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Comparative analysis of real-time payments on contemporary businesses

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Abstract:
As many things happen nowadays in real-time, the same trend is uprising with money flow. Individuals and companies are not willing to wait for their payment to arrive for days. Real-Time Payments (RTP) provide a possibility to transfer money from account to account in 10 seconds, 24 hours a day, 365 days a year. Some use cases, benefits, and difficulties of RTP have been identified, but since currently the most usage and research are focusing on payments between two individuals, there was a need for a study to investigate "What are the impacts of real-time payments on businesses". The thesis aims to fill the gap of missing information through interviews and comparing previous studies together to better understand RTP's impacts on businesses.

This research is based on qualitative data, that has been collected by interviewing professionals working among payments. Answers of the interviewees were compared to each other to find similarities in answers. Interview questionnaires were based on the objectives of the study, and the purpose was to get interviewees to answer in their own words. In addition, as a secondary source, publications from companies, banks, and financial institutions were used. The literature review examines, how payments and real-time payments work in practice.

As a result of the study, it was identified that real-time payments are enabling several use cases and benefits for business usage. Study shows that the current benefits of RTP occur the most for small- and medium-sized companies. RTP gives companies better transparency of their cash position and increases working capital. In addition, RTP can improve customer service and satisfaction and transfers the economy towards a more formalized form. RTP also can enhance the supply chains, since the payments can be done faster, and by allowing the usage of Just-In-Time payments. For many companies, there is barely any matter of whether funds are moving in real-time or not. Since RTP is an individual payment, processing them for certain companies might be more demanding than processing multiple payments in the collection. RTP are more expensive to send than regular batch payments. If a company is not using the recent payment standards, implementing costs may end up being high. The study also found that although the rich and structured data in payments helps process the payments automatically and safer, with RTP monitoring the payment frauds might occur a risk since the payment cannot be stopped when it has been launched. Although usage of RTP is expected to increase, it is believed, that in the future not all the payments will not run in real-time.

KEYWORDS: real-time payments, just-in-time, money flow, supply chain

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TIIVISTELMÄ:
Nykyaikana monet asiat tapahtuvat reaaliajassa, ja sama trendi on tunnistettavissa myös rahavirtojen parissa. Yksityishenkilöt ja yritykset eivät ole halukkaita odottamaan maksujen saapumista useiden päivien ajan. Reaaliaikainen maksaminen mahdollistaa rahan siirtämisen tililtä toiselle 10 sekunnissa vuorokauden ympäri, vuoden jokaisena päivänä. Reaaliaikaisen maksamisen käyttötapoja, hyötyjä ja haasteita on tunnistettu, mutta tällä hetkellä käyttö ja tutkimus painottuu kahden yksityishenkilön välisiin maksuihin. Tämä tutkimus pyrkii selvittämään, miten reaaliaikainen maksaminen vaikuttaa yrityksiin. Tutkimus pyrkii lisäämään tietoa haastatteluiden avulla, sekä vertailemalla aiempia julkaisuja keskenään.

Tutkimus noudattaa laadullisen tutkimuksen periaatteita. Tutkimusaineisto on kerätty haastatteluiden avulla. Haastateltavat ovat maksujen parissa työskenteleviä ammattilaisia. Haastateltavien vastauksia on vertailtu keskenään yhtenäisyyksien selvittämiseksi. Haastattelukysymykset pohjautuivat tutkimuksen tutkimustavoitteisiin. Kysymysasettelu oli toteutettu siten, että haastateltavat pystyvät vastaamaan niihin omin sanoin. Lisäksi toissijaisena lähteenä tutkimuksessa käytettiin julkaisuja yrityksiltä, pankeilta ja taloudellisilta instituutioilta. Tutkielman kirjallisuuskatsaus osuus tarkastelee, miten maksut ja reaaliaikaiset maksut toimivat käytännössä.

Tutkimus osoitti, että reaaliaikaiset maksut tarjoavat useita hyötyjä ja mahdollistavat erilaisia käyttötapoja yrityksille. Hyötyjä tunnistettiin etenkin pienille- ja keskisuurille yrityksille. Reaaliaikainen maksaminen tarjoaa yrityksille paremman läpinäkyvyyden yrityksen käytössä oleviin käteisvarantoihin, ja tehostaa käyttöpääoman määrää. Lisäksi reaaliaikainen maksaminen parantaa asiakaspalvelua ja tyytyväisyyttä, ja vie kokonaistaloutta muodollisempaan suuntaan. Reaaliaikainen maksaminen voi tehostaa toimitusketjuja, sillä se mahdollistaa ”Just-In-Time” maksamisen käytön sekä maksujen nopeamman liikkumisen. Useille yrityksille ei ole merkitystä, liikkuvatko maksut reaaliajassa vai viiveellä. Koska reaaliaikaset maksut lähetetään yksittäisinä maksuina, tietyille yrityksille niiden prosessoinnista saattaa aiheutua enemmän vaivaa, kuin useista, yhtenä koontina lähetettävistä maksuista. Lisäksi reaaliaikaisten maksujen lähettäminen on kalliimpaa, kuin tavallisten koontina lähetettävien maksujen. Mikäli yritys ei käytä viimeisimpiä maksustandardeja, niiden käyttöönotosta johtuvat kulut saattavat nousta korkeiksi. Maksuviestien monipuolinen ja strukturoitu data auttaa prosessoimaan maksuja automaattisesti ja turvallisemmin. Tästä huolimatta, maksaessa reaaliaikaisesti maksupetosten valvonta hankaloituu, sillä lähetettyä maksua ei pystytä pysäyttämään. Vaikka reaaliaikaisen maksamisen käytön odotetaan yleistyvän entisestään, tulevaisuudessa niiden ei uskota korvaavan kaikkia viiveen kanssa tapahtuvia maksuja.

AVAINSANAT: real-time payments, just-in-time, money flow, supply chain

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Abbreviations

ACH = Automated Clearing Houses
AML = Anti Money Laundering
APIs = Application Programming Interfaces
ECB = European Central Bank
EEA = European Economic Area
EPC = European Payments Council
ERP = Enterprise Resource Planning (System)
gpi = Global Payments Innovation
ISO = International Organization for Standardization
KYC =Know Your Customer
PSP = Payment Services Providers
RTGS = Real Time Gross Settlement
RTP = Real Time Payments
SEPA = Single Euro Payments Area
PSD2 = Payment Services Directive Two
SME – Small to Medium Enterprise
SWIFT = Society for Worldwide Interbank Financial Telecommunication
TIPS = Target Instant Payment System

1 Introduction

In the payments industry all over the globe, one huge trend is Real-Time Payments (RTP). Real-Time Payments provide a possibility to transfer money from account to account in 10 seconds, 24 hours a day, 365 days a year (European Central Bank, 2022). As many things happen nowadays in real-time, the same trend is uprising with money flow. Individuals, banks, and corporates are no longer willing to wait days for payments to arrive. (C. Miller, 2020). "*Real-time payments allow people, businesses, and governments to make payments more quickly with funds immediately available for use by the recipient".* (Deloitte, 2019, p.6.)

Real-time payments are a relatively new thing, but RTP schemes are developing around the world with high speed. According to the Bank of Finland (2019) in 2014, 14 countries had payment infrastructure that supports payments happening in real-time but in 2021, the number of countries with real-time payments was over 50 (Shah, Khatri & Sarma, 2021; Tuozzolo et. Al, 2021; Mastercard,2020). According to Tomaney and Murrant (2021), the total number of real-time transactions worldwide grew from 50 billion to 70.3 billion from 2019 to 2020, which is more than 41%. Compared to all electronic transactions, in 2020 this was 9.8% of the total transactions. In their report, Tomaney and Murrant estimated that by 2025 the share of real-time transactions of electronic payments will be 17.4%. European Central Bank (2022) identified that in the SEPA area the percentage of instant payments of all transactions has grown from 5.2% (October 2019) to 10.38% (September 2021).

As the trend is noticed, there is a wide consensus that instant payments are in a key position for future payment systems. (Bank for International Settlements, 2016; European Central Bank, 2018; Faster Payments Task Force, 2017; Deloitte 2015; EY, 2018 & HSBC, 2018 as cited by Deloitte in 2019). Tuozzolo et. Al (2021) states that today's focus is to make payments easier, and there is a global goal to minimize the use of cash and move towards the electronic world. There are significant benefits recognized in payment modernization, and instant payments are in a key position for this. (Tuozzolo et. Al 2021).

Real-time payments are still in the developing stage all over the world, and they are still mostly focused on use cases between two individuals, which in practice are low-value retail payments. (Tomaney & Murrant, 2021; Panjwani & Macintyre, 2020). Significant use cases and benefits have also been recognized for payments having companies or governments included as participants, and there is a push for corporates to move to use real-time payments in their operations (Panjwani & Macintyre, 2020).

The research and use cases have been recognized at a general level, but the studies are not focused on how instant payments are impacting specific fields. This study will focus on finding and recognizing the impacts and use cases of real-time payments on businesses. The objectives of the study are to analyse past and present payment processes, identify instruments of processes to facilitate real-time payments, to identify the benefits of real-time payments on businesses, and to identify areas of improvement of processes for real-time payments. The Research gap is to achieve a better understanding of the impact of real-time payments, by providing new interview material and finding consistency and divergence in the existing literature.

The research will be done by collecting information from different publications, and by interviewing professionals working in payments from different companies and financial institutions. Findings of publications and interviews will be also compared to each other. It is necessary to mention, that since some of the used secondary materials are from commercial operators, some of the materials may contain some “marketing speech”, and therefore these statements will be compared to each other, and to collect information to prove their validity. Publications used in the research are mostly articles, reports, white papers, and infographics by banks, central banks, other financial institutions, consultancy companies, and corporates.

The purpose of this research is not to be an all-embracing report about the relations between instant payments and the supply chain, but its scope is to start a conversation and recognize existing and new use cases, possibilities, and difficulties in practice. The payment industry is complex (Panjwani & Macintyre, 2020), so wide background

information about the real-time payments and payments industry is necessary to be provided to better understand the purpose and result of the study.

1.1 Research gap, questions, and objectives

According to different reports, more information about the impacts of real-time payments is needed. For example, Deloitte in 2019: "*The full impact of real-time payments only becomes clear with time as the track record gets longer and entrepreneurial corporates, start-ups, and policymakers have more time to deploy innovative services on top of the modern real-time payments infrastructure"* (p.62). The Research gap is to achieve a better understanding of the impact of real-time payments, by providing new interview material and finding consistency in the existing literature.

The research question is following:

- What are the impacts of real-time payments on businesses?

Objectives for the study are:

- To analyse / to compare past and present payment process
- Identify instruments of processes to facilitate real-time payments
- To identify the benefits of real-time payments on business/business activities
- To identify areas of improvement of processes for real-time payments

1.2 Keywords and limitations

Keywords:	**Limitation / Comment**
Real-time payments	Also known as Instant Payments
Just-In-Time	Used together with payments, real-time payments, or money flow
Money flow	-
Supply chain	Used together with payments, real-time payments, or money flow

Table 1 Keywords and limitations of the study

- Paper will not describe deeply, how payments and payment systems are working technically
- It does not pay attention to the details of the companies that will be interviewed, and it does not discuss supply chains or just-in-time procedures other than payment-related levels.
- Innovations and information about the usage of RTP might give a competitive advantage for companies. Some of the most recent publications are limited or they cost money and cannot, therefore, be used in the thesis.
- Most recent research and publications are often published or sponsored by commercial actors, such as banks or corporates. Therefore, marketing speech might occur in these materials.
- Due to the time and expanse of the study, interviews are only done for a few participants. These participants are geographically located in Europe and North America. Therefore, when making wide generalizations of the results special attention is paid and interviews will be compared to each other and to the literature.

1.3 Focus of the study / Structure of the study

The structure of the thesis will be following: Introduction, literature review, methodology, results, and conclusions. The introduction will introduce the topic, the literature review will give needed background information about the topic, the methodology chapter will open the details about the study, the results will discuss findings and interviews, and the conclusions will sum up and evaluate the research.

The study aims to collect all-encompassing information about the topic, what are the impacts real-time payments have on contemporary businesses. This will be done by using recent literature and by interviewing professionals from different companies and organizations. In addition, needed background information about the topic is given. This information will be also compared between each other and with the theory to create, confirm, cancel, or challenge assumptions. The Paper will describe the functional background of the Real-Time Payments and the use cases and challenges for companies.

Data will be collected from the publications and journals. In addition, articles by financial institutions, such as banks and central banks and individual companies will be used. Interviews are done with the payment experts (or similar) of different size companies, corporates, and financial institutions. Data will be analysed by comparing results to each other and the theoretical resources collected.

