banking services closer to customer. As it has been stated by one expert:

> *"I think banks will have a role in the future but definitely different. Banks can no longer take it for granted that customers will come their channels, instead we need to think how to make our channels and service offering relevant, when to work with partners and when to integrate into other platforms with financial products which could be branded or white label."*

In addition, the concern regarding the banks losing the interface and only becoming the back-end provider has been pointed out in the answers. Still, as it has been stated earlier, this can also be seen as one strategic option for some banks to utilize for. However, it is also stated that open banking will change the game permanently although for now the change and impact of open banking have been quite slow in Nordics and in Finland. Still, banks really need to evaluate their current strengths and have proper strategy for the future. As it has been declared in the survey by one expert:

> *"Open Banking has come to stay. If the bank thinks it's only going to do a mandatory minimum [regarding requirements of open banking and PSD2], I'd say it could be a risk."*

Summary of the analysis and results are presented in the Table 3 below. The summary table is presented with the same form that the main themes were presented in the Table 1, in order to clarify easily the main points of the experts' answers under different main themes.

Main theme	**Main points of the experts' answers**
Current state of PSD2 open banking, and utilization of APIs in Finnish banking industry	• Bigger banks see open banking more as an opportunity while smaller ones see it more as a threat. • Open banking is slowly changing the way banks innovate but the impact has been low so far. • APIs can act as a facilitator for different innovation opportunities and especially premium APIs offer great opportunity to gain benefits from APIs.
Open innovation opportunities and collaboration in the Finnish banking industry	• Banks understand the value of external knowledge and inbound flows of information but are not able to utilize it enough.

	• TPPs could offer banks external paths to market and especially customer data is an asset that could be externalised. • Collaboration is seen crucial for banks to ensure competitiveness, but banks are struggling to find suitable partners. • Banks creating its own platform is technically possible but may not be reasonable strategy option as joining other's platform is seen as better option.
Challenges of open banking, open innovation, and collaboration in the Finnish banking industry	• Open banking requires change in the mindset and culture. • Banks may lose customer interface and become backend player providing the core banking systems. • Cultural divergence makes collaboration challenging. • Overall increase of platform economy and BigTechs are seen as major threats. • Degree of openness is not seen as challenge with PSD2 open banking but may be if more openness and data sharing is required for free.
Future of Finnish banking industry (banks' future role in financial ecosystem and how open banking affects to it)	• Banks' will still have role in financial ecosystem, but it will evolve. • Core business principles of banks shall remain the same (e.g., providing accounts and taking deposits). • Open banking requires banks to give up control on the value chain and open it for TPPs, banks need to figure out how to stay relevant for future generations.

Table 3. Summary and main points of the survey results.

4.3 Validity and reliability of the study

The word “reliability” in research refers to repeatability or consistency related to chosen data collection and analysis techniques (Saunders et al., 2007, pp. 149-150). In other words, it means for instance that could other observer reach same results by using same measures. Since this study has multiple exploratory elements and sampling technique was purposive, these results of the survey are not presenting the whole population of open banking experts working in Finnish banking industry. In addition, the risk and challenge of purposive sampling of experts in the field and opinion-based questions is that other researcher could end up finding totally different experts with totally different opinions.

Additionally, since the study is cross-sectional, it has multiple exploratory elements and qualitative research methods used can be observed as non-standardized, the findings of the study are not inherently assumed to be repeatable because they represent reality at the time they were collected, in an ever-changing situation (Saunders et al., 2007, pp. 319-320). Especially, because open banking is rather new phenomenon, the experts’ answers to survey could have been completely different year ago and may be completely different next year. The premise behind using this kind of research method is that the situations to be investigated are complex and dynamic, and the importance of these methods comes from the flexibility of them which makes it easier to handle the complexity. As a result, it would be unrealistic to try to ensure that qualitative, non-standardised study could be repeated with same results by other researcher but there are also situations where these methods can be beneficial.

Also, as it was stated earlier, reliability in research refers also to consistency besides repeatability. The questionnaire that is being used has to have certain robustness in order to produce consistent results at different times and with different conditions, such as with different samples. In addition, questions of the survey must be clear enough to be understood easily and to be understood right way in order to avoid the issues that respondent is either unable to answer the question at all or might understand the question

wrong or differently and also answer wrong or with the information that is not necessary. Because of this, the questionnaire used in this study was prepared and considered carefully.

In addition, eventually only seven responses from experts were collected from total of 40 sent proposals. This amount is rather low, although questions were mainly open-end questions and the analysis technique was purely qualitative, meaning that there were not same kind of requirements for minimum number of responses that would have been needed if the analysis would have been consisted of quantitative methods. However, this research strategy and technique were chosen due to these exploratory elements of the study and because the goal was to gain better understanding and new insights from certain phenomenon rather that looking for the infinite truth. The one option for gaining more responses could be loosen the selection criteria of experts in order to find more candidates to send proposals for. However, the chosen criteria have been used in order to find true experts in the field who can offer informative responses.