2 Literature review

2.1 Overview of payment infrastructures and clearing system mechanisms

When a payment transaction is made, it will be cleared, and then settled. Simplifying, clearing means validating the payment instruction information, while settlement means, that the money is transferred from one account to another (SWIFT, 2016). When this is done in real-time, paying in real-time is possible. The clearing and settlement process is done in "Clearing Houses" known also as "Clearing and settlement mechanisms" (CSM) or payments systems (EPC, 2022).

In a nutshell, payment systems can be divided into the three main categories: High value, low-value (retail) and real-time payments (Tompkins & Olivares, 2016). High-value payments are cleared and settled transaction-per-transaction in central bank operated high-value payment systems, which often are real-time-gross settlement systems, RTGS (SWIFT, 2016), which means that the funds can be transferred without a delay. High-value payments are transferred between financial institutions (Tompkins & Olivares, 2016). Low-value payments, also known as retail payments, are cleared and settled as a "batch", which includes multiple transactions (SWIFT, 2016). Most of the payments are sent as low-value payments, such as individual credit transfers and purchases of goods and services. The most dominant low-value payment clearing method is Automated Clearing House (ACH), which is a centralized system that automatically *"exchanges payment files and extracts file totals to calculate bilateral or multilateral participant positions throughout exchange periods"* (Tompkins & Olivares, 2016, p.13). Real-time payments can be thought of as a mixture of RTGS and low-value payments, as they have features from both. They are individual and instant but dedicated to low-value payments and used by individuals and organisations.

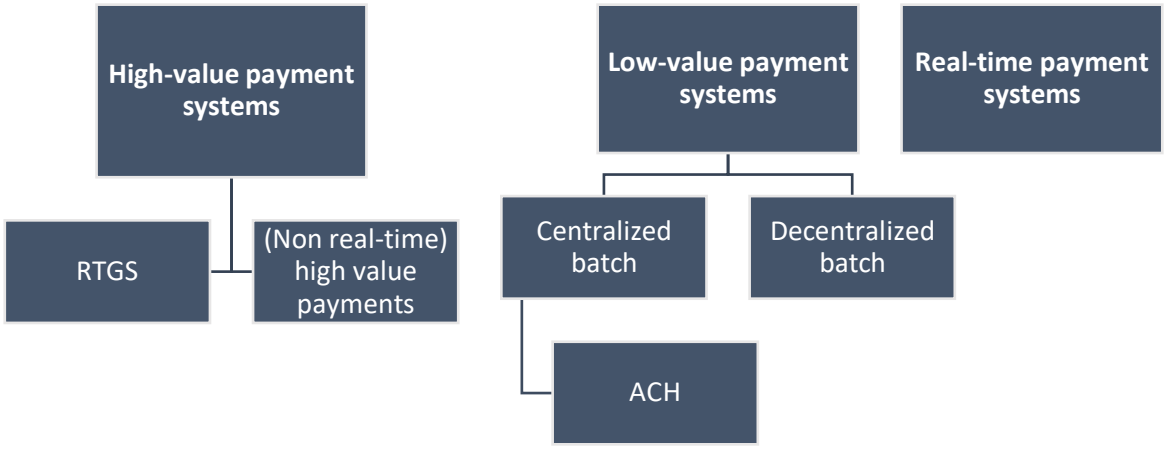

Figure 1 Types of payments systems, simplified (adopted from Tompkins & Olivares, 2016)

Traditionally, low-value batch payments have been processed "end-of-the-day", but due to the high demand for faster money transfer, batch processing cycles have become more frequent, and for low-amount transactions real-time transaction-by-transaction based clearing and settlement became possible. Therefore, the line between RTGS, ACH, and real-time payments is blurring (SWIFT, 2016), and therefore for consumers, it often does not play a wide role in which way payment has been cleared and settled.

Clearing house systems arise in lately 18th century in London. The Banker's Clearing House (TBCH) was founded, and it was the first provider of daily bilateral clearing. (Haare 2007). According to Haare (2007), In the mid-1800, banks started sending their employees by foot to other banks with cheques and money orders, so that settlement between these banks could be done. However, it was noticed that a more efficient way to do this would be to meet up "half-a-way", in the street and exchange the required documents and do the settlement by cash there. Later, the walking clerks met up in a pub to exchange the documents and cash, and the concept of a clearing house was born (Haare,

2007). Nowadays, clearing and settlement systems are digital, highly regulated, and part of critical infrastructure (Swift, 2016).

In the glossary of the European Payments Council, clearing is defined as “the process of transmitting, reconciling and, in some cases, confirming transfer orders before settlement, potentially including the netting of orders and the establishment of final positions for settlement” (EPC, 2022). ECB defines settlement as “An act which discharges obligations in respect of funds or securities transfers between two or more parties”. (ECB, 2022)

In the simple example below, company 1 wants to pay company 2. Following simplified flow could apply for real-time payment or low-value batch payment. If the payment would be sent as a regular low-value batch payment, Bank 1 would combine multiple payments as a batch, that is going to bank 2 and then send the whole batch to bank 2 via CSM. If the payment would be done as a real-time payment, Bank 1 would send the payment individually immediately.

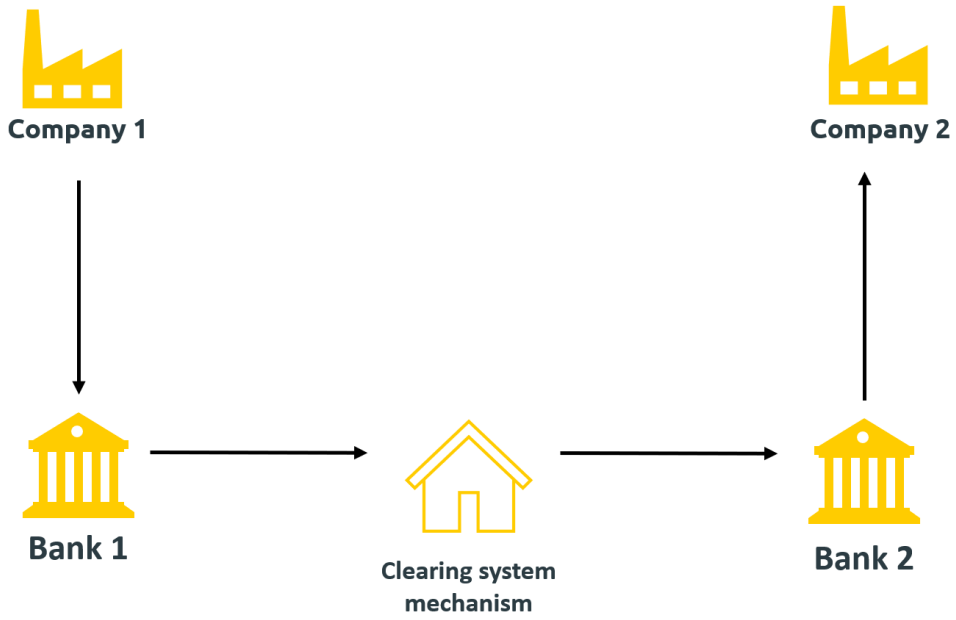

Figure 2 Simple B2B payment flow (Adopted from Bank of Finland, 2022)

2.2 Real-time Payments

We have already used to, that many things, such as sending and receiving messages, are happening in real-time. However, according to SWIFT (2015), financial supply chains had not reached the same speed as the physical movement of the goods. Although sending money in real-time is possible in certain cases, in many cases completing an electronic payment might still take a business day or two, especially if payment is committed during the weekend, bank holiday, or night-time (ECB, 2020; Hartmann et. Al, 2019). The rising trend of instant payments allows people, businesses, and governments to commit payments in a way that the recipient can use transferred funds immediately. (Deloitte, 2019).

Instant payment describes any payment where the payment arrives at the recipient almost immediately after a payment transaction initiated by the payer. Instant Payment means, that the payment will be on the account of the recipient in seconds, regardless of the day or time (ECB, 2020). In other words, payments are "*cleared and/or settled within seconds on a 24/7 basis*" (Hartmann et. Al, 2019). Instant payment is final, meaning that it cannot be cancelled after it has been executed. Both payer and the payee will receive a confirmation about successful or unsuccessful payment. (Bank of Finland, 2019).

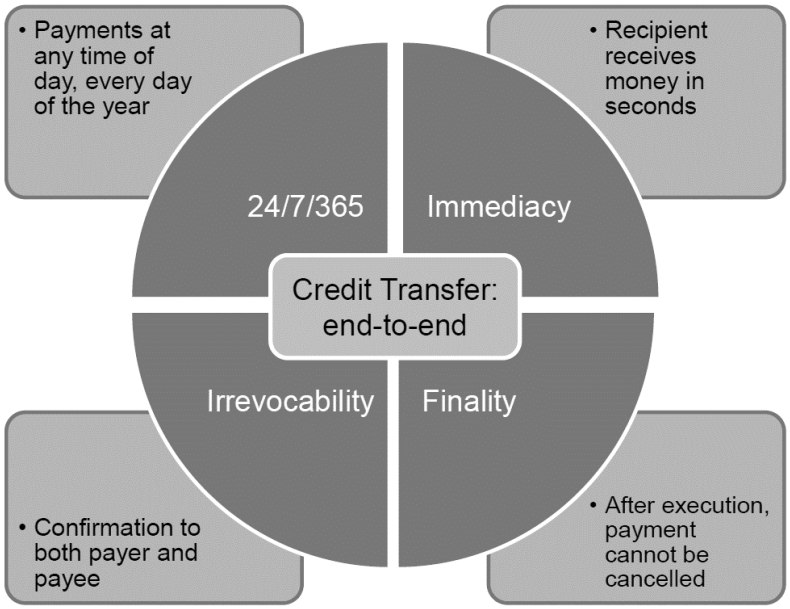

Figure 3 Instant payment features (Bank of Finland, 2019)

The real-time payment itself launched like a "traditional" credit transfer, without a visible difference to the user. (Bank of Finland, 2019). However, it enables new ways of paying as well, such as Request to pay, which will be discussed later in this paper.

Instant Payments (IP) are also known as real-time payments (RTP), immediate payments, fast payments, or faster payments (Bank of Finland, 2019). In Europe, the most used term is Instant Payments, which is also used by European Central Bank (ECB) and European Banking Association (EBA). Usually, these are used as a synonym for each other, but some resources, such as the Bank of Finland (2019) are stating that *"Real-time payment describes any payment where the payment arrives at the recipient almost immediately after a payment transaction initiated by the payer" (p.7),* whereas *"Instant payment is always real-time but, in addition, it also has other features." (p.7).* According to the Bank of Finland these features mean that Instant payments are always available, 24 hours a day, 365 days a year, whereas real-time payments can be real-time only at a certain time of the day. However, in this paper, we will use these terms as a synonym, since most of the writers do the same.

2.2.1 Share of real-time payments of all payments

Tomaney and Murrant (2021) view, that around 9.8 per cent of all electronic payments all around the world are currently instant payments. A report by Capgemini Research Institute (2021) presents, that together instant payments and electronic money were covering 14,5% of global non-cash transactions in 2020, but they estimate that number will be more than 25% by 2025. It is seen, that not depending on the market, the trend of using Instant payment is growing worldwide.

In the SEPA area, in 2020 real-time payments accounted for over 10 billion transactions, but for 2021 estimated total number of transactions is estimated to be around 13.5 billion. (Capgemini Research Institute, 2021). In October 2019 share of instant payments in the SEPA area was 5,2%, but two years later, in September 2021 the number total share of instant payments in the SEPA area was 10.38% of all transactions (European Central Bank, 2022).

According to Tomaney and Murrant (2021), in Finland instant payments were covering 0,8% of all payments in 2020. They estimate that the number will increase to 9.7% in 2025 of all payments and 11.8% of all digital payments.

2.2.2 Common Misunderstandings about instant payments

Bank of Finland (2019) highlights, that instant payment does not always mean mobile payment and mobile payment does not necessarily mean instant payment. For instance, when mobile is using credit or debit card details to pay, this might be the case. From a consumer point-of-view, it might be difficult to understand, whether the payment itself is happening in real-time, or if it just looks like it. Although interest in instant payments is high, it does not indicate the level of understanding about how these payments work (Pymnts.com, 2022).

According to the Pymnts Intelligence (2022) report, most consumers believe that instant payments do not provide funds immediately available, and almost half of the small companies said that they are not interested in switching to instant payment because they are happy with their current providers. In many cases, the sender or the receiver of the payment does not even know about the existing instant payment network. “They just know that funds can be sent immediately” (Ledford, 2021, as cited by Adams 2021, p.2).

In practice, this can be seen as a misunderstanding, of what are instant payments. There are multiple ‘instant-looking’ services, that are giving confidence to the user, that they will receive the money even though the actual transfer of the money will take the traditional settlement time (Salmony, 2017). Pymnts Intelligence (2022) report raises, that in the United States, 44% of consumers think that payment platforms, such as PayPal have the same ability as actual instant payment platforms, such as Zelle, although this is not the case. They state that this might be the one reason why some of the consumers are not seeing the functionality of real-time payments correctly since they incorrectly mix them to non-instant payment platforms, such as PayPal, or for example MobilePay in Finland. These platforms are transferring the information about transfer in real-time, but not necessarily the actual funds. In addition, in the SEPA area, a regular wide amount of batch payments are being processed multiple times a day during working hours, and therefore a short delay is maybe not be detected.

2.2.2.1 Example 1: MobilePay

MobilePay, which has been launched by Danske Bank, is a mobile application, that charges transaction amount from payers’ debit/credit card and transfers it to the receiver’s account in the background. From users’ perspective, the difference between instant payments cannot be easily recognized but in functionality, it differs. Using Instant Payment does not require the usage of a card, since the funds will be transferred straight for example from the payer’s account. However, MobilePay charges the amount to be transferred from the credit or debit card and sends it to the receiver’s bank account.

Since most of the Finnish banks are connected to the same instant payment network as Danske Bank, the money will often move in real-time. (MobilePay, 2022)

2.2.2.2 Example 2: PayPal

In early 2000, payment service provider Paypal started co-operating with the online market platform eBay. Back then, according to Mattinen (2019) customers of eBay saw two things regarding paying significant: money being seen as a receiver's account balance immediately after payment - and reliability, which are the same benefits that can be seen with instant payments. Mattinen (2019) raises an example of the consumer, who is selling goods to the other consumer. For users it was a huge benefit, that the information about that money had been transferred was received in real-time, and there was no need to wait for payment for days or send the product without concern that the payment has been made correctly. Therefore, since it was a huge benefit for users, it also provided a competitive advantage to PayPal and eBay.

PayPal did not have a real-time payment platform. If customers wanted to transfer their money from the PayPal account to their bank accounts, a normal one-to-three-day time processing time applied.

2.2.2.3 Credit transfers between two accounts in the same bank

Transfers inside the same bank are happening in real-time, but this is happening in the bank's internal systems. Actual instant payment requires paying to a recipient's account, in another bank, and real-time payment infrastructure between banks is needed. (Bank of Finland, 2019) Therefore, credit transfers inside the same bank are not treated as real-time payments.

2.3 Financial messaging

Payment systems rely on messaging standards to connect and transact quickly and effectively across industries (Gallaher & Harper, 2021). Communication between interacting parties of payment takes the form of financial messaging, which is a way to transfer information and actions (Foody et. Al 2014). *"Financial messages can be used to describe wire transfers, account inquiries, corporate actions and countless other operations" (Foody et. Al, 2014, p.16).* Currently, still predominant message standard, SWIFT MT was launched in 1973 is being replaced by a new message standard, ISO 20022. In many areas and countries, ISO 20022 has already taken over the MT standard. (Moyne & Lopez, 2021). For card transactions, the most used standard is ISO 8583, which according to Gallaher & Harper (2021) is a lower priority to be replaced by ISO20022, which however is possible via API's.

When payment is done, by using an e-bank or some payment application, the system will create a financial message in the background. This can be also done by ERP systems, that companies are using. For companies, it is often more efficient to create the financial messages by themself and send them straight to the bank, instead of using the user interface of the bank's application.

2.3.1 ISO 20022

When discussing real-time payments, it is necessary to talk about the most topical ISO standard relating to payments, ISO 20022. ISO20022 is the global standard for financial messaging, which has been recognized as a particularly useful standard for enabling deeper data gathering, which has the potential to improve payment system interoperability and efficiency (Gallaher & Harper, 2021). It is an open data standard that is being adopted around the world for domestic batch and instant payment systems, and high-value real-time gross settlement. (SWIFT, 2019). A common expectation is that 85% of market infrastructures (by the value of payments) will be migrated to ISO 20022 worldwide by 2025 (Citibank, 2022). European Parliament and the Council regulated already

ten years ago, in 2012 (REGULATION EU) No 260/2012), that SEPA banks and clearing- and settlement systems are required to use ISO 20022 standard.

Gallaher and Harper (2021) state that ISO 20022 answers to the most important needs of payment messages: they need to be highly structured and machine-readable as possible, so that they can be handled automatically, but also human-readable so that issues can be identified. Since financial information can also be complicated, messages also need to be flexible and there must be a possibility to add different kinds of information. "*ISO 20022 is an extremely flexible standard, capable of representing any payment in any business scenario. The cost of this flexibility is complexity" (SWIFT, 2019, p.4)*. ISO 20022 includes more than 700 different XML schemas for different kinds of financial messaging. (ISO20022.org, 2022).

ISO20022 is based on Extensible Markup Language (XML) technology. XML is a simple, human, and computer-readable open standard format to represent low-level data and it is relatively easy to understand for people (Fawcett et al, 2012). XML documents are based on XML schemas, that determines the structure of the message, and which element are allowed, mandatory, optional, or forbidden. XML technology provides significant benefits, since it is machine-readable, and enables easy manipulations of messages, which means that the same information in the same file can be used in multiple ways. (C. Miller, 2020).

From a business point of view, structured data and especially the remittance information in ISO 20022 messages enable the possibility of automatic reconciliation, invoice matching, and account receivables and payables management (Euromoney, 2022). The report also presents, that it might also offer automatic cash-position reporting and increased traceability and assurance of payments when coupled with corporate enterprise resource planning (ERP) systems, which will make cash management processes more efficient and automatic.

Euromoney’s publication (2021) discusses that to fully realize ISO 20022's potential, banks must guarantee that their payment processing systems can fully handle the standard's data and pass it on to payment infrastructures, which will necessitate significant expenditures in payment processing and digital channel infrastructure. Euromoney’s publication in 2021 also raises, that some challenges appear in sending and receiving these messages. For example, they raise that since a large number of payment channels are migrating to ISO 20022, the final solutions to how payment standards are implemented will slightly differ and lead to differing practices in how fields are populated. Rao (2021) compares interbank communication to sports: although we have global rules in certain sports, there might be slight differences in different countries or leagues. Therefore, rules need to be agreed upon beforehand between participants. The same applies to banks; although ISO 20022 makes data more solid, it leaves banks also freedom.

In 2019, SWIFT mentioned in its "ISO 20022: Better data means better payments" report, that the challenges that global correspondent banking has faced, are related to insufficient or poor-quality data. When it comes to compliance, anti-money laundering, and know-your-customer processes, missing key information causes delays. SWIFT estimated in 2019, that 10% of all international payments are stopped somewhere for compliance checks, while most of them are unnecessary and avoidable investigations. SWIFT (2019) mentions that missing or imperfect information causes the need for costly and inefficient manual processes, also reducing the visibility of cash flow and cash positions for corporate treasurers. Users of payment systems have comparable limitations in terms of the business intelligence they can extract from their payment data, which should be a rich source of information about customer behaviour. In addition, publication appraises, that banks are not aware of the business purpose of a payment, which makes it difficult for them to build value-added services for companies. According to SWIFT (2019), these challenges can be defeated by improving and adding better-defined data and by ensuring that data is not “lost or corrupted as it flows through the System” (p.2).

ISO 20022 is seen as a key step toward real-time international payments for multiple use cases because it allows for the inclusion of remittance documents. In 2020, C.Miller stated, that in the next five years, ISO20022 will be the main language for high-value payments, “supporting 80 per cent of the volume and 89 per cent of the value of transactions worldwide, as major market infrastructures prepare to adopt the standard by 2021.”

The following example message contains a simple credit transfer between two participants in ISO 20022 format. The message has been formed by using SEPA Instant payment guidance (SEPA INST. SCT), meaning to be real-time payment if it were sent to the real-time payment rails.

Following ISO20022 based, pain.001 XML message is used for regular instant payment credit transfer. In this credit transfer, the company ‘Initiating company’, with company id “123456-8” initiates instant SEPA payment on behalf of the debtor “One who pays” to “One who gets paid”. The structure and format of the payment message are strictly defined. If the content or structure of the message is not following the demands of the banks and ISO 200022 standards, it will be rejected. In the following example, unstructured address data and remittance information is used to save space, although using structured data is one of the key benefits of ISO 20022.

```
<?xml version="1.0" encoding="utf-8"?>
<Document
xmlns="urn:iso:std:iso:20022:tech:xsd:pain.001.001.03"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLoca-
tion="urn:iso:std:iso:20022:tech:xsd:pain.001.001.03
pain.001.001.03.xsd">
  <CstmrCdtTrfInitn>
    <GrpHdr>
      <MsgId>011664</MsgId>
      <CreDtTm>2022-03-24T10:30:47</CreDtTm>
      <NbOfTxs>1</NbOfTxs>
      <InitgPty>
        <Nm>Initiating Company</Nm>
        <Id>
          <OrgId>
```

```
        <Othr>
          <Id>1234567-8</Id>
          <SchmeNm>
            <Cd>YTJ</Cd>
          </SchmeNm>
        </Othr>
      </OrgId>
    </Id>
  </InitgPty>
</GrpHdr>
<PmtInf>
  <PmtInfId>PmtInfId</PmtInfId>
  <PmtMtd>TRF</PmtMtd>
  <PmtTpInf>
    <SvcLvl>
      <Cd>SEPA</Cd>
    </SvcLvl>
    <LclInstrm>
      <Cd>INST</Cd>
    </LclInstrm>
  </PmtTpInf>
  <ReqdExctnDt>2022-03-25</ReqdExctnDt>
  <Dbtr>
    <Nm>One who pays</Nm>
    <PstlAdr>
      <Ctry>FI</Ctry>
    </PstlAdr>
  </Dbtr>
  <DbtrAcct>
    <Id>
      <IBAN>FI0840557920016848</IBAN>
    </Id>
    <Ccy>EUR</Ccy>
  </DbtrAcct>
  <DbtrAgt>
    <FinInstnId>
      <BIC>HELSFIHH</BIC>
      <PstlAdr>
        <Ctry>FI</Ctry>
      </PstlAdr>
    </FinInstnId>
  </DbtrAgt>
  <CdtTrfTxInf>
    <PmtId>
      <InstrId>SEPA Instant Reference</InstrId>
      <EndToEndId>1-123456</EndToEndId>
    </PmtId>
    <Amt>
      <InstdAmt Ccy="EUR">10.00</InstdAmt>
    </Amt>
    <ChrgBr>SLEV</ChrgBr>
    <CdtrAgt>
      <FinInstnId>
```

```
            <BIC>OKOYFIHH</BIC>
          </FinInstnId>
        </CdtrAgt>
        <Cdtr>
          <Nm>One who gets paid</Nm>
          <PstlAdr>
            <Ctry>FI</Ctry>
            <AdrLine>Wolfintie 34</AdrLine>
            <AdrLine>65200 Vaasa</AdrLine>
          </PstlAdr>
        </Cdtr>
        <CdtrAcct>
          <Id>
            <IBAN>FI2557230220077111</IBAN>
          </Id>
          <Ccy>EUR</Ccy>
        </CdtrAcct>
        <RmtInf>
          <Ustrd>Hi mom</Ustrd>
        </RmtInf>
      </CdtTrfTxInf>
    </PmtInf>
  </CstmrCdtTrfInitn>
</Document>
```

Code 1 Example ISO20022 pain.001 message (Adopted from Danske Bank, 2022)

2.3.2 Comparison of ISO 20022 and SWIFT MT format

The following comparison of ISO20022 and MT message format highlights the importance of structured and granular data.