So, even though the data sample ended up being rather small and research could have been more extensive with larger number of responses, still valuable insights have been gained, and the results succeed to answer the research question and reach research objectives. Also, the original idea of conducting semi-structured interviews with experts rather than having survey, could have offered more extensive results. That is because then there would have been opportunity to ask additional questions for gaining some more examples for different statements for instance. Also, the one issue of having survey rather than interview is that experts may not have time or interest to give such a long and a comprehensive written answer than they could give on interview.

With the concept of validity in the research is usually meant the quality of the different parts of the chosen research methods. As it has been stated already, choosing these particular methods was considered precisely and chosen research strategy is valid. Also, as part of the internal validity related to use of surveys, is to measure whether the survey

questionnaire has ability to really measure what has been intended to be measured. Meaning that one is worried about whether the results of the survey will accurately reflect the reality of what one is measuring. However, Saunders et al. (2007) state that this presents a problem, because if one actually already knows the reality of what should be measured, there would be no point in developing such survey. However, this problem can be circled by utilizing other evidence to support the answers found in survey such as literature and earlier publications as it has been done in this work also.

5 Discussion and Conclusion

5.1 Conclusion of research findings

In this chapter, the goal is to provide comprehensive summary of research findings and use it to present the final answers to research questions and to validate that research objectives were achieved.

Current state of open banking and its impact to innovation processes in Finnish banks

One of the main objectives of this study has been to examine the current state of open banking and its impact to traditional banks' innovation processes in Finland. It has been found that experts in the Finnish financial industry believe that the impact of open banking has been rather low as well as the development of open banking in Finland so far. Open banking might slowly change the way that traditional banks are innovating in Finland but there has not been any ground-breaking open banking driven innovation in Finland yet.

One possible reason for open banking development being such slow and impact being low in Finland is the current nature of Finnish banking and financial industry. There are only few bigger banks operating in Finland and market share has been distributed between these few in large respects. Also, as the market is concentrated and rather small, the competitive pressure might not be as strong as in some bigger and more attractive banking markets which may be one reason for slower development of open banking related innovations. In addition, the attitude towards open banking has been observed depending highly on the size of the bank. Bigger ones tend to see it more as an opportunity while smaller banks may view it more often as threat. One reason for this is that bigger banks have enough development resources to gain opportunities from such developments as open banking. This observation is visible also in the Finnish industry where bigger banks such as Nordea and OP Financial Group have been developing different open banking solutions such as premium APIs more eagerly.

However, although there may not have been major changes for banks innovation processes yet in practice because of open banking, it has forced banks to reconsider their current processes, practices, and future role in the financial ecosystem. It has been found that as Finnish banks have now established their PSD2 obliged APIs and open banking development portals, it is time to start really considering bigger strategic aspects such as future business models and monetisation of open banking.

Additionally, there have been identified multiple new innovation and business opportunities drawn from the open banking and use of APIs that Finnish banks can utilize. Especially, more value-added premium APIs which can be made chargeable can offer opportunities of creating new revenue streams and to bring new and old products to market that has not been made available or open to outside of the banks before. Also, APIs in general can be observed as a facilitator of new innovation opportunities and facilitator of open banking opportunities. Especially in PSD2 based open banking where the whole open banking concept, its implementation and different open banking strategies are built around advantages and utilization of APIs.

Still, many unexploited opportunities and untapped potential of open banking and utilization of APIs have been identified and as it has been stated, the development have been quite slow so far in Finland. It has been stated by experts in the field that especially customer data is one asset that banks could leverage much more. Banks have such large amount of data from their customers comparing to other companies and industries that banks have deep understanding of their customers which could be utilized for creating real embedded banking experience where bank services are seamlessly integrated into customers everyday life.

Current state and opportunities of utilizing open innovation practices and cooperation in Finnish banks

Finnish banks have certainly realised that it is not always beneficial to try to create and develop everything by yourself. Banks have realised that practising different open

innovation activities and cooperating with third parties is not only beneficial but may be also crucial to ensure the competitiveness of the bank. Especially inbound open innovation activities where external knowledge and technology are brought to bank's own innovation process and the knowledge is integrated into company's own knowledge have been seen as opportunity.