	Example ISO 20022 debtor data		Customer data example
Debtor	Name		MATTI MEIKÄLÄINEN
	Postal Address	Department	
		Sub Department	
		Street Name	WOLFINTIE
		Building Number	34
		Post Code	65200
		Town Name	VAASA
		Country	FI
	Identification	Private Identification - Other Id (This could be for example passport number)	FP12345678
Debtor Account	Identification	IBAN	FI1234567891011112

ISO 20022 allows granular data structure

Figure 4 Example of structured ISO 20022 data (Adopted from Intercope, 2022 & Payment Market Practice Group, 2017)

MT format - Unstructured

```
:50F:/FI123456789101112
MATTI MEIKÄLÄINEN WOLFINTIE 34
 65200   VAASA   FINLAND   ID:
FP12345678
```

Automatic processing is difficult since positions and content varies

Code 2 Unstructured MT format (Adopted from Payment Market Practice Group, 2017 & SWIFT 2019)

MT format - Structured (Risk of potential truncation & loss of info)

```
:50F:/FI123456789101112
1/ MATTI MEIKÄLÄINEN
1/
2/ WOLFINTIE 34
3/FI/VAASA 65200
```

Data is loss (passport number) since structured MT format supports only limited amount of data

Code 3 Structured MT Format (Adopted from Payment Market Practice Group, 2017 & SWIFT 2019)

2.4 Just in time payments and push payments

The term “Just-In-Time payment” (JIT-payments) is slowly becoming in general use. For example, Bermingham (2020), Schmitz-Becker et. Al (2018), and Salmony (2017) are discussing JIT payments. Schmitz-Becker et. Al (2018) are stating that JIT payments mean mirroring the just-in-time philosophy into the payment processes. Both JIT systems and payments digitalization aims to improve productivity and profitability by streamlining operations and increasing efficiency (Bermingham 2020), and therefore used together as just-in-time payments they provide significant benefits for production.

Just-in-time philosophy is described as a management strategy, that aims, that materials are produced, transported, and transferred based on a real need at the best possible time (Logistiikan maailma, 2022). According to Batth (2021), the just-in-time philosophy aims to procure the needed materials when they are required, minimize inventory, and maximize efficiency.

With the importance of speed in today's supply chain, the ability to function in real-time is extremely essential to manufacturers (Bermingham 2020). By adding the automatized, real-time payment to JIT production, a new level of speed can be achieved (Bermingham 2020). However, speed is not the only benefit that just time payments can provide. According to Schmitz-Becker et. Al (2018, p.8) just in time payments provides "*enhancing working capital, allowing more precise funding, reducing costs and maintaining facility headroom".* Ordering and paying also require human interaction and resources (Salmony 2017), and by replacing accounts payable processes with automated digital options, like real-time payment procedures, manufacturers can save money and time (Bermingham, 2020).

In manufacturing, materials and parts are often bought from suppliers. In JIT, high-level trust between supplier and buyer is needed, since when the reorder comes in, frequent deliveries of materials are required (Batth, 2021), and they are critical. Just-in-time payments are providing companies with the opportunity to use just-in-time deliveries with lower risk since the payments can be moved same time as goods. This also reduces trade friction and delays (Schmitz-Becker et. Al 2018). Schmitz-Becker et. Al (2018) also raise, that "companies can use real-time payments to access a wider supplier base without incurring additional supplier risk through digital 'cash on delivery" (p. 9), which can be also used in just-in-time deliveries. In practice, this means, that payment can also be done when the supplier is delivering the goods to the buyer.

In practice just-in-time payments could work in the following way: A stock monitoring system detects those materials or goods that need to be reordered. Instead of needing financial departments to process invoices – payment can be done automatically. Stock monitoring system commits and orders with payment. When the supplier receives the payment immediately, also the goods can be sent faster.

From in supplier's point of view, it is beneficiary to receive payment faster, and in addition to internal benefits, buyer benefits since those who play in real-time are appreciated in a market (Bermingham 2020). Just in time payments are providing clear benefits for buyers to benefit, but benefits are recognized also by suppliers. Bermingham (2020) argues, that automatization increases their agility and releases resources, which will help them to capture more market share.

Real-time payments are a key enabler for manufacturers to use just-in-time payments since as they are structured, better automatization is enabled and funds are transferred in real-time. However, since just-in-time payments are not yet settled expression, and the concept is not unequivocally defined, it should be researched more and approached carefully.

2.5 Request to pay (R2P)

"We can't talk about real-time payments without talking about "Request to Pay", stated Katrin Boettger in ACI Worldwide's blog post in 2021. Request to pay (R2P) is a feature, that enables initiating the payment in real-time in a way that receiver of the payment sends the request, and the payer accepts it on their device. "Request to pay" could be launched with multiple different payment instruments, such as scanning a QR-code, payment button in website, a smart device such as a mobile phone or smartwatch, or in an online bank" (Bank of Finland, 2019).

In the simplified example (Figure 5) below, the owner of the blue phone (on the left) sends a request to the black phone (in the middle) to pay 100€. The owner of the black phone accepts the request, and the owner of the blue phone gets confirmation about receiving the money. The requester of the payment could, for example, be also a payment terminal at the supermarket, or an automated system in the web store.

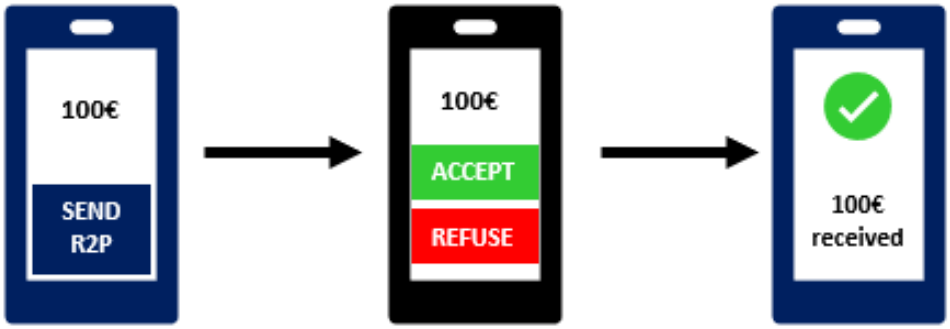

Figure 5 Simplified R2P flow, (adapted from European Payments Council, 2022)

2.6 Theoretical Framework of the study

The purpose of this subchapter is to summarize the literature review chapter of the thesis, including the keywords under investigation. In the literature review, necessary background information to understand how real-time payments work is handled. In addition, basic information about just-in-time and push payments, and request to pay is introduced, since understanding these topics is necessary when reading the results chapter of the thesis.

To understand how payments and money flow work, understanding the functionality of payment infrastructures and clearing systems mechanisms is needed. Payments can roughly be divided into three categories according to the clearing system mechanisms where they are processed: High value, low-value and real-time systems. To get a better understanding of money flow, a figure about how payments are moving from one company to another is also presented.

To understand the topic of the thesis, it is necessary to know what is meant by real-time payments. Sub-chapter about real-time payments also about their features, prevalence and about the fact that the line of recognizing the payment being real-time is blurring – they can easily be mixed with payment products that are not based on real-time clearing.

In practice, payments are information that is transferred. Payment – and information relating to payments are sent in financial messages. Features of the payments are highly based on the information available in these messages. Since financial communication between participants of the supply chain is done with financial messaging, participants must understand each other. Especially in real-time payments, messages must be formed in a way that information can be handled automatically. Therefore, financial messaging is highly regulated and based on standards. ISO 20022 message standard is the most topical financial message standard, that has multiple features that support automatic handling and enable the presence of necessary information.

Below, figure 6 summarizes, the relationship and hierarchy of the keywords handled in the thesis. In practice, money flow can be seen as one part of the supply chain. Payments are an essential part of money flow, and the main topic of the thesis, real-time payments are part of the payments. Just-in-time (payments) can be seen as one of the main use cases of real-time payments.

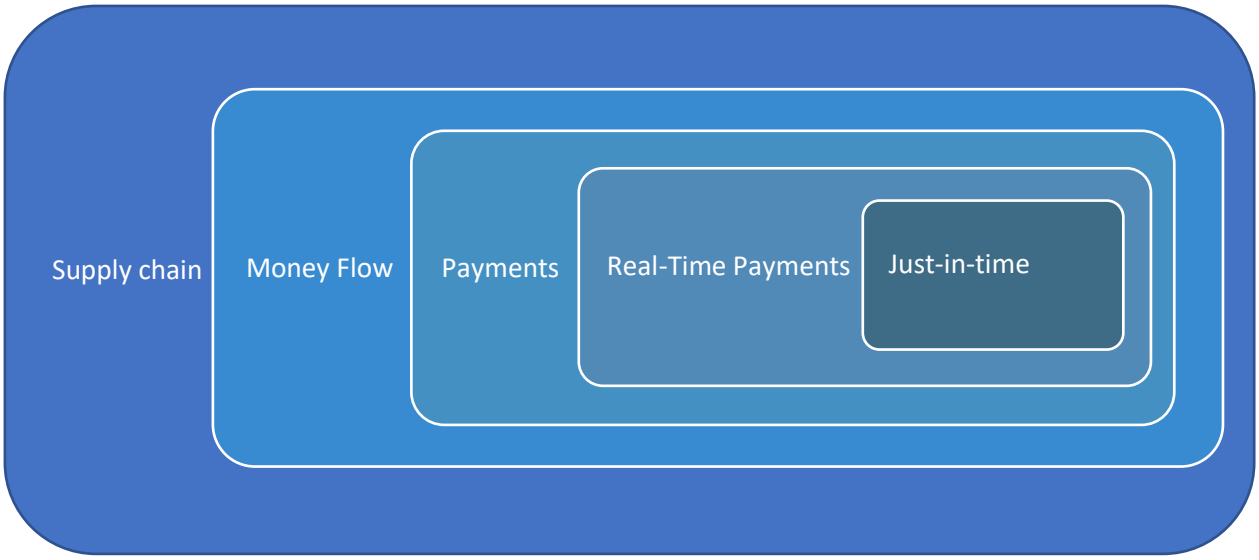

Figure 6 Hierarchy and relationship of keywords and core-issues of the thesis in the onion model

3 Methodology

This chapter answers, how the research problem was approached, what are the data collection methods to get there, and how the data was analysed. In addition, in this chapter validity and reliability of the research are evaluated.

3.1 Research Strategy

The main purpose of the research was to get answers to the research question "What are the impacts of real-time payments on businesses?". Answers to this question were decided to collect by creating a qualitative study. The qualitative study was chosen, because the topic is a large and complex entity, and therefore to commit quantitative research would have required more resources. However, quantitative data, such as statistics provided in different publications have been used to support information.

3.2 Data collection and analysis

As a primary resource, the gap of missing recent information was aimed to be filled by interviewing professionals, that are working among payments. The sampling population for the interviews was people working in management or as high-level consultants. Requirements for interviewees were, that they know the payments industry well, and are working in companies, corporates, or financial institutions in Europe or North America.

The research approach of the thesis is inductive. The thesis aims to collect pieces of information from interviews, to form a theory or generalisation. This is done by analysing the answers of interviewees with thematic methods, comparing the answers to each other, and finding similarities and differences between the answers.

As a secondary resource, publications from recent years are used. Most of the used material is published after 2016 since most of the literature and usage of real-time payments are focused after those years. To get the most recent information from the

market for the research, articles, white papers and publications from both non-commercial and commercial players were used. Multiple references used in the paper were published during the writing process.

For the study, around 40 interview requests were sent on LinkedIn and by email to the people, that were targeted by their profession and company. The sample is therefore convenient, but companies and people were targeted by intuition, and therefore randomly. In addition, around ten of the interviewee candidates were targeted via working channels. The purpose of the sample was to find people, that understand payments as a large entity, but also have views about them from the point-of-view of businesses, from different angles. For the LinkedIn search, keywords used were related to payments and senior management from multiple departments. On LinkedIn, interview proposals were sent to targeted people by private messages.

For the thesis, four high-level payment industry professionals were interviewed. The reason for the relatively low number of interviewees is the complexity of the topic, meaning that many of the interview candidates declined the request because they did not know about the topic. Another reason to be mentioned was the low reply rate to the interview proposals on email and LinkedIn. Relevant material, that was caught from the interviews is presented in this research, and the notable statements are presented in the results chapter.

The length of the interviews was planned and suggested to be 30 minutes, but depending on the interviewee's timetable, they were 25 to 45 minutes. For the interviews I prepared open questions, that were based on the objectives of the study. The main questions can be found in the appendix. During the interviews, more questions were made depending on the answers of the interviewees to get more accurate answers, to stay on the topic, or to get a better understanding of the topic they were discussing. Since the topic is complex, and there are not simply "one-word" answers to the questions, I found open discussions the best way to collect information from interviewees.

In the support of the research question, the paper “Strategies for Qualitative Interviews” published by the Sociology Department of Harward University was used. In the paper, it was mentioned that the purpose of a qualitative interview is to let the interviewee tell the story in their own words (Department of Sociology, Harward University), which was also a key focus in an interview to receive new information. At the beginning of the interviews, an easy opening question about real-time payments was made not only just to give an easy start for the interviewee, but also to ensure that the interviewee and interviewer had the same understanding of the topic. The structuration of the questionnaire was planned to be in order, that would help to think answers to the next questions. Since interviewees had different backgrounds, a questionnaire was adapted to answers, and therefore, the questions were asked in varying order. In addition, some extra questions were made during the conversation and some of the questions were dropped out due to the time limitations or the previous answers.

3.3 Validity and reliability

Hiltunen (2009) states, that validity means, how well research method measures, what it needs to be measured. In addition, if results are indicating, that knowledge received from the study is corresponding the present theory, or can make it more accurate or better, then the results of the research are valid. In the study, same elements were identified in primary resource, which were interviews, and in secondary resource, which were literature. In addition, interview questions were formed in a way, that they aimed to find answers for the objectives of the study. Interviewees had strong background among payments, but since there were only 4 interviewees, in external validity point-of-view carefulness is needed, since wide generalisations cannot be made for all the industries or companies, especially if they vary from the ones that has been discussed in the interviews. In internal validity point-of-view, theory presented in the thesis corresponds to the literature, and the interviews of the study. Therefore, it can be considered internally valid.

Reliability means, that study is repeatable (Hiltunen, 2009). Base questions for the interviews can be found in the appendix. Research process have been described in previous subchapter, and therefore study can be repeated. Since the topic is current, and payments industry is developing with high speed, results might differ, if same study would be done for example after multiple years.

The literature used in the research is recent and topical. The focus of the literature has been on articles and publications by nonpartisan players, but since in this paper also publications, such as white papers of commercial players have been used, marketing speech may occur in some of these references. However, most of these publications have been recognized and used in other literature as well, which gives the impression that these have been also believed as valid studies by others.

Interviewees are high-level professionals in the payment industry, and they represent different players in the field. Interviews were done with the people working in known, significant organizations. Permission to use interviews was confirmed by all the participants. All interviewees are from Europe and most of them are from Finland. However, they all have a background working in an international environment. Since interviewees are high-level professionals with a long history of payments, material received from interviews can be treated as remarkable. However, the number of interviewees was relatively small, and therefore, answers are generalized with concern.

4 Results

The purpose of this chapter is to present and discuss the results of the study. This will include the analysis of the interviews, and the analysis of the information caught in literature, and publications. In the results, benefits, use cases and challenges of real-time payments are presented. In addition, the impacts of Covid-19 as the topic are mentioned. After that, interviews will be analysed one by one.

4.1 Benefits and use cases of real-time payments

Real-time payments are improving the market efficiency, and therefore causing economic growth, states CEO of ACI Worldwide, Odilon Almeida in the ACI Worldwide blog in 2022, basing his statement on research by the Centre for Economics and Business Research. In the research, a noticeable correlation was found between real-time payments and economic growth.

Studies by Bank for International Settlements (2016), European Central Bank (2018), Faster Payments Task Force (2017), Deloitte (2015), EY (2018) and HSBC (2018) as cited by Deloitte (2019), provide a consensus, that instant payment schemes represent best practice for future payment systems.

The obvious benefit of real-time payments is speed. Using real-time payments reduces or deletes waiting times. For example, while buying a car from another individual or company, instant payments enable buying or selling in real-time without waiting for money to transfer. Therefore, the possibility of ending up a victim of fraud is decreasing and security is improving. This removes the phenomenon that money is “being locked in the system” between payer and receiver, while the transaction is processed (Deloitte, 2019). Another example can be the situation, where the consumer buys something from a brick-and-mortar store or online and returns the product. According to my observation, the return of the money back to the bank account will often take a couple of business

days. This might lead to awkward situations. For example, the buyer, who is having a limited amount of money, that is dedicated to buying a certain product, ends up buying the last piece of the product that tends to be broken. The customer returns the product, but his or her last money is stuck in the reimbursement, which will be coming back to the account in several bank days. The same would also apply to e-commerce. Thus, real-time payment could provide consumers with the opportunity to receive payback in real-time.

Since consumers have started to get used to real-time payments in P2P transactions, they will start using them more and more also for eCommerce. (Tomaney & Murrant, 2021). According to them, for merchants adopting these services online is a critical factor in the short term. Tomaney and Murrant (2021) view, that by moving to use instant payment systems, customers of eCommerce are likely to save time instead of writing their card details or login into the online bank. In practice, when committing the order, the eCommerce platform could, for example, send a “Request to pay” message to the customer’s device, when the customer only needs to approve the payment on their device.

According to research by PYMNTS Intelligence (2022), more than 75% of businesses want financial institutions to offer faster payment options. The report by PYMNTS Intelligence (2022) also states, that businesses are recognizing the benefits of faster payments even better than consumers, even though most of the current use cases are for P2P transactions. Especially larger companies, with revenue of more than 1 million US dollars, believe that it is essential to provide payments faster (PYMNTS Intelligence, 2022).

Although in Europe most of the people are using financial services that are provided by a bank, in developing countries the situation might be different. Real-time payments can make formal financial services like banks more attractive options to individuals, who currently only use cash or mobile for paying. This could improve governmental control and reduce the black market. Therefore, real-time payments can also help with the transformation to a more formalized economy. As mentioned by Deloitte (2019), case studies for

example from Thailand suggest that instant payments can help override the usage of cash. This will reduce black market activity, which will lead to growing tax income and decreasing financial crime. (Deloitte, 2019).

Reduction of usage of cash has multiple benefits. Brien (2021) states, that instant payment reduces the possibility of employee theft, and mistakenly gives the wrong amount of change back to the customer. Brien (2021) also raises, that handling and depositing cash safely causes costs and work. With instant payment, merchants can improve their cash flow management, which could be beneficiary for the small businesses, that want to start using their received money quickly. Brien (2021) gives an example of a bakery, that can sell the goods in the morning, and use the funds in the same afternoon received in the morning.

Possible override of real-time payments over payment cards is also recognized. In the research by ACI Worldwide and Ovum in 2018, it was found that more than two-thirds of banks, billing organizations, and merchants believe, that combination of real-time payments and open banking will overtake payment cards over time (ACI Worldwide 2018). This may lead up the better security. For example, in 2020 in Finland, 30,8% of all payment frauds were situations, where card details were stolen online. In France, this same amount was 32,8%. In addition to frauds committed online, getting card details stolen or skimmed in person is also likely: for example, in France 16,7% of all payment fraud and in Norway 22,1%. (Tomaney, Murrant, 2021).

The study by ACI Worldwide and Ovum in 2018 indicated, that real-time payments are expected to improve customer service. This was seen by 86 per cent of banks, 82 per cent of billing organizations, and 78 per cent of merchants (ACI Worldwide 2018). The study included in total more than 1000 respondents from 19 countries from multiple industries, such as financial institutions, merchants, and billing organizations. Instant payments are also driving better customer loyalty. Pymtns Intelligence (2022) report finds, that 66% of consumers are saying that they “would do more business with

companies that offer free instant payment options". In addition, the report raises that 34% of customers who are not able to use their preferred payment method are feeling disappointed and 46% are feeling anxious if they are not able to use the payment method that they feel safe.

Businesses can achieve better automated invoicing and remittance processing, which will result in a smaller number of errors and exceptions by implementing real-time payments (Pymnts Intelligence, 2022). This reduces the need for human interaction, which reduces the usage of the company's resources on the cash management side. According to Pymtns Intelligence (2022), payment operations will become more efficient, more secure, and accessible and lead to the grown revenue while overhead costs are reduced.

Whereas the benefits of instant payments in the point-of-view of peers are that money can be transferred as soon as possible, Panjwani & Macintyre (2020) notices that incorporating point-of-view this can be turned also upside down; instant payments also allow executing the payment as late as possible. They add, that in addition, instant payments are key to doing it secure and least costly way. Companies want to postpone their outgoing payments and receive the incoming payments as soon as possible. This allows for more efficient working capital.

Most of the current use cases of real-time payments are mostly focused on low-value transactions between two individuals. (Tomaney & Murrant, 2021; Panjwani & Macintyre, 2020). However, significant use cases and benefits are also recognized for businesses. (Panjwani & Macintyre, 2020); (Schmitz-Becker et. Al 2018). It is not meant to list all possible use cases of instant payments. As noted in this research, at the general level instant payments are often used in the same way as non-instant, the difference coming from speed and data. However, in this chapter, some of the practical possible use cases will be mentioned from businesses' point-of-views.

For businesses, one of the biggest benefits might occur from better cash management (Brien, 2021; Salmony, 2017). According to Brien (2021), the speed of payment and improved data help both suppliers and buyers: customers may make payments precisely in time to optimize savings, whereas suppliers are receiving the funds immediately. In practice, when the due date of an invoice is set, companies are paying them on the last possible day, and after that, without instant payments, it might take one or two days before the actual money can be seen in a receiver's account. In addition, Brien (2021) mentions that rich data makes cash management better for treasurers.

Salmony (2017) and Brien (2021) recognize the use case of real-time payments also for supply chains. Instant payments can enable the usage of Just-In-Time payments, which will reduce the complex reconciliation processes in companies when the purchase of the parts and material can be done at the same time as the order itself (Salmony, 2017). The same also applies to logistics: Salmony (2017) mentions, that for example ship insurance or customs at the harbour can be paid immediately, which will allow the container to leave quicker. Brien (2021) also states that when payment moves immediately, companies can ship the goods immediately when saving time for the client to wait.

One use case or benefit that studies, including both Salmony (2017) and Brien (2021) are recognizing is an immediate salary payment. In practice, this means that salary can be paid and received immediately after when the work is done. This has been for example tried by food delivery company DoorDash (PYMNTS Disbursements 2022).

Category of Payment	Example
• Business to Business (B2B)	Logistics, Work performance, intra-company, foreign purchase
• Business to a private individual (B2P)	Insurance compensation, reimbursement, salary,
• Private individual to Business (P2B)	Work performance, grocery shopping, car purchase, e-services.

• private individual to another private individual (P2P)	Between friends, online marketplace, car purchases, etc.
• Government to Business (G2B)	Tax return, assistance, etc
• Business to Government (B2G)	Tax payment
• Government to a private individual (G2P)	Tax return, social security
• Private individual to government (P2G)	Tax payment, returning social security

Table 2 Payment categories roughly: Adapted from Bank of Finland (2019) and Deloitte (2015)

4.2 Challenges of Instant Payments

There are also some challenges, to what comes with instant payments. Pymnts.com Disbursements (2022) report mentions that understanding the concept of instant payments is in a key position, how consumers and businesses perceive them. Instant payments are also often confused with other payment platforms, that ostensible is providing an opportunity to transfer money in real-time, although the actual funds will move with delay.

Panjwani and Macintyre (2020) argue instant payments are not necessarily the only good thing for companies. First, implementing instant payments is costly. Secondly, it can also be seen, that using IP could decrease working capital in cases where multiple instant payables need to be paid during a short time. However, it is good to notice that IP does not necessarily mean, that everything needs to be paid or received immediately.

4.2.1 Costs

As reported by Global Banking News (2021), board member of the European Central Bank and former director-general of Bank of Italy, Fabio Panetta, warned commercial banks about too high fees for instant payment in the payments forum, hosted by Finland's central bank, in May 2021. Panetta highlighted, that *"For instant payments to become the new normal, they must be cheap and easy to use"* as cited by Global Banking News (2021). Capgemini Research Institute (2021) also raises, that according to Panetta, some of the banks are charging up to 1.00€ to send instant payment from their clients, while the cost to banks themself is 0,002€ (0,2-euro cents) per transaction.

In the United States, The Clearing House (TCH) is also having a flat fee for sending instant payments. Financial Institutions, such as banks that are connected to the instant payments network, are charged 4,5-dollar cents per sent credit transfer (The Clearing House 2019).

Micro businesses and small businesses see the costs of instant payments to be a critical factor. The report by PYMNTS Intelligence (2022) raises, that 66% of micro-businesses and 60% of small businesses would not be interested in using instant payments if the costs are higher than their current bank costs.

Steinbach, M. (2015) as cited by Salmony (2017) estimated that for the banks implementing instant payments will be even more expensive than implementing the euro. Salmony (2017) shows, that the actual costs of implementing real-time payments are mostly paid by the banks, while only 10% of the costs will be focused on the central infrastructure. He also raises, that it was estimated that per each bank investment costs in the UK for 'Faster Payments' infrastructure was over 200 million British pounds per participating bank – and in the UK deployment of real-time payments was relatively easy due to the high level on the concentration of financial infrastructure. According to Salmony (2017), these costs raise from the need to deploy the bank's systems into instant payments, such as booking engines and anti-money laundering, requiring widely management and development resources. Instant payments also require the adoption of the

ISO20022 message standard, and if the bank does not support the standard yet, which might be the case, especially outside Europe, even more costs will apply although the benefits of adapting the standard are undisputed. Brien (2021) states that one challenge with instant payments is, that companies need to understand all the benefits, as the speed itself might not be enough for a costly investment decision.