Today, most of the cooperation and partnerships that banks have are about integrating TPPs different technical capabilities to bank's own service offering. Most valuable competencies that TPPs like FinTech companies have to offer for traditional banks is that they are usually innovative, more agile and might possess technological expertise that banks do not have, and which can enable faster development processes. Additionally, FinTech companies usually have good competence in user design and usability journeys. It has also been found that TPPs such as FinTechs could offer new distribution channels to bank's own products and services and by that help banks to find new ways to market which is essential part of open innovation paradigm. Essential for these partnerships is that they should always be two-way deals meaning that there should be some benefit to all parties involved. Balancing the give-and-take of the information has to be considered always.

Regarding the outbound open innovation practices and banks externalising their internal ideas, knowledge, and competencies in order to bring innovations to new markets or current market quickly through new distribution channels is seen possible but also considered as an option where banks need to be extremely careful. In addition, it has been found that some core competencies of the bank should not be externalised ever, and traditional banks should stay as banks. Concern has also been raised whether banks have already become too much tech-play and banks should be careful to not drift too far from their core business. Banks are working in trust-based business and the customer trust is one of their greatest assets.

However, the greatest asset that bank has which could be monetised and utilised in other markets also is their customer base and data. Still, it has to be considered carefully that how the data and customer base is opened for third parties in order to maintain the customer trust. Premium APIs are one option as well as banks can serve as trustworthy ecosystem facilitator for their customers, curating digital financial services. As a result, banks can serve as a noteworthy distribution platform and sales channel for third parties.

It this not necessarily surprising that inbound open innovation practices have been utilised more in Finnish banks compared to outbound activities. It has been commonly stated in open innovation literature and studies that companies are seeing inbound activities and practicing them more than outbound activities and one major reason for that has been that for long time outbound activities have not been understood correctly in companies and because of this companies have failed to take advantage of these outbound activities.

In addition, as innovation platforms are essential part of both open innovation and open banking, it has to be considered whether such business model could be beneficial and possible for bank. Generally, from technical aspect it is possible for bank create such platform and there would be different opportunities and benefits offered. However, issues have been pointed out regarding it. Again, banks should be careful from not drifting too far from their core business and compromise their customer trust by getting too technology centric. Nevertheless, since platform economy and business model are getting more and more usual in different industries, it may be that bigger platform players such as Google or Amazon may be entering more into the financial industry also. One option for banks is to join platform that is being facilitated by others. This option is especially likely one for smaller banks, but every bank will need to consider their strategy and role in this new ecosystem and the decisions should be based around bank's goals, strengths, weaknesses, and constraints because not all strategies work for everyone.

Challenges of open banking and open innovation for Finnish banks

Multiple different challenges regarding open banking and open innovation in Finnish banks have also been discovered. Relating to open banking in general, it has been found that open banking is a huge change which demands banks to give up some control of their value chain, which has been completely controlled by bank before. Also, as any huge change, the open banking is requiring some change in organisation's culture and mindset of its people.

In addition, the banks losing the customer interface is challenge that has been emphasized multiple times by open banking experts during the empirical part of this study. The concern is whether entrance of new players will push banks behind the curtains to continue their business as invisible infrastructure which is providing the core back-end systems while these new players that have great experience form user design are starting to control the user interfaces completely. However, this can also be seen as strategic option for banks to consider.

Also, it has been emphasized that it may not be the PSD2, and open banking initiative driven by it which are causing much of challenges. Firstly, because the data that is required to be shared with TPPs through APIs is still very basic data which does not provide much of opportunities or challenges only by itself. Secondly, it may be that factors which follow the open banking may cause real challenges such as overall increase of platform economies, BigTech companies and forthcoming open finance. So, PSD2 driven open banking can be observed as a catalyst for greater change in Europe. Regulator will play central role in shaping the future of the financial industry because it may choose to be Pro bank or Pro FinTech for instance when new regulations are considered.

Although, the direction of Finnish and European banking industry's future cannot be known for sure yet. However, it is sure that banks cannot take it for granted anymore that newer generations would automatically come to traditional bank for their banking services, since there are many more other players providing the services as well and

which may be already familiar for younger generations such as big technology companies. Traditional banks have to figure out how to bring their banking services closer to customers and to stay relevant option for newer generations as well.

For summarising final answer to the main research question of this study "*What kind of open innovation opportunities are available for Finnish banks by utilizing open banking and APIs?",* it can be stated that APIs certainly can be used as facilitator of new innovation opportunities including open innovation activities, cooperative development and forming innovation platforms. However, so far, the development of open banking has been rather slow in Finland and there has not been any revolutionary open banking or API-driven innovations yet. Also, it has been estimated that after Finnish banks have finished the process of building their open banking portals and basic APIs, there will be more room for new innovation to come.