4.2.2 Technical Limitations

Instant payments are still in a developing stage worldwide, and they are mostly focused on payments between two individuals in many countries (Tomaney & Murrant, 2021). One significant reason for this could be the relatively low maximum limit of the individual real-time payment (Hartmann et. Al 2019). For example, the most used instant payment scheme 'SCT Inst' in Single Euro Payments Area (SEPA), which contains 27 EU member states, 3 European economic area countries (EEA), and 6 non-EEA countries which are geographically located in Europe, the limit used to be 15 000€ (Schmitz-Becker et Al, 2019). However, in 2020 limit was increased, and currently, SCT Inst supports real-time payments up to 100,000€ (EPC, 2019). In the U.S, real-time payment credit transfers have been limited to 100,000$ (The Clearing House, 2019).

Since nowadays many things happen around the clock, there is no time for downtime. New formats, such as ISO 20022 allow more data to be used, and therefore, they require more processing power from the systems. Many financial institutions and companies are having systems, that have been built up over decades. The older technology is challenging and expensive to modernize. (ACI Worldwide, 2021) Brien (2021) indicates, that the adoption of instant payments will take time due to its complexity. Brien (2021) raises, that while implementing real-time payment processes, heavy legacy processes might occur.

4.3 Effects of Covid-19

It is widely agreed and noticed, that payments have shifted away from cash and cheques towards digital payments. Covid-19 has accelerated this trend, causing changes in consumer and corporate behaviour more than no one could have predicted (Brien, 2021). Usage of real-time payments is highly rising, which has been recognized in statistics.

Capgemini Research Institute (2021) discusses in the 'World Payments reports', that before the Covid-19 pandemic banks and payment companies were mostly promoting their treasury management solutions and corporate connectivity tools for large corporates. The report raises interesting after-effects of a pandemic; these solutions started to be more affordable and attractive for SMEs as well since the understanding of open APIs has significantly increased.

The total impact of the Covid for payments cannot be known yet, since during the writing moment (in spring 2022) pandemic has not ended yet, and to realize all the impacts, further study is needed. If we look up the numbers, increased usage of real-time payments has happened during the pandemic time. According to Heikkinen and Välimäki (2021), the pandemic has especially increased the usage of contactless payment methods, such as contactless card payments and mobile payments. In Finland, mobile payments' upper limit does not exist, which might be the one accelerator for the usage, whereas contactless payment with the card is limited to up to 50 euros. Covid has also increased businesses to provide online and traditional services in parallel, which causes more need for payment methods since they need to work in both online and face-to-face environments (Heikkinen & Välimäki, 2021).

Covid has also impacted payments on the business side. Pandemic pushed employees into remote work, including those who were responsible for paying the company bills. Mastercard (2022) raises, that for example paying by check and receiving checks at remote work tend to be slow and difficult, which made many professionals look for a better solution.

4.4 Interview: George Stein, Business Development Director, XMLdation

Stein has 35 years of experience in FinTech and Transaction Banking, in business development, product marketing, and business management roles. He joined XMLdation in 2017 in his current role and has worked with other Fintech companies to execute business development and product strategies. His banking career included senior positions with UniCredit, Bank of America, Deutsche Bank, and Chase Manhattan. Stein started his career with Commerzbank.

XMLdation is a company, that provides solutions and consultation for banks, financial institutions, and clearing infrastructures in financial messaging. XMLdation's tools help banks, clearing infrastructures, and their stakeholders to roll out new payment schemes and adopt new payment formats (XMLdation 2022).

Stein mentions, that one of his favourite quotes regarding payments from the late 1980s is from the ex-CEO of Citibank, saying that "Money is information of move". Stein refers to the blogpost made by him, where he explains this twofold: *"The exchange of value (especially money) is a key means by which counterparties communicate and maintain a commercial relationship"* and *"information about a payment is as important as the payment itself. If you're buying a house or waiting for a shipping container to be released, you need to first know that the payment has occurred."* (XMLdation, 2022). Stein views, that in addition, to payments being the transfer of value, it is also a key way how participants of the economy communicate with each other. Stein believes that real-time payments are having an impact on how companies manage their finances.

Stein views, real-time payments are "incredibly useful" of businesses point-of-view. Stein argues that the reason we never had real-time payments until now, is that when people started to think about how to use computers to automate their payments processing, they just took the old processes and put them on computers. The process people knew

mostly was checks. Stein assesses that if looking at ACH systems, for example, ACH in the United States or BACS in the United Kingdom, that are still working, it is the same process only in electronic form that the check process used to be.

According to Stein, the core systems of banks were designed to operate on a batch basis. In other words, they would take in all kinds of information, and then they would process everything during a certain time of the day. This means putting all the amounts in the correct accounts etc. For treasurers it sometimes meant, that to know their account positions, waiting time until the next day was needed.

Stein raises, that until the early 2000s, one of the challenges was to provide faster and better reporting, sort of end of day reporting or "as early in the day as possible reporting. Corporate treasurers and more importantly, the systems the corporate treasurers are using could get that information and present a picture to the treasurer early enough in the day so they can see if there is any money to be invested. Stein clarifies, that for example back in the 1980s, interest rates were high, cash was valuable, and therefore it was important for companies to ensure that every single extra penny was invested. On the other hand, if a company needed money to borrow, they wanted to do that as early as possible, since it is cheaper. Although information moves slightly faster than back then, and interest rates are lower, companies are still managing their treasury the same way.

As a corporate treasurer, it is frustrating to work with delays, views Stein. He believes that payment systems are catching up finally what treasurers have been looking for decades. It makes it much easier to have a lot of transparency about your cash position if payment happens in real-time. Therefore, RTP allows companies to automatize their treasury more forward, which will reduce the need for resources. Stein says that for corporate treasurers RTP provides better efficiency, supports automation and it saves employee resources.

According to Stein, to start using RTP solutions requires businesses to invest to upgrade systems to support real-time payments, which in practice means supporting XML-based,

ISO20022 formats. Big ERP providers have been pushing their clients to upgrade their systems. This causes high costs to the companies.

Stein says, that in the United Kingdom, banks are not charging the usage of instant payments on the retail side, but on the corporate side, they do. The price for instant payment has gone down, but Stein finds, that currently on the corporate side sometimes still considered a premium product. However, Stein sees that in a few years real-time payments will become a very common standard, but it is not there yet.

Stein views that in the next 10 years we are seeing less differentiation between high-value payment systems and real-time systems. Currently, there are different systems for bulk payments and big, important payments. Stein sees, that at some stage there will be only one payment system, for example, one in each country. In addition, there could be a link system, that connects different payment systems, like Target2 now in Europe does. However, Stein views that this could take more time than ten years.

Stein lists some benefits of real-time payments. They are related to speed and information. Stein views, that with speed you get a better ability to react better, which helps companies can do faster and better decisions and react to opportunities. Since increasing computing power allows for handling bigger files – more information can be put in the messages which helps to understand what has been paid and why. Stein views, that although the level of information is better now than ever before, it could be better.

According to Stein, for decades corporate treasurers have been asking the banks to make it easier for them to track their liquidity. Treasurers have been complaining about two things: they must wait for the money, and when the money gets there, the information that comes with the money is not good. The better the information is, the easier it can be used and worked with. Stein mentions that real-time treasury provides much more transparency.

Stein gives an example of how poor information in payment messages causes more work. In the late 90s, EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) standardised messages were commonly used in financial communication

between organisations, but they couldn't be sent to the clearing systems. The case was, that banks needed to convert their messaging first to the other format and send it to the clearing. When it came back, they needed to convert it again. The conversion was often made to the SWIFT MT format, or to some local format, that did not contain much space for additional information about the payment. Back then, when payment was sent, the sender simultaneously needed to send a separate message to the receiver about what the payment is about, and the receiver needed to combine the payment and the information manually, which required plenty of resources. There have also been companies, that used to do this automatic reconciliation on behalf of banks and corporate treasurers.

To put it in the nutshell, Stein highlights that in addition to speed, thanks to the new formats, real-time payments go together with more information and for corporate treasurers, it means more time for decision making and better transparency to see what is going on.

When asking Stein about the main challenges for companies about starting using real-time payments, he highlights the classic business case challenge. If a company wants to invest, they need to justify the business case. If the company cannot demonstrate that investment on starting using real-time payment-based operations is a monetary efficient investment, management will likely ask for more benefits and after that, it depends on the management and company how these other benefits are seen. Stein explains that there even large corporates are handling their treasury with a relatively small amount of people, and therefore only saving human resources in treasury operations would not big benefit enough itself.

Stein describes an example process from a financial supply chain – or just-in-time point of view, from the automotive industry. The automotive industry has multiple continuous processes, where purchase orders are frequent and recurrent. When car manufacturers are running out of certain parts, such as tires, the everyday purchase does not necessarily require human interaction. The computers can send the purchase order of the parts automatically when they detect that the parts are running out of stock. On the

receiver side, this can again be handled automatically, and the production or delivery process can start. In addition, when the automated purchase order contains certain information in a bilaterally agreed format, also the financial communication can be handled automatically in real-time. In practice, the part-deliver can automatically form an invoice, and send it back to the car manufacturer, where it can be automatically processed and paid, without the need of using human interaction. Stein believes that the same kind of automation happens in other industries, especially in continuous-flow-based manufacturing, where also the pricing of the material can vary on a day-to-day basis. At the end of the interview, Stein states that the faster and better information companies get on the banking side, the less there is a risk that all these flows will be interrupted.

4.5 Interview: Päivi Heikkinen, Head of Payment Systems Department & Chief Cashier, Bank of Finland

Päivi Heikkinen works as Head of Payment Systems Department & Chief Cashier in Bank of Finland. Heikkinen has been working for 35 years in banking, and her career has led from the customer business to the side of the payment systems, where banking services are provided. Later, Heikkinen has been working among supervising central banks' infrastructures, and most lately, analysing and leading the political work of payments.

> The Bank of Finland is the national monetary authority and the central bank of Finland. At the same time, it is also a part of the Eurosystem, which is responsible for monetary policy and other central bank tasks in the euro area and administers the use of the world's second-largest currency – the euro. The primary objective of the Eurosystem and the

> Bank of Finland alike is price stability, which means a moderate rise in consumer prices. The Bank of Finland has tasks relating both to Finland and to the Eurosystem. In addition to monetary policy, the Bank's core tasks are financial stability and financial statistics, banking operations, and currency supply. (Bank of Finland, 2022)

At the beginning of the interview, Heikkinen highlights, that if we want to research payments, we cannot just do estimates just by the payment side, but we also need to pay attention to the use case of payment, the situation when payment is done, and the actual need of the payment. By taking these factors into account, we can find the best ways of payment and the systems of the background, that are supporting the payment itself. This also mirrors the customer benefits – no matter if we talk about the private or commercial side.

Heikkinen points out, that the way companies are seeing the paying in real-time, depends widely on the company. Heikkinen sees, that most companies are not too aware of real-time payments, or even the payments themselves. When they pay, they are paying the attention that money will disappear from their account, and if the debt collector does not appear, everything has been executed as planned. On the other side, when companies receive the payment, they will maybe pay attention to when the payment has arrived, is it late, how long payment time has been given and so on.

Heikkinen emphasises, that there are companies for which handling out the product or service, or receiving the payment is meaningful. In these cases, we might talk about quite a small business, or businesses, which are managing their cash in a way, that they are not having credit in the bank, and they are paying "straight from the bank account", in practice meaning that their cash management is done on daily basis. For these kinds of companies, Heikkinen is seeing that real-time payments can provide benefits, but the fact how known the businesses are for about these benefits cannot be sure.

One of the large sectors of payments is wholesale. When we are looking at the market of wholesale, like in Finland, there are only a couple of large companies that are running

the market. First, they are using highly standardized and structured cashier processes. Secondly, wholesale chains have been stated, that there is no matter how the covering is moving. Most of the payments today are moving as traditional batch payments, which are transferred multiple times a day, meaning that transfers are executed during the same day or for the next day. For wholesale chains, it does not necessarily matter whether they will receive the payments in a batch or individually as an instant payment. However, Heikkinen highlights, that these businesses do not want to start receiving every single transaction individually, since it is not reasonable for their accounting processes. In practice this means, that even if the payments were done in real-time payment systems, there is a need for a service, that would collect the sales as a batch. Depending on the company, product, service, and the position of cash management, there are different approaches for real-time payments. Some of the attitudes can even be terrified, as Heikkinen views.

Heikkinen believes, that if we want to maintain a rational, cost-efficient way to do payments, then instant payments and batch-based payments are going to be side-by-side. Therefore, instant payments are not going to replace batch payments. Heikkinen does not find it meaningful, that every single small payment, such as a coffee purchase or paying the electricity bill would move as an individual payment. However, it is possible technically. Heikkinen considers, that it would be better that the real-time payment and batch payment “pipes” are appearing side-by-side; if another payment system is having a problem, then the other one could be used, instead of just using the instant payments as a principle. Heikkinen highlights, that it would be essential, that customers could decide which payment method they want to use.

As Heikkinen mentioned, certain companies are more aware of real-time payments than others. She raises, that the Bank of Finland is discussing regularly with Finnish Commerce Federation (Kaupan liitto). Generally speaking, they are aware of the payment processes and opportunities. From these discussions, the Bank of Finland has got some information, about whether the service is good or not for end customers. Paying in real-time sounds good on paper technically, but then customers do not want to have individual rows on

an account statement. And for the fact, if the payment arrives now or tomorrow, there is no big difference for a wide number of companies.

Heikkinen thinks that bigger corporates, such as industrial or international companies are having resources to pay more attention to their financial administration processes. Heikkinen sees that these bigger corporates are more aware of payments, but she finds does not have enough perspective to answer more in point-of-view of companies. She highlights, that this should be asked of corporates themselves. However, Heikkinen notices, that at the general level it seems like other companies than big corporates are not excessively aware of payments, which is based on the questions that the Bank of Finland is receiving, and the questions that have been presented in payments forums.

When asking Heikkinen about" does instant payments bring any additional technologies", she is basing her answers on the point of view of existing systems. Currently, in Finland banks have chosen the way, that the payment material sent by companies is following the SEPA Credit Transfer standard. The bank is the one, who decides whether the payment is sent in a batch, as a regular payment, or individually in an instant payment scheme. In practice, this means – that there are no special demands on companies, and they call to follow "old guidelines". If we would go into the system, that company could decide whether to send payment in normal batch or via the instant payment system, next step would be that back-office ERP systems, that are generating the payment messages could separately create payment messages that are following instant payment scheme rules – which are bit stricter and narrower than regular batch payment ones. Currently – it is not demanded. It could be also done in a way that regular message is taken and edited in a way that it is suitable for instant payments, which practically means taking rid of certain data.

Heikkinen raises, that when it comes to point-of-sales, it is widely spoken that instant payment solutions can come next to the card payment. Then it could create a genuine competitor to international card brands, which are having a strong market position. Bank of Finland sees that these companies are having the possibility to create terms and conditions for how payments are settled and to place their pricing. To support card-free

instant payment, customers would need a product that allows sending a note from a payment terminal to settle the instant payment. This could be a mobile phone for example. Heikkinen adds, that, there must be a way to get confirmations to the payment terminal about successful payment.

In a best-case scenario, the seller does not need to save the events to the temporary store and send them to the acquirer, as it is still done partly among card payments. Some of this information is moving in real-time, but buffering appears. Payments would leave straight from the customer's account, by using the R2P method, or the customer initiates payment by using the code provided by the payment terminal when it will be a one-way transfer. To enable this, it will require a receiver to have the capability to receive this kind of payment. This would require more accurate agreement with technical standards, and those service providers who can build both payee and payable applications. Heikkinen sees, that this would probably not be a problem. Payments are two sides market, and the other– buyers' market is the one that requires more work.

Heikkinen does not see any technical barriers to R2P use cases for transactions between businesses if there are beneficiary use cases. In B2B markets, players are often acting according to buyers' sale agreements, and billing and paying the bill are not the same way time-critical that it would build a need for instant R2P payment. However, there might be these kinds of tasks, or projects, where getting certain things done launches the payment, which could be done with R2P technology. Heikkinen highlights that these questions can be discussed in a central bank, but to get better answers, those should be asked straight from the companies. Heikkinen sees, that even banks do not know this properly, but the information from companies themselves is needed to which solutions and processes are giving the best results in different business fields.

According to Heikkinen, payment systems are systems where information about the payment is settled via a clearing house mechanism - or bilaterally, and coverage is cleared between the payee and payable in a central bank account. They also share common rules and actions. A very topical theme is, how do we take care of the fact that there are enough payment "pipes" in use if some payment "pipes" are occurring problems.

Hereby, Heikkinen sees the need for backup systems. Finland used to have national systems, that were deactivated in the 1990s. It is difficult to see, under what circumstances would these systems be built back. But Heikkinen sees that there is a clear need for different kinds of systems, that can be scaled up, and if we recognize some market failures, then we must be able to launch them to everyday use.

4.6 Interview: Anniina Heinonen, Managing Director of Payments, Wolt

Heinonen is currently the leader of the payment department of the international food delivery company Wolt. Her background in payments started more in the year 2016 when Heinonen oversaw founding MobilePay Finland, first from the parent company in Denmark and then as CEO of MobilePay Finland for four years. After that Heinonen was working in a company IBF Digital, where she was building electric money-based and bank errands applications. In the summer of 2021, Heinonen took over to be Managing Director of Payments in technology company Wolt, which offers a platform for restaurants, consumers, and couriers for food deliveries. Before payments, Heinonen has been working with digital businesses for example for Google, and in the banking industry in multiple positions.

> Wolt is a technology company that makes it incredibly easy to discover and get the best restaurants, grocery stores, and other local shops delivered to your home or office. Wolt works together with tens of thousands of merchant partners as well as with over a hundred thousand courier partners across 23 countries and more than 250 cities. (Wolt, 2022. https://www.linkedin.com/company/wolt-oy/?originalSubdomain=fi)

When asking, how companies see paying in real-time, Heinonen looks from a wider perspective. While Heinonen was working with Danske Bank, back then there was a discussion going on about real-time payments. From a point of view of companies, there is a one-point that Heinonen highlights. Real-time paying gives full potential if the company can also work in the real economy. If money is being transferred to the account of the

company in real-time it is one thing, but how data related to payments and financial administration processes are running, is the other issue. It would be ideal that both, would be fully working in real-time, and being fully settled and reconciled in real-time, then the full benefits could be achieved. However, Heinonen views that there are plenty of things to do before getting there. When money moves in real-time from account to account – it is nice, but it is not necessary the most critical for all kinds of businesses.

One immediate use case, that Heinonen highlights from the point of view of payment institutions is enhanced working capital. Heinonen states that multiple companies are part of the long payment chains, meaning money is coming from somewhere and money needs to be moved forward. When money is received and paid forward to the next one in the chain for example in a cycle or frequency, delays might cause difficulties, and bind working capital. Therefore, if this can be done faster, the usage of working capital enhances.

Heinonen states, that from the customer point-of-view, if thinking of both sellers and buyers, real-time payment especially in customer interface might be waited and appreciated. Heinonen believes, that if a company can provide customers with payment solutions, that are related to RTP it is a benefit. Heinonen also highlights that different use cases are depending on the business itself. Heinonen gives an example, that for example for payment service MobilePay, real-time payment infrastructure was critical, but if thinking for example about paper machine industry, there is barely any matter whether the money moves immediately or in a couple of days since the projects are anyway taking a long time. Heinonen thinks that general use cases should be looked at at the business field or company level.

Heinonen was not able to answer if Wolt is having any test programs coming relating to the paying salaries in real-time, such as DoorDash has been testing in the US. At the general level, Heinonen says that paying salaries in real-time, the barrier is not the actual movement of funds, but it is that is it possible to get the financial administration side and taxation processes, etc to work in real-time. In Finland, there have been attempts toward that way, and tax official is also making their services more real-time friendly.

Heinonen sees that this is the way we are going to, but how it is concretely done, is not clear yet.

When it comes to financial processes becoming real-time, the readiness in Finland is much better than in many other countries. In Finland, practices are supporting certain kinds of models. Heinonen raises implementing the PSD2 standard, which is a regulation, that allows accepted third party providers to be able to provide their own bank-related services by letting them use certain bank data (Salmony, 2017). PSD2 is a good example of how large, value chains and ecosystems' changing regulation is put into the practice. It requires working for years, and all the participants are needed to change their practices. For example, in strong customer authentication, payment card providers were in the key position to get this spread up widely when PSD2 was included in their standards. The same trend might be with real-time payments. Heinonen believes, that there is a possibility that we are starting to regulate RTP for different participants. For example, participants must fulfil certain times. Main players of the ecosystems – banks are having the possibility to do this already if needed, but what is the capability of all other administration processes to work in real-time and where the biggest barriers are, Heinonen, cannot say. Heinonen sees, that regulation is one way to do it.

Heinonen says, that although it is not the same whether the money moves in real-time or within the delay, we have got used to dealing with delays. Heinonen explains, that even Payment processes of Wolt have been built in a way that there are delays. In Wolt's payment chain, the customer makes an order, and then it goes through all the processes, which include multiple participants such as card companies, payment service providers, etc. Money is not going through the payment chain without stopping at some point. Sometimes delays are appearing because of business reasons, and sometimes because of technical reasons. Heinonen does not have a view about how much we have expectations about if all payments go in real-time, but in Wolt's point-of-view, Wolt is having big sale volumes and it is required that financial administration processes are going at the same time as each other. Heinonen views, that currently, even if there are plenty of

events happening the same day, maintaining is accurate work, not to mention that if the money goes through the pipe at once.

Heinonen highlights, that sometimes there is a reason why money does not move immediately. If we think about the events such as those that happened in February 2022, (Russia's attack on Ukraine) that were followed by sanctions, delays are helping to monitor the payments. Delays are giving participants a better ability to monitor and ensure that everything is going as planned and regulated.

Heinonen views, that not all the payments will not be in real-time in the future. Some of the payments, it is not meaningful. And in the value chain of payment, there are multiple participants, and, in a way, it would mean that everything should run 24/7. Then we would not have cut off times. If we use cut-off times, certain operations will be seen on the next day. If we would lead to a situation where everything would go in real-time, it would cause new demands for resources, monitoring processes, and many other things. Heinonen views, that longer time scale vision that all processes are highly automatized, and if people would not need to be 24/7 following the payments and it would be enough that this is doing only sometimes – then everything could go through the pipe in real-time. But if data is not perfect, and automatization is perfect – it is not possible and does not mean that everything would be fully working in real-time.

On 5 years time scale, Heinonen sees that paying is getting more scattered. If we think in 5 years' cycles backwards, we do not need to go too far away to the time when only legit payments were cash and bank card in Finland. Even the credit card has been looking in Finland to be a questionable payment method. Slowly, there have been coming new payment methods, which can be based on card rails. For example, espresso house has application payment that is based on the way that you just transfer money there on your account – it is one example that it gets more and more scattered. Heinonen believes, that service providers, such as Wolt which do not have anything to do with the financial field, can start to provide payment options to their customers when both of service provider and customer are receiving benefits. If we think about going real-time, these things that can be smartly real-timed will go real-time.

Heinonen says that might be easily overestimated where we will be in 5 years with real-time payments. But if thinking 5 years behind, some bilateral real-time applications were existing. On the customer side, especially if you are a receiver, it is a default that they will come in real-time. Surely, the trend will spread to the business side, especially when a company is working as a receiver and processes are straightforward.

4.7 Interview, Jenni Verno, Cash Management Manager, Wärtsilä

Jenni Verno is having a strong background in working in cash management. Verno works currently as a cash management manager in Wärtsilä, where she started in May 2021. Before that Verno has been a leading cash management lead consultant for approximately 5 years in Opus Capita, which changed its name to Nomentia later. In addition, she has been working 8 years for the Norwegian bank DNB as a Cash Management Sales Advisor.

> Wärtsilä is a global leader in innovative technologies and lifecycle solutions for the marine and energy markets. We emphasise innovation in sustainable technology and services to help our customers continuously improve their environmental and economic performance. Our dedicated and passionate team of 17,000 professionals in more than 200 locations in 68 countries shape the decarbonisation transformation of our industries across the globe. In 2021, Wärtsilä's net sales totalled EUR 4.8 billion. Wärtsilä is listed on Nasdaq Helsinki. (Wärtsilä, 2022) https://www.wartsila.com/about

Verno views, that paying in real-time can be useful for some cases. If something has not been paid in a time or if there are payment decisions that require quickly handling, that have not been entered into the account's ledger. In these cases, paying instant is useful and even a must. However, Wärtsilä is trying to get all the invoices into the account's ledger, because approval chains operated there. In addition, these payments are run in a batches couple of times a week to the bank. Verno sees that it is important that this flow is stable, which also ensures that these payments do not need to happen in real-

time. Thanks to SEPA, payments on the batch side are already quite fast. In general, Verno views that payments do not need to run in instantly in normal payment cases.