However, biggest constraint right now for banks preventing or limiting the process of practising any open innovation activities is that banks struggle to find suitable third parties to collaborate and to partner with. It seems that smaller companies are too small to meet the banks requirements while the bigger ones may be too big or expensive to collaborate with or they are developed enough to rather choose to compete with the bank. One major reason for this is that banks are operating in trust-based business where the role of compliance is very central and crucial part of the business, because of this, banks have demanding requirements regarding for example IT security and compliance which may be limiting the number of potential partners, especially when considering smaller players and start-ups which may not be mature enough.

5.2 Future research suggestions

As it has been found in this study, even though impact of open banking has been rather low and development of it has been rather slow, Finnish banks still need to reconsider their processes, policies, and future place in value chain of the Financial ecosystem.

Although, there have been multiple studies about different potential open banking strategies for banks to consider, one possible topic could be to compare how Finnish banks open banking strategies are differentiating from other markets where the open banking initiatives are much more developed and where the market is already closer to the concept of open finance which is seen as next stage for the open banking.

Also, as this study has been focusing on open banking mainly from innovative point of view and the main focus has been on assessing innovation opportunities and challenges that open banking and utilisation may offer, the alternative approach could be regarding more on the actual business and economic value of the open banking. Meaning different ways that banks could monetise the open banking and what could be the economic values of different strategic options of open banking.

In addition, as it has been emphasized, traditional banks are realising the value of collaboration and cooperative development of products, but they are struggling to find suitable partners. The one option could be to study is aspect of collaboration from FinTechs point of view that how they see the current situation and what are the possible constraints for the collaboration, and do they see it as beneficial as traditional banks. This kind of research could be done from the Finnish market also but as it is still rather small, the one option could be to focus on Nordic market as it is much bigger and there already is some FinTech companies that are collaborating successfully with Nordic banks such as Tink and Minna technologies.

Finally, as the threat of BigTechs entering the market has been one common topic in the discussion of open banking and disruption of financial industry from the beginning, it is offering many kinds of possibilities for further studies. As said, it has been in the discussion for long time that it can be possible threat that BigTechs enter the financial industry and companies such as Amazon and Apple have already shown some interest towards it but there has not been much of a real penetration to market in practise. So, one possibility would be to study that why they have not fully penetrated the market yet and what

are the functions that they are most interested about. This study could also be done from multiple point of views including the traditional bank's point of view. In addition, for topic of threat of BigTechs, the general increase in platform economies and companies utilising platform business models, it could be one topic to focus fully on that what kind of platforms could be formed in financial industry, which players are involved and what are the different possible roles for these players?

However, there are multiple different opportunities to focus on future research in the field of open banking, as it may be catalyst for even bigger change and all of its future implications cannot be known yet. However, what seem to be sure is that traditional banks' role in the financial ecosystem will be changing because of it, slowly but surely, also in Finland.

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Appendices

Appendix 1. Online survey questionnaire

Background information

1. How many years of experience you have from working in banking or financial industry?
2. Current occupational title and/or former titles working in financial industry?
3. How familiar you feel with concepts of open banking and Revised payment service directive (PSD2) (Scale from 1-5, 1= not very familiar and 5= very familiar)

Current state and impact of open banking in Finland

4. How would you describe the current attitudes towards open banking in traditional Finnish Banks?
    a. Are they seeing it more as an opportunity or a threat?
5. Do you think that open banking has changed greatly the way traditional Finnish banks innovate and develop products? If yes, how?
6. What factors of open banking and use of application programming interfaces (APIs) do you see as greatest opportunities for traditional banks to utilize in their innovation and product development processes?

Collaboration with third parties

PLEASE NOTE: In this section, the term “Third party” refers to external third parties such as FinTech companies, start-ups, and external developers.

7. How Finnish banks are currently utilizing external knowledge, technologies, and partnerships of third parties?
    a. And what are the most valuable competencies that third parties have to offer for Finnish banks?
8. Do you think that traditional Finnish banks could sell their internal knowledge and technologies to external parties?
    a. And what would be the most valuable competencies that Finnish banks would have to offer for third parties?

9. Do you think that collaboration with third parties (e.g., FinTechs or external developers) has changed due to open banking?
    a. And how crucial collaboration with third parties is for Finnish banks?

Challenges of open banking and collaboration

10. What do you think are the common challenges or threats that Finnish banks are facing because of open banking?
11. Do you think that there is certain level of openness of open banking that it becomes harmful for the bank? Why? Why not?
12. What major challenges do you think are related to collaboration with third parties such as FinTechs or external developers?

Future of banking in Finland

13. Do you think it would be possible for traditional Finnish bank to implement platform business model by building its own open banking ecosystem?
    a. And would it be beneficial for bank to do so? Why? Why not?
14. What do you think is the role of traditional Finnish banks in the future? And will open banking change it dramatically?