When asking Verno about the use cases and benefits of RTP in Wärtsilä, she sees that RTP payments are used mostly in departments that work cross-border. Verno also mentions, that in certain projects payment needs to be sent immediately. Verno says that most of the payments in Wärtsilä are done in a batch, but they are also receiving instant payments almost every day. If paying outside the batch, costs appear since Wärtsilä' s automatical payment process is made for batch payments and individual payments need to be processed manually.

Verno doubts, that Wärtsilä does not necessarily save money by using RTP. However, it is important to get payments through without delays, so that project times will not be delayed. Especially, if there will be a chain of delays, it will cause additional costs. For example, if paying the official fees takes time, it may cause delays in the delivery of the goods to the customer.

Verno sees that large companies are running their payments in quite a similar way. When it comes to SME companies, Verno sees that RTP is more important since liquidity management is stricter, and it is easier to pay in real-time and receive real-time payments. Verno believes, that it is more important to them in cash management planning point of view.

Verno says, since Wärtsilä is having operations and payments all over the world, local knowledge is important. For example, in some Southern American countries payment standards are not similar when paying in real-time, so local knowledge is needed. In Europe, the dialogue is done between companies and banks all the time, and banks are giving multiple options for payment and giving advice. Wärtsilä wants to follow standards and common practices in payments.

Verno speculates, that if instant payments could be sent in a batch, and if the cost would be the same as with regular batch payments, they could be more used by companies.

Beforehand banks were using other banks to send payments across borders, and it took a long time. Nowadays they are running quite smoothly.

In the next five years, Verno expects more global payments, that could move all over the world across borders as smoothly, standardised and structured as in SEPA. Verno believes that SWIFT would be part of the conversation if this would occur. Verno does not believe, that all the payments would be in real-time in the future, but she highlights that it could be nice that payments could be done in real-time all over the world. However, it needs to be considered that there are plenty of countries that have regulations for cross-border payments. Verno sees, that having cross-border real-time payments that work everywhere would be amazing, but in practice difficult.

Verno mentions the issues with possible fraud. If payment is done in real-time in hurry, there is a risk of payment fraud, since payment is sent immediately and cannot be stopped. In these cases, the payer must be accurate about where payment is sent and who has sent the bill. Therefore, the rush is a risk marker.

Verno works a lot with banks. When asking about other payment trends, she sees, that one mention worth thing is that fintech companies are cooperating with banks and creating payments even quicker. Verno believes, that some additional services for payments, such as standardized references to help payment tracking, automatic real-time receipt in real-time or automatic bookkeeping are trends that might become more general all the time. Handling the data is important, and Verno is interested to see what benefits better data management will provide.

Verno summarizes, that the good sides of RTP are that money is transferred quickly and it makes cash management planning easier for the receiver. It especially benefits SME companies. Cons are, that stopping the payment is difficult and therefore a risk of fraud might occur. Another downside Verno mention is the costs of the RTP.

4.8 Summary of interviews

This sub-chapter contains a summary table about interviews, to indicate core issues, personnel interviewed and the correlation between answers. In the interviews, the backgrounds of the interviewees were reflected in their answers, and despite the different backgrounds, cohesion between answers was found. In the table below, the summary of the answers is presented. Answers, that have unity with each other have been marked with certain coloured numbers.

	Stein	Heikkinen	Heinonen	Verno
Benefits and use cases	Faster and better reporting and information give transparency Better transparency about the cash position (2) More automized treasury management Just-In-Time payments (4)	Beneficial especially for SME companies (1) A competitor to international card brands – R2P Instant payment solutions can come next to the card payment (3) Can work as a backup to other payment rails	Real-time paying gives full potential if the company can also work in the real economy. Enhanced working capital (2) Believes, that customers values if the company is providing real-time payment solutions (3)	Beneficial especially for SME companies (1) Improves cash position (2) Enables, that urgent payments can be handled quickly Cross-border payments Instant payment decreases delivery time in some cases (4)
Challenges	Possibly high implementation costs to the companies (5) Business case challenge - is there enough usage that it will pay back? (5)	Awareness of companies about payments and RTP RTP moves individually – Some companies want to receive payments in batches. (6) If the payment arrives now or tomorrow, there is no big difference for a wide number of companies. (7)	Better automatization is not enough – the data needs still to be better The financial administration side needs to work in real-time as well to achieve all benefits (6) For some companies/fields payment funds moving in real-time is not needed (7) Monitoring in real-time (8)	Costs (5) RTP moves individually – Some companies want to receive payments in batches. (6) Processes are built for batches (6) Stopping the payment is difficult or impossible – the risk of payment fraud (8)
Future views	Less differentiation between high-value payment systems and real-time systems	Views, that RTP will not override traditional batch payments (9) In the future companies can decide to RTP by themselves. Currently, it is done by the bank.	RTP will become more general in use cases where they are beneficial, especially for receivers on the customer side. All payments will not be in real-time (9) More scattered payments Possible regulation for RTP	More global payments, that could move as smooth as payments in SEPA in a standardized format Believes that all the payments will not be in real-time (9)

Table 3 Summary of interviews

As a result of interviews, therefore at least 9 items were identified, that occurred in more than one interview. For benefits of real-time payments, they were

1. RTP are especially beneficial for SME companies
2. RTP enables better (transparency of) cash position and working capital
3. New payment solutions
4. Enhances supply chains

The challenges of real-time payments were identified as followed:

5. Costs
6. Many companies prefer batch payments over individual payments since their processes have been built for batches
7. In multiple cases, there is no matter if funds are moving in real-time
8. Monitoring RTP is more difficult – the risk of payment fraud

Future views, there was a consensus among respondents that

9. All the payments will not be in real-time in the future

5 Conclusions

Conclusions chapter collects the study together, discusses the findings, evaluates them, and provides some views from future studies.

5.1 Conclusion and results

The impact of real-time payments for businesses are depending on the company's field and size. The companies, whose core business is based on the movement of funds, such as MobilePay real-time payments are critical, but for example in the paper machine industry, there is barely any matter whether the money moves immediately or in a couple of days since the projects are anyway taking a long time.

As a result of the study, the benefits of RTP were identified to be especially beneficial for SME companies. RTP gives companies better transparency of their cash position and increases working capital since funds are not "on the way" for days. RTP also can enhance the supply chains, since the payments can be done faster, and by allowing the usage of Just-In-Time payments. In literature, it has also been identified that RTP improves customer service and is leading the economy towards a more formalized form, decreasing the black market and improving tax income, especially in developing countries. Consumers also value the new payment method possibilities. In addition to the common benefits of real-time payments, some individual grassroots level use cases have been recognized in the literature. As an example, there have been trials in paying salaries to the food delivery employees every day in real-time.

Especially larger companies prefer to have their payments in batches, not individual as RTP are. One challenge of RTP is, that companies' processes have been built in a way that they support payment processing in batches, and therefore the processing of RTP is not as efficient than it could be. One challenge of RTP are processing and implementation costs. They are more expensive to send than regular payments for companies, implementing systems that support real-time payments is costly, and they require more computing power than some old processes. The fact that monitoring of payments in

real-time is more difficult, since it requires advanced automatization, and therefore risk of payment fraud might occur. However, due the more structured data RTP are also improving the security of payments.

For future views, consensus seem to be that not all they payments will not move in real-time. Share of real-time payments will increase, and the current biggest expectations are in cross-border real-time payments. There are expectations, that RTP based innovations will take more place in early future in payment markets. One example to mention about this is R2P, that is expected to be replacing the usage of payment cards at least partly.

In addition to the fact that payments are the transfer of value, it is also an important channel for how participants of the economy communicate with each other. Since real-time payments are not only providing a faster way to transfer money, but as a side effect more structured and rich information on payments messaging, it will provide new business opportunities and multiple use cases.

In practice, implementing real-time payments means the usage of the ISO 20022 standard. Structured format and the possibility to include rich remittance information in ISO 20022 based real-time payments decrease delays, make money move faster, improve market efficiency, and therefore cause economic growth (Almeida, 2022), whereas missing key information causes delays, no matter if it comes to corporate treasury, transactions between companies or bank operations such as compliance, anti-money laundering and know-your-customer processes.

Especially during the Covid-19 pandemic, cash payments decreased, and demand for other “touch-free” payment solutions was increasing. Real-time payments are noticed to override usage of payment cards as well. As a result, this improves the payment security in the point-of-views of consumers, companies and governments, since this will lead to decreasing amount of traditional theft crimes.

Although features of real-time payments are emphasized by multiple professionals, there are still a wide number of companies, who does not have a big matter of the

payment arriving immediately or within the delay. Real-time payments can be seen beneficial for certain cases, but for some of the players they do not play any role – they can be even a problem.

5.2 Evaluation of the results

From the point-of-view of research, the purpose of the study was to get an answer to the research question: “What are the impacts of real-time payments on businesses?”. The answers provided to the question were based on the interviews and literature review. The study identifies the benefits, use cases and difficulties of real-time payments, as objectives of the study were. In addition, the study gave an overview of payment processes and the background of real-time payments.

For this study, four high-level professionals were interviewed. Since the number of interviewees was low, answers received from the interviews cannot be generalised alone without reservation. However, most of the answers received were supporting the other interviews or literature and therefore received information was supporting the other statements.

The topic itself was wide, and considering the size of the master’s thesis, it would have been more beneficial to take a more bounded topic. Instead of focusing on impacts on all businesses, boundaries could have been set to one company or the one field.

5.3 Future research

Since the awareness and the importance of payments – and real-time payments depends on the field and company, general use cases should be looked in these levels. Future research could be focusing on the impact of real-time payments for one company, or for one field, to get more accurate results. Most of the companies are not too aware of real-

time payments, or even the payments themselves. Therefore, the research could be done to find out, how aware companies are – and why they are not aware of the payments.

In interviews it occurred, that Request to pay usage for business-to-business use cases could be investigated more – and it should be asked from companies themselves.

Real-time payments are only one item in payment modernisation. Further studies can be made on how other payment-related technologies and regulations, such as PSD2, or open banking are impacting businesses. However, this study indicates that separating payment operations and solutions to small blocks might be difficult. For example, it is difficult to discuss real-time payments without discussing the whole entity of payments and for example importance of structured data and regulation.

The same study could be repeated after some years since for now, it seemed to be difficult to find versatile data about use cases and impacts of real-time payments for businesses. For example, most of the contacted people outside of the treasury or cash management departments in companies did not know about payments, although it could be beneficiary for example for people working with supply chains, logistics, and customer service. Therefore, future studies could be done especially focusing on certain operations in companies. Also, the number of interviewees is relatively low, and still, more information about the impact of real-time payments on businesses is needed. Future studies could target more interviewees and companies. In addition, when it comes to real-time payments, the next big topic is transferring money in real-time across borders which certainly provides multiple research possibilities.

It is seen, that during the Covid-19 pandemic take-over of real-time payments and different contactless payment solutions have been accelerated. The full impact of Covid-19 for paying in real-time has been studied, but there is still space for further studies. In addition, payments have been in a significant role in politics, after Russia attacked Ukraine in February 2022. To mention one widely discussed topic, the United States,

European Union, and their allies removed certain Russian banks from the main interbank payment system worldwide, SWIFT, making Russia's international trade and cross-border payments much more difficult (de Oliveira Dias et. Al 2022). In addition, there are plenty of other impacts in the payments industry, that these events have caused. For example, due to the sanctions countries have settled for Russia, payments are needed to be supervised closely, which highlights the importance of structured data in payments and causes difficulties when money is sent in real-time since it cannot be monitored or cancelled by supervising human manually.

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Appendix:

Interview questionnaire palette

- Tell about your professional background
- Describe what is mean by real-time payments in your own words (Purpose of this question was to ensure that interviewer and interviewee have the same understanding of the topic)

- Your views about real-time payments - Are they useful from a business point of view?
  - Why?
  - Why not?
  - For which kind of business / which departments?

- What resources do it requires from businesses to start using real-time payment-based solutions?

- What use cases and benefits there are for businesses?

- What are the main challenges and barriers for companies with real-time payments? Any real-life examples?

- How do you see that usage of real-time payments will develop in the future? (In 5 years)

- What is required to get into the situation you see in five years

- Do you have other trends or technologies on your mind relating to real-time payments - how do they tie together with instant payments (No need to go deep